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Ready Reference

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How to use the MICROPAEDIA

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

Alphabetization

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

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

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

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

Entry arrangement

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

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

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

Cross-references

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

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

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

Abbreviations

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

Territorial boundaries

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

Trudeau, Pierre Elliott (b. Oct. 18, 1919, Montreal—d. Sept. 28, 2000, Montreal), Liberal politician and prime minister of Canada (1969–79; 1980–84). His terms in office were marked by the establishment of diplomatic relations with China (1970) and improved relations with France, the defeat of the French separatist movement, independence from the British parliament, and the formation of a new Canadian constitution with the principal additions of a bill of rights and an amending formula.

Trudeau grew up in a family of French and Scots-French descent, in the affluent Montreal suburb of Outremont. He studied at Jean-de-Brébeuf, an elite Jesuit preparatory school, and at the Université de Montréal, from which he received a law degree in 1943. He served on the Privy Council for three years as a desk officer, and in 1950 he helped found the *Cité Libre* ("Free City"), a monthly critical review. He practiced law from 1951 to 1961, specializing in labour and civil liberties cases.

An assistant professor of law at the Université de Montréal (1961–65), in 1965 Trudeau was elected as a "new wave" Liberal to the House of Commons. In 1967 he toured the French-speaking African nations on behalf of the prime minister, Lester B. Pearson, who had appointed him parliamentary secretary (1966) and minister of justice and attorney general. As minister of justice, Trudeau won passage of three unpopular social welfare measures—stricter gun-control legislation and reform of the laws against abortion and homosexuality.

On Pearson's announcement of his plan to retire, Trudeau campaigned for the leadership of the Liberal Party. His colourful personality and disregard of unnecessary formality, combined with his progressive ideas, made him the most popular of the 20 candidates. He became party leader on April 6, 1968, and prime minister two weeks later. As a determined anti-separatist, Trudeau in 1970 took a strong stand against terrorists from the Front de Libération du Québec.

The elections of October 1972 left Trudeau and the Liberals much weakened, with a minority government dependent on the coalition support of the New Democratic Party (NDP). During the next year and a half the Prime Minister faced a series of no-confidence votes in Parliament, but in the national elections on July 8 the Liberal Party won a clear majority and an increased number of seats in Parliament.

Throughout the 1970s, Trudeau struggled against increasing economic and domestic problems. In the national general elections of May 22, 1979, his Liberal Party failed to win a majority (although Trudeau maintained his seat in Parliament), and the Progressive Conservative Party won power as a minority government.

The Liberal Party was returned to power in the general election of Feb. 18, 1980, and Trudeau began his fourth term as prime minister on March 3. The proposal of French separatism in Quebec was defeated in a provincial referendum on May 20, 1980, and Trudeau then began work on his plans to reform Canada's constitution. Proposed reforms included "patriation" (*i.e.*, that the British Parliament transfer the authority to amend Canada's constitution to Canada), a charter of human rights, broadened federal economic powers, and institutional changes in federal structures such as the Supreme Court.

On Dec. 2, 1981 the Canadian House of Commons approved Trudeau's constitutional reform resolution with a vote of 246 to 24 (only the representatives from Quebec dissented), and on April 4, 1982, Queen Elizabeth II of England declared Canada's independence from the British Parliament. With these major political aims realized, Trudeau spent his final years in office seeking greater economic independence for Canada, forming better trade relations between industrialized democracies and Third World nations, and urging further international disarmament talks. On Feb. 29, 1984, Trudeau resigned from the leadership of the Liberal Party, but he remained in office until a successor could be chosen at the party leadership convention in June of that same year.

Trudeau's publications include *La Fédéralisme et la société Canadienne-Française* (1967; *Federalism and the French Canadians* 1968), *Les Cheminements de la politique* (1970; *Approaches to Politics*), and *Conversations with Canadians* (1972).

True Cross, Christian relic, reputedly the wood of the cross on which Jesus Christ was crucified. Legend relates that the True Cross was found by St. Helena, mother of Constantine the Great, during her pilgrimage to the Holy Land about 326.

The earliest historical reference to veneration of the True Cross occurs in the mid-4th century. By the 8th century the accounts were enriched by legendary details describing the history of the wood of the cross before it was used for the Crucifixion.

Adoration of the True Cross gave rise to the sale of its fragments which were sought as relics. John Calvin pointed out that all the extant fragments, if put together, would fill a large ship, an objection regarded as invalid by some Roman Catholic theologians who claimed that the blood of Christ gave to the True Cross a kind of material indestructibility, so that it could be divided indefinitely without being diminished. Such beliefs resulted in the multiplication of relics of the True Cross wherever Christianity expanded in the medieval world, and fragments were deposited in most of the great cities and in a great many abbeys. Reliquaries designed to hold the fragments likewise multiplied, and some precious objects of this kind survive.

The desire to win back or obtain possession of the True Cross was claimed as justification for military expeditions, such as that of the Byzantine emperor Heraclius against the Persians (622–628) and the capture of Constantinople by the crusaders in 1204.

The Feast of the Finding of the Cross was celebrated in the Roman Catholic Church on May 3 until it was omitted from the church calendar in 1960 by Pope John XXIII.

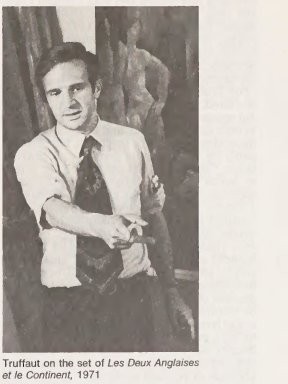
true water beetle: *see* predaceous diving beetle.

Truffaut, François (b. Feb. 6, 1932, Paris—d. Oct. 21, 1984, Neuilly-sur-Seine, near Paris), French film critic and producer whose attacks on established filmmaking techniques paved the way for the movement known as the Nouvelle Vague (New Wave). His major films include *Les Quatre Cents Coups* (1959; *The 400 Blows*), *Tirez sur le pianiste* (1960; *Shoot the Piano Player*), *Jules et Jim* (1961; *Jules and Jim*), *Baisers volés* (1968; *Stolen Kisses*), *L'Enfant sauvage* (1970; *The Wild Child*), *L'Histoire d'Adèle H.* (1975; *The Story of Adèle H.*), and *Le Dernier Métro* (1980; *The Last Metro*).

Early works. Truffaut was born into a working-class home. His own troubled childhood provided the inspiration for *Les Quatre Cents Coups* a semi-autobiographical study of a working-class delinquent. It is the first of the Antoine Doinel trilogy, tracing its hero's evolution from an antisocial anguish to a happy and settled domesticity. When it won the "best direction" prize at the 1959 Cannes Festival, Truffaut was established as a leader of the French cinema's *Nouvelle Vague* (New Wave)—a term for the simultaneous presentation of first feature films by a number of French directors—a tendency that profoundly influenced the rising generation of filmmakers around the world. The New Wave marked a reaction against the commercial production system: the well-constructed plot, the limitations of a merely craftsmanlike approach, and the French tradition of quality with its heavy reliance on literary sources. Its aesthetic theory required every detail of a film's style to reflect its director's sensibility as intimately as a novelist's prose style retraces the workings in depth of his mind—hence the phrase *le camera-stylo* ("camera-pen"). The emphasis lay on visual nuance, for, in keeping with a general denigration of the preconceived and the literary, the script was often treated less as a ground plan for a dramatic structure than as merely a theme for alfresco improvisation. Improvised scenes were filmed, deploying the visual flexibility of newly developed television equipment (*e.g.*, the handheld camera) and techniques (*e.g.*, extensive postsynchronization of dialogue). The minimization of costs encouraged producers to gamble on unknown talents, and the simplicity of means gave the director close control over every aspect of the creative process, hence Truffaut's term *auteur,* or film author.

Outside his art, Truffaut was reticent about his private life, although it is known that he was sent to a reformatory before leaving school at the age of 14 to work in a factory. His interest in the cinema, however, brought him to the attention of the critic André Bazin, doyen of the monthly avant-garde film magazine *Cahiers du Cinéma,* who incorporated him into the staff. For eight years Truffaut asserted himself as the most truculent critic of the contemporary French cinema, which he considered stale and conventional, and advocated a cinema that would allow the director to write dialogue, invent stories, and, in general, produce a film as an artistic whole in his own style. Thus, he was influential in the cinema world before he actually made a film. Like his leading character in *Baisers volés,* another film in the Doinel series, he deserted from his military service, being committed to various prisons until he was able to resume his journalistic career and, eventually, put his ideas into creative practice. Again like Doinel in *Domicile conjugale* (1970; *Bed and Board*), he married and became the father of two daughters.

Truffaut's initial creative effort, the short piece *Les Mistons* (1958; *The Mischief Makers*), depicted a gang of boys who thought-



Truffaut on the set of *Les Deux Anglaises et le Continent,* 1971
By courtesy of Les Films du Carrosse

lessly persecute two young lovers. His second short, *Une Histoire d'eau* (1959; "A Story of Water"), was a slapstick comedy for which Jean-Luc Godard developed the conclusion. Both films met with sufficient appreciation to facilitate his first feature-length film, *Les Quatre Cents Coups*. An evocation of the adolescent's pursuit of independence from a staid adult world of conformity and protocol, for which Truffaut evinced a romantic sympathy, the film proved to be one of the most popular New Wave films, especially in England and the United States. Two tenderly pessimistic studies in sexual tragedy followed, *Tirez sur le pianiste*, adapted from the U.S. thriller *Down There* by David Goodis, a genre for which Truffaut evinced great admiration, and *Jules et Jim*.

Later works. After this burst of creativity he seemed to have a period of hesitation. All of his later works, however, were intensely personal and explored one of two themes: studies in forlorn childhoods—*e.g.,* The Doinel trilogy and *L'Enfant sauvage*, the chronicle of an 18th-century doctor who attempts to domesticate an uncivilized child—and sensitive melodramas sadly celebrating disastrous confrontations between shy heroes and boldly emancipated or possessive women. The first theme shows the influence of filmmaker Jean Vigo, in its uncompromising stance against authority of any kind, and of Jean Renoir, in its feeling for place and atmosphere and its mingling of the nostalgic with sudden outbursts of blatant humour, as well as of Truffaut's personal experience. The second owes much to the American *roman noir,* or "black novel," the diverse manifestations of which, from the morally disintegrated heroes of William Faulkner to the sadistic gangsters of Mickey Spillane, have fascinated French novelists from Jean Paul Sartre to the present. A certain hero worship, also, is discernible in Truffaut's long, published conversations with the veteran British-American filmmaker Alfred Hitchcock, whose work he admired in complete defiance of his earlier theories. Of Truffaut's features only *Fahrenheit 451* (1966), a film version of Ray Bradbury's science-fiction novel, falls outside these categories, though it relates to the American style and the poetic-melodramatic form. Through his production company, Les Films du Carrosse, Truffaut coproduced, among other films, Godard's first feature and Jean Cocteau's last. His own later films include *Domicile conjugale*; *La Nuit américaine* (1972; *Day for Night*), for which he was awarded an Oscar by the Academy of Motion Picture Arts and Sciences; and *Le Dernier Métro* and *Vivement Dimanche* (1983; "Lively Sunday").

For Truffaut, the cinema had to be, on the one hand, personal and, on the other, a splendid spectacle. The style of his first three films, at once delicate, lyrical, and exceptionally fertile in cinematographic invention, has become, partly by choice, more prosaic and conventional. Controversy has centred on the extent to which his films involve a militant conservatism—whether, for example, Truffaut in *L'Enfant sauvage* deplores, documents, feels nostalgic for, or positively and without reservation approves the narrow, strict rigidities with which its psychologist (played by Truffaut himself) sets about civilizing the abandoned, autistic child. It may be that Truffaut's earlier inspiration was rooted in the nostalgias and despairs of his childhood, and as with success he matured into adult and father, so his films lost in lyricism, while maintaining their fidelity to life's prosaic side. But life's grayness and flatness was recorded with a sense of resignation and quiet achievement quite distinct from platitude or petulant nihilism.

(R.Du./Ed.)

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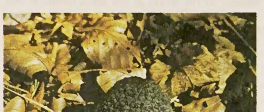
truffle, edible, subterranean fungus prized as a food delicacy from classical times. Truffles are in the genus *Tuber,* order Tuberales, of the class Ascomycetes (division Mycota). They are native mainly to temperate regions. The different species range in size from that of a pea to that of an orange.

A section of a young specimen shows a whitish homogeneous flesh that with age becomes a rich dark colour showing a lighter marbling. Truffles flourish in open woodland on calcareous soil. They are saprophytes, usually associated with the roots of trees, possibly



English truffle (*Tuber aestivum*)
S.C. Porter—Bruce Coleman Inc.

in a mutually beneficial association (*see* mycorrhiza). The spores of *Tuber* are large; from one to four may be seen in a spore sac, or ascus. (These, the first ascospores to be observed, were described by the French botanist Joseph Pitton de Tournefort in 1701–11.)

The most valued truffle in French cookery is the Périgord (*T. melanosporum*), which is said to have first gained favour toward the end of the 15th century. It is brown or black, rounded, and covered with polygonal warts having a depression at their summit; the flesh (gleba) is first white, then brown or gray, and when mature becomes black with white veins having a brown margin. The odour is well marked and pleasant. The main French *truffières* (truffle grounds) are in Périgord and the *département* of Vaucluse, though truffles are gathered throughout a large part of France.

The truffle industry is an important one in France, and about one-third of the gatherings are exported. The French government undertook the reforesting of many large and barren areas, for many of the best truffle regions become productive by the planting of trees, particularly oaks. Because truffles often occur at depths of up to about 30 centimetres (12 inches), it is difficult to detect them unaided. Truffles, when occurring near the surface of the ground, crack it as they reach full size, and experienced gatherers can detect them. Furthermore, in the morning and evening columns of small yellow flies may be seen hovering over a colony. Occasionally an individual is sufficiently sensitive to the scent of truffles to locate them, but truffle hunting is usually carried on with the aid of trained pigs and dogs.

Although truffles are much desired as food, direct cultivation of truffles for commerce is difficult. Calcareous ground is dug over and acorns or seedlings planted. Soil from truffle areas is usually spread about, and the ground is kept in condition by light plowing and harrowing. After three years, clearings are made and the trees pruned. If they are to appear, truffles do so only after about 5 years; gathering begins then, but is not very profitable until 8 or 10 years have passed. The yield is at its maximum from 5 to 25 years later.

The English truffle, *T. aestivum,* is found principally in beech woods. It is bluish black, rounded, and covered with coarse polygonal warts; the gleba is white when immature, then yellowish, and finally brown with white branched markings.

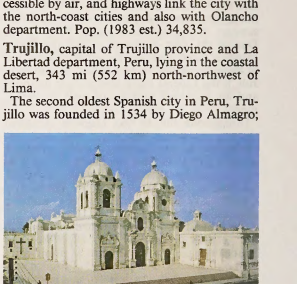
Truffles are rare in North America, being found most often in Oregon and California. False truffles (*Rhizopogon*), form small, underground, potato-like structures under coniferous trees, in parts of North America.

Consult the INDEX *first*

Trujillo, capital, Colón department, northeastern Honduras, on Trujillo Bay, sheltered from the Caribbean Sea by Cape Honduras. Founded in 1524, the historic city was the first capital of the Spanish colonial province of Honduras, flourishing especially in the early 17th century. In 1531 it was made a bishop's see, but that office was removed to Comayagua in 1561. Dutch pirates sacked Trujillo in 1643; it lay in ruins until it was resettled by Galicians in 1787. William Walker, the U.S. filibuster who attempted to conquer Honduras, was shot nearby in 1860. The town never regained its 17th-century prominence, though it is a commercial centre and exports bananas, coconuts, mahogany, and hides. Since 1920 it has lost most of its port trade to Puerto Castilla to the north. In the 1970s a fishing industry developed, and a packing and refrigeration plant was built. A sawmill also has opened, processing lumber for export. Tourism has grown in importance because of fine beaches nearby. Trujillo is accessible by air, and highways link the city with the north-coast cities and also with Olancho department. Pop. (1983 est.) 34,835.

Trujillo, capital of Trujillo province and La Libertad department, Peru, lying in the coastal desert, 343 mi (552 km) north-northwest of Lima.

The second oldest Spanish city in Peru, Trujillo was founded in 1534 by Diego Almagro;



The cathedral at Trujillo, Peru
Walter Aguiar—EB Inc.

the following year it was elevated to city status by the conquistador Francisco Pizarro, who named it after his birthplace in Spain. It sustained heavy damage from an earthquake in 1612. Following 19th-century foreign investment in sugarcane plantations, Trujillo's population swelled, until it became one of Peru's largest cities.

The irrigated lands of the surrounding Río Moche Valley produce sugarcane and rice. The city's industries include sugar refineries, knitting mills, and breweries. Trujillo is on the Pan-American Highway and is linked by

road to inland communities and nearby beach resorts. The city has an airport and is connected to major agricultural areas and its seaport of Salaverry by rail. Trujillo is the site of the National University of Trujillo (1824) and an archaeological museum. The ruins of Chan Chan, capital of the pre-Inca Chimú empire, are situated 4 miles (6 km) west. Pop. (1990 est.) city, 532,000.

Trujillo, ancient (Latin) TURGALIUM, town, Cáceres *provincia,* Extremadura *comunidad autónoma* ("autonomous community"), western Spain, on the Tozo River, a tributary of the Tagus River. It is sited on a hill 25 miles (40 km) east of the provincial capital Cáceres. Trujillo was a town of importance in the European Middle Ages, and Francisco Pizarro, conqueror of Peru, was born there about 1475; his palace still stands, and his tomb is in the Church of Santa María de la Concepción. The town also has Roman remains, an impressive Moorish castle, and the 15th-century Gothic Church of Santa María. Trujillo is an agricultural trade and road centre, with food processing and milling. Pop. (1981) 9,445.

Trujillo, *estado* ("state"), northwestern Venezuela. It is bounded on the west by Lake Maracaibo and by the states of Portuguesa on the east, Mérida on the southwest, Barinas on the south, and Zulia on the north. Covered with mountains over most of its area of approximately 2,900 square miles (7,400 square km), Trujillo is one of the truly Andean states of Venezuela and ranks high agriculturally despite the restriction of cultivation largely to narrow valleys and alluvial terraces. The principal crops produced in the state include coffee, corn (maize), garlic, sesame, sugarcane, wheat, and cassava. The state capital, Trujillo, is a regional market centre for the agricultural products of the surrounding area, although in the 20th century Valera (*q.v.*) has become more important commercially and is the state's largest city. The state is served by both the Pan-American and the trans-Andean highways. Pop. (1989 est.) 543,869.

Trujillo, city, capital of Trujillo *estado* ("state"), northwestern Venezuela. The city lies on a northern outlier of the Cordillera de Mérida, 2,640 feet (805 m) above sea level. Founded in 1556, Trujillo was the site of the 1813 proclamation by the liberator Simón Bolívar, which promised a "fight to the death" for independence from Spain. In colonial times a thriving way station between Táchira and Mérida, it has been outstripped in size and commercial importance by Valera, which lies 12 miles (19 km) to the west-southwest. Trujillo is a market centre for a fertile agricultural region in which cacao, corn (maize), coffee, sugarcane, tobacco, and fruit are cultivated. Flour mills are among the city's industries. The Pan-American Highway passes near the city. Pop. (1987 est.) 39,387.

Trujillo (Molina), Rafael (Leónidas) (b. Oct. 24, 1891, San Cristóbal, Dominican Republic—d. May 30, 1961, Ciudad Trujillo, near San Cristóbal), dictator of the Dominican Republic from 1930 until his assassination in 1961.

Trujillo entered the Dominican army in 1918 and was trained by U.S. Marines during the U.S. occupation (1916–24) of the country. He rose from lieutenant to commanding colonel of the national police between 1919 and 1925, becoming a general in 1927. Trujillo seized power in the military revolt against President Horacio Vásquez in 1930. From that time until his assassination 31 years later, Trujillo remained in absolute control of the Dominican Republic through his command of the army, by placing family members in office, and by having many of his political opponents murdered. He served officially as president from 1930 to 1938 and again from 1942 to 1952.

Competent in business, capable in administration, and ruthless in politics, Trujillo brought a degree of peace and prosperity to the republic that it had not previously enjoyed. However, the people of the country paid for this prosperity with the loss of their civil and political liberties, and the benefits of economic modernization were inequitably distributed in favour of Trujillo and his favourites and supporters. In spite of the harsh measures that Trujillo took to protect his power, domestic opposition continued to grow during the later years of his regime, and he also came under considerable foreign pressure to liberalize his rule. He began to lose support in the army, and this led to his assassination by machine-gun fire as he was driving to his San Cristóbal farm. Many of the supposed assassins, including General J.T. Díaz, were subsequently captured and executed.



Trujillo
Pictorial Parade

Truk Islands (Micronesia): *see* Chuuk Islands.

trullo, plural TRULLI, conical, stone-roofed building unique to the *regione* of Puglia (Apulia) in southeastern Italy and especially to the town of Alberobello, where they are used as dwellings. Upon a whitewashed cylindrical wall, circles of gray stone, held in place by lateral opposition and gravity and without mortar, were piled to a pinnacle. Probably originating with a local Stone Age culture, the trulli have been perpetuated as a folk tradition, possibly because of the local shortage of lumber and the abundance of stone fragments that must be removed to permit land cultivation. Trulli are protected by Italian law as national monuments.



Trulli in Alberobello, Italy
Pellegrini—Gnmoldi

Trullo, Council in (692): *see* Quinisext Council.

Truman, Harry S. (b. May 8, 1884, Lamar, Mo., U.S.—d. Dec. 26, 1972, Kansas City, Mo.), 33rd president of the United States (1945–53), who led his nation into international confrontation with Soviet and Chinese communism and defended the New Deal reforms.

Early life and career. Truman was the son of a mule trader and farmer. He attended school in Independence, Mo., completing high school in 1901. He became a bank clerk in Kansas City; then in 1906 he took over management of his maternal grandmother's farm at Grandview. He also served as local postmaster, road overseer, and national guardsman. He became a partner in a lead mine (1915) and in an oil-prospecting business (1916); both failed.

Truman distinguished himself in heavy action as a captain in World War I, showing bravery and other qualities of leadership. On June 28, 1919, he married Elizabeth ("Bess") Wallace, an Independence girl whom he had known since childhood. He became a partner in a Kansas City haberdashery store, and, when the business failed, he entered politics with the help of Thomas Pendergast, a Democratic boss of Jackson county.



Truman, 1945
By courtesy of the U.S. Signal Corps

With the support of Pendergast's political machine and of World War I veterans, Truman won a seat as county judge in 1922. But despite excellent work, in 1924 (the same year that his daughter, Margaret, was born) non-Pendergast Democrats combined with the Ku Klux Klan to defeat him. Truman then sold memberships in the Kansas City Automobile Club and attended night classes for two years at the Kansas City Law School. A state bank in Englewood in which he became a partner went into bankruptcy because of the fraudulent activities of its former owner, but Truman enjoyed his first business success following his organization of the Community Savings & Loan Association in Independence.

With Pendergast's backing, in 1926 he became presiding judge of the county court. As a two-term, eight-year county administrator, Truman's reputation for honesty and good management gained him Republican as well as Democratic support. Meanwhile, Pendergast was gaining dictatorial control over Jackson county; he achieved statewide power in the early 1930s, determining who would serve as Missouri's governor and as its members of the U.S. House of Representatives. That Truman was not in his inner circle was revealed in 1932 when Pendergast stifled Truman's ambition to become governor and refused to name him to the Missouri delegation to the Democratic National Convention.

In 1934 Truman's political career seemed ended because of the two-term tradition attached to his job. But the machine's gangsterism in the March municipal election, in which four persons were killed at the polls, had a direct bearing on his future. After three indi-

viduals rejected Pendergast's subsequent offer of support in the coming U.S. Senate primary contest, Truman, his fourth choice, quickly accepted. Truman was elected with the help of a suspicious machine vote in Jackson County.

Truman entered the U.S. Senate in 1935 under the cloud of being the puppet of a crooked boss. But his attention to duties and his friendly personality soon won over his colleagues. He was the author of the Civil Aeronautics Act of 1938, and his two-year committee investigation led to the Transportation Act of 1940. The outlook for Truman's reelection in 1940, however, was gloomy; the Pendergast machine lay in shambles, with Tom Pendergast in prison for having taken bribes. President Roosevelt offered Truman a face-saving place on the Interstate Commerce Commission, but he stubbornly ran for another term even though newspapers rated him a distant third in a three-man primary race. Yet because of the last-minute support of Robert E. Hannegan, a young St. Louis Democratic subboss, Truman won by a slender margin.

The nation's growing defense and then war production programs soon launched Truman into his major senatorial endeavor. His Special Committee Investigating National Defense exposed a long list of graft, waste, and product deficiencies and brought him public praise. At the same time, he used his expanding patronage power to reward Hannegan with a series of appointments. The advancement of Hannegan to chairman of the Democratic National Committee in January 1944 led to a successful effort to have Pres. Franklin D. Roosevelt replace Vice Pres. Henry A. Wallace with Truman on the victorious 1944 presidential ticket. Truman's vice presidency lasted only 82 days, during which time he met with Roosevelt only twice and had little knowledge of the administration's programs and plans.

Succession to the presidency. Roosevelt died on April 12, 1945. Truman was a month away from his 61st birthday when he took the presidential oath of office. Vital decisions had to be made at a relentless pace, despite his lack of tutelage. In swift order he made final arrangements for the San Francisco charter-writing meeting of the United Nations (UN), helped arrange Germany's unconditional surrender on May 8, and went in July to his first and only summit meeting, at Potsdam, Ger., for inconclusive talks about a peace settlement. The Pacific war ended officially on September 2, after atomic bombs had been dropped on the Japanese cities of Hiroshima and Nagasaki following Truman's orders. His justification for the bombings was a report from advisers that 500,000 Americans would be lost in an invasion of Japan.

Truman enjoyed a five-month honeymoon with Congress, which ended in September 1945 when he submitted his "Economic Bill of Rights," which included social reforms that he hoped would head off a return to economic depression. The developing vocal opposition, added to public weariness over meat shortages and inflation and the defection of Roosevelt admirers when Truman installed his own choices in his Cabinet, combined to give Republicans control of Congress in 1946.

Two years later many Democratic leaders believed Truman could not win election and demanded that he retire. But the 1948 convention nominated him, with Sen. Alben W. Barkley as his running mate. All public opinion polls showed that the New York governor Thomas E. Dewey, the Republican nominee, would be an easy winner. Undaunted, Truman carried out a "give 'em hell" campaign, repeatedly denouncing the "Republican do-nothing 80th Congress." In November he upset a complacent Dewey by a 114-electoral-vote margin.

In his State of the Union message in 1949, Truman proposed the Fair Deal, a liberal 24-plank domestic program. But despite his efforts, only a single plank was enacted into law—a low-cost public housing measure. He fared much better in foreign affairs, however, where he considered the Soviet Union the principal roadblock to world peace. To restrict Soviet territorial advances and spreading spheres of influence, he developed a "containment" policy, thus setting the course of U.S. foreign policy for decades to come.

Among his Cold War moves were the Truman Doctrine of economic and military aid to Greece and Turkey in 1947 to reduce Communist pressures on their governments; the four-year $17,000,000,000 Marshall Plan of 1948 for economic recovery in western Europe; and the North Atlantic Treaty Organization (NATO) pact of 1949, a collective security agreement with non-Communist European nations. When China came under Communist control in 1949, Truman's containment policies were extended to include that giant nation. He also established the Central Intelligence Agency (CIA) in 1947, initiated the Berlin airlift of 1948 to bring supplies into the former German capital when the Soviets blocked surface entrances, instituted the Point Four Program of 1949 to provide aid to underdeveloped countries, and decided in 1950 to construct the hydrogen bomb in order to maintain an arms lead over the Soviets, who had recently exploded an atomic bomb.

Outbreak of the Korean War. In June 1950 Communist North Korea crossed the 38th parallel boundary and attempted to seize South Korea. Truman sent U.S. forces to Korea under Gen. Douglas MacArthur with UN sanction. Once MacArthur had liberated the south, the administration ordered the capture of North Korea; but MacArthur's advance to the Yalu River boundary with Manchuria brought hundreds of thousands of Chinese Communist troops into the fighting. MacArthur's insistence on attacking China as well forced Truman to fire him.

The unpopularity of the continuing war and the uncovering of unsavoury and fraudulent activities by several federal officials made Truman's last two years in office appear chaotic. A further decline of confidence in the government was brought on by the charges of Sen. Joseph R. McCarthy of Wisconsin that the State Department and other agencies were Communist-controlled.

After Truman left office in January 1953 and retired to Independence, his popularity soared. And with the perspective of passing years the haze surrounding his presidency lifted. What remained was a man who had generally succeeded in his foreign policy and a president who, as Harry Truman himself once put it, had "done his damndest." His life in retirement was modest but active, perhaps epitomized by his habit of the brisk morning walk, or "constitutional," which he maintained for as long as his health permitted.

In a comparison of U.S. presidents, Harry S. Truman must be judged one of the strongest. Yet during his term of office his reputation was that of a man not too small for his job. Compared unfavourably by northern Democrats with his popular predecessor, Franklin D. Roosevelt, condemned by Southern Democrats for his liberal civil rights program, and at war with Republican isolationists and economic conservatives, Truman spent a turbulent period in office. But after his term, the significance of his efforts slowly became evident, especially his foreign policy goal of containing Communist expansion and his largely unsuccessful programs of social and economic reforms to raise standards of living for workers and farmers and to broaden civil rights for minorities; his continued pursuit of these goals kept them viable for future action.

He died in 1972 in Kansas City, Mo., and was buried at the Truman Library grounds in Independence. (A.Sg.)

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Truman Doctrine, pronouncement by U.S. Pres. Harry S. Truman on March 12, 1947, declaring immediate economic and military aid to the governments of Greece, threatened by Communist insurrection, and Turkey, under pressure from Soviet expansion in the Mediterranean area. As the United States and the Soviet Union struggled to reach a balance of power during the Cold War that followed World War II, Great Britain announced that it could no longer afford to aid those Mediterranean countries, which the West feared were in danger of falling under Soviet influence. The U.S. Congress responded to a message from Truman by promptly appropriating $400,000,000 for this purpose.

Trumbić, Ante (b. May 27, 1864, Split, Dalmatia, Austria-Hungary—d. Nov. 18, 1938, Zagreb, Yugos.), Croatian nationalist from Dalmatia who played a leading role in the founding of Yugoslavia.

Trumbić entered political life under the Austrian crown, first as a member of the Dalmatian Diet from 1895 and then as representative in the Reichsrat (federal assembly) in Vienna from 1897. In 1905 he was elected mayor of Split. As an advocate of South Slav unity opposed to Habsburg supremacy, Trumbić helped to draft the Rijeka Resolution (1905), by which it was hoped to win the support of anti-Habsburg Hungarians. The scheme failed.

After the beginning of World War I, Trumbić fled, along with other South Slav patriots, to Rome. In 1915 he became president of the Yugoslav Committee, with headquarters in London, which sought the support of the Allies in establishing an independent and united South Slav state. In July 1917 he successfully negotiated with leaders of the Serbian government the Declaration of Corfu, an affirmation of unity that laid the foundation for the future Yugoslav state.

At the conclusion of the war, in December 1918, Trumbić became the first foreign minister of the newly formed Kingdom of Serbs, Croats, and Slovenes and represented his country at the Paris Peace Conference. Formidable difficulties arose over the Italian government's demand for Fiume and extensive territories on the eastern Adriatic coast (promised to it by the British and French in the secret Treaty of London of 1915) as well as with the more independence-minded Croatian nationalists at home. Trumbić's diplomatic skill went far in gaining most of the disputed lands for Yugoslavia and preserving unity at home. He retired from politics in 1929.

Trumbo, Dalton (b. Dec. 9, 1905, Montrose, Colo., U.S.—d. Sept. 10, 1976, Los Angeles), screenwriter and novelist who was probably the most talented member of the Hollywood Ten, one of a group who refused to testify before the 1947 U.S. House Committee on

Un-American Activities about alleged communist involvement. He was blacklisted and in 1950 spent 11 months in prison.

Trumbo got his start in movies in 1937; by the 1940s he was one of Hollywood's highest paid writers for work on such films as *Kitty Foyle* (1940), *Thirty Seconds over Tokyo* (1944), and *Our Vines Have Tender Grapes* (1945). After his blacklisting, he wrote 30 scripts under pseudonyms. He won an Oscar for *The Brave One* (1956), written under the name Robert Rich. In 1960 he received full credit for the motion-picture epics *Exodus* and *Spartacus,* and thereafter on all subsequent scripts, and he was reinstated as a member of the Writers Guild of America. Trumbo's vivid antiwar novel, *Johnny Got His Gun,* won an American Booksellers Award for 1939. He filmed the movie of the novel himself in 1971.

Trumbull, John (b. April 24, 1750, Westbury, Conn. [U.S.]—d. May 11, 1831, Detroit, Michigan Territory), American poet and jurist, known for his political satire, and a leader of the Hartford Wits (*q.v.*).

While a student at Yale College (now Yale University), Trumbull wrote two kinds of poetry: "correct" but undistinguished elegies of the Neoclassical school, and brilliant, comic verse that he circulated among friends. His burlesque "Epithalamium" (1769) combined wit and scholarship, and his essays in the style of Joseph Addison were published in *The Boston Chronicle* in 1770. While a tutor at Yale he wrote *The Progress of Dulness* (1772–73), an attack on educational methods.

He passed the bar examinations in 1773 and moved to Boston. His major work was the comic epic *M'Fingal* (1776–82). Despite its pro-Whig bias, its reputation as anti-Tory propaganda has been exaggerated.

His literary importance declined after 1782, as he became increasingly interested in law and politics. He first held office in 1789 as a state's attorney and subsequently as a state legislator and a judge until 1819.

Trumbull, John (b. June 6, 1756, Lebanon, Conn. [U.S.]—d. Nov. 10, 1843, New York, N.Y.), American painter, architect, and author, whose paintings of major episodes in the U.S. War of Independence form a unique record of that conflict's events and participants.

Trumbull was the son of the Connecticut governor Jonathan Trumbull (a first cousin to John Trumbull the poet). A boyhood injury to his left eye made him virtually monocular, with the consequence that his small-scale work is finer than his large. He attended Harvard College and then taught school. During the American Revolution he served as an aide to General George Washington, achieving the rank of colonel.

In 1780 he went to London via France, but, as a reprisal for the hanging by the Americans of the British agent Major John André, he was imprisoned there and used the time to study architecture. Released, he returned home but was back in London to study with the painter Benjamin West by 1784.

At the suggestion of West and with the encouragement of Thomas Jefferson, Trumbull in about 1784 began the celebrated series of historical paintings and engravings that he was to work on sporadically for the remainder of his life. From 1789 he was in the United States, but he returned to London in 1794 as secretary to John Jay, remaining for 10 years as a commissioner for the implementation of the Jay Treaty. In 1800 he married an Englishwoman, Sarah Hope Harvey, an amateur painter. He lived in the United States from 1804 to 1808, and in 1808 he attempted portrait painting in London but with little success. From 1815 to 1837 he maintained a rather unsuccessful studio in New York City.

In 1817 Trumbull was commissioned by the U.S. Congress to paint four large pictures in the rotunda of the Capitol at Washington ("Washington Resigning His Commission," "The Surrender of Cornwallis," "The Surrender of Burgoyne," and, best known of all, "The Declaration of Independence"; series completed in 1824) from the small and far superior originals of these scenes that he had painted in the 1780s and '90s, now in the Yale University Art Gallery. In 1831 Benjamin Silliman, a professor at Yale, established the Trumbull Gallery at Yale, the first art gallery at an educational institution in America. Trumbull gave his best works to this gallery in exchange for an annuity.

Trumbull, Lyman (b. Oct. 12, 1813, Colchester, Conn., U.S.—d. June 25, 1896, Chicago, Ill.), U.S. senator from Illinois whose independent views during the Civil War and Reconstruction eras caused him to switch from the Democratic Party to the Republican to the Liberal Republican and back to the Democratic Party in his long political career.

Trumbull grew up in Connecticut and, after studying law and gaining admission to the bar, settled in Illinois. His career in public life began in 1840, when he was elected to the state legislature as a Democrat.

In 1854 Trumbull ran as a Democrat for the U.S. House of Representatives. Although elected, he never served, because in 1855 the state legislature made him a U.S. senator. By 1856 he had become a Republican; his opposition to slavery had made it impossible for him to remain among the Democrats. With the coming of the Civil War, Trumbull staunchly supported President Abraham Lincoln's efforts to suppress rebellion.

Trumbull pressed for making the emancipation of the slaves a Northern war aim, and, as chairman of the Senate Judiciary Committee in 1864, he helped draft the Thirteenth Amendment. He aligned himself with the Radical Republicans in advocating vigorous prosecution of the war and an early end to slavery. Following Lincoln's assassination, he at first supported President Andrew Johnson but then broke with the president over Reconstruction policy. He supported Radical Reconstruction, yet in 1868 he was one of just seven Republican senators voting to acquit Johnson of impeachment charges.

His waning enthusiasm for Radical Reconstruction, his break with the Republican leadership in the trial of Andrew Johnson, and his revulsion at the corruption rampant in the administration of President Ulysses S. Grant led Trumbull to back the Liberal Republican Party in 1872. When party presidential nominee Horace Greeley lost and the party collapsed, Trumbull finished out his third term as senator and then retired to his Chicago law practice. By 1876 Trumbull had returned to the Democratic Party, serving as counsel for Samuel J. Tilden in the disputed presidential election.

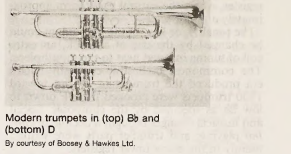
Trump, Donald J(ohn) (b. 1946, New York, N.Y., U.S.), American real-estate developer who amassed vast hotel, casino, and other real-estate properties in the New York City area.

The son of a wealthy apartment-building developer in the Queens borough of New York, Trump graduated from the University of Pennsylvania's Wharton School of Finance in 1968. He went to work in his father's company, the Trump Organization, and worked to expand its holdings of rental housing. In the 1970s he made a series of shrewd property purchases in Manhattan, obtaining generous tax concessions on his land and building purchases from New York's city government, which was eager for new investment at a time when it confronted a severe fiscal crisis. Trump bought and renovated several aging hotel complexes and apartment towers in Manhattan and built new ones there as well. By the 1990s Trump's business empire encompassed a number of glamorous high-rises, hotels, and condominiums, including Trump Tower (opened 1983); more than 25,000 rental and co-op apartment units in Queens and Brooklyn; and several hotel-casino complexes in the nearby gambling centre of Atlantic City, N.J. In 1988 Trump bought the Boston-New York-Washington, D.C., shuttle service from failing Eastern Airlines.

trumpet, in zoology, any of certain snail species, including members of the conch (*q.v.*) and triton groups (*see* triton shell).

trumpet, French TROMPETTE, German TROMPETE, in music, brass wind musical instrument sounded by lip vibration against a cup mouthpiece. Ethnologists use the word trumpet for any lip-vibrated instrument, whether of horn, conch, reed, or wood, with a horn or gourd bell, as well as for the modern brass instrument.

The metal trumpet dates from the 2nd millennium BC in Egypt, when it was a small ritual or military instrument sounding only one or



Modern trumpets in (top) B♭ and (bottom) D
By courtesy of Boosey & Hawkes Ltd.

two notes. Used in various forms as a military and sometimes civilian signal instrument—as the straight Greek *salpinx,* the similar Roman *tuba,* and the Roman *lituus,* straight with an upturned bell—it came into prominence as a musical instrument in the Middle Ages. Later forms included the natural trumpet of the 16th–18th century and, following the invention of valves (*c.* 1815), the modern valve trumpet. The valve trumpet, ordinarily built in B♭, maintains the traditional trumpet bore, cylindrical with a terminal bell flare, though usually the bore tapers toward the mouthpiece to provide additional flexibility of tone. The bend near the bell incorporates a tuning slide. The compass ranges from F♯ below the treble staff to well above the staff, depending on the player's skill. The music is notated a major second higher than the actual sound.

Mouthpieces vary; orchestral players usually prefer a wider and deeper mouthpiece than dance-band and jazz players, who favour a narrower and shallower mouthpiece to produce a sustained forte in the high register. The tone quality may be changed by inserting a mute into the bell: either a conical straight mute of fibre or various aluminum mutes.

Instruments in keys other than B♭ are frequently used. The "piccolo" trumpet in D, also known as the Bach trumpet, was invented in about 1890 by the Belgian instrument-maker Victor Mahillon for use in the high trumpet parts of music by J.S. Bach and George Frideric Handel. Other forms include the older E♭ trumpet, the trumpet in C, piccolo trumpets in F and high B♭, and the bass trumpet in B♭.

On a natural (valveless) trumpet the possible notes (*i.e.,* the harmonic series) include (*c′* = middle C):

(c)	g	c′	e′	g′	(b♭′)
(2)	3	4	5	6	7
c″	d″	e″	(f♯″)	g″	(a″)
8	9	10	11	12	13
(b♭″)	b″	c‴			
14	15	16			

The 2nd harmonic is not producible; the 7th is badly out of tune with the musical scale; the 11th, 13th, and 14th, also out of tune, can with skill be sounded as F or F♯ and A or G♯, respectively. Modern valve trumpets generally use notes 2–12 of this series but pitched an octave lower; depression of the valves lengthens the tubing and allows the production of the intervening notes of the chromatic (12-note) scale.

The most ancient trumpets had straight tubes barely 2 feet (60 centimetres) long, but the medieval *buisine*, a straight instrument retaining the trumpet's traditional association with royalty and pomp, reached a length of about 6 feet (almost 2 metres). Increased length allows a correspondingly greater number of natural harmonics, though the range is also determined by the nature of the player's lips. By *c.* 1400 the tube had been lengthened to the extent that the trumpet was bent in an S-shape for manageability. By about 1500 it acquired the elongated loop now associated with the instrument. By 1600 court and guild trumpeters, accompanied by kettledrums, were able to play melodies in the higher, or *clarino*, register, where the natural notes form approximately a major scale.

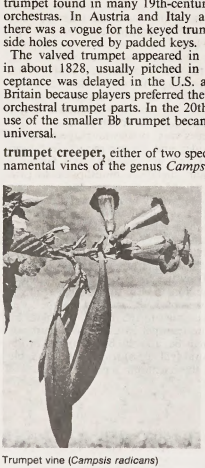
The tonality, or key, of the instrument could be changed by the use of a crook, an extra coil of tubing inserted next to the mouthpiece. The commonest orchestral crook in Bach's era produced the trumpet in D, but toward 1800 trumpets were crooked from F down to low B♭ as specified by the composer. Social and musical changes brought a decline in *clarino* playing, and trumpet parts were written mainly in the easier lower registers.

In order to play notes outside the natural series, trumpets with a sliding section of the tube appeared from the Renaissance onward, the most important being the trombone. A German trumpet with a sliding mouthpipe, the *tromba da tirarsi*, was sometimes used in the music of Bach. The English flat trumpet (*c.* 1695), which had a sliding upper bend near the mouthpiece, reappeared as the slide trumpet found in many 19th-century English orchestras. In Austria and Italy after 1801 there was a vogue for the keyed trumpet, with side holes covered by padded keys.

The valved trumpet appeared in Germany in about 1828, usually pitched in F; its acceptance was delayed in the U.S. and Great Britain because players preferred the cornet in orchestral trumpet parts. In the 20th century, use of the smaller B♭ trumpet became almost universal.

trumpet creeper, either of two species of ornamental vines of the genus *Campsis* (family Bignoniaceae, *q.v.*). Both are deciduous shrubs that climb by aerial rootlets.

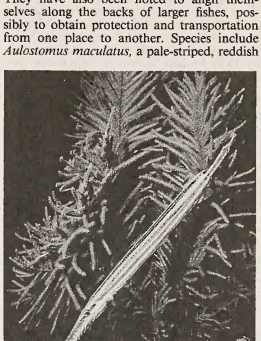
Campsis radicans, also called trumpet vine and cow itch, is a hardy climber native in eastern and southern United States; it produces terminal clusters of tubular, trumpet-shaped orange to orange-scarlet flowers. The Chinese trumpet creeper (*C. grandiflora*) of eastern Asia is a poor climber but produces spectacular bunches of brilliant scarlet flowers.



Trumpet vine (*Campsis radicans*)
John H. Gerard—EB Inc.

trumpet fish, also called FLUTEMOUTH, any of the marine fishes that constitute the family Aulostomidae (order Gasterosteiformes), found along shores in tropical waters. Trumpet fishes have elongated, slender bodies and stiff, tubelike snouts ending in small, weak jaws. The body is covered with small scales, the back bears a row of spines that can be raised in defense, and the chin is provided with a short barbel. West Indies species may attain lengths of up to 180 centimetres (6 feet); northern species, however, are usually less than 30 centimetres (1 foot).

They eat small animals, and they sometimes rest head downward among certain corals (gorgonians), blending with the surroundings. They have also been noted to align themselves along the backs of larger fishes, possibly to obtain protection and transportation from one place to another. Species include *Aulostomus maculatus*, a pale-striped, reddish or brown Atlantic species, and the painted flutemouth (*A. chinensis*), a variably coloured Pacific form.



Trumpet fish (*Aulostomus maculatus*)
Douglas Faulkner

Articles are alphabetized word by word, not letter by letter

trumpet marine, also called TROMBA MARINA, or TRUMSCHEIT (German: "drum log"), stringed musical instrument of medieval and Renaissance Europe, highly popular in the 15th century and surviving into the 18th century. It had a long narrow body and one or two strings, which the player's left thumb touched lightly to produce the notes of the harmonic series, as on a natural trumpet. The strings, originally plucked, were by the 15th century sounded by a bow played between the fingering and the tuning pegs.

The tone of the trumpet marine was brassy and substantial. One foot of the bridge was free and rattled loosely on the belly when the strings vibrated. The stationary bridge foot served as a sound post, extending through the belly to the instrument's back and transmitting the string vibrations to it. In the 17th century seven or eight sympathetic strings were set inside the body.



Angel playing a trumpet marina (left), detail from "Angel Musicians," panel by Hans Memling; in the Koninklijk Museum voor Schone Kunsten, Antwerp
By courtesy of the Koninklijk Museum voor Schone Kunsten, Antwerp

trumpeter, also called TRUMPET BIRD, any of three species of long-legged, round-bodied birds comprising the family Psophiidae (order Gruiformes). All are about 50 centimetres (20 inches) long, inhabit northern South America, and are named for their strident calls, uttered as they roam the jungle floor searching for berries and insects. Trumpeters are small-headed and thin-necked, with short, rounded wings, a short bill, and a characteristic hunched posture. Their plumage is dark, with lighter wing patches. Unwary, they are easily killed for their excellent flesh.

The most widespread species is the common, or gray-winged, trumpeter (*Psophia crepitans*). The others are the pale-winged, or white-winged, trumpeter (*P. leucoptera*), and the dark-winged, or green-winged, trumpeter (*P. viridis*), of Brazil.



Gray-winged trumpeter (*Psophia crepitans*)
Eric Hosking

The name trumpet bird is also applied to certain birds of paradise of the genera *Manucodia* and *Phonygammus* (*see* bird-of-paradise).

Trumpler, Robert Julius (b. Oct. 2, 1886, Zürich—d. Sept. 10, 1956, Berkeley, Calif., U.S.), Swiss-born U.S. astronomer who, in

his extensive studies of galactic star clusters, demonstrated the presence throughout the galactic plane of a tenuous haze of interstellar material that absorbs light generally and decreases the apparent brightness of distant clusters. The presence of this obscuring haze explained why spiral nebulae are observed to be concentrated at the galactic poles.

Trumpler was educated in Switzerland and Germany, went to the United States in 1915, and joined the staff of Lick Observatory, Mount Hamilton, Calif., three years later. In 1922 he went to Wallal, Australia, on a solar-eclipse expedition to test experimentally Albert Einstein's general theory of relativity by observing whether the Sun's gravitational field indeed would bend the light from nearby stars. His observations confirmed Einstein's theory. Trumpler transferred to the astronomy department of the University of California, Berkeley, in 1938 and retired in 1951.

Trumpler's independent observations of galactic star clusters and the differences in them, which indicate their age, helped to provide the foundation of the present theory of stellar evolution. Probably the most successful scheme of classification of galactic clusters by appearance is Trumpler's. He also devised a method of classification in terms of magnitude and spectral type.

His papers include "Observations on the Deflection of Light in Passing Through the Sun's Gravitational Field," with the American astronomer William Wallace Campbell (1923), "Spectral Types in Open Clusters" (1925), "Observations of Mars at the Opposition of 1924" (1927), and "Preliminary Results on the Distances, Dimensions, and Space Distribution of Open Star Clusters" (1930), all in *Lick Observatory Bulletins,* and "Observational Evidence of a Relativity Red Shift in Class O Stars" (1935), in *Publications of the Astronomical Society of the Pacific.*

trumscheit (musical instrument): *see* trumpet marine.

trundle bed, also called TRUCKLE BED, a low bed, so called from the trundles, or casters, that were attached to the feet so that it could be pushed under the master bed when it was not in use. The bed was intended for servants, who used to sleep in their employer's room so as to be near at hand. The framework was generally of oak, and suspension was provided by leather or canvas straps looped through holes in the sides.

The first reference to the trundle bed occur in the 16th century, and the bed remained in use until the late 18th century. The phrase is still used in some rural areas to describe a small bed of any kind, and the concept survives in the metaphor "to truckle under," or to be subservient.

Trung Sisters, byname of TRUNG TRAC and TRUNG NHI (fl. AD 39–43), heroines of the first Vietnamese independence movement, who headed a rebellion against the Chinese Handynasty overlords and briefly established an autonomous state. Their determination and apparently strong leadership qualities are cited by scholars of Southeast Asian culture as testimony to the respected position and freedom of women in Vietnamese society, as compared with the male-dominated societies of China and India.

Trung Trac, the elder sister, was the widow of Thi Sach, lord of Chau Dien, in northern Vietnam, who had been assassinated by a Chinese general for plotting with other lords to overthrow the Chinese. Trung Trac thereupon assumed leadership of the movement. In AD 39 she, with her sister Trung Nhi and other members of the aristocracy, marched on Lien Lau, forcing the Chinese commander to flee. Within a year the sisters and their allies held 65 northern citadels. At Me Linh, in the lower Red River delta, the Trung Sisters jointly proclaimed themselves queens of an independent state (of unknown name) extending from southern China to the present site of Hue.

The Trung Sisters' revolutionaries—without peasant support, without supplies, and with untrained forces—were no match, however, for the seasoned Chinese troops of General Ma Yüan (Ma Vien). He defeated them first at Lang Bac, near the present site of Hanoi. The Trung Sisters then retreated to Hat Mon, now Son Tay, where they were decisively beaten. Unable to face defeat, they committed suicide, drowning themselves at the juncture of the Day and Red rivers in AD 43. The Hai Ba ("Two Sisters") pagoda at Hanoi and the pagoda of Hat Mon, in the province of Son Tay, are dedicated to the Trung Sisters, and an avenue in downtown Ho Chi Minh City (formerly Saigon) is named for them.

trunkfish: *see* boxfish.

Truong Chinh, original name DANG XUAN KHU (b. Feb. 9, 1907, Ha Nam Ninh province, Vietnam—d. Sept. 30, 1988, Hanoi), Vietnamese scholar and statesman, a leading North Vietnamese communist intellectual.

While a high school student at Nam Dinh, Truong Chinh became an activist in the anticolonialist movement; he joined Ho Chi Minh's organization, the Vietnamese Revolutionary Youth Association, in 1928, taking part in student demonstrations against the French. Arrested and expelled from the local high school, he continued his education in Hanoi, where he received his degree and supported himself as a teacher while pursuing a political career within the recently formed Indochinese Communist Party (PCI). While editing a Communist Party newspaper in Hanoi, he was arrested by the French in 1932 and spent the next four years in prison. Paroled in 1936, he was a well-qualified candidate for command in the PCI, most of whose earlier leaders had been executed or exiled. About this time he adopted the name Truong Chinh ("Long March"), after Mao Zedong's famous march.

The Communist Party was banned in Indochina during World War II, and Truong Chinh and his associates continued their work underground. In 1941 Truong Chinh became secretary-general of the PCI, in charge of the dissemination of communist doctrine in Vietnam. With General Vo Nguyen Giap, Truong Chinh planned the tactical strategy that led to victory by the Vietnamese over Japanese occupation forces in August 1945 and to the establishment of the Democratic Republic of Vietnam, headed by Ho Chi Minh. Truong Chinh described these events in his book *The August Revolution.* The PCI was disbanded but reemerged as the Alliance for the Dissemination of Marxism, with Truong Chinh as its chairman and leading theoretician. In 1951 the Vietnam Workers' Party (Dang Lao-Dong Viet-Nam) was born, with Truong Chinh as secretary-general.

Truong Chinh's power was eclipsed briefly in 1956, when he was held responsible for failures of the Central Reform Committee. He lost his post as secretary-general of the party, but by April 1958 he had again become a public figure and was appointed vice premier of North Vietnam and president of the Scientific Research Council. Following the death of Ho Chi Minh in 1969, Truong Chinh, Le Duan, and Pham Van Dong formed the controlling triumvirate of North Vietnamese politics. He was chairman of the Standing Committee of the National Assembly from 1960 to 1981 and was president of the State Council from 1981 to 1987.

Truong Chinh sought to organize North Vietnam along lines similar to those of the People's Republic of China. He won recognition as a writer and poet and as a leading dialectician; he wrote *The Resistance Will Win* (1947), an explicit set of directives for guerrilla warfare. A biographical account of Truong Chinh is given by Bernard B. Fall in his introduction to *Primer for Revolt* (1963), which contains *The August Revolution* and *The Resistance Will Win.*

Truong-son (Southeast Asia): *see* Annamese Cordillera.

Truong Vinh Ky: *see* Pétrus Ky.

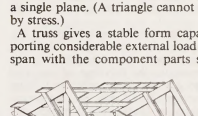
Truro, town, seat of Colchester county, central Nova Scotia, Can. It lies along the Salmon River, near the head of Cobequid Bay, an eastern arm of the Minas Basin, 61 miles (98 km) north-northeast of Halifax. The site was originally settled in the 1670s by Acadians, who were expelled in 1755. They were followed in 1761 by New Englanders and Scots-Irish from Ulster, and the original name, Cobequid (Micmac Indian: "End of Flowing Water"), was changed to Truro, for the town in Cornwall, Eng. The township of Truro was created in 1765, and the town was incorporated in 1875. Now a commercial centre in a farming and lumbering area, Truro also is an industrial town with dairy processing, printing, and the manufacture of building materials, textiles, and clothing. It is the site of provincial agricultural, business, and teachers' colleges. A provincial exposition is held annually. Victoria Park (1,000 acres [405 hectares]), noted for its scenery, has two picturesque waterfalls in a deep gorge. Pop. (1991) 11,683.

Truro, city, Carrick district, county of Cornwall, England. It is centrally situated in the county on the River Truro at the head of the tidal estuary of the River Fal. Truro's first charter dates from 1130 to 1140, but the borough was not created a city until 1877. Truro is the county town (seat) of Cornwall. The Anglican diocese of Truro, centred on the Cathedral of St. Mary (1880–1910), covers Cornwall and part of the county of Devon. Truro's industries include lumbering, food processing, and light engineering. Dredging enables small vessels to reach the quays, but the harbour is dry at low tide. China clay is the chief export. Pop. (1981) 16,348.

Truro, town (township), Barnstable county, southeastern Massachusetts, U.S. It lies near the northern tip of Cape Cod. Settled in 1700, it was incorporated in 1709 and named for Truro, in Cornwall; it soon became a bustling fishing centre. Futile attempts at farming and failure to continue successful fisheries (owing to the silting of harbours and marine disasters offshore) led to the town's decline, but an artists' and writers' colony developed there in the early 20th century and has survived. The Highland (Cape Cod) Light (5 miles [8 km] north) was originally established in 1797. The Pilgrims spent their second night in the New World (1620) at Pilgrim Spring (7 miles [11 km] northeast), where they found fresh water. Summer tourism is the economic mainstay. Pop. (1990) 1,573.

truss, in engineering, a structural member usually fabricated from straight pieces of metal or timber to form a series of triangles lying in a single plane. (A triangle cannot be distorted by stress.)

A truss gives a stable form capable of supporting considerable external load over a large span with the component parts stressed pri-



Triangular wooden truss

marily in axial tension or compression. The individual pieces intersect at truss joints, or panel points. The connected pieces forming the top and bottom of the truss are referred to respectively as the top and bottom chords. The sloping and vertical pieces connecting the chords are collectively referred to as the web of the truss.

Trusses were probably first used in primitive lake dwellings during the early Bronze Age, about 2500 BC. The first trusses were built of timber. The Greeks used trusses extensively in roofing, and trusses were used for various construction purposes in the European Middle Ages. Andrea Palladio's *I quattro libri dell'architettura* (1570; *Four Books on Architecture*) contained plans for timber trusses. A major impetus to truss design came in the development of covered bridges in the United States in the early 19th century. Cast iron and wrought iron were succeeded by steel for railroad truss bridges. The two systems most commonly used are the Pratt and the Warren; in the former, the sloping web members are parallel to each other, while, in the latter, they alternate in direction of slope. Trusses are also used in many kinds of machinery, such as cranes and lifts, and in aircraft wings and fuselages.

truss, in medicine, device for holding a reduced hernia in place. In treating infants, an interlacing of yarn forms a supportive pad that is placed over the herniated area. In adult treatment, a pad of heavier material is placed over the hernia to prevent protrusion. A truss is usually a temporary expedient and seldom used as a substitute for surgical repair. A nasal truss is a trusslike device used to hold bones of the nose in place after a fracture.

trust, in Anglo-American law, a relationship between persons in which one has the power to manage property and the other has the privilege of receiving the benefits from that property. There is no precise equivalent to the trust in civil-law systems.

A brief treatment of trusts follows. For full treatment, *see* MACROPAEDIA: Property Law.

The trust is of great practical importance in Anglo-American legal systems. Consciously created trusts, usually called "express trusts," are used in a wide variety of contexts, most notably in family settlements and in charitable gifts. Courts may also impose trusts on people who have not consciously created them in order to remedy a legal wrong ("constructive trusts").

Fundamental to the notion of the trust is the division of ownership between "legal" and "equitable." This division had its origins in separate English courts in the late medieval period. The courts of common law recognized and enforced the legal ownership, while the courts of equity (*e.g.,* Chancery) recognized and enforced the equitable ownership. The conceptual division of the two types of ownership, however, survived the merger of the law and equity courts that occurred in the 19th and 20th centuries. Thus, today, legal and equitable interests are usually enforced by the same courts, but they remain conceptually distinct.

The basic distinction between legal and equitable ownership is quite simple. The legal owner of the property (the "trustee") has the right to possession, the privilege of use, and the power to convey those rights and privileges. The trustee thus looks like the owner of the property to all the world except one person, the beneficial owner ("beneficiary"). As between the trustee and the beneficiary, the beneficiary receives all the benefits of the property. The trustee has the fiduciary duty to the beneficial owner to exercise his legal rights, privileges, and powers in such a way as to benefit not himself but the beneficiary. If the trustee fails to do this, the courts will require him to account to the beneficiary and may, in extreme cases, remove him as legal owner and substitute another in his stead.

The divisions between legal and beneficial ownership are normally created by an express instrument of trust (usually a deed of trust or a will). The maker ("settlor") of the trust will convey property to the trustee (who may be an individual or a corporation, such as a bank or trust company) and instruct the trustee to hold and manage the property for the benefit of one or more beneficiaries of the trust.

While trusts are normally created by an express instrument of trust, courts will sometimes imply a trust between people who have not gone through the formal steps. A simple example would be the situation in which one member of a family advances money to another and asks the second member to hold the money or to invest it for him. A more complicated example of an implied trust would be the situation in which one party provides money to another for the purchase of property. Unless such provision was explicitly made as a gift or as the natural expression of a close relationship (*e.g.,* parent-child), the acquired property is held in trust for the person who provided the money even though the second party holds the legal title. (This type of trust is frequently called a "resulting trust.") Finally, courts will sometimes impose a trust relationship upon parties where there is no evidence that such a relationship was intended. For example, where one party obtains property from another by making fraudulent representations, the defrauding party is frequently required to hold the property in trust for the defrauded party. (This type of trust is a constructive trust.)

Private express trusts are probably the most common form of trust. They are a traditional means of providing financial security for families. By will or by deed of trust, a testator or settlor places property in trust to provide for his family after he is deceased. The trustee may be a professional or may be a member of the family with experience in managing money, or a group of trustees may be chosen. The trustees will invest the property in a way that allows them to make regular payments to the deceased's survivors. In some situations, such as where the deceased left minor or incompetent survivors, a court may create a trust for such persons' benefit, even if the deceased did not do so. Hence, statutory guardianships for minors and incompetents are sometimes called "statutory trusts."

Public express trusts are created to benefit larger numbers of people, or, at least, are created with wider benefits in mind. The most common public trusts are charitable trusts, whose holdings are intended to support religious organizations, to enhance education, or to relieve the effects of poverty and other misfortunes. Such trusts are recognized for their beneficial social impact and are given certain privileges, such as tax exemption. Other public trusts are not considered charitable and are not so privileged. These include holdings for public groups with a common interest, such as a political party, a professional association, or a social or recreational organization.

In the commercial sector, trusts have come to play important roles. Trusts may be established to manage various funds designated for special purposes by businesses and corporations. Such designations might include funds deposited against bonds issued by the company or liens on property that are being used as collateral against bonds. Money for employee-pension funds or profit-sharing programs is often managed through trust arrangements. Such commercial trusts are almost always managed by corporate trustees.

Some modern civil-law systems, such as that of Mexico, have created an institution like a trust, but this has normally been done by adapting trust ideas from the Anglo-American system rather than by developing native ideas. In civil-law jurisdictions, many of the purposes to which the Anglo-American trust is put can be achieved in other ways. For example, the charitable trust of Anglo-American law has a close analogy in the civil-law "foundation" (French *fondation,* German *Stiftung*). Regarding the purposes for private express trusts mentioned above, lawyers in European countries get professional management for assets by turning them over to managers who are paid a fee for their services. There is, however, a greater preference in civil-law countries than there is in Anglo-American ones for the administration of property by the person who owns and benefits from it.

trust company, corporation legally authorized to serve as executor or administrator of decedents' estates, as guardian of the property of incompetents, and as trustee under deeds of trust, trust agreements, and wills, as well as to act in many circumstances as an agent. Trust companies may have commercial banking departments, and commercial banks may have trust departments. In some countries, trust companies and commercial banks, though separate institutions, are often affiliated. Because the United States pioneered in the development of incorporated trust institutions, legislation and practices of other countries often have been modeled upon American patterns. State laws in the United States generally prescribe minimum capital and surplus requirements for trust operations and require the segregation of trust assets from banking-department assets, the segregation of and separate accounting for the assets of each trust estate, and the specific allocation of managerial responsibility for trust operations.

Trust companies serve as trustees for individuals, business corporations, nonprofit institutions, and governmental bodies. They distinguish between personal trusts and corporate trusts, often having separate departments for the two classes. In serving as trustee, the company usually takes legal title to property conveyed to it and manages it according to the instructions of the creator of the trust, the prescriptions of state law, or the directions of a court having jurisdiction, depending upon the circumstances by which the trust originates. When trust companies accept various managerial duties on an agency basis, they do not take title to property.

Trust services for individuals tend to centre on the administration of estates. Other personal trust work of trust companies is concerned chiefly with living trusts and testamentary trusts. Any person during his lifetime may convey property in trust to a trust company with instructions as to the disposal of the income from the property and eventually of the property itself. Such living trusts are used especially by the wealthy who seek to reduce the burden of estate taxes. Testamentary trusts, which originate in wills, arise when a person stipulates that his estate is not to be distributed but is to be held in trust for a certain period of time.

Their principal service to business corporations is to serve as trustees under corporate bond indentures. In this capacity, a trust company takes title to or a lien upon any property put up as security and verifies the performance of requirements imposed by the loan contract. This function is a matter of rather rigid verification and involves little discretionary action. A service involving more discretion on the part of the trust company is the management of corporate pension funds. Companies seeking higher returns on such funds than can be offered by group insurance plans may transfer these funds to a trust company for management. Trust companies may also serve as transfer agents (keeping records of

a corporation's stockholders or bond owners), as corporate stock registrars (responsible for the proper issuance of new stock certificates when additional stock is sold or outstanding stock is transferred), and as paying agents for the distribution of dividends.

Trusteeship Council, one of the principal organs of the United Nations (UN), responsible for supervising the government of trust territories and for leading them to self-government or independence. The council consists of member states administering trust territories, permanent members of the Security Council that do not administer trust territories, and other members elected by the General Assembly for three-year terms. The council meets once a year; each member has one vote, and decisions are made by a simple majority of those present.

The concept of international supervision of colonial territories was introduced by U.S. President Woodrow Wilson at the Paris Peace Conference in 1919; his assertion that there should be "no annexations" resulting from the victory over Germany and Turkey eventually produced the mandate system of the League of Nations.

The trusteeship system of the UN, like the mandate system of the League of Nations, was established on the principle that colonial territories taken from defeated enemies should not be annexed by any victorious nation but should be administered by a mandatory, or trust, power under international supervision until they were able to determine their own future status. The trusteeship system differed from the mandate system in its provision for the submission of petitions and for periodic visits to the trust territories by UN missions.

In 1945 only 12 League of Nations mandates remained: Nauru, New Guinea, Ruanda-Urundi, Togoland and Cameroon (French administered), Togoland and Cameroon (British administered), Pacific Islands (Carolines, Marshalls, and Marianas), Western Samoa, South West Africa, Tanganyika, and Palestine. All of these became UN trust territories except South West Africa (now Namibia), which South Africa refused to enter into the trusteeship system, despite vigorous international criticism over the years. By 1994 some form of self-government had been achieved by all the trust territories. *See also* mandate.

Truth, Sojourner, legal name ISABELLA VAN WAGENER (b. *c.* 1797, Ulster county, N.Y., U.S.—d. Nov. 26, 1883, Battle Creek, Mich.), black American evangelist and reformer who applied her religious fervour to the abolitionist and women's rights movements.

Isabella was born into slavery and spent her childhood as an abused chattel of several masters. Her first language was Dutch. Between 1810 and 1827 she bore at least five children to a fellow slave named Thomas. Just before New York state abolished slavery in 1827, she found refuge with Isaac Van Wagener, who set her free. With the help of Quaker friends, she waged a court battle in which she recovered her small son, who had been sold illegally into slavery in the South. About 1829 she went to New York City with her two youngest children, supporting herself through domestic employment.

Since childhood Isabella had had visions and heard voices, which she attributed to God. In New York City she became associated with Elijah Pierson, a zealous religious missionary. Working and preaching in the streets, she joined his Retrenchment Society and eventually his household.

In 1843 she left New York City and took the name Sojourner Truth, which she used from then on. Obeying a supernatural call to "travel up and down the land," she sang, preached, and debated at camp meetings, in churches, and on village streets, exhorting her listeners to accept the biblical message of God's goodness and the brotherhood of man. In the same year, she was introduced to abolitionism at a utopian community in Northampton, Mass., and thereafter spoke in behalf of the movement throughout the state. In 1850 she traveled throughout the Midwest, where her reputation for personal magnetism preceded her and drew heavy crowds. She supported herself by selling copies of her book, *The Narrative of Sojourner Truth,* which she had dictated to Olive Gilbert.

Encountering the women's rights movement in the early 1850s, and encouraged by other women leaders, notably Lucretia Mott, she continued to appear before suffrage gatherings for the rest of her life.

In the 1850s Sojourner Truth settled in Battle Creek, Mich. At the beginning of the American Civil War, she gathered supplies for black volunteer regiments and in 1864 went to Washington, D.C., where she helped integrate streetcars and was received at the White House by President Abraham Lincoln. The same year, she accepted an appointment with the National Freedmen's Relief Association counseling former slaves, particularly in matters of resettlement. As late as the 1870s she encouraged the migration of freedmen to Kansas and Missouri. In 1875 she returned to the city of Battle Creek, where she remained until her death.

BIBLIOGRAPHY. Two reliable biographies are Arthur H. Fauset, *Sojourner Truth* (1938, reprinted 1971); and Hertha E. Pauli, *Her Name Was Sojourner Truth* (1962, reissued 1976).



Sojourner Truth
By courtesy of the Burton Historical Collection, Detroit Public Library

Truth or Consequences, byname T OR C, formerly (until 1950) HOT SPRINGS, city, seat (1937) of Sierra county, southwestern New Mexico, U.S. It lies along the Rio Grande, east of the Black Range in Gila National Forest, 60 miles (97 km) north-northwest of Las Cruces.

The locality was first settled in the mid-19th century near the Springs of Palomas (Palomas Springs), which were later called Hot Springs. The community itself was subsequently named Hot Springs and attained a reputation as a mineral spa. It also became a service point for the surrounding stock-raising, mining, and farming area. Its present controversial place-name was adopted in 1950 when the city cooperated with radio (later television) personality Ralph Edwards, master of ceremonies of the quiz show called "Truth or Consequences," in a promotion effort to hold a yearly program and fiesta there. The city lies between two state parks—Elephant Butte Lake (northeast) and Caballo Lake (south)—and tourism, aided by the medicinal springs, is important. Pop. (1994 est.) 6,285.

truth-value, in logic, truth (*T* or 1) or falsity (*F* or 0) of a given proposition or statement. Logical connectives, such as disjunction (symbolized $\vee$, for "or") and negation (symbolized $\sim$), can be thought of as truth-functions, because the truth-value of a compound proposition is a function of, or a quantity dependent upon, the truth-values of its component parts.

The truth-value of a compound statement can readily be tested by means of a chart known as a truth table. Each row of the table represents a possible combination of truth-values for the component propositions of the compound, and the number of rows is determined by the number of possible combinations. For example, if the compound contains just two component propositions, there will be four possibilities and thus four rows to the table. The logical properties of the common connectives may be displayed by truth tables as follows:

And

p	q	$p \cdot q$
T	T	T
T	F	F
F	T	F
F	F	F

Or

p	q	$p \vee q$
T	T	T
T	F	T
F	T	T
F	F	F

If . . . then

p	q	$p \supset q$
T	T	T
T	F	F
F	T	T
F	F	T

Not

p	$\sim p$
T	F
F	T

in which $\cdot$ signifies "and" and $\supset$ signifies "if . . . then." (In the "or" table, for example, the second line reads, "If p is true and q is false, then $p \vee q$ is true.") Truth tables of much greater complexity, those with a number of truth-functions, can be constructed by means of a computer. Abstract systems of logic have been constructed that employ three truth-values (*e.g.,* true, false, and indeterminate) or even many, as in fuzzy logic, in which propositions have values between 0 and 1.

TRW Inc., formerly (1958–65) THOMPSON RAMO WOOLDRIDGE INC., major American manufacturer of advanced equipment and systems for industry and government. Headquarters are in Cleveland, Ohio.

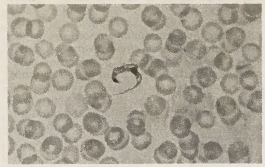
The company began as the Cleveland Cap Screw Company, with 29 employees, in 1901. It later changed its name to the Electric Welding Products Company and in 1916 incorporated as the Steel Products Company, acquiring the Michigan Electric Welding Company and the Metals Welding Company. The name was changed to Thompson Products, Inc., in 1926. In 1958 it merged with Ramo-Wooldridge Corporation, which it partly owned, becoming Thompson Ramo Wooldridge Inc. The name was changed to TRW Inc. in 1965.

Throughout its history the company has expanded and diversified through the acquisition of other technical companies. Through its various divisions and subsidiaries, TRW designs and manufactures a wide range of parts for cars, trucks, and other vehicles and offers advanced engineering and research services. Its largest segment is the manufacture of air bags and many other automotive components. The space and defense segment makes electronic components and communications systems for military aircraft, and designs and builds spacecraft and spacecraft subsystems. The information systems and services segment operates large databases that enable clients to prescreen the creditworthiness of individual consumers and businesses.

trypanosomiasis, infectious disease in both humans and animals caused by certain mem-

bers of the flagellate protozoa genus *Trypanosoma* and spread by certain bloodsucking insects.

The genus *Trypanosoma* belongs to the family Trypanosomatidae, which is in the order Kinetoplastida. The life cycle of trypanosomes includes a stage spent in blood or other tissues



Trypanosome with human red blood cells (highly magnified)
John J. Lee

of a vertebrate host and a stage in the gut of an invertebrate, typically a fly.

About 20 species of *Trypanosoma* are known, of which only two—*T. cruzi* and *T. brucei*—cause disease in humans. Each species is responsible for a different disease. *T. cruzi* causes American trypanosomiasis, also called Chagas' disease (*q.v.*), which occurs primarily in the Central and South American tropics and is spread by the bite of insects of the family Reduviidae, also known as "kissing bugs." The parasite multiplies in the bloodstream and may enter the heart, liver, and spleen, where it causes extensive damage. *T. brucei* is responsible for African trypanosomiasis, or sleeping sickness (*q.v.*), which occurs in equatorial Africa in two forms, both transmitted by the tse-tse fly (*Glossina*). East African, or Rhodesian, sleeping sickness is an acute form of the disease caused by the subspecies *T. brucei rhodesiense.* West African, or Gambian, trypanosomiasis is a slower-developing chronic form of the disease caused by *T. brucei gambiense.* Both organisms can eventually invade the brain, causing mental deterioration, coma, and death.

Other *Trypanosoma* species cause economically important diseases in livestock: nagana, dourine, surra, and mal de caderas.

tryptophan, an amino acid that is nutritionally important and occurs in small amounts in proteins. It is an essential amino acid, meaning that humans and certain other animals cannot synthesize it and must obtain it from their diets. Infants require greater amounts of tryptophan than adults to ensure normal growth and development. Tryptophan is used by the body to manufacture several important substances, including the neurotransmitter serotonin and the vitamin niacin. Diets poor in tryptophan can lead to pellagra (*q.v.*), a disease resulting from niacin deficiency; however, this disease is now rare in developed countries. In 1901 the English biochemist Frederick G. Hopkins isolated tryptophan from casein, the major protein found in milk.

tsaddik (Judaism): *see* tzaddiq.

Tsai-ch'un (Chinese emperor): *see* T'ung-chih.

Ts'ai Lun, Pinyin CAI LUN, courtesy name (*tzu*) CHING-CHUNG (b. *c.* AD 50, Ch'en-chou [in modern Hunan province], China—d. 121, China), Chinese court official who is traditionally credited with the invention of paper.

Ts'ai Lun was a eunuch who entered the service of the imperial palace in AD 75 and was made chief eunuch under the emperor Ho-ti (reigned 88–105/106) of the Eastern Han dynasty in the year 89. About the year 105 Ts'ai conceived the idea of forming sheets of paper from the macerated bark of trees, hemp waste, old rags, and fishnets. The paper thus obtained was found to be superior in writing quality to cloth made of pure silk (the principal writing surface of the time), as well as being much less expensive to produce and having more abundant sources.

Ts'ai reported his discovery to the emperor, who commended him for it. Important improvements were subsequently made to Ts'ai's papermaking process by his apprentice, Tso Po, and the process was rapidly adopted throughout China, from which it eventually spread to the rest of the world. Ts'ai himself was named a marquess in 114.

Ts'ai Shen, Pinyin CAI SHEN, also called (Wade-Giles romanization) TS'AI PO HSING CHÜN, the popular Chinese god (or gods) of wealth, widely believed to bestow on his devotees the riches carried about by his attendants. During the two-week New Year celebration, incense is burned in Ts'ai Shen's temple (especially on the fifth day of the first lunar month), and friends joyously exchange the traditional New Year greeting "May you become rich" (*"Kung hsi fa ts'ai"*).

The Ming-dynasty novel *Feng Shen Yen I* relates that when a hermit, Chao Kung-



Ts'ai Shen, wood figurine; in the Guimet Museum, Paris
By courtesy of the Musee Guimet, Paris

ming, employed magic to support the collapsing Shang dynasty (12th century BC), Chiang Tzu-ya, a supporter of the subsequent Chou-dynasty clan, made a straw effigy of Chao and, after 20 days of incantations, shot an arrow made of peach-tree wood through the heart of the image. At that moment Chao became ill and died. Later, during a visit to the temple of Yüan Shih, Chiang was rebuked for causing the death of a virtuous man. He carried the corpse, as ordered, into the temple, apologized for his misdeed, extolled Chao's virtues, and in the name of that Taoist god canonized Chao as Ts'ai Shen, god of wealth, and proclaimed him president of the Ministry of Wealth. (Some accounts reverse the dynastic loyalties of Chao and Chiang.)

Another account identifies Ts'ai Shen as Pi Kan, put to death by order of Chou Hsin, last Shang emperor, who was enraged that a relative should criticize his dissolute life. Chou Hsin is said to have exclaimed that he now had a chance to verify the rumour that every sage has seven openings in his heart.

Tsai-t'ien (Chinese emperor): *see* Kuang-hsü.

Ts'ai-tien (China): *see* Han-yang.

Ts'ai Yüan-p'ei, Pinyin CAI YUANPEI (b. January 1863, Shanyin, Chekiang province, China—d. March 5, 1940, Hong Kong), educator and revolutionary who served as head of Peking University from 1916 to 1926 during the critical period when that institution played a major role in the development of a new spirit of nationalism and social reform in China.

Ts'ai passed the highest level of his civil-service examination in 1890, becoming one of the youngest successful candidates in the history of the imperial examination system. In 1904 he helped organize and became the first president of the Restoration Society (Kuang-fu hui), a revolutionary group dedicated to the overthrow of the Ch'ing (Manchu) dynasty. Most of this group later became affiliated with the United League (T'ung-meng hui), formed in 1905 by the revolutionary leader Sun Yat-sen, and Ts'ai became head of the party's Shanghai branch.

As provisional president of the Chinese republic, Sun Yat-sen appointed Ts'ai minister of education in January 1912, following the overthrow of the 2,000-year-old Chinese imperial system. Six months later, shortly after the presidency passed to the military dictator Yüan Shih-k'ai, Ts'ai resigned his post and went to Europe, where he remained, except for a brief interval in 1913, until late in 1916. During this period, Ts'ai organized a work-study program in which more than 2,000 Chinese students and labourers traveled to France to study in the schools and work in the factories. Many future Chinese leaders were trained in this program, including Zhou Enlai, who helped organize one of the first Chinese Communist cells while in Paris.

In 1916, after first declining a position as governor of the central Chinese province of Chekiang, Ts'ai was made chancellor of the most prestigious school in China, Peking University. The university served as a centre of the May Fourth Movement, which began in 1919 as a student demonstration against imperialist exploitation of China and ended as a nationwide movement. Most of the future leaders of China—including the young Mao Zedong, who was employed as a clerk in the library—were associated with the university at this time.

In 1926 Ts'ai left Peking to participate in revolutionary activities against Chiang Kai-shek's Northern Expedition to unify China. After the failure of these efforts, Ts'ai continued to work for the cause of higher education, accepting positions in Chiang Kai-shek's government. In 1928 he helped found and served as the first president of the Academia Sinica, China's highest institution of academic study and research. In 1935 Ts'ai resigned all official posts and retired to Shanghai.

Tsaidam Basin, Wade-Giles romanization CH'AI-TA-MU P'EN-TI, Pinyin QAIDAM PENDI, northeastern section of the Plateau of Tibet, occupying the northern and western parts of Tsinghai province, China. The basin is bounded on the south by the towering Kunlun Mountains, with many peaks in the western part of more than 20,000 feet (6,000 m) above sea level, and in the north and east by the A-erh-chin and Nan mountain systems, across which the Tang-chin Pass is the only practicable pass into Kansu province. The pass opens into the eastern Tsaidam Basin through the area around Koko Nor (Blue Lake). The basin is considerably lower than other sections of the Plateau of Tibet, being at an average elevation of between 8,000 and 10,000 feet (2,400 and 3,000 m).

The Tsaidam Basin is almost entirely an area of interior drainage, with rivers discharging either into Koko Nor or into one of the nu-

merous salt lakes and saline swamps in the basin's central area. In the northwest of the basin is an area of true desert. Another area of true desert occurs in the subsidiary basin in the north, around the Su-kan Lake (a salt lake). The Charhan Salt Marsh in the centre of the basin is China's largest surface rock-salt bed, with an area of 618 square miles (1,600 square km) and solid salt deposits up to 50 feet (15 m) thick. The area has a climate marked by long and extremely cold winters, great temperature variations, and minimal rainfall—the total precipitation of the area is less than 4 inches (100 mm) a year. Outside the desert and salt-marsh areas in the centre of the basin, the land is rolling plain covered with poor grass, but the slopes of the surrounding mountains have areas of good grassland, particularly in the north, where the A-erh-chin and Nan mountains have some forested areas, especially near Koko Nor.

Until recent times the Tsaidam area was sparsely peopled, and the population was for the most part composed of pastoralists noted for their horse breeding; the region is also renowned for its sheep. Since World War II, however, the mineral riches of the area have attracted attention. These include vast deposits of salt, potash, various borate minerals, and boron. In the 1950s extensive geologic surveys of the area revealed rich reserves of coal, oil, and asbestos. Oil fields are in operation, including several around Mang-ya. A large oil refinery has been constructed at Lan-chou, southeast of the Tang-chin Pass, and another has been built at Mang-ya. Very large iron deposits have also been found at Golmud, which has developed a chemical industry using local materials and which produces fertilizer on a considerable scale. In the late 1970s the railway from Lan-chou in Kansu to Hsi-ning in Tsinghai was extended to Golmud, and a network of highways had been constructed. The area has also been the scene of experiments in agriculture. With intensive irrigation, some of the marginal areas in the north and east are used to grow wheat.

Tsamkong (China): *see* Chan-chiang.

Tsan-Usdi (Cherokee Indian chief): *see* Ross, John.

Ts'ang-chou, Pinyin CANGZHOU, city in Hopeh *sheng* (province), China. Ts'ang-chou is situated on the low-lying coastal plain about 60 miles (100 km) south of Tientsin on the Grand Canal and on the Tientsin–P'u-k'ou railway. The coastal plain there is very low, and in historical times the coastline was much farther inland than at present.

The Han dynasty (206 BC–AD 220) first established a county there, Fou-hai, some 25 miles (40 km) northeast of the present city. The first town of Ts'ang-chou was established in the 5th century, some 15 miles (24 km) southeast of the present city. The area became important in the late part of the Sui dynasty (581–618) and in the early part of the T'ang dynasty (618–907), after the completion of the Yung-chi canal linking the area of Tientsin with the Huang Ho (river) and Lo-yang in Honan province. Because the city was in an area of poor natural drainage traversed by several large rivers, the T'ang dynasty, in the late 7th century, constructed a canal to give the city better drainage and direct access to the sea. After the 8th century the Yung-chi canal was abandoned, and Ts'ang-chou's role as a transport centre declined. Under the Yüan (1206–1368) and Ming (1368–1644) dynasties, however, the new Grand Canal linking the Peking area to Yang-chou passed through this area, and Ts'ang-chou became an important port for merchant shipping on the canal.

Ts'ang-chou is a collecting centre for the agricultural produce of the surrounding area, particularly for the land west of the Grand Canal. The eastern area has suffered from repeated inundations and from the consequent salinity of the soil and is sparsely peopled in comparison with most of the North China Plain. The coastal area produces a good deal of salt. Since 1963, however, the area has been subjected to intensive flood-control measures, drainage, and irrigation works as part of the Hai River project. Although Ts'ang-chou's population has grown considerably since 1949, it remains a transportation and commercial centre, with negligible industrial development. Pop. (1985 est.) 190,800.

Tsang-po (Asia): *see* Brahmaputra River.

Ts'ang-wu (China): *see* Wu-chou.

Tsankov, Aleksandŭr (b. 1879, Oriakhova, Bulg.—d. July 17, 1959, Belgrano, Arg.), politician, prime minister of Bulgaria (1923–26) during years of great domestic unrest and violence.

Tsankov studied law at Sofia University, where in 1910 he became professor of economics. Originally a social democrat, he had by 1922 moved considerably to the right politically, becoming in that year leader of the conservative group National Concord (Naroden Zgovor), which conspired to overthrow the radical peasant dictatorship of Aleksandŭr Stamboliyski.

After the military coup of June 9, 1923, Tsankov replaced Stamboliyski as premier; but resistance to his regime claimed thousands of lives during the following months. His new political coalition, the "Democratic Entente," secured a large majority in the November 1923 elections, but civil disturbances nonetheless continued practically unchecked through the end of his ministry (January 1926). During the 1930s Tsankov headed the Bulgarian fascist movement, and in September 1944, after the Soviet occupation of his country, he formed a short-lived Bulgarian government-in-exile in Austria under German auspices. For several months following World War II, he was interned in Austria by U.S. forces. On his release he emigrated to South America.

Ts'ao Chan, Pinyin CAO ZHAN, also called (Wade–Giles romanization) TS'AO HSÜEH-CH'IN (b. 1715?, Chiang-ning, China—d. Feb. 12, 1763, Peking), author of *Hung lou meng* (*Dream of the Red Chamber*), generally considered China's greatest novel. A partly autobiographical work, it is written in the vernacular and describes in lingering detail the decline of the powerful Chia family and the ill-fated love between Pao-yü and his cousin Lin Tai-yü.

Ts'ao was the grandson of Ts'ao Yin, one of the most eminent and wealthy men of his time. In 1728, however, his family, which held the hereditary office of commissioner of imperial textiles in Nan-ching, suffered the first of a series of reverses and moved to Pei-ching. By 1742 Ts'ao's contemporaries reported him to be living in reduced circumstances and engaged on a work that could hardly be anything other than the *Dream*. The author had finished at least 80 chapters of the novel before his death. The work was completed by Kao Eh, about whom little is known.

Ts'ao Chih, Pinyin CAO ZHI, also called (Wade–Giles romanization) CH'EN SSU WANG, or PRINCE SSU OF CH'EN (b. 192, China—d. 232, China), one of China's greatest lyric poets and the son of the famous general Ts'ao Ts'ao.

Ts'ao Chih was born at the time his father was assuming command over the northern third of China, later to be named the Wei kingdom by his successor, Ts'ao P'ei, Ts'ao Chih's older brother and bitter rival.

In a family of poets—the verses of Ts'ao Ts'ao and Ts'ao P'ei were also widely known—Ts'ao Chih's talents quickly surpassed those of his father and elder brother. Indeed, Ts'ao Ts'ao was so impressed with the poetic skill that Ts'ao Chih displayed from his earliest years that he once considered making him crown prince over the head of Ts'ao P'ei. Added to Ts'ao P'ei's resentment of Ts'ao Chih was the fact that as a young adolescent Ts'ao Chih had fallen in love with the Lady Chen, the woman who later became the consort of his elder brother. Thus, when Ts'ao P'ei ascended the throne as Emperor Wen of Wei in 220, he took pains to make his younger brother's life as difficult as possible.

Ts'ao Chih's resulting frustration and misery can be seen as a theme of much of his poetry. Writing in the then-standard five-word line, Ts'ao Chih extended and strengthened its use to make it a flexible and yet precise vehicle for the expression of his wide-ranging emotions.

Tsao-chuang, Pinyin ZAOZHUANG, city, southern Shantung *sheng* (province), China. The city includes an extensive area on the western flank of the southwestern spur of the Shantung Hills, to the east of the Grand Canal, that contains one of the most important coal-mining districts of eastern China. The coal deposits, which are of high-quality bituminous coal, suitable for coking, are connected with those of Chia-wang and Suchow in northern Kiangsu *sheng*.

The mines were developed before World War II, and much of the production was distributed by rail and the canal to the Yangtze River valley. Under the Japanese occupation, coal production was increased, but, during the latter part of World War II, the mines were seriously damaged and ceased production.

The Tsao-chuang mines were not brought back into production until 1954. They were then extensively modernized and mechanized and by 1957 they had equaled prewar production and later exceeded it. The nearby city of Han-chuang, which has also been a mining centre since the early 1960s, lies south of Tsao-chuang on the Grand Canal. There has been some industrial development in the region, in addition to mining. Pop. (1985 est.) 269,400.

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Tsao Chün, Pinyin ZAO JUN, in Chinese mythology, the Furnace Prince whose magical powers of alchemy produced gold dinnerware that conferred immortality on the diner. The Han-dynasty emperor Wu-ti was reportedly duped by Li Shao-chün, a self-styled mystic, into believing that this new deity was capable of conferring immunity from old age. Accordingly, Wu-ti offered the first sacrifice to Tsao Chün in 133 BC. A year after Li was brought to the palace, he secretly fed a piece of inscribed silk to a bull, then informed the emperor that the animal's stomach contained mysterious sayings. When Li's handwriting was recognized, the emperor ordered his execution. At that time, it was believed that Tsao Chün's chief duty was to watch over the furnace that produced gold, the means to immortality.

Han emperor Hsüan-ti (reigned 74–48/49 BC) is said to have seen Tsao Chün in human form: he called himself Ch'an Tzu-fang, wore yellow garments, and had unkempt hair cascading to his shoulders. The emperor, much impressed, sacrificed a lamb in his honour. In about the 7th century AD the similarity of names caused Tsao Chün to be identified with Tsao Shen, god of the kitchen (or hearth), who in turn was later confused with Ho Shen, the god of fire.

Ts'ao Hsüeh-ch'in (Chinese novelist): *see* Ts'ao Chan.

Ts'ao Kuo-chiu, Pinyin CAO GUOJIU, in Chinese mythology, one of the Pa Hsien, the Eight Immortals of Taoism. Ts'ao is sometimes depicted in official robes and hat and carrying a tablet indicative of his rank and of his right to palace audiences. He was a man of exemplary character who often reminded a dissolute brother that though one can escape the laws of man, one cannot avoid the nets of heaven. In another tradition, however, Ts'ao is said to have been in conflict with the law but mended his ways after his release from prison was arranged by an imperial mandate.



Ts'ao Kuo-chiu, wood sculpture, 18th century; in the Guimet Museum, Paris
By courtesy of the Musee Guimet, Paris

A legend reports that Chung-li Ch'üan and Lü Tung-pin (two of the Pa Hsien) welcomed Ts'ao into their company after a visit to his mountain hideaway. *See also* Pa Hsien.

Ts'ao P'ei, Pinyin CAO PEI, posthumous name (*shih*) WEN-TI, courtesy name (*tzu*) TZU-HENG (b. AD 187, Po-hsien [now in modern Anhwei province], China—d. 226, China), founder of the short-lived Wei dynasty (AD 220–265/266) during the Three Kingdoms period of Chinese history.

The son of the great Han general and warlord Ts'ao Ts'ao, Ts'ao P'ei succeeded his father as king of Wei upon the latter's death in 220. At the same time, Ts'ao P'ei formally proclaimed the end of the Han dynasty (206 BC–AD 220) and the inauguration of the Wei dynasty, of which he was the first emperor. He retired the last Han emperor with great honours and married the emperor's two daughters. He then undertook administrative reforms in his domains. Ts'ao P'ei's Wei dynasty never controlled more than the northern part of China and lasted less than 50 years.

Tsao Shen, Pinyin ZAO SHEN, in Chinese mythology, the god of the kitchen (god of the hearth), who is believed to report to the celestial gods on family conduct and to have it within his power to bestow poverty or riches on individual families. Because he is also a protector of the home from evil spirits, his periodic absences are thought to make the house especially vulnerable to becoming haunted at such times. Tsao Shen's identity in life and in the history of his cult are uncertain. The god of the kitchen has also been confused with Ho Shen (god of fire) and with Tsao Chün ("Furnace Prince").

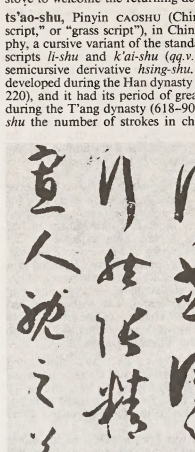
One belief was that at least once each month Tsao Shen departs from his place above the kitchen stove to relate to the celestial gods,



Tsao Shen and his consort, paper image designed to be fixed over the kitchen stove; in the Horniman Museum and Library, London
By courtesy of the Horniman Museum and Library, London

or to the city's spiritual magistrate, Ch'eng Huang (god of the wall and moat), what he has seen. It was also believed that toward the end of the 12th lunar month Tsao Shen must make an annual report to the ruler of heaven. Before the time of his departure, honey or sweet food is ceremonially smeared over the lips of the god's paper image so that only pleasant words may issue from his mouth. Offerings of food and wine are placed before the image, which is then burned along with figures of chariots, horses, money, and household utensils, all made of paper. As the new year begins, a fresh image is placed above the stove to welcome the returning deity.

ts'ao-shu, Pinyin CAOSHU (Chinese: "draft script," or "grass script"), in Chinese calligraphy, a cursive variant of the standard Chinese scripts *li-shu* and *k'ai-shu* (*qq.v.*) and their semicursive derivative *hsing-shu*. The script developed during the Han dynasty (206 BC–AD 220), and it had its period of greatest growth during the T'ang dynasty (618–907). In *ts'ao-shu* the number of strokes in characters are



Ts'ao-shu by Sun Kuo-t'ing (d. AD 688); in the National Palace Museum, Taipei
By courtesy of the National Palace Museum, Taipei, Taiwan, Republic of China

reduced to single scrawls or abstract abbreviations of curves and dots. Strokes of varying thickness and modulation show a great variety of shapes. *Ts'ao-shu* is not bound by rules for even spacing, and characters need not be of the same approximate size; the calligrapher thus has the fullest freedom of expressive movement of line. *K'uang* ("crazy") *ts'ao-shu* is an extremely wild and illegible form.

Ts'ao Ts'ao, Pinyin CAO CAO, courtesy name (*tzu*) MENG-TE (b. AD 155, Po-hsien [in modern Anhwei province], China—d. 220, Loyang [in modern Honan province]), one of the greatest of the generals at the end of the Han dynasty (206 BC–AD 220) of China.

Ts'ao's father was the adopted son of the chief eunuch of the imperial court. Ts'ao was initially a minor garrison commander and rose to prominence as a general when he suppressed the Yellow Turban Rebellion, which threatened the last years of Han rule. The dynasty, however, was greatly weakened by the rebellion, and in the ensuing chaos the country was divided among the major generals into three kingdoms. Ts'ao occupied the strategic northern section around the emperor's capital at Lo-yang and gradually assumed all imperial prerogatives. His domain was known as the kingdom of Wei.

Ts'ao's large armies—at one time he is said to have had a million men under arms—and his skillful maneuvering have long been notorious in Chinese history. He was described by Confucian historians and in popular legends as the archetypal shrewd, bold, unscrupulous villain. He was portrayed in this role in the great 14th-century historical novel *San Kuo chih yen i* (*Romance of the Three Kingdoms*), and since then he has been one of the most popular figures of Chinese legend and folklore, with various evil magic powers ascribed to him. Modern historians tend to view Ts'ao as a skillful general and pragmatic politician. After Ts'ao's death the last Han ruler, Hsien-ti, ceded the throne to Ts'ao's son Ts'ao P'ei, who proclaimed the Wei dynasty (220–265/266).

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

tsar, also spelled TZAR, or CZAR, English feminine TSARINA, TZARINA, or CZARINA, title associated primarily with rulers of Russia. The term tsar, a form of the ancient Roman imperial title *caesar,* generated a series of derivatives in Russian: *tsaritsa,* a tsar's wife, or tsarina; *tsarevich,* his son; *tsarevna,* his daughter; and *tsesarevich,* his eldest son and heir apparent (a 19th-century term).

In medieval Russia the title tsar referred to a supreme ruler, particularly the Byzantine emperor, who was considered the head of the Orthodox Christian world. But the fall of the Byzantine Empire in 1453 and the Ottoman Turks' conquest of the Balkans left the grand princes of Moscow as the only remaining Orthodox monarchs in the world, and the Russian Orthodox clergy naturally began to look to them as the defenders and possible supreme heads of Orthodox Christianity. Claims were put forth that Moscow would become the "third Rome" in succession to Constantinople (now Istanbul) and Rome itself. In 1472 Ivan III, grand prince of Moscow, married Sofia (Zoë) Palaeologus, the niece of the last Byzantine emperor. Sofia brought with her the traditions of the Byzantine court and its concept of the exalted nature of monarchical power.

In 1547 Ivan IV the Terrible, grand prince of Moscow, was officially crowned "tsar of all Russia," and thus the religious and political ideology of the Russian tsardom took final form. As tsar, Ivan IV theoretically held absolute power, but in practice he and his succes-

sors were limited by the traditional authority of the Orthodox church, the Boyar Council, and the legal codes of 1497, 1550, and 1649.

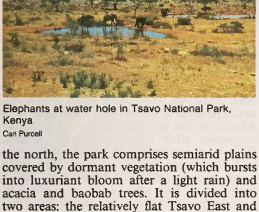
In 1721 Tsar Peter I discarded the title of tsar for that of "emperor of all Russia" as part of his effort to secularize and modernize his regime and assert the state's primacy over the church. "Emperor" remained the official title for subsequent Russian rulers, but they continued to be known as "tsars" in popular usage until the imperial regime was overthrown by the Russian Revolution of 1917. The last Russian tsar, Nicholas II, was executed by the Soviet government in 1918. The early Bulgarian emperors (10th to 14th century AD) and the 20th-century kings of Bulgaria (from 1908 to 1946) also called themselves tsars.

Tsaritsyn, also formerly STALINGRAD (city, Russia): *see* Volgograd.

Tsarskoye Selo (city, Russia): *see* Pushkin.

Tsatsos, Anthimus VII: *see* Anthimus VII Tsatsos.

Tsavo National Park, national park, southeastern Kenya, east of Mount Kilimanjaro. It was established in 1948 and is the largest (8,036 square miles [20,812 square km]) of Kenya's national parks. Drained by the Tsavo and Galana rivers, and the Tiva River in



Elephants at water hole in Tsavo National Park, Kenya
Carl Purcell

the north, the park comprises semiarid plains covered by dormant vegetation (which bursts into luxuriant bloom after a light rain) and acacia and baobab trees. It is divided into two areas: the relatively flat Tsavo East and the volcanic Tsavo West, which is dotted with springs and water holes. Wildlife includes elephants, as well as lions, rhinoceroses, buffalo, hippopotamuses, hartebeests, several species of antelope, and hundreds of species of birds. Poaching, particularly for rhinoceroses, and brush fires are constant problems. The park is bisected by the Nairobi-Mombasa highway and railway line.

Tschaikovsky, Pyotr Ilyich (composer): *see* Tchaikovsky, Peter Ilich.

Tschermak von Seysenegg, Erich (b. Nov. 15, 1871, Vienna, Austria—d. Oct. 11, 1962, Vienna), Austrian botanist, one of the co-discoverers of Gregor Mendel's classic papers on his experiments with the garden pea.

Tschermak interrupted his studies in Vienna to work at the Rotvorwerk Farm near Freiberg, Saxony. He completed his education at the University of Halle, receiving his doctorate in 1896. After working a few years at several seed-breeding establishments, he joined the staff of the Academy of Agriculture in Vienna in 1901. There he spent practically his entire teaching career, attaining the position of professor in 1906.

In the spring of 1898 Tschermak began breeding experiments on the garden pea in the Botanical Garden of Ghent. The next year he did volunteer work at the Imperial Family's Foundation at Esslingen near Vienna and continued his experiments on peas in a private garden. While writing the results of his experiments, Tschermak saw a cross-reference to Mendel's work and had the papers sent to him from the library of the University of Vienna. He found that Mendel's work with the garden pea duplicated and in some ways superseded his own. In the same year (1900) that Tschermak reported his findings, Hugo de Vries and Carl Erich Correns also reported their discovery of Mendel's papers.

An outstanding plant geneticist, Tschermak applied Mendel's rules of heredity to the development of new plants such as Hanna-Kargyn barley, wheat-rye hybrids, and a fast-growing, disease-resistant oat hybrid.

Tscherning, Anton Frederik (b. Dec. 12, 1795, Frederiksværk, Den.—d. June 29, 1874, Copenhagen), military reformer and radical champion of democracy in mid-19th-century Denmark.

While still an artillery officer in the Danish army, Tscherning developed a hatred for his country's absolutist regime. Leaving the military in the early 1840s, he became a founder in 1846 of the Society of Friends of the Peasant, a political reform organization of urban and agrarian intellectuals; he served as its chairman from 1846 to 1856. Following the liberal nationalist demonstrations of March 1848 that forced the king to call for a limited constitutional monarchy, Tscherning was named war minister in the new government. Reflecting popular demand, it immediately engaged Denmark in the Schleswig War (1848–50) for the annexation of the duchy of Schleswig. Serving as war minister until November 1848, Tscherning successfully reorganized the army, though he was less fortunate in directing field operations. He sat in Parliament from 1849 to 1866 and in the State Council from 1854 to 1864, at all times urging greater democratic participation, agrarian reform, free trade, and reduction of civil-service expenditure.

In the early 1860s Tscherning spoke out against the National Liberal government's chauvinistic policy of incorporating Schleswig into the state, breaking with most of the peasant party on that issue. After the disastrous Danish-German War (1864), he again led the democratic forces in unsuccessful agitation against the restrictive 1866 reform of membership in the upper chamber of Parliament.

Tschudi, Gilg, also called AEGIDIUS (b. Feb. 5, 1505, Glarus, Switz.—d. Feb. 28, 1572, Glarus), Swiss humanist and scholar, the author of a chronicle of Swiss history that was used as a source by many subsequent writers, including Friedrich Schiller.

Though a pupil of the religious reformer Huldrych Zwingli, Tschudi remained a convinced and militant Roman Catholic; and his efforts to eliminate the Zwinglians came to be known as the *Tschudikrieg* ("Tschudi's War"; 1558–64). After holding several administrative posts, he became chief magistrate of Glarus.

Tschudi's enduring importance rests especially on the *Chronicon Helveticum,* 2 vol. (1734–36), a "Swiss Chronicle" covering the years 1000–1470. Many assiduously collected documents were incorporated in it; others were fabricated, in an attempt to give a coherent and comprehensive chronology. His chronicle was the leading authority until the 19th century, when much of his work was found to be spurious. Consequently, his reputation as a historian suffered, but the literary aspect of his work is still justly admired. His other works include two accounts of ancient Helvetia.

Tsederbaum, Yuly Osipovich: *see* Martov, L.

Tsegaye, Gabre-Medhin, also called TSEGAYE GABRE-MEDHIN (b. Aug. 17, 1936, Ambo, Eth.), Ethiopian playwright and poet who wrote in Amharic and English.

Tsegaye earned a degree from the Blackstone School of Law, Chicago, and studied stagecraft at both the Theatre Royal, Windsor, and the Royal Court Theatre, London. In Ethiopia he was director of the Haile Selassie I Theatre (now the National Theatre).

Tsegaye wrote more than 20 plays, most of them in Amharic, and translated a number of plays of William Shakespeare and Molière into that language as well. His Amharic plays deal primarily with contemporary Ethiopia, especially with the plight of youth in urban settings and the need to respect traditional morality, as in *Crown of Thorns* (1959).

Oda Oak Oracle (1965) is Tsegaye's best-known verse play written in English. Like his other English plays, it is based on Ethiopian history and focuses on religious conflict. *Collision of Altars* (1977) is an experimental play that includes mime, incantation, dance, and the use of masks. Tsegaye's English poetry appeared in Ethiopian journals and was included in several anthologies of African poetry, including *New Sum of Poetry from the Negro World* (1966).

Tselinograd (Kazakhstan): *see* Aqmola.

Ts'en Shen, also called TS'EN CHIA-CHOU, Pinyin CEN SHEN, or CEN JIAZHOU (b. 715, Nan-yang [Chiang-ling], China—d. 770, Ch'eng-tu, Szechwan province), one of the celebrated poets of the T'ang dynasty (618–907) of China.

Because of the decline of his aristocratic family, Ts'en had to rely upon his literary skill to secure government appointment through the examination system. During the 750s he held several assignments in the central Asian outposts of the far-flung T'ang empire until the eruption of the An Lu-shan Rebellion of 755 forced his return to China. Having supported the loyalist cause, he succeeded to a number of provincial posts under the restoration until his retirement in 768.

A member of the second generation of High T'ang poets, which included such masters as Li Po and Tu Fu, Ts'en participated in the effort to reinvigorate the *lü-shih,* or "regulated poem," through innovations in diction and metre. Contemporaries praised him for his stylistic craftsmanship, particularly his skill at creating unconventional metaphors and imaginative phrases. But he came to be best known as a "frontier poet" because he so frequently set his poems in the exotic central Asian locale that he had experienced firsthand in the midst of his career.

Tseng Kuo-fan, Pinyin ZENG GUOFAN, canonized name (Wade-Giles) WEN-CHENG (b. Nov. 26, 1811, Hsiang-hsiang, Hunan province, China—d. March 12, 1872, Nanking), Chinese administrator, the military leader most responsible for suppressing the Taiping Rebellion (1850–64)—thus staving off the collapse of China's imperial regime.

Early career in civil service. Tseng Kuo-fan was born into a prosperous family dominated by his grandfather Tseng Yü-p'ing, a farmer with social ambitions. Tseng Kuo-fan passed the prefectural examination in 1833, one year after his father had succeeded at his 17th attempt. The next year, he passed the provincial examination, and, after failing the metropolitan examination at the capital in 1835, he finally passed in 1838.

The *chin-shih* ("doctorate degree") led to his appointment to the Hanlin Academy, a body of the most outstanding scholars in the country, which performed literary tasks for the court; and Tseng served continuously in the capital for more than 13 years. He always remained devoted to interpreting the Confucian Classics.

Tseng's intellectual progress helped his political career. He was soon appointed junior vice president of the Board of Ceremonies, serving later as vice president of the boards of Defense, Works, Justice, and Finance. Tseng

was, nevertheless, bored with his routine life and wanted to help the people more substantially. In 1850, 1851, and early in 1852, he repeatedly criticized the emperor's behaviour, the government's financial policy, and imperial treatment of an outspoken official.



Tseng Kuo-fan, detail of a portrait; in the National Palace Museum, Taipei

By courtesy of the National Palace Museum, Taipei, Taiwan, Republic of China

Military exploits. In 1852, Tseng Kuo-fan's mother died, and, in accordance with prevailing custom, he asked permission to observe the three-year mourning period at home. This granted, he was soon called into service again when the Taiping rebels, who had taken up arms in 1850, had by 1852 reached the fertile Yangtze River valley in south-central China, seriously threatening the Ch'ing dynasty's survival. The rebellion, a great religious-political upheaval, eventually caused the loss of some 20,000,000 lives and was the greatest threat the Ch'ing dynasty had ever faced. Tseng joined the local defense forces in his native Hunan province early in 1853, gradually shouldering more and more responsibility for the rebellion's suppression.

Since the corrupt imperial troops were too weak to resist the rebels, the government encouraged members of the scholar-gentry to organize local self-defense militias in their home areas. Tseng became the most outstanding of these new military leaders. He not only established a local militia in Hunan but combined the units formed by several scholars in his home district into a regional army. This army, paid and equipped by voluntary contributions and local funds, was loyal to Tseng and his officers. Tseng's example was followed by other regional leaders such as Tso Tsung-t'ang and Li Hung-chang, who first served on Tseng's staff and then organized their own regional armies under Tseng's general direction. Beginning in 1860, the imperial government found it necessary to appoint the new military men as governors-general and governors of the provinces that their troops occupied. The armies of Tseng wrested from the rebels their supply areas along the upper Yangtze River and finally besieged and captured their capital, Nanking, in 1864.

Later administrative activity. Victory over the Taiping rebels in 1864 was the climax of Tseng's career. Thereafter, he was mainly an administrator, serving twice as governor-general of Kiangnan and Kiangsi provinces and once as governor of Chihli (present-day Hopeh) province. In 1864–65 he established official government printing offices in Nanking and four other cities to reprint the Chinese Classics and historical books, and he also restored at Nanking the examinations system, which had been discontinued during the Taiping years.

Between May 1865 and October 1866 he again assumed military command in order to quell the Nien Rebellion that took place in northern China, but after a year of indecisive fighting he resigned after recommending his protégé, Li Hung-chang, as his successor in the campaign.

Tseng never had an opportunity to work at the capital again after 1864, but his prestige, power, and open-mindedness enabled him to make important changes. Li Hung-chang gained tremendous power in the government, power that few other Chinese officials ever held and that, when passed on to the official Yüan Shih-k'ai, finally led to the collapse of the Ch'ing dynasty. With Tseng's support, Jung Hung, a graduate of Yale University in the United States, established an ironworks in Shanghai that later became the Kiangnan Arsenal (*q.v.*). It was upon Tseng's recommendation, too, that the government introduced student education overseas.

Tseng was given the posthumous title of Wen-Cheng, the highest title given to civil officials under the Ch'ing dynasty.

Assessment. Since the 1920s, Tseng's role in history has caused controversy. Conservatives, such as the Kuomintang (KMT), or Nationalist Chinese, leaders, after 1928, hailed him as a symbol of Confucianism and a model of moral cultivation, while revolutionaries, including several founders of the Kuomintang and most of the communist leaders, bitterly criticized him for nationalist reasons. He was essentially a Confucian without being dogmatically conservative in policy, and it was with the philosophy of the ancient reformer that his deepest loyalties lay. (S.-y.H./Ed.)

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Tseng Ts'an (Chinese philosopher): *see* Tseng-tzu.

Tseng-tzu, Pinyin ZENGSI, also called (Wade-Giles) TSENG TS'AN (b. 505 BC—d. *c.* 436 BC), Chinese philosopher, disciple of Confucius, believed to be the author of the *Ta hsüeh* ("Great Learning"). In this classic, a part of the *Li Chi* ("Record of Rites") and one of the Four Books, he discussed the great importance of the Confucian virtues *chung* ("loyalty") and *shu* ("reciprocity").

Tseng-tzu was highly influential in reaffirming the Confucian emphasis on the virtue of *hsiao* ("filial piety"). He enumerated the three degrees of filial piety: honouring father and mother, not disgracing them, and being able to support them.

Tsesis (Latvia): *see* Cēsis.

tsetse fly, any of about 21 species of African bloodsucking flies constituting the genus *Glossina,* family Muscidae (order Diptera), which transmit sleeping sickness in humans and a similar disease called nagana in domestic animals. Tsetse flies readily feed on the blood of humans, domestic animals, and wild game. The widespread presence of the tsetse has tended to inhibit human settlement and agriculture in some localities of sub-Saharan Africa.

All tsetse species are similar in appearance. They are robust, sparsely bristled flies that are usually larger than their relative, the housefly, and range from 6 to 16 mm (0.2 to 0.6 inch) in length. Tsetses are rather drab in appearance, with colour varying from yellowish brown to dark brown; the gray thorax often has dark markings, and the abdomen may be banded. The stiff, piercing mouthparts, directed downward as the fly bites, are held horizontally at other times. While resting, the wings are held flat over the back. A bristlelike appendage (arista) on each antenna bears one row of long, branched hairs, differentiating the tsetse fly from all other flies.

The tsetse fly may live from one to three months. The young develop singly and in the female's uterus; the larva hatches from an egg within the female and feeds on a nutrient fluid secreted by paired milk glands on her uterine wall. The ensuing three stages of larval growth require about nine days. Without a sufficient blood meal, the female fly will produce a small, underdeveloped and nonviable larva; when adequately fed, however, she will produce a fully matured larva about once every 10 days throughout her life. After being deposited on the ground, the larva burrows into the soil and pupates within an hour; after several weeks the adult emerges.



Tsetse fly (*Glossina brevipalpis*)

Anthony Bannister

In general, tsetse flies occur in woodlands, though they may fly out a short distance into open grasslands when attracted by a host animal. The medically important species *Glossina palpalis* occurs primarily in dense streamside vegetation, while *G. morsitans,* by contrast, feeds in more open woodlands. Both sexes suck blood almost daily, especially during the warmest part of the day. Most tsetse species cease activity soon after sunset, or at temperatures below 15.5° C (60° F). Of the tsetse flies that attack humans, 80 percent or more may be males; the females usually attack larger animals.

Only two species of tsetse flies commonly transmit the flagellate protozoan parasites (trypanosomes) that cause human sleeping sickness. The tsetse *G. palpalis* is the chief carrier of the parasite *Trypanosoma gambiense,* which causes sleeping sickness throughout western and central Africa. *G. morsitans* is the chief carrier of *T. rhodesiense,* which causes sleeping sickness in the highlands of eastern Africa. *G. morsitans* also carries the trypanosomes that cause nagana.

The most effective controls of the flies have been environmental ones—destruction of the wild game upon which the flies feed, clearing of woodlands, and periodic burning to prevent the growth of brush. Trapping of flies, control by natural parasites, and application of insecticides to livestock have not had great success; aerial sprays using residual insecticides have produced inconclusive results.

Where the same name may denote a person, place, or thing, the articles will be found in that order

Tsetserleg, also spelled TSETSERLIK, or TSETSERLIG, town, central Mongolia. It lies on the northeastern slopes of the Hangayn Mountains, 250 miles (400 km) southwest of Ulaanbaatar, the capital. Once the seat of a monastery, Tsetserleg is an ancient

cultural and commercial centre; it now has a theatre, hotel, hospital, and an agricultural college. The main industry is food processing. Pop. (latest est.) more than 2,000.

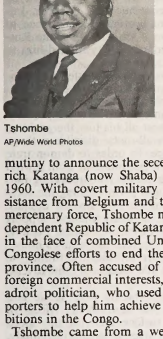
Tsévié, town, southern Togo, West Africa. It is located about 20 miles (32 km) north of Lomé, the national capital. The town constitutes an important centre for palm oil processing and a major market for commercial trade among Togo's *régions.* Tsévié has road and railway links with Notsé, Atakpamé, and Blitta to the north and with Lomé to the south. The Ewe people inhabit Tsévié and the surrounding area. Pop. (1981) 20,247.

Tshaka (Zulu leader): *see* Shaka.

Tshangs-pa Dkar-po, in Tibetan Buddhism, one of the eight fierce protection deities. *See* dharmapāla.

Tshikapa, village, Kasai-Oriental region, Zaire, on the Kasai River, about 30 mi (50 km) north of the Angolan border. The noted diamond mining (arising after the first diamond was discovered in the area in 1907) fell off in the 1970s, but gravel quarrying remained important. The site has boat landings and an airport.

Tshombe, Moise(-Kapenda) (b. Nov. 10, 1919, Musumba, Belgian Congo—d. June 29, 1969, Algiers), politician, president of the secessionist African state of Katanga, and premier of the united Congo Republic (now Zaire) who took advantage of an armed



Tshombe
AP/Wide World Photos

mutiny to announce the secession of mineral-rich Katanga (now Shaba) province in July 1960. With covert military and technical assistance from Belgium and the aid of a white mercenary force, Tshombe maintained his independent Republic of Katanga for three years in the face of combined United Nations and Congolese efforts to end the secession of the province. Often accused of being a pawn of foreign commercial interests, Tshombe was an adroit politician, who used his foreign supporters to help him achieve his personal ambitions in the Congo.

Tshombe came from a wealthy family and at his father's death inherited sizable business holdings. After the businesses began to fail, however, Tshombe turned to politics. From 1951 to 1953 he was one of the few Congolese to serve on the Katanga Provincial Council. In 1959 he became president of Conakat (Confédération des Associations Tribales du Katanga), a political party that was supported by Tshombe's tribal group, the powerful Lunda, and by the Belgian mining monopoly Union Minière du Haut Katanga, which controlled the province's rich copper mines. At a conference called by the Belgian home government in 1960 to discuss independence for the Congo, Tshombe presented Conakat's proposals for an independent Congo made up of a loose confederation of semi-autonomous provinces. Tshombe's proposals, as well as those of other federationists such as Joseph Kasavubu, were rejected in favour of Patrice Lumumba's plan for a strongly centralized republic. Conakat won only 8 of 137 seats in the Congolese Parliament in the first national elections of May 1960, but Tshombe's party and its allies won a majority in Katanga's Provincial Assembly, and Tshombe became president of the province. Although he appeared to accept Lumumba's national government, with the mutiny of the Force Publique (militia) two weeks after independence, Tshombe declared Katanga independent.

After the ouster of Congolese Premier Lumumba by President Kasavubu and the army in September 1960, Tshombe opened negotiations with Kasavubu toward a possible end to Katanga secession but later abandoned the talks. He may have been implicated in the subsequent death of Lumumba. Tshombe failed to win diplomatic recognition for his state, and after the United Nations intervened with force in Katanga in January 1963 and defeated his troops, Tshombe fled to Spain. Recalled from exile in 1964 by President Kasavubu to assume the post of premier to quell a rebellion in the eastern Congo, Tshombe was dismissed in 1965, ostensibly for using white mercenaries against the rebels, though it is also contended that he was attempting to oust Kasavubu. Tshombe returned to Spain. In 1967, when there were rumours that he planned to return to the Congo, Tshombe was kidnapped and taken to Algeria. Algerian officials refused Congolese Pres. Joseph Mobutu's demands for Tshombe's extradition to stand trial for treason. Tshombe remained under house arrest near Algiers, where he died of a heart attack.

Ts'iao-tso (China): *see* Chiao-tso.

Tsimihety, a Malagasy people living in mountainous north central Madagascar. The Tsimihety ("Those Who Never Cut Their Hair") were originally sedentary mountain people living in extended families organized through patrilineal descent. They succeeded in remaining independent of the early Sakalava and Betsimisarake kingdoms but submitted to Merina rule in the 1820s and to French rule at the turn of the 20th century.

Tsimihety speak a dialect of Malagasy, the Austronesian West Indonesian language common to all Malagasy peoples. The Tsimihety have traditionally never been politically united but are now one of the most mobile and dynamic peoples of Madagascar. A high birth rate and strict rules for exogamous marriage obliged them to penetrate neighbouring areas in search of pastures for their cattle and land on which to grow their staple food, rice. The main area for Tsimihety expansion was toward the west, among the lands of the Sakalava people. Many Tsimihety sons also work as seasonal wage labourers on coffee or tobacco plantations throughout northern Madagascar.

Tsimlyansk Reservoir, Russian TSIMLYANSKOYE VODOKHRANILISHCHE, reservoir created by a giant barrage (dam) at the great bend of the Don River, near the town of Tsimlyansk in Rostov *oblast* (province), southern Russia. The reservoir, about 160 miles (257 kilometres) long, was constructed in 1950–51 in connection with the building of the Volga-Don Shipping Canal. It provides hydroelectric power and irrigation water for the extensive vineyards and market gardens along the lower Don.

Tsimshian, also spelled CHIMMESYAN, Indians of the North Pacific Coast of North America, inhabiting the mainland and islands around the Skeena and Nass rivers and Milbanke Sound in what is now British Columbia and Alaska. They speak any of three Tsimshian dialects: Niska, spoken along the Nass River; coastal Tsimshian, along the lower Skeena and the coast; and Kitksan (or Gitksan), along the upper Skeena. Tsimshian is classified as a Penutian language.

Like the economy of the Tlingit and Haida (*qq.v.*), that of the Tsimshian was based on fishing. Land animals were hunted during the winter; in summer, groups settled at permanent sites to trap migrating salmon and eulachon (candlefish). Eulachon were particularly valuable for their oil, which was made into a food highly regarded by many peoples of the area. Large, permanent winter houses, made of wood and often carved and painted, symbolized the wealth of Tsimshian families.

The coastal Tsimshian and the Niska were divided into four major clans, or kin groups; the Kitksan into three. These were further divided into local segments or lineages, descent being traced through the maternal line. Each lineage had its own fishing and hunting areas, berry grounds, house or houses, and heraldic crests representing events in the family history, as well as its own chiefs. It was generally an independent social and ceremonial unit. Local groupings, or tribes, were composed of several lineages; each lineage was ranked relative to the others, and the chief of the highest-ranked lineage was recognized as chief of the tribe. The tribe as a whole held properties such as the winter village site and participated in ceremonies and warfare.

The Tsimshian were known for their highly conventionalized applied art. Carved and painted columns (popularly known as "totem poles") were erected, primarily as memorials to deceased chiefs. The major Tsimshian potlatches, ceremonial distributions of gifts, had as their purpose the announcement and validation of the position of the new chief. Potlatches sometimes marked a series of events several years apart, such as house building, totem-pole raising, and dramatizations of privileges and crests.

Tsinan (China): *see* Chi-nan.

Tsing Hai (lake, China): *see* Koko Nor.

Tsinghai, Wade–Giles romanization CH'INGHAI, Pinyin QINGHAI, *sheng* (province) of northwestern China in the Tibetan highlands, bounded on the north and east by Kansu, on the southeast by Szechwan, on the south and west by the Tibetan Autonomous Region, and on the west and north by the Sinkiang Uighur Autonomous Region.

A brief treatment of Tsinghai follows. For full treatment, *see* MACROPAEDIA: China.

Tsinghai was a remote region of China, lying to the west of the historic provinces that made up China proper. Parts of it came under Chinese control in the 3rd century BC. For centuries it was sparsely occupied by nomadic herdsmen, chiefly Tibetans and Mongols, plus a few Chinese settlers on farms around the northeastern corner of Koko Nor (lake). The Chinese population increased over the years, and Tsinghai was made a Chinese province in 1928. Its capital is Hsi-ning.

Most of Tsinghai consists of mountains and high plateaus. Between these mountain ranges are broad valleys, rolling hilly areas, and extensive flat tablelands. The Tsaidam Basin, an immense, low-lying area, is in the northwestern part of the plateau. The basin's southeastern part forms a broad swamp which is in turn formed by several rivers flowing from the snowcapped T'ang-ku-la-shan-mo (mountain range). Tsinghai's climate is typically continental, influenced by the region's remoteness from the sea and its protection from sea winds by its mountain masses. Most rainfall occurs in the summer. Winters are dry, cold, and windy; summers are hot. Strong winds from the Mongolian Plateau blanket the region with sand, causing serious agricultural problems. The plateau thrives with grass, nevertheless,

and Tsinghai possesses some of China's best pasturelands for sheep, horses, and yaks. The region is a historic home of nomadic herdsmen and is noted for its horse breeding. Also found in the region are antelope, wild horses, wolf, fox, bear, and some exotic birds.

Besides the Han (Chinese), many national minorities live in Tsinghai, including Tibetan, Mongol, and Hui (Chinese Muslims). Although Tsinghai is China's fourth largest political unit in area, it is sparsely populated.

Economically, Tsinghai is divided into two parts by the Jihyneh Mountains. The eastern side takes advantage of drainage from the Huang Ho and has large tracts of farmland crisscrossed by irrigation canals and dotted with settlements. The principal crops raised are spring wheat, barley, and Irish potatoes. The western side is the plateau basin, where herds of cattle, yaks, horses, and sheep graze on the vast stretches of grassland. Most of the Tibetans and Mongols have long engaged in herding there. In the pastoral areas, large tracts of land have been opened up for cultivation, which has enabled the introduction of a farming-livestock economy. The Kunlun and Ch'i-lien mountains are well forested; among the timber products are spruce, birch, Chinese pine, and Chinese juniper. In nearby farming areas are found peach, apricot, pear, apple, and walnut orchards.

Crude oil is produced in the Tsaidam Basin oil field. The basin also has deposits of coal, iron ore, and other minerals, including potassium, which supplies a large fertilizer plant located there. The big salt lakes offer large reserves of borax and, especially, of salt. Industrial enterprises in Tsinghai, mostly in Hsining, include tanneries, match factories, and woollen textile and dairy facilities.

The province's first rail link with the rest of China was established in 1959. Truck transportation is important, and there are several main highways in the region. Area 278,400 square miles (721,100 square km). Pop. (2000 est.) 5,180,000.

Tsinghai-Tibet Plateau (China): *see* Tibet, Plateau of.

Tsingtao, Wade-Giles romanization CH'ING-TAO, Pinyin QINGDAO, port city, eastern Shantung *sheng* (province), China. Tsingtao is located on the south coast of the Shantung Peninsula at the eastern entrance to Kiaochow Bay, one of the best natural harbours in northern China. Although the bay sometimes freezes in severe winters, it is always open for large ships.

Originally a minor fishing village, Tsingtao developed a large junk trade in Ch'ing times (17th–20th century), when a customs station called Ch'ing-tao K'ou was established. With the establishment of the Peiyang (North Ocean) fleet in the 1880s, the Chinese government realized the strategic importance of Tsingtao, setting up a minor naval station and building fortifications there. In 1897 the German government, which had ambitions in this area, dispatched a force to occupy Tsingtao; in 1898 it forced the Chinese government to pay an indemnity and to grant Germany a 99-year lease on Kiaochow Bay and the surrounding territory, together with railway and mining rights in Shantung. Tsingtao was declared a free port in 1899, modern port facilities were installed, and a railway was built to Chi-nan (Tsinan). A modern European-style city was laid out, and a variety of industries were founded. A branch of the Imperial Maritime Customs was established to control the trade of the coast as far south as the new port of Lien-yün-kang in Kiangsu province. In 1914, when Japan declared war on Germany, its prime purpose was the capture of Tsingtao. The port capitulated after a blockade in November 1914. The Japanese continued to occupy the city until the Washington Conference of 1922, when the port was returned to China. During this period, however, the Japanese built up a strong position, both in Tsingtao itself and in the Shantung hinterland.

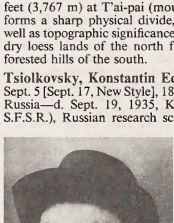
Tsingtao came under the effective control of the Nationalist government in 1929 and became a special municipality. Port development continued, and its trade overtook that of its rival, Tientsin, in about 1930, after which it continued to expand at the expense of Tientsin. The Japanese occupied the city in 1938 and held it until 1945. During this period, considerable industrial development occurred. By 1941 Tsingtao had major modern cotton mills, locomotive and railway car works and repair facilities, engineering shops, and factories manufacturing rubber, matches, chemicals, and dyestuffs. Its brewing industry produces one of the best-known beers of China. Since 1949 it has developed as a major base for heavy industry, and by the 1970s textiles, formerly the preeminent manufacture, were rivaled by the growth of the engineering industry. In the late 1950s a major primary iron and steel industry was established there. The city is the terminus of an east-west railway line and is linked by rail with the port of Yen-t'ai (Chefoo). It is also a large fishing port and is famous for its parks and beaches. In 1984 Tsingtao was designated one of China's "open" cities as part of a new policy inviting foreign investment.

Tsingtao, an important cultural centre, is the seat of Shantung University, Tsingtao Institute of Technology, Tsingtao Engineering College, and other institutions of higher education. The city is also home to three oceanographic institutes and is China's main centre for the pursuit of marine science and technology. Pop. (1999 est.) 1,702,108.

Tsining (China): *see* Chi-ning.

Tsinling Mountains, Wade-Giles romanization CH'IN LING, Pinyin QIN LING, mountain range in North China, extending east-west from southeast Kansu province into Shensi and Honan provinces. It is considered to be an extension of the Kunlun Mountains. It constitutes a watershed between the Wei and Han rivers and reaches a height of 12,359 feet (3,767 m) at T'ai-pai (mount). The range forms a sharp physical divide, of climatic as well as topographic significance, separating the dry loess lands of the north from the green, forested hills of the south.

Tsiolkovsky, Konstantin Eduardovich (b. Sept. 5 [Sept. 17, New Style], 1857, Izhevskoye, Russia—d. Sept. 19, 1935, Kaluga, Russian S.F.S.R.), Russian research scientist in aero-



Tsiolkovsky
Tass—Sovfoto

nautics and astronautics who pioneered rocket and space research and the development and use of wind tunnels for aerodynamic studies. He was also among the first to work out the theoretical problems of rocket travel in space.

Tsiolkovsky was from a family of modest means. His father, Eduard Ignatyevich Tsiolkovsky, a provincial forestry official, was a Polish noble by birth; his mother, Mariya Ivanovna Yumasheva, was Russian and Tatar. The boy lost his hearing at age nine as a result of scarlet fever; four years later his mother died. These two events had an important bearing on his early life in that, being obliged to study at home, he became withdrawn and lonely, yet self-reliant. Books became his friends. He developed an interest in mathematics and physics and, while still a teenager, began to speculate on space travel.

At 16 Tsiolkovsky went to Moscow, where he stayed for three years, studying chemistry, mathematics, astronomy, and mechanics, attending lectures with the aid of an ear trumpet, and expanding his grasp of the problems of flight. But the elder Tsiolkovsky understandably wanted his deaf son, notwithstanding his growing ability to deal with abstruse questions in physics, to achieve financial independence. After discovering that the youth was going hungry and overworking himself in Moscow, his father called him home to Vyatka in 1876.

The future scientist soon passed the teachers examination and was assigned to a school in Borovsk, about 60 miles (100 km) from Moscow, where he began his teaching career, married Varvara Yevgrafovna Sokolovaya, and renewed his deep interest in science. Isolated from scientific centres, the deaf teacher made discoveries on his own. Thus, in Borovsk, he worked out equations on the kinetic theory of gases. He sent the manuscript of this work to the Russian Physico-Chemical Society in St. Petersburg but was informed by the chemist Dmitry Ivanovich Mendeleyev that it already had been done a quarter century before. Undaunted and encouraged by Mendeleyev, he continued his research. Impressed by the intellectual independence of this young provincial schoolteacher, the Russian Physico-Chemical Society invited him to become a member.

In 1892 Tsiolkovsky was transferred to another teaching post in Kaluga, where he continued his research in astronautics and aeronautics. At that time he took up the problem that occupied almost all his life: the problem of constructing an all-metal dirigible with an adjustable envelope. In order to demonstrate the validity of his experiment, he built a wind tunnel, the first in Russia, incorporating into it features that would permit testing the aerodynamic merits of various aircraft designs. Since he did not receive any financial support from the Russian Physico-Chemical Society, he was obliged to dip into his family's household budget in order to build the tunnel; he investigated about 100 models of quite diverse designs.

Tsiolkovsky's experiments were subtle and extremely clever. He studied the effects of air friction and surface area on the speed of the air current over a streamlined body. The Academy of Sciences learned of his work and granted him modest financial aid of 470 rubles, with which he built a larger wind tunnel. Tsiolkovsky then compared the feasibility of dirigibles and airplanes, which led him to develop advanced aircraft designs.

While investigating aerodynamics, however, Tsiolkovsky began to devote more attention to space problems. In 1895 his book *Gryozy o zemle i nebe* (*Dreams of Earth and Sky*) was published, and in 1896 he published an article on communication with inhabitants of other planets. That same year he also began to write his largest and most serious work on astronautics, "Exploration of Cosmic Space by Means of Reaction Devices," which dealt with theoretical problems of using rocket engines in space, including heat transfer, a navigating mechanism, heating resulting from air friction, and maintenance of fuel supply.

The first 15 years of the 20th century un-

doubtedly were the saddest time of Tsiolkovsky's life. In 1902 his son Ignaty committed suicide. In 1908 a flood of the Oka River inundated his home and destroyed many of his accumulated scientific materials. The Academy of Sciences did not recognize the value of his aerodynamic experiments, and, in 1914, at the Aeronautics Congress in St. Petersburg, his models of an all-metal dirigible met with complete indifference.

In the final 18 years of his life, Tsiolkovsky continued his research, with the support of the Soviet state, on a wide variety of scientific problems. His contributions on stratospheric exploration and interplanetary flight were particularly noteworthy and played a significant role in contemporary astronautics. In 1919 Tsiolkovsky was elected to the Socialist Academy (later the Academy of Sciences of the U.S.S.R.). On Nov. 9, 1921, the council of the People's Commissars granted him a pension for life in recognition of his services in education and aviation. (M.S.A.)

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Tsitsihar, Wade–Giles romanization CH'I-CH'I-HA-ERH, Pinyin QIQIHAR, city, western Heilungkiang *sheng* (province), China. It is situated in the middle of the fertile Nen River plain, a part of the Manchurian Plain.

The site was originally settled by nomadic Tungus and Daghur herdsmen, who called it Pu-k'uei (a Daghur word meaning "frontier"). A settlement was also said to have been established there under the Mongols in 1333, but the town remained small until the 17th century. The Heilungkiang region then became important both because of the Russian eastward advance to the Pacific and because of increasing Chinese interest in the Amur River valley. Later its importance also grew because of the Manchu government's campaigns against the Mongols. Tsitsihar became the communications centre of Heilungkiang province, which was still sparsely inhabited, as well as a major garrison centre. The military government of Heilungkiang was transferred to the village of Tsitsihar in 1699. A military depot with barracks and arsenal was set up there, and many convicted criminals, both Chinese and Manchu, were exiled to the area.

In the 18th century Tsitsihar was a frontier town renowned for its gambling and sexual license. Nonetheless, it was also a centre of Chinese influence. Schools were established there for the Manchu garrison in 1744 and for the Chinese in 1796. Despite the heavy Chinese settlement, Chinese immigrants soon swamped the Manchus, so that by the end of the 18th century almost the entire urban population was Chinese-speaking. In the 1860s, after the territory north of the Amur had been ceded to the Russians, the Chinese government gradually opened up more and more land in the area to Chinese settlement.

By then Tsitsihar had become a city of some size, and by the end of the 19th century some industry had also been established. The completion of the Chinese Eastern Railway in 1903 made the city a centre for communications, and in the late 1920s and '30s a network of lines radiating from the city was extended into the northern part of Heilungkiang. By 1932 the city had a great concentration of handicraft industries.

Under the Japanese, who occupied the region from 1931/32 to 1945, Tsitsihar became a major military base, and its economic importance grew rapidly. Tsitsihar has become a large and important industrial city with an engineering industry producing heavy machinery, railroad equipment and rolling stock, machine tools, diesel engines, cranes, and other products. It has a large woodworking and timber industry, using timber from the Greater Khingan Range. There is a large paper mill, installed in 1954, which produces newsprint. Food processing is also important and includes the production of milk powder and other dairy produce (the Nen River plain is a dairy farming district), and there is sugar refining from local sugar beets. Pop. (1999 est.) 1,115,766.

Tskhinvali, also spelled CCHINVALI, formerly (1934–61) STALINIRI, city, north-central Georgia, on the Bolshaya Liakhvi River. It is the leading city of an area populated by a Caucasian people known as Ossetians, or Ossetes. Tskhinvali has varied industries, including electrical and mechanical engineering and food-processing and wood-working concerns. It also has a local museum, a teacher-training institute, and a medical school. Pop. (1991 est.) 42,600.

Tso chuan (Chinese: "Tso's Commentary"), Pinyin ZUO ZHUAN, ancient commentary on the *Ch'un-ch'iu,* and the first sustained narrative work in Chinese literature. The *Ch'un-ch'iu,* the first Chinese chronological history, chronicles events during the Spring and Autumn period (770–476 BC) of China's history. The *Tso chuan* is a detailed commentary on this work and provides extensive narrative accounts and ample background materials concerning the events chronicled in the *Ch'un-ch'iu.* The *Tso chuan* also provides authentic historical documents and written evidences (though fragmentary) of the philosophical schools of the time. As such, the *Tso chuan* is a comprehensive account of the principal political, social, and military events of the entire Spring and Autumn period. The commentary also occupies a seminal place in the history of Chinese literature because of its influential narrative style. Historical events and personages are presented directly through action and speech, and the book's third-person narrative is notable for its orderly structure and clear and laconic presentation.

The *Tso chuan* was once believed to have been written by Tso, an ancient historian about whom virtually nothing is known (his last name may have been Ch'iu-ming). The *Tso chuan* is now believed to have been compiled by an anonymous author during the early part of the Warring States period (475–221 BC). The *Tso chuan* is listed among the Nine, Twelve, and Thirteen Classics. *See also* Ch'un-ch'iu.

Tso Tsung-t'ang, Pinyin ZUO ZONGTANG (b. Nov. 10, 1812, Hsiang-yin, Hunan province, China—d. Sept. 5, 1885, Foochow, Fukien), Chinese administrator and military leader, one of the scholar-officials who worked to suppress the great rebellions that threatened the imperial government during the second half of the 19th century. Tso's efforts helped revive the declining Ch'ing dynasty (1644–1911/12) and reestablished the Chinese position in Central Asia.

Born into a well-connected, scholarly family, Tso passed his preliminary civil-service examinations and devoted himself to geographic and agricultural studies. Around 1850, when the Taiping Rebellion began to spread through South China, Tso helped organize local defense forces, and he soon became one of the top imperial commanders. By 1863 he was governor-general of Chekiang and Fukien and one of the most powerful figures in China.

In 1866 he was made governor-general of Shensi and Kansu to quell the Muslim rebels there. Tso slowly and systematically defeated the rebels, using a combination of effective taxation, encouragement of economic production, and Western technology. Following this campaign, he successfully argued in favour of attempting the reconquest of Chinese Central Asia (now Sinkiang Uighur Autonomous Region) from other Muslim rebels. Tso helped finance and supply his troops by building his own arsenal and woolen mill and forcing his troops to grow grain and cotton in their spare time. He not only destroyed the rebels but also reestablished Chinese power so convincingly that China regained, by the Treaty of St. Petersburg in 1881, the important border passes that Russia had occupied during the Muslim rebellion. A sick old man, blind in one eye, Tso was still not allowed to retire. In 1884 he was sent to South China and placed in charge of defenses in the war with France. He died soon after the peace settlement.

Tsong-kha-pa (b. 1357—d. 1419), Tibetan lama who founded a new Tibetan Buddhist sect known as the Dge-lugs-pa (*q.v.*), literally "Model of Virtue" but more commonly referred to as the Yellow Hat sect to distinguish it from the older Red Hat sect. Hoping to restore monastic discipline, Tsong-kha-pa enforced celibacy, required the wearing of yellow robes, and insisted on adherence to a rigorous routine. The sect eventually gained considerable influence in Mongolia; with Mongol aid, Tsong-kha-pa's successors were eventually (1642) installed as the rulers of Tibet with the title Dalai Lama.

Tsonga, also spelled THONGA, culturally similar Bantu-speaking peoples inhabiting the southern coastal plain of Mozambique, parts of Zimbabwe and Swaziland, and the Transvaal of South Africa. They numbered some 4.6 million in the late 20th century.

The Tsonga were formerly organized as independent peoples, each occupying its own territory and named for a powerful, dominant patrilineage. Early in the 19th century, however, they were conquered by the Nguni peoples.

Tsonga economy is based on mixed agriculture and pastoralism. Cassava is the staple; corn (maize), millet, sorghum, and other crops are also grown. Women do much of the agricultural work, although some men grow cash crops. Most Tsonga now depend on wage labour for cash, many migrating to Zimbabwe or South Africa to find work.

The settlement pattern is characterized by scattered villages of mud and wattle huts, each village being occupied by members of a patrilineage; descent, succession, and inheritance are also patrilineal. Polygyny is common, and a bride-price is paid. A man's livestock is apportioned among his wives for their support and for eventual inheritance by the children of each household. Widows are inherited by males of the dead husband's lineage.

Although many Tsonga are Christian, many also adhere to their own traditional religion, which entails constant attention to the propitiation of ancestral spirits. Illness and other misfortunes are usually attributed to the breaking of a taboo, to the anger of an ancestor, or to sorcery.

Tsou Yen, Pinyin ZOU YAN (b. 340—d. 260? BC), Chinese philosopher of the ancient state of Ch'i (present-day Shantung), and leading exponent of the Yin–Yang school. The only account of his life is a brief one in the *Shih chi* ("Historical Records"). To him is attributed the association of the Five Agents theory with the Yin–Yang doctrine. Nature was thought to consist of changing combinations of the Five Agents (metal, wood, water, fire, earth), which were governed by the basic dualism of the cosmic principles of Yin (Earth, female, passive, absorbing) and Yang (Heaven, male, active, penetrating).

Tsu, capital, Mie *ken* (prefecture), Honshu, Japan. It lies along the mouth of the Ano River, facing Ise Bay. Tsu developed around a 16th-century castle and served as a post town and trade centre for cotton during the Tokugawa era (1603–1867). A modern cotton mill established in Tsu in 1898 was followed after

World War II by factories producing electrical machines, glass, and appliances. During the 1960s shipbuilding facilities were expanded. Rice and wheat are produced in the surrounding area.

Tsu is an educational centre, containing Mie University (1949). The city has two large temples and a shrine. Tsu Park contains a museum, and the castle site is occupied by a library and a reconstructed (1958) castle turret. Pop. (1992 est.) 161,436.

Tsubouchi Shōyō, pseudonym of TSUBOUCHI YŪZŌ (b. June 22, 1859, Ōta, Fukui prefecture, Japan—d. Feb. 28, 1935, Atami), playwright, novelist, critic, and translator who occupied a prominent position in Japanese letters for nearly half a century. He wrote the first major work of modern Japanese literary criticism, *Shōsetsu shinzui* (1885–86; "The Essence of the Novel"), translated the complete works of William Shakespeare, and helped found the modern Japanese theatre.

The youngest son of a samurai (warrior class) family, Shōyō graduated from Tokyo Imperial University in 1883. He achieved fame in the 1880s as the translator of Sir Walter Scott, E.G.E. Bulwer-Lytton, and Shakespeare and as the author of nine novels and many political allegories advocating parliamentarism. In *Shōsetsu shinzui,* Shōyō attacked the loosely constructed plots and weak characterizations of contemporary Japanese novels and urged writers to concentrate on analyses of personality in realistic situations. His best-known novel, however, *Tōsei shoseikatagi* (1885–86; "The Character of Present-Day Students"), depicting the foolish adventures of a group of contemporary university students, suffered from the same weaknesses that he decried.

In 1883 Shōyō began teaching social science at the school that later became Waseda University. In 1890 he helped organize its faculty of letters and then helped establish Waseda Middle School, which he later headed. He founded (1891) and edited the literary journal *Waseda bungaku.* Shōyō was also one of the founders of the *shingeki* ("new drama") movement, which introduced the plays of Henrik Ibsen and George Bernard Shaw to Japan and staged modern plays by Japanese authors. In 1915 he retired to devote his time to his translation of Shakespeare.

Tsuchiura, city, Ibaraki *ken* (prefecture), Honshu, Japan, on the western shore of Lake Kasumi. A castle was constructed on the city site during the Muromachi period (1338–1573), and Tsuchiura grew to be a flourishing centre of land and sea transportation. Fishing was also highly developed. The Jōban Line (railway) was opened through Tsuchiura in 1896, and in 1920 a Japanese naval base and related machinery and construction industries were established. The city's importance declined somewhat after World War II, but it has since regained its status as a prominent administrative, commercial, and cultural centre. Improved transportation has led to its development as a suburb of the Tokyo-Yokohama metropolitan area. Pop. (1995) 132,243.

Tsugaru Strait, Japanese TSUGARU-KAIKYŌ, strait of the northwest Pacific extending east from the Sea of Japan to the open ocean between the Japanese islands of Honshu and Hokkaido. It is 15 to 25 miles (24 to 40 km) wide. The strait takes the Tsugaru Current, a warmer and saltier flow that is an extension of the Tsushima Drift, and carries it into the Pacific. Hakodate is a port city on Hokkaido; Aomori is its complement on Honshu. The Seikan Tunnel linking Aomori and Hakodate cities runs beneath the strait.

Tsui, Daniel C., in full DANIEL CHEE TSUI (b. Feb. 28, 1939, Honan province, China), Chinese-born American physicist who, with Horst L. Störmer and Robert B. Laughlin, received the 1998 Nobel Prize for Physics for the discovery and explanation of the fractional quantum Hall effect.

After receiving a Ph.D. in physics from the University of Chicago in 1967, Tsui joined the research staff at Bell Laboratories (Murray Hill, New Jersey), where he and Störmer made their prizewinning discovery. Tsui became a professor at Princeton University in 1982.

Tsui and Störmer's research was based on the Hall effect, which is the development of a crosswise electric field in current-carrying ribbon whose surface lies perpendicular to a strong magnetic field. This transverse electric field results from the force that the magnetic field exerts on the moving particles of the electric current. In 1980 Klaus von Klitzing discovered that at extremely low temperatures, though the strength of the applied magnetic field was increased smoothly, the corresponding change in electrical resistance occurred in discrete steps or jumps, thereby displaying quantum properties. In 1982 Tsui and Störmer studied this quantum Hall effect at temperatures near absolute zero and under extremely powerful magnetic fields. They found the quantum changes in electrical potential to occur in fractional increments of the steps observed by Klitzing, a result that could not be explained by existing theoretical models. In 1983 Laughlin posited that in a powerful magnetic field, electrons condense and form a quantum fluid in which their fractional charges become observable.

Tsukuba Science City, also called TSUKUBA ACADEMIC CITY, Japanese TSUKUBA KENKYŌ GAKUEN TOSHI, city, Ibaraki *ken* (prefecture), central Honshu, Japan. It is located 35 miles (56 km) northeast of Tokyo, just south of Mount Tsukuba. Surrounded by farmland, this highly planned research and education community incorporates five towns and one village.

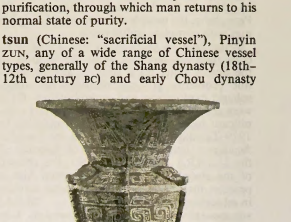
Tsukuba Science City was developed in the 1970s and '80s to stimulate scientific discovery. Its constituent municipalities were administratively united in 1987. The city has 46 national research institutes and two universities, as well as more than 240 private research facilities; nearly half of Japan's public research and development budget is spent in Tsukuba. Among the most prominent institutions are the University of Tsukuba (1973; formerly Tokyo University of Education), the High Energy Accelerator Research Organization (KEK), the Electrotechnical Laboratory, and the National Institute of Materials and Chemical Research.

Tsumeb, company town, north-central Namibia. At an elevation of 4,232 feet (1,290m), the town is a northern terminus of the country's north-south railway and lies on a main trunk highway about 275 miles (440 km) north of Windhoek, the capital.

The Tsumeb area features copper ore deposits, and in 1903 an Anglo-German company acquired mining rights. The town remained a small copper-mining centre until the Tsumeb mine was purchased in 1947 by the largely U.S.-based Tsumeb Corporation, Ltd. It has since been developed as a planned company town, exploiting mineral deposits that include significant amounts of lead and copper as well as zinc, cadmium, silver, and germanium (a metalloid element used as a semiconductor). An integrated copper and lead smelter treats concentrates from Tsumeb and other mines. Southwest of Tsumeb is the site of the final German troop surrender to South African forces in World War I. Pop. (1991) 16,211.

tsumi, in the Shintō religion of Japan, a state of defilement or impurity resulting from the commission of unnatural or criminal acts. Incest, contact with the pollution of blood or death, and agricultural vandalism are prominent examples of *tsumi.* The term also covered sickness, disaster, and error, all beyond the control of man. *Tsumi* were thought to hinder the proper growth of the life force and result in a state of ritual impurity. Both ancient and modern Shintō are in agreement that defilement can be erased by some form of purification, through which man returns to his normal state of purity.

tsun (Chinese: "sacrificial vessel"), Pinyin ZUN, any of a wide range of Chinese vessel types, generally of the Shang dynasty (18th–12th century BC) and early Chou dynasty



Bronze *tsun* inlaid with black lacquer, Shang dynasty (18th–12th century BC); in the Metropolitan Museum of Art, New York City.
By courtesy of the Metropolitan Museum of Art, New York, Rogers Fund, 1943

(1111–*c.* 900 BC), all of which have an ample interior volume probably meant for containing wine. There are two essential varieties of *tsun.* One is tall and somewhat trumpet-shaped. The other variety consists of various animal shapes, often densely embellished with animal decoration.

ts'un (Chinese: "wrinkles"), Pinyin CUN, in Chinese painting, brushstrokes or dabs that give texture, or surface, to the pictorial elements. The Chinese artist does not strive for illusionistic modeling dependent upon the manipulation of light and shade; rather, after the forms are outlined, texture strokes are used to give character to the form. Over the ages, Chinese painters and critics have codified *ts'un* into many different types—including 25 basic ones; there are texture strokes for trees, rocks, raindrops, mountains, and virtually every other kind of natural phenomenon. Various painters are noted for having either invented or specialized in certain types; the artist's personality and expressive intent is thus specified by the "texture method" (*ts'un-fa*) that he employs.

Tsun-i, Pinyin ZUNYI, city in northern Kweichow *sheng* (province), China. Tsun-i is situated on the main route from Kuei-yang in the south to Chungking in the north.

The city was brought under regular Chinese administration only in the early 7th century AD. A county was set up there in 640, and its present name, Tsun-i, was given in 642. It remained the seat of Tsun-i *hsien* (county), but the area did not begin to be developed until Ming times (1368–1644). The county seat, originally to the west, was established on its present site under the Sung dynasty (960–1279). Tsun-i achieved fame as a result of the Long March (1934–35) of the Communist armies northwestward from their bases in Kiangsi province, which took them through Tsun-i. In 1935 the Central Political Bureau of the Chinese Communist Party held a conference there at which Mao Zedong, the future founder of the Chinese Communist state, finally established his dominance in the party over rival leaders in it who did not share his views on revolutionary strategy.

Until 1949 Tsun-i was not much more than a local market town dependent upon Kueiyang. During the period of the First Five-Year Plan (1953–57), Tsun-i expanded considerably, was designated a city, and became an industrial centre. The old town, primarily administrative, was joined by a newer area containing the commercial and industrial quarters. A silk textile mill, rice and flour mills, small engineering works, and a chemical industry producing phosphates were established. The surrounding area also became important for the production of manganese. In the late 1950s large iron- and steelworks were built at Tsun-i. Pop. (1990) 261,862.

tsunami, also called SEISMIC SEA WAVE, or TIDAL WAVE, catastrophic ocean wave, usually caused by a submarine earthquake occurring less than 50 km (30 miles) beneath the seafloor, with a magnitude greater than 6.5 on the Richter scale. Underwater or coastal landslides or volcanic eruptions also may cause a tsunami. The term tidal wave is more frequently used for such a wave, but it is a misnomer, for the wave has no connection with the tides.

After the earthquake or other generating impulse, a train of simple, progressive oscillatory waves is propagated great distances at the ocean surface in ever-widening circles, much like the waves produced by a pebble falling into a shallow pool. In deep water, the wavelengths are enormous, about 100 to 200 km, and the wave heights are very small, only 0.3 to 0.6 m (1 to 2 feet). The resulting wave steepness, or ratio of height to length, ranges between 3/2,000,000 and 6/1,000,000. This extremely low steepness, coupled with the waves' long periods that vary from five minutes to an hour, enables normal wind waves and swell to completely obscure the waves in deep water. In any progressive oscillatory wave, the actual water motion at the surface consists of a vertical orbit with a diameter equal to the wave height, coming full circle during the period of the wave. Thus, a surface-water particle or a ship in the open ocean experiences the passage of a tsunami as an insignificant rise and fall of only 0.3 to 0.6 m, lasting from five minutes to an hour.

The surface orbital motion of any progressive oscillatory wave is transmitted diminishingly downward through the water, becoming insignificant at a depth below the surface equal to approximately half the wavelength. Tsunamis, however, being enormously longer than even the greatest ocean depths, experience significant retardation of orbital motion near the seafloor and behave as shallow-water waves regardless of the depth of the ocean the waves are propagated across. The velocity of shallow-water waves is controlled by this friction with the bottom, obeying the formula $c = \sqrt{gD}$ in which c is the wave velocity, g is the acceleration of gravity, and D is water depth. This relationship was used to determine the average depth of the oceans in 1856, long before many deep-sea soundings had been taken. Assuming an average velocity for seismic sea waves of about 200 m per second (450 miles per hour), an average oceanic depth of about 4,000 m is obtained; this figure compares very well with the modern estimate of 3,808 m. The relationship has enormous practical value, enabling seismologists to issue warnings to endangered coasts immediately after an earthquake and several hours before the arrival of the tsunamis.

As the waves approach the continental coasts, friction with the increasingly shallow bottom reduces the velocity of the waves. The period must remain constant; consequently, as the velocity lessens, the wavelengths become shortened and the wave amplitudes increase, coastal waters rising as high as 30 m in 10 to 15 minutes. By a poorly understood process, the continental shelf waters begin to oscillate after the rise in sea level. Between three and five major oscillations generate most of the damage; the oscillations cease, however, only several days after they begin.

Tsunamis are reflected and refracted by nearshore bottom topography and coastal configurations as any other water waves. Thus, their effects vary widely from place to place. Occasionally, the first arrival of tsunami at a coast may be a trough, the water receding and exposing the shallow seafloor. Such an occurrence in Lisbon, Port., on Nov. 1, 1755, attracted many curious people to the bay floor; and a large number of them were drowned by the succeeding wave crest that arrived only minutes later. Perhaps the most destructive tsunami was the one that occurred in 1703 at Awa, Japan, killing more than 100,000 people. The spectacular underwater volcanic explosions that obliterated Krakatau (Krakatoa) Island on Aug. 26 and 27, 1883, created waves as high as 35 m in many East Indies localities, killing more than 36,000 people.

Tsuneaki (Japanese painter): *see* Tosa Mitsuoki.

ts'ung, Pinyin CONG, Chinese jade form found primarily in the Shang (18th–12th century BC) and Chou (1111–255 BC) dynasties. A hollow cylinder or truncated cone enclosed in a rectangular body, the *ts'ung* varies in proportion from squat to quite tall.

The outer flat surfaces are usually embellished with horizontal segments at the corners, while the planar surfaces are decorated with lines and other abstract designs. The *ts'ung* may have been used as an astronomical instrument, or it may have been a symbol for



Brown and black jade *ts'ung*, Han dynasty (206 BC–AD 220); in the Field Museum of Natural History, Chicago

By courtesy of the Field Museum of Natural History, Chicago

the "earth" (a counterpart to the symbolic "heaven" of the *pi*), or it may have served an entirely different, unknown function.

Tsuruga, city, Fukui *ken* (prefecture), Honshu, Japan. It faces Tsuruga Bay of the Sea of Japan. A flourishing port since early historic times, it was one of the main centres of communication with the Asian mainland and a major shipment centre for the former national capitals of Nara and Kyōto. Tsuruga's industrial base was developed after World War II with factories producing synthetic fibres, chemicals, and cement. The city is also the site of four nuclear-power plants, each using a different type of reactor. Pop. (1990) 68,039.

Tsuruoka, city, Yamagata *ken* (prefecture), Honshu, Japan, in the Shōnai Plain. Tsuruoka developed as a castle town during the Tokugawa period (1603–1867), and most of its buildings are of that period. Traditional industries produce candles, silk textiles, and sake (rice wine). After the Meiji period (1868–1912), large textile and agricultural machinery factories became established. The city is also a distribution centre for rice and timber produced in the surrounding region.



Chido Museum, Tsuruoka, Japan

Photos Pack

Tsuruoka Park, on the old castle site, contains the Shōnai Shrine dedicated to the god of war. The city houses the Chido Museum, known for its collection of folk art, and the home in which the novelist and literary critic Takayama Rinjirō was born. Pop. (1990) 99,891.

Tsuruya Namboku IV, original name EBIYA GENZŌ, also called DAI NAMBOKU (b. 1755, Edo [now Tokyo], Japan—d. Dec. 23, 1829, Edo), Japanese Kabuki playwright of the late Tokugawa period (1603–1867), known for his plays with supernatural themes and macabre and grotesque-looking characters.

Little is known of his early years, but in 1755 he became an apprentice of the dramatist Sakurada Jisuke I. About 1780 he married the daughter of Tsuruya Namboku III, a well-known Kabuki actor of the time. After a long apprenticeship he finally became the chief playwright for the Kawarazaki Theatre in Edo about 1801. He took the name Tsuruya Namboku IV in 1811.

His first major success was *Tenjiku Tokubei ikoku-banashi* (1804; "Tokubei of India: Tales of Strange Lands"), written for the leading actor of the day, Onoe Matsusuke I. Namboku wrote for the virtuoso performer, and his originality and stagecraft were immensely popular among the Kabuki patrons of Edo. In all he wrote some 120 plays. Using his specialty, ghostly themes, he vividly portrayed the lives of commoners, interweaving cruelty, humour, and pathos. His most popular works include *Osome Hisamatsu ukina no yomiuri* (1813; "Osome and Hisamatsu: A Scandal Sheet") and *Tōkaidō Yotsuya kaidan* (1825; "Ghost Story of Tōkaidō Yotsuya").

Tsushima, archipelago, Nagasaki *ken* (prefecture), off the coast of southeastern Japan. The islands lie in the Korea Strait separating Japan and Korea, and divide the strait into the Tsushima Strait (west) and the Korea Strait (east). The archipelago consists principally of two rocky islands, Kami and Shimo, which are separated at one point by only a narrow channel. Kami has an area of 98 square miles (255 square km), while Shimo has an area of 174 square miles (450 square km).

The islands are heavily forested, and lumbering is the principal economic activity. Shiitake mushrooms, millet, soybeans, and buckwheat are produced on the limited agricultural land. The archipelago is part of the Iki-Tsushima Quasi-National Park. The principal towns are Izuhara (the administrative centre) and Kechi on Shimo and Hitakasu on Kami.

Historically, the archipelago was a stepping-stone between Korea and Japan, and through-

out its early history it was raided by Korean and Japanese pirates. From the 12th century to 1868 the islands were the fief of the Sō daimyo family, who often acted for Japan in diplomatic relations with Korea. During Mongol attempts to invade Japan in 1274 and 1281, the islands' population was massacred. In 1905 a Russian fleet was defeated by Japan in the Battle of Tsushima, which took place north of the islands. Pop. (1995 prelim.) 43,512.

Tsushima, Battle of (May 27–29, 1905), naval engagement of the Russo-Japanese War, the final, crushing defeat of the Russian navy in that conflict.

The Japanese had been unable to secure the complete command of the sea because the Russian naval squadrons at Port Arthur and Vladivostok made sorties and both sides suffered losses in the ensuing engagements. Meanwhile, the Russian government decided to send the Baltic Fleet all the way to the Far East under the command of Admiral Zinovy Petrovich Rozhestvensky to link up with the Pacific Squadron at Port Arthur, upon which the combined fleets would overwhelm the Japanese navy. The Russian Baltic Fleet, having spent the whole summer fitting out, sailed from Liepaja on Oct. 15, 1904. Off the Dogger Bank (in the North Sea) on October 21, several Russian ships opened fire on British trawlers in the mistaken belief that they were Japanese torpedo boats, and this incident aroused such anger in England that war was only avoided by the immediate apology and promise of full compensation made by the Russian government. At Nossi-Bé, near Madagascar, Rozhestvensky learned of the surrender of Port Arthur to Japanese forces and proposed returning to Russia; but, expecting naval reinforcements, which had been sent from the Baltic via Suez early in March 1905 and which later joined him at Camranh Bay (Vietnam), he decided to proceed. His full fleet amounted to a formidable armada, but many of the ships were old and unserviceable and their crews were poorly trained. Early in May the fleet reached the China Sea, and Rozhestvensky made for Vladivostok via the Tsushima Strait. Admiral Togō Heihachirō's fleet lay in wait for him on the south Korean coast near Pusan, and on May 27, as the Russian Fleet approached, he attacked. The Japanese ships were superior in speed and armament, and, in the course of the two-day battle, two-thirds of the Russian Fleet was sunk, six ships were captured, four reached Vladivostok, and six took refuge in neutral ports. It was a dramatic and decisive defeat; after a voyage lasting seven months and when within a few hundred miles of its destination, the Baltic Fleet was shattered, and, with it, Russia's hope of regaining mastery of the sea was crushed.

Tsutsumi FAMILY, family of Japanese businessmen who built two vast corporate empires as Japan made the transition from a manufacturing-based to a service-based economy in the late 20th century.

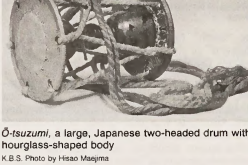
Born into a peasant family, Tsutsumi Yasujiro (b. 1889, Shiga prefecture, Japan—d. April 26, 1964) graduated from Waseda University in 1913. He founded the Kokudo Keikaku land-management company in 1918 and began buying real estate on a significant scale in the 1920s. He also entered politics, being elected to the House of Representatives in 1924 and reelected 12 times after that. Yasujiro laid the basis of his fortune in the years immediately following World War II, when he was able to buy large tracts of land in Tokyo and other important locations at bargain prices from ruined aristocrats and others who had been impoverished by the war. He then began building suburban railways, resorts, hotels, department stores, and golf courses. His various business concerns were unified under the Seibu Railway Co., Ltd. His political career climaxed when he served as speaker of the House of Representatives in 1953–54. At his death in 1964 he was one of the wealthiest men in Japan.

Yasujiro fathered numerous children by three successive wives and various mistresses. Tsutsumi Yoshiaki (b. May 29, 1934) inherited the bulk of his father's fortune, becoming president of Seibu Railway Co. and the principal shareholder in Kokudo Keikaku. The owner of the largest private railroad company in Japan, Yoshiaki built many hotels, amusement parks, resorts, golf courses, and sports centres adjacent to his network of railway lines radiating from Tokyo. By the early 1990s he was the largest private landowner in Japan and, owing to the spectacular rise in Japanese real-estate values, one of the world's wealthiest people.

The other prominent son of Yasujiro was Seiji (b. March 30, 1927), who in 1964 received only a single department store as his share of his father's inheritance. But Seiji was able to parlay this property into the Seibu chain of luxury department stores, which by 1990 had become Japan's largest department store chain. Seiji also built up The Seiyu, Ltd., a large chain of discount department stores, and he diversified into a vast array of other retailing, financial, and leisure-time services. His more than 100 companies were unified in the Saison Group conglomerate, which in 1988 purchased the Inter-Continental Hotel chain of luxury hotels in the United States, Europe, and the Middle East. An unconventional and artistically inclined businessman, Seiji was also a well-known author of poems and short stories under the pen name of Tsuji Takashi. Yoshiaki and Seiji kept their corporate empires separate and in fact were said to be intensely competitive rivals of one another.

Tsuyama, city, Okayama *ken* (prefecture), Honshū, Japan. It lies along the upper Yoshii River, in the centre of the Tsuyama basin. A castle was built there in 1442. An important post town during the Tokugawa period (1603–1867), Tsuyama is still a centre of traditional home industries, producing *tabi* (socks), sickles, and silk gauze textiles. The remains of the castle and old buildings around it attract tourists. In the suburban agricultural area, rice, wheat, and dairy cattle are raised. Pop. (1995 prelim.) 91,168.

tsuzumi, any of various Japanese two-headed drums with hourglass-shaped (waisted) bodies. Ancient Japanese court orchestra music had three types of these drums, of which



Ō-tsuzumi, a large, Japanese two-headed drum with hourglass-shaped body
K.B.S. Photo by Hisao Maejima

only the *san no tsuzumi* form survives in *komagaku* style (courtly music of Japanese, Korean, and other non-Chinese, non-Indian ancestry). Better-known *tsuzumi* are found in the music of Nō and Kabuki theatres. The smaller *ko-tsuzumi* is held on the player's right shoulder and hit with fingers of the right hand, producing four soft sounds by changing encircling rope tensions with gentle left-hand squeezes. Resonance is altered by thin paper (*choshigami*) applied to the centre of the rear horsehide skin. By contrast, the cowhide skins of the large *ō-tsuzumi* are heated before being tied tightly against the body. The instrument, held on the left hip, produces a crackling sound when one head is struck with the central fingers of the right hand, which sometimes are covered with hard paper thimbles to intensify the sound.

Related to these drums is the *changko,* a large hourglass-shaped drum with two heads, prominent in much Korean music. Their kinship is seen in their construction: the skins are sewn to hoops wider in diameter than the instrument body and are held tightly against it by the bracing ropes.

tsuzure, Japanese tapestry, the full name of which is *tsuzure-nishiki* ("polychrome tapestry"). They were usually woven of silk on cotton warp covered with silk, gold, or silver threads. *Tsuzure* techniques reached Japan from China in the late 15th or early 16th century during the Muromachi (Ashikaga) period (1338–1573). Production was at its height in the Tokugawa period (1603–1867), particularly early in the 17th century and throughout the 18th century. *Tsuzure* was used mainly for robes and gift wrapping.

Tsvet, Mikhail Semyonovich, Tsvet also spelled TSVETT, or TSWETT (b. May 14, 1872, Asti, Italy—d. June 26, 1919, Voronezh, Russian S.F.S.R.), Russian botanist who developed the adsorption chromatography technique of separating plant pigments by extracting them from leaves with ether and alcohol and percolating the solution through a column of calcium carbonate.

Tsvet studied in Geneva, Switz., receiving his doctorate in 1896, and in 1901 he received a degree from the University of Kazan in Russia. In 1902 he became a laboratory assistant at the University of Warsaw, and in 1908 he began teaching botany and microbiology at the Warsaw Technical University. Tsvet took part in the university's evacuation to Moscow and then to Nizhny Novgorod during World War I. In 1917 he became professor and director of the botanical garden at Yuryev (later Tartu) University in Estonia, which in 1918 was transferred to Voronezh.

Tsvet was noted for his research on plant pigments, especially chlorophyll, of which he discovered several new forms, and the carotenoids, a term he first coined.

Tsvetayeva, Marina Ivanovna, married name MARINA IVANOVNA EFRON (b. Sept. 26 [Oct. 8, New Style], 1892, Moscow, Russia—d. Aug. 31, 1941, Yelabuga), Russian poet whose verse is distinctive for its staccato rhythms, originality, and directness and who, though little known outside Russia, is considered one of the finest 20th-century poets in the Russian language.

Tsvetayeva spent her youth predominantly in Moscow, where her father was a professor at the university and director of a museum and her mother was a talented pianist. The family traveled abroad extensively, and at the age of 16 she began studies at the Sorbonne. Her first collection of poetry, *Vecherny albom* ("Evening Album"), appeared in 1910. Many of her best and most typical poetical qualities are displayed in the long verse fairy tale *Tsardevitsa* (1922; "Tsar-Maiden").

Tsvetayeva met the Russian Revolution with hostility (her husband, Sergei Efron, was an officer in the White counterrevolutionary army), and many of her verses written at this time glorify the anti-Bolshevik resistance. Among these is the remarkable cycle *Lebediny stan* ("The Swans' Camp," composed 1917–21, but not published until 1957 in Munich), a moving lyrical chronicle of the Civil War viewed through the eyes and emotions of the wife of a White officer.

Tsvetayeva left the Soviet Union in 1922,

going to Berlin and Prague, and finally, in 1925, settling in Paris. There she published several volumes of poetry, including *Stikhi k Bloku* (1922; "Verses to Blok") and *Posle Rossii* (1928; "After Russia"). She also composed two poetical tragedies on classical themes, *Ariadne* (1924) and *Phaedra* (1927), several essays on the creative process, and works of literary criticism, including the monograph *Moy Pushkin* (1937; "My Pushkin"). Her last cycle of poems, *Stikhi k Chekhii* (1938–39; "Verses to the Czech Land"), was an impassioned reaction to Nazi Germany's occupation of Czechoslovakia.

In the 1930s Tsvetayeva's poetry increasingly reflected alienation from her émigré existence and a deepening nostalgia for Russia. At the end of the '30s her husband—who had begun to cooperate with the communists—returned to the Soviet Union, taking their daughter with him (both of them were later to become victims of Joseph Stalin's terror). In 1939 Tsvetayeva followed them, settling in Moscow, where she translated poetry. The evacuation of Moscow during World War II sent her to a remote town where she had no friends or support. She committed suicide in 1941.

BIBLIOGRAPHY. Simon Karlinsky, *Marina Tsvetaeva* (1985); Elaine Feinstein, *A Captive Lion* (1987); Lily Feiler, *Marina Tsvetaeva* (1994).

Tswana, also called BATSWANA OR BOTSWANA, formerly spelled BECHUANA, westerly division of the Sotho (*q.v.*), a Bantu-speaking people of South Africa, Botswana, Zimbabwe, and Namibia. The Tswana comprise several groups, the most important of which (numerically speaking) are the Hurutshe, Kgatla, Kwena, Rolong, Tlhaping, and Tlokwa. They numbered some 5 million in the early 21st century.

The Tswana live in a grassland environment where they practice animal husbandry and subsistence agriculture based on corn (maize) and sorghum. Large numbers of Tswana men make seasonal and periodic migrations to the mining and industrial centres of South Africa.

Tswana material culture reflects the widespread intrusion of European goods and standards. Housing forms range from the traditional circular single-roomed dwelling with conical thatched roof to multiroomed rectangular houses with roofs of corrugated iron. European dress prevails. Every Tswana is part of a patrilineal descent group, each of which is associated with a distinctive symbol that serves as a polite mode of address and sometimes as a surname. In self-administering political units, especially those of Botswana, the basic social unit is the ward, a readily identifiable, self-contained social and administrative entity comprising a number of lineally related families and their dependents and servants. Its leader is usually the head of the senior family. Ward identification is strong, but so are ties to age groups (age sets, or regiments) that cut across ward loyalties.

Ethnic group membership includes alien elements, and Tswana members are often in a minority, so that a Tswana group accordingly lacks cultural and even linguistic uniformity. The chief rules with the assistance of advisers and officials, but at the same time all matters of public policy usually require the approval of a general council open to all adult males.

Ṭu bi-Shevaṭ (Hebrew: "Fifteenth of Shevaṭ"), Jewish festival of the new year of trees, or arbor day. It occurs on Shevaṭ 15 (January or early February), after most of the annual rain in Israel has fallen and when, thereafter, the fruit of a tree is considered, for tithing, to belong to a new year. In modern Israel, the day has become popular in symbolizing the reclaiming of land from the desert for agriculture.

T'u-chia, an official nationality of China distributed over south-central areas including western Hunan, southwestern Hupeh, and eastern Szechwan provinces. The T'u-chia numbered some 6 million at the turn of the 21st century. Fewer than 250,000 speak either Northern T'u-chia or Southern T'u-chia, both Tibeto-Burman languages of the Sino-Tibetan language family. Chinese is their native language, though many also understand the language of the neighbouring Miao (Hmong) people, to whom they are related. Like the Miao, the T'u-chia grow corn (maize), wet rice, wheat, and sweet potatoes on small terraced fields in the foothills and narrow valleys of their homeland. They also cultivate tea, tung, oranges, peppers, eggplants, sesame, sunflowers, and galla nuts and sell tung oil, tea, ramie, beets, cotton, medicinal herbs, and many other products at local markets. They are noted for their handicrafts, particularly their weaving and embroideries. In their distinctive traditional dances, the T'u-chia use a great variety of hand gestures to describe their daily life. Their religious beliefs include Taoism, ancestor worship, and shamanism.

Tu-chiang-yen, Pinyin DUJIANGYAN, city in central Szechwan province (*sheng*), China. Some 30 miles (48 km) northwest of Ch'eng-tu, the provincial capital, it is located at the western rim of Ch'eng-tu plain, near the middle reaches of Min River. Tu-chiang-yen is essentially a tourist city; its famous Tu-chiang-yen Irrigation System and nearby Mount Ch'in-ch'eng (Qincheng) were added to UNESCO's World Heritage list in 2000. The irrigation system is an ancient water control complex devised by Li Ping, a local administrator during the time of Warring States (475–221 BC). It includes a dike that divides the torrential flow of the river into inner and outer flows. While the outer flow drains the floodwater, the inner flow is redirected to irrigate the farmland. With additional dams, sluices, and channels, the system freed the plain of floods and droughts and ensured agricultural success. Mount Ch'in-ch'eng is considered the birthplace of Taoism, the mystical religio-philosophical tradition born in China.

The city is a collection and distribution centre for local output of Chinese medicine, tea, and Chinese kiwi fruit, and some small industries are present. Pop. (1999 est.) 154,867.

Tu Duc, original name NGUYEN PHUOC HOANG NHAM (b. Sept. 22, 1829, Hue, Vietnam—d. July 9, 1883, Hue), emperor of Vietnam known for his conservatism and isolationism, whose acts helped precipitate the French conquest of Vietnam.

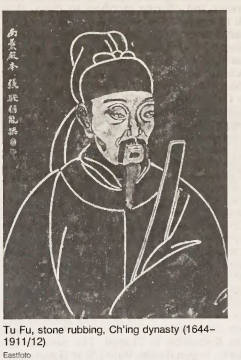
A son of Emperor Thieu Tri, he was chosen over his older brother to succeed his father. He took the reign name Tu Duc when he ascended the throne in 1847. He continued his father's persecution of missionaries and opposition to engagement with Europe. The decapitation of the Spanish bishop José María Díaz in 1857 brought reprisals: French forces occupied Tourane (Da Nang) in 1858 and defeated the Vietnamese at several key centres in southern Vietnam. Tu Duc was forced in 1862 to cede to France his three southern provinces (known to the French as Cochinchina) in a treaty that was later disputed.

Tu Duc's reign was further disrupted by rebellions in 1865. In 1873, after a French attack on the citadel of Hanoi, he granted trade concessions to France and opened the Red River in the north to European commercial shipping. He appealed to China for protection, pleading the cause of Vietnam as one of China's vassal states, but within four years of his death, the French had established the Indochinese Union.

Tu Fu, Pinyin DU FU, also called TU KUNG-PU or TU SHAO-LING, courtesy name (*tzu*) TZU-MEI (b. 712, Kung-hsien, now in Honan province, China—d. 770, en route between Tan-chou and Yüeh-yang, Hunan province), Chinese poet, considered by many literary critics to be the greatest of all time.

Born into a scholarly family, Tu Fu received a traditional Confucian education but failed in the imperial examinations of 735. As a result, he spent much of his youth traveling. During his travels he won renown as a poet and met other poets of the period, including the great Li Po (*q.v.*). He flirted briefly with Taoism while traveling with Li Po, but he returned to the capital and to the Confucianism of his youth. All his life he retained his strong admiration for his older, freewheeling contemporary, but he never again saw Li Po.

During the 740s Tu Fu was a well-regarded member of a group of high officials, even though he was without money and official position himself and failed a second time in an imperial examination. He married, probably in 741. He tried for five years (751–755) to attract imperial attention and finally won a nominal position at court. In 755 during An Lu-shan's rebellion, Tu Fu experienced extreme personal hardships. He escaped, however, and in 757 joined the exiled court, being given the position of censor. His memoranda to the emperor do not appear to have been particularly welcome; he was eventually relieved of his post and endured another period



Tu Fu, stone rubbing, Ch'ing dynasty (1644–1911/12)
Eastfoto

of poverty and hunger. Wandering about until the mid-760s, he briefly served a local warlord and acquired some land, but in 768 he again started traveling aimlessly toward the south. Popular legend attributes his death (on a boat on the way to Hunan) to overindulgence in food and wine after a 10-day fast.

Tu Fu's early poetry celebrated the beauty of the natural world and bemoaned the passage of time. He soon began to write bitingly of war, as in "Ping-ch'ü hsing" ("The Ballad of the Army Carts"), about conscription, and with hidden satire, as in "Li-jen hsing" ("The Beautiful Woman"), which speaks of the conspicuous luxury of the court. As he matured, and especially during the tumultuous period of 755 to 759, his verse began to express profound compassion for humanity caught in the grip of senseless war.

Tu Fu's paramount position in the history of Chinese literature rests, finally, on his superb classicism. He was highly erudite, and his intimate acquaintance with the literary tradition of the past was equaled only by his complete ease with the rules of prosody. His dense, compressed language makes use of all the connotative overtones of a phrase and of

all the intonational potentials of the individual word, qualities that no translation can ever reveal. He was an expert in all poetic genres current in his day, but his mastery was at its height in the *lü shih*, or "regulated verse," which he refined to a point of glowing intensity.

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T'u-lu-p'an (China): *see* Turfan.

T'u-lu-p'an P'en-ti (China): *see* Turfan Depression.

T'u-ti, Pinyin TUDI (Chinese: "Place God"), type of Chinese god whose deification and functions are determined by local residents. The chief characteristic of a T'u-ti is the limitation of his jurisdiction to a single place—*e.g.*, a bridge, a street, a temple, a public building, a private home, or a field. In the case of private homes, the T'u-ti is often identified with the god of riches. In all cases, a T'u-ti is subservient to the Ch'eng Huang, the spiritual magistrate of the city.

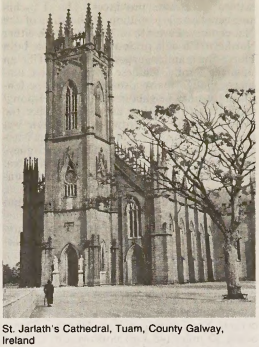
In most cases, these gods originated as historical persons who in life came to the assistance of their respective communities in times of need. It is supposed that, by deifying such persons and offering sacrifices to them, they will be moved to show similar solicitude after death. If misfortunes visit a locality, the T'u-ti is judged to have lost interest and a new patron is chosen.

Some Chinese refer to T'u-ti shen ("Spirit God of the Place") and T'u-ti yeh ("Venerable God of the Place"), but there is nothing special about their name or function to distinguish them from any other "Place God."

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Tu-yün, Pinyin DUYUN, city in central Kweichow *sheng* (province), China. Situated some 60 miles (100 km) southeast of the provincial capital of Kuei-yang, Tu-yün is a transport centre, with a highway route running eastward into Hunan province and a main route, followed by a highway and railway, running south to Liu-chou in Kwangsi province. It is approximately 25 miles (40 km) south by rail from the junction of a line running eastward from Kweichow to Hunan. The north-south railway, begun during World War II and completed as far as Tu-shan (south of Tu-yün) by 1944, was destroyed in the last stages of the war but was rebuilt in the mid-1950s. Tu-yün subsequently became the economic centre of a large district, which has been considerably developed. There is some small-scale coal mining, and paper, linen textiles, leather, and other goods are produced. In the 1960s a chemical industry, producing large quantities of fertilizers, was developed. Pop. (1990) 132,-971.

Tuam, Irish TUAIM, chief market town of the northern part of eastern County Galway, Ireland. It is the seat of a Roman Catholic archbishop, the see having been founded by St. Jarlath (*c.* 550), and the seat of a Protestant bishop. The Protestant cathedral incorporates part of an ancient church built about 1130 with the help of Turloch O'Connor, king of Connaught. The chancel is all that remains of the original structure, the rest having been rebuilt in its original style in the 19th century. The Roman Catholic cathedral, in Perpendicular Gothic style, has a square tower, which can be seen from miles around. In the market square is the High Cross of Tuam. There is a diocesan college for training clergy in Tuam.



St. Jarlath's Cathedral, Tuam, County Galway, Ireland

By courtesy of the Irish Tourist Board

The town has a racecourse, is a centre of the sugar-beet industry, and manufactures electronic components. Pop. (1986) 4,109.

Tuamotu Archipelago, French ÎLES TUAMOTU, also called PAUMOTU, island group of French Polynesia, central South Pacific Ocean. The archipelago comprises 75 atolls, one raised coral atoll (Makatea), and innumerable coral reefs, roughly dispersed northwest-southeast as a double chain for over 900 miles (1,450 km). The islands, save for Makatea, are entirely flat with little freshwater. The largest atoll of the group is Rangiroa, which consists of a circle of 20 islets surrounding a broad lagoon. Fakarava and Hoa atolls are also important. Raroia is the reef on which the *Kon-Tiki* expedition ended its 4,300-mile drift across the Pacific in 1947.

Pokapuka atoll was sighted by Ferdinand Magellan as he crossed the Pacific in 1521. Iron cannons recovered on Amanu in 1929 and 1969 indicate that the Spanish caravel *San Lesmes* was shipwrecked on the atoll in 1526. Subsequently visited by the Portuguese Pedro Fernández de Quirós (1606) and others, the islands came under French protection in 1844 and were annexed in 1880 as a Tahitian dependency. They now form, with the Gambier Islands, a *circonscription* (administrative division) of French Polynesia, with *circonscription* headquarters at Papeete, on Tahiti. The islands' villages are situated near lagoons where pearl oysters, fish, and coconuts support the population. Since World War II many villagers have emigrated to Papeete. The uninhabited atolls of Mururoa (*q.v.*) and Fangataufa have been used by France for nuclear weapons tests since the 1960s. An airstrip on Hoa serves the testing grounds. Pop. (1988) 11,754.

Tuan Ch'i-jui, Pinyin DUAN QIRUI (b. March 6, 1865, Ho-fei, Anhwei province, China—d. Nov. 2, 1936, Shanghai), warlord who dominated China intermittently between 1916 and 1926.

A student of military science in Germany, Tuan became President Yüan Shih-k'ai's minister of war following the Chinese Republican Revolution of 1911. Shortly before Yüan's death in 1916, Tuan became premier, and he kept the post in the new government. He restored the provisional constitution of 1912, which had been dissolved by Yüan in 1913. In May 1917, when Tuan tried to force the National Assembly to enter World War I on the side of the Allies, he was dismissed by President Li Yüan-hung. Immediately afterward, he suppressed an attempt to restore the emperor and resumed control of the government.

Tuan declared war on Germany on Aug. 14, 1917, and received financial and military aid from the Japanese, who helped him and his warlord allies build a military establishment called the Anfu Clique. Japanese aid created popular anxiety that Tuan was letting the country be dominated by imperialist powers, and these feelings were aggravated by Chinese complicity in the transfer of German rights in China to Japan after the war. On May 4, 1919, a wave of protests and demonstrations swept the country. As Tuan's popularity declined, other warlords formed a coalition against him; in July 1920 his troops were defeated, and he was forced to retire from politics. In the fall of 1924 two rival warlords, Chang Tso-lin and Feng Yü-hsiang, jointly occupied Peking. They called Tuan out of retirement to run the new government and mediate between them. In April 1926 Chang defeated Feng, and Tuan was no longer needed. He devoted the rest of his life to the study of Buddhism and to philanthropic works.

Tuapse, city and seaport of Krasnodar *kray* (region), southwestern Russia. It lies on a sheltered bay of the Black Sea. Founded in 1838 around a fortress established in 1828, it grew in the 20th century as a major ship-repairing, oil-refining, and oil-export centre. It is linked by pipeline to Grozny and the north Caucasian oil fields. Other industries include food processing and the manufacture of petroleum machinery. Pop. (1991 est.) 63,800.

Tuareg, French TOUAREG, Berber-speaking pastoralists who inhabit an area in North Africa ranging from Touat, Alg., and Ghudāmis, Libya, to northern Nigeria and from Fezzan, Libya, to Timbuktu, Mali. Their political organizations extend across national boundaries. In the late 20th century there were estimated to be 900,000 Tuareg.

The northern Tuareg live mainly in true desert country, whereas the southerners live primarily in steppe and savanna. The Tuareg consist of confederations including the Ahaggar (Hoggar) and Azjer (Ajjer) in the north and the Asben (Aïr Tuareg), Ifora, Itesen (Kel Geres), Aulliminden, and Kel Tademaket in the south. The southerners breed zebu cattle and camels, some of which are sold to the northern Tuareg. Raiding of caravans and travelers was important in pre-European times, as was caravan trading, which declined with the introduction of motor vehicles. Droughts across southern Mauritania, Senegal, Niger, Burkina Faso (Upper Volta), and Chad in the 1970s and '80s both reduced the numbers of the southern Tuareg and eroded their traditional pastoral way of life.

Tuareg society is traditionally feudal, ranging from nobles, through clergy, vassals, and



Tuareg tribesman, Niger

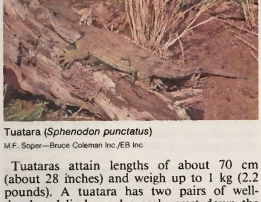
Marc Riboud—Magnum

artisans, to labourers (once slaves). The conventional Tuareg dwelling is a tent of red-dyed skin (sometimes replaced in the later 20th century with plastic). Traditional weapons include two-edged swords, sheathed daggers, iron lances, and leather shields. Adult males wear a blue veil in the presence of women, strangers, and in-laws, but that practice began to be abandoned with urbanization. They have preserved a peculiar script (*tifinagh*) related to that used by ancient Libyans.

Tuat (oasis, Algeria): *see* Touat.

tuatara (genus *Sphenodon*), either of two species of lizardlike animals that are the sole living members of the reptilian order Rhynchocephalia. They are found only on some of the islets of New Zealand.

A brief treatment of tuataras follows. For full treatment, *see* MACROPAEDIA: Reptiles.



Tuatara (*Sphenodon punctatus*)
M.F. Soper—Bruce Coleman Inc./EB Inc.

Tuataras attain lengths of about 70 cm (about 28 inches) and weigh up to 1 kg (2.2 pounds). A tuatara has two pairs of well-developed limbs and a scaly crest down the neck and back. Unlike lizards, it has a third eyelid, the nictitating membrane, which closes horizontally, and a pineal eye, an organ of doubtful function between the two normal eyes. The tuatara also has a bony arch, low on the skull behind the eyes, that is formed by the presence of two large openings (temporal fossae) in the region of the temple. It is this bony arch, which is not found in lizards, that has been cited as evidence that tuataras are survivors of the otherwise extinct order Rhynchocephalia and are not lizards. And indeed, tuataras differ little from the closely related form *Homeosaurus,* which lived 150 million years ago during the Jurassic Period.

The tuatara was long thought to be a single species, *S. punctatus,* but authorities now acknowledge the existence of both it and another species that closely resembles it, *S. guntheri.* Tuataras are active at night, live in burrows, and eat insects, other small animals, and birds' eggs. They do well at relatively low temperatures. Eight to 15 eggs are laid in the spring, some distance from the burrow; hatching does not occur until the next spring. Some tuataras may live about 100 years.

Tuatha Dé Danann (Gaelic: "People of the Goddess Danu"), in Celtic mythology, a race inhabiting Ireland before the arrival of the Milesians (the ancestors of the modern Irish). They were said to have been skilled in magic, and the earliest reference to them relates that, after they were banished from heaven because of their knowledge, they descended on Ireland in a cloud of mist. They were thought to have disappeared into the hills when overcome by the Milesians. The *Leabhar Gabhâla* (*Book of Invasions*), a fictitious history of Ireland from the earliest times, treats them as actual people, and they were so regarded by native historians up to the 17th century. In popular legend they have become associated with the numerous fairies still supposed to inhabit the Irish landscape.

tuba, deep-pitched brass wind instrument with valves and wide conical bore. The word



Military brass band tuba
By courtesy of Boosey & Hawkes Ltd.

tuba originally was the name of a straight-built Roman trumpet and was the medieval Latin word for trumpet. Valved bass brass instruments for bands are mentioned as early as 1829, but little is now known about them. In 1835 Wilhelm Wieprecht and Johann Gottfried Moritz of Berlin patented the bass tuba in F, with five valves. Subsequent designs were considerably influenced by the French contrabass saxhorn.

Modern military and brass band tubas are of two sizes used together: the E-flat bass (or bombardon) and the BB-flat bass, a fourth lower. When these tubas have three valves, their lowest notes are, respectively, the A below the bass staff and the E below that. The E-flat bass generally has a fourth valve that lowers the basic pitch by a fourth to BB-flat, enabling the instrument (with use of valves) to produce the low E, below which the compass can be continued downward in fundamentals (lowest note producible by a length of tubing), E-flat, D, and so on. These basses are coiled vertically and held upright aslant the player's body, with the bell pointing to the right; in the United States the bell may be turned forward. Alternative designs, likewise in E-flat and BB-flat but encircling the body, include the circular bass, or helicon (*q.v.*), with the bell resting across one shoulder, and the American sousaphone, with an extremely wide bell raised above the player's head.

Orchestral tubas vary in different countries. Large instruments in BB-flat or a tone higher, in C, are used in the United States and parts of Europe. The original pitch of F (a tone above the E-flat bass) is preferred in Great Britain and (with rotary rather than piston valves) in Germany. All have the fourth valve and often a fifth valve tuned to a wide semitone for facilitating good intonation in certain fingerings. French orchestras use a small C tuba pitched a fifth above the F tuba. This is a six-valved development of the earlier French bass saxhorn. The military-band euphonium normally serves as a tenor tuba. Tuba parts are written at actual pitch except in brass bands, where transposed notation allows the parts to be read with cornet fingering.

Wagner tubas are four-valved, small-bored tubas designed in the 19th century for the German composer Richard Wagner for special effects in his four-part music-drama cycle *The Ring of the Nibelung.* Basically derived from the French horn, they are played by horn players with horn mouthpieces and have a quieter tone colour. The bass and contra-bass saxhorns in E-flat and BB-flat are also sometimes referred to as tubas.

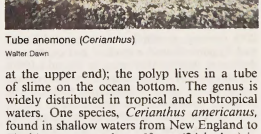
Tubalar (people): *see* Tofalar.

Tuban, also spelled TOEBAN, city, East Java *provinsi* ("province"), Java, Indonesia. It is a fishing port on the Java Sea, about 50 miles (80 km) northwest of Surabaya. Road and railway link it with Babat to the south, and it is connected by road with Rembang and Kudus to the west and Surabaya to the southeast. The population is predominantly Madurese, and there is a large colony of Chinese immigrants. Tuban is a major centre of trade and transshipment for the surrounding rice- and corn-(maize-) growing region, and its exports also include fish and copra. Its industry includes rice milling and other food processing; crafts include wood carving, handloom weaving, and batik printing. Tuban was one of several ports that fell to the Muslims in the last decades of the 15th century; in 1619 it was subjugated by Agung, sultan of the Mataram kingdom of Java. It was known as an opium-smuggling centre during Dutch rule. Pop. (1990) city, 56,161.

Tubarão, city, southeastern Santa Catarina state, southern Brazil, on the Tubarão River. It is the seat of Tubarão municipality, created in 1870. Crops cultivated in the surrounding coastal plain include grains, *feijão* (beans), coffee, rice, and sugarcane. Iron ore and steel are mined for export. Products are transported by highway to Florianópolis, the state capital, 120 miles (193 km) northeast, and by railway or road to the ocean port at Laguna, 20 miles (32 km) northeast. Pop. (2000 prelim.) 69,910.

tube (metropolitan transit): *see* subway.

tube anemone (genus *Cerianthus*), any of a group of invertebrate marine animals of the class Anthozoa (phylum Cnidaria) characterized by an elongated polyp (*i.e.,* a hollow stalklike structure with a mouth and tentacles



Tube anemone (*Cerianthus*)
Walter Dawn

at the upper end); the polyp lives in a tube of slime on the ocean bottom. The genus is widely distributed in tropical and subtropical waters. One species, *Cerianthus americanus,* found in shallow waters from New England to Florida, grows to about 60 cm (24 inches) in length.

tube worm, any of a number of tube-dwelling marine worms belonging to the annelid class Polychaeta (*see* polychaete; feather-duster worm; tentacle worm). Other tube-dwelling worms include the horseshoe worm (*q.v.;* phylum Phoronida) and the beardworm (*q.v.;* phylum Pogonophora).

tuber, short, thickened, mostly underground stem that constitutes the resting stage of certain seed plants. It bears minute scale leaves, each with a bud that has the potential for developing into a new plant. The potato is a typical tuber, as is the Jerusalem artichoke. The term is also used imprecisely but widely for fleshy roots or rhizomes of other plants that resemble tubers—*e.g.,* the "tuber" (actually a tuberous root) of a dahlia.

tuberculin test, procedure for the diagnosis of tuberculosis infection by the introduction into the skin, usually by injection on the front

surface of the forearm, of a minute amount of purified protein derivative (PPD) tuberculin. Tuberculin is a protein substance from the tuberculosis-causing bacillus, *Mycobacterium tuberculosis,* first discovered and extracted by Robert Koch in 1890. When the test is positive, a region of swelling 10 mm (0.4 inch) or greater in diameter, usually accompanied by redness, occurs within 48 hours at the site of injection. A positive reaction indicates that the individual was previously exposed to the tubercle bacillus, but it does not necessarily indicate that active clinical tuberculosis is present, or ever existed. The test is a help to the physician in determining the source and time of an infection and in distinguishing tuberculosis from other pulmonary conditions.

tuberculosis (TB), infectious disease that is caused by several species of *Mycobacterium,* collectively called the tubercle bacillus. Tuberculosis in humans is usually caused by the human variety of the bacillus, *M. tuberculosis,* and in fewer cases by the bovine variety of the bacillus, *M. bovis.* Besides cattle, which are infected by the bovine type of bacillus, other domestic animals susceptible to tuberculosis include swine and fowl, the latter being infected by the avian type of bacillus. The tubercle bacillus is a small, rod-shaped bacterium that is extremely hardy; it can survive for months in a state of dryness and can also resist the action of mild disinfectants. The tubercle bacillus was discovered and identified as the cause of tuberculosis in 1882 by the German physician Robert Koch.

Tuberculosis occurs in humans worldwide, and in many developing countries it is still a chief cause of death. Historically, tuberculosis rates have been notably higher in urban than in rural communities because of cities' greater crowding (hence greater opportunity for transmission of the bacillus) and poorer sanitation and hygiene. Accounts of tuberculosis can be found in the writings of the ancient Egyptians, in those of the Greek physician Hippocrates, and in the medical writings of most urbanized societies since then. The disease reached near-epidemic proportions in the rapidly urbanizing and industrializing societies of Europe and North America in the 18th and 19th centuries. Indeed, tuberculosis was the leading cause of death for all age groups in the Western world from that period until the early 20th century, at which time improved health and hygiene caused a gradual but continuing decline in its mortality rates. In the mid-1980s the number of deaths caused by tuberculosis began to rise again in developed nations. The disease's resurgence was attributed to deteriorating health-care systems, increased poverty and homelessness, and the spread of HIV (human immunodeficiency virus), which greatly increases the chance that a TB-infected individual will develop active tuberculosis. Tuberculosis remains a significant cause of death in the developing countries of Africa, Asia, and Latin America. It is generally estimated that the prevalence (or occurrence) of the disease is approximately 20 times the mortality from it in any given period. The death rate is especially high in densely populated countries with poor hygienic standards.

Infection with tuberculosis spreads in two ways, by the respiratory route directly from another infected person or by the gastrointestinal route by drinking milk infected with the tubercle bacillus. In the former case the organism is *M. tuberculosis,* in the latter *M. bovis.* Most human tuberculosis is acquired by the inhalation of bacilli from the sputum or other fluid discharges of infected persons. The minute droplets discharged by sneezing, coughing, and even talking can contain hundreds of tubercle bacilli that may be inhaled by a healthy person. In infections with *M. tuberculosis,* the tubercle bacilli commonly affect the lungs, in which case the disease is known as pulmonary tuberculosis. By contrast, infections with *M. bovis* often affect the bones and joints. About 90 percent of all clinically recognized tuberculosis in humans is pulmonary.

The anatomic unit of tuberculosis is a highly characteristic pathological lesion known as the tubercle. It usually consists of a centre of dead cells and tissues, cheeselike in appearance, in which can be found many tubercle bacilli. This centre is surrounded by radially arranged phagocytic (scavenger) cells and a periphery containing connective tissue cells. The tubercle forms as a result of the body's defensive reaction to the bacilli that lodge in bodily tissues. Tubercles are microscopic in size, but most of the visible manifestations of tuberculosis, from barely visible nodules to large tuberculous masses, are conglomerations of such tubercles.

Primary pulmonary tuberculosis occurs mostly in childhood. Often the infection is without symptoms and immunity results. When the primary infection heals, a small scar in the lung is visible on X ray. Sometimes the infection does not heal but spreads into the bloodstream and through the body, causing miliary tuberculosis, a highly fatal form if not adequately treated. Another complication is tuberculous meningitis; before the advent of specific drugs, this was always fatal, but now most cases recover. Bone and joint tuberculosis in childhood has virtually disappeared in areas of the world where all milk is pasteurized; elsewhere it remains a serious disease.

Postprimary pulmonary tuberculosis occurs mainly in young adults but can occur at any age. The onset of the disease is usually insidious, with lack of energy, weight loss, and persistent cough. These symptoms do not subside, and the general health of the patient deteriorates. Eventually, the cough increases, there is much sweating, the patient may have chest pain from pleurisy, and there may be blood in the sputum, an alarming symptom. The lesion in the lung consists of a collection of dead cells in which tubercle bacilli may be seen. This lesion spreads and may erode a neighbouring bronchus or blood vessel, causing the patient to cough up blood (hemoptysis). Tubercular lesions may spread extensively in the lung, causing large areas of destruction, cavities, and scarring. The amount of lung tissue available for the exchange of gases in respiration decreases, and if untreated the patient dies from failure of ventilation and general toxemia and exhaustion. Sometimes the infection extends into other systems, and almost any organ of the body may be affected.

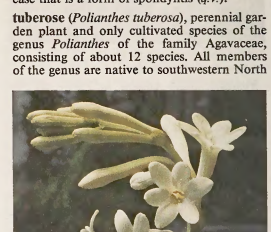
The diagnosis of pulmonary tuberculosis depends on finding the tubercle bacillus in the sputum, in the urine, in gastric washings, or in the cerebrospinal fluid. An X ray of the lungs may show typical shadows caused by tubercular nodules or lesions. A skin test (*see* tuberculin test) shows whether a person is susceptible to tuberculosis or whether he has become immune after infection.

The prevention of tuberculosis depends on good hygienic and nutritional conditions and on the recognition of infected patients and their early treatment. A vaccine, known as BCG vaccine (*q.v.*), is composed of specially weakened tubercle bacilli. Injected into the skin, it causes a local reaction and, later, immunity to infection. It has been widely used in some countries with success. Its use in young children has helped to control infection in the developing world, but the main hope of ultimate control lies in preventing exposure to infection; and this means treating infectious patients quickly, possibly in isolation until they are noninfectious.

The treatment of tuberculosis now consists of drug therapy and good general care. In the 1940s and '50s several antimicrobial drugs were discovered that revolutionized the treatment of patients with tuberculosis. Isoniazid, rifampicin, and streptomycin are the three main drugs used to treat tuberculosis; all three are capable of virtually eradicating the tubercle bacillus from the human body. Other such drugs are ethambutol, para-aminosalicylic acid, thiacetazone, and pyrazinamide. Before these drugs were available, treatment consisted of long periods, often years, of bed rest and often surgical removal of useless lung tissue. With early drug treatment, surgery is now rarely needed. One problem with drug therapies, however, is that the bacilli may become resistant to some of the drugs; this is avoided mainly by giving combinations of the drugs. The patient is usually made noninfectious quite quickly, but complete cure requires treatment for several months at least. If the patient does not continue treatment for the required time or is treated with only one drug, the resistant bacilli multiply and the patient becomes sick again. If subsequent treatment is also incomplete, the surviving bacilli may become resistant to several drugs. These multidrug-resistant (MDR) strains of bacilli cause an acute form of the disease that is extremely difficult to cure and in most cases proves fatal.

tuberculous spondylitis, inflammatory disease that is a form of spondylitis (*q.v.*).

tuberose (*Polianthes tuberosa*), perennial garden plant and only cultivated species of the genus *Polianthes* of the family Agavaceae, consisting of about 12 species. All members of the genus are native to southwestern North



Tuberose (*Polianthes tuberosa*)
Maurice B. Cook

America. The tuberose has long, bright green leaves clustered at the base; smaller, clasping leaves along the stem; fragrant, waxy white flowers in a cluster at the tip of the stem; and tuberous roots. The flowers are used in the manufacture of perfumes.

tubinares (bird order): *see* procellariiform.

Tübingen, *Regierungsbezirk* (administrative district), southeastern Baden-Württemberg *Land* (state), southwestern Germany. Tübingen is bordered by Bavaria *Land* to the east, Lake Constance (Bodensee) to the south, and the *Regierungsbezirke* of Freiburg and Karlsruhe to the west and Stuttgart to the north. The district occupies an area of 3,443 square miles (8,918 square km) and is coextensive with a portion of the larger historic region of Swabia (*q.v.*). In 1952 the new *Land* of Baden-Württemberg was created. Württemberg-Hohenzollern became the new *Land*'s southeastern *Regierungsbezirk* of Südwürttemberg-Hohenzollern. In 1973 an administrative reform altered the borders of Südwürttemberg-Hohenzollern and changed its name to Tübingen, after the district's administrative seat.

Central Tübingen is drained from southwest to northeast by the upper Danube River. South of the Danube is the region of Upper Swabia, the westernmost lands of southern Germany's Alpine Foreland. Glaciers once covered nearly all of the Upper Swabian foreland, their de-

posits forming a morainic landscape with rolling hills. Meadow is dominant, although spruce and fir forests cover many hilltops, and small lakes and bogs fill depressions where drainage has been interrupted. Dairy farming is the chief source of income in the cool, moist region. Wetland nature reserves and numerous health spas featuring peat and mud baths attract many visitors. The population of Upper Swabia is concentrated in the south of Tübingen district along the shores of Lake Constance, Germany's largest lake. Popular lakefront tourist resorts offer swimming, sailing, and a spectacular view of the Swiss Alps. Vineyards, orchards, hop fields, and market gardens are abundant on warm slopes above the lake. Friedrichshafen, the district's chief city in the lake region, manufactures aircraft and machinery.

The Swabian Mountains (Schwäbische Alb), a dry upland plateau of Jurassic limestones, rise gradually from the Danube valley and extend to Tübingen's northern border. A sparsely populated and economically poor region, the mountains are characterized by karstic features such as sinkholes, caves, dry valleys, and underground watercourses. Forest is scarce on the windy and exposed mountain slopes, where sheep and stall-fed dairy cattle are raised on marginal pastureland. The upland villages and arable land are concentrated in valley troughs that traverse the mountains from north to south. Albstadt, the chief town of the upland, specializes in textile manufacturing. In Tübingen's northwest corner the Swabian Mountains descend abruptly into the Neckar River valley in a steep scarp some 1,300 feet (400 m) high. Many isolated outlier hills of the Swabian Mountains are topped by the castles of past imperial dynasties, among them Hohenzollern Castle, the home of the Prussian ruling family. Reutlingen and Tübingen are the leading cities of the middle Neckar valley and manufacture textiles, machinery, and electrical equipment.

Located on the border with Bavaria at the confluence of the Blautopf and Danube rivers is Ulm, the largest city of Tübingen and an important industrial and transportation centre.

The native population of Tübingen are Swabians, descendants of the Suebi, a Germanic people who occupied the territory from the 3rd century AD. They speak Swabian, one of three main German dialects in Baden-Württemberg. Upper Swabia is noted for the wealth of art and architecture in its famous Baroque churches and monasteries. Higher education in the *Regierungsbezirk* is centred in the old Swabian university town of Tübingen at the University of Tübingen, founded in 1477, and at the University of Ulm, founded in 1967. The population of Tübingen is predominantly Roman Catholic. Pop. (1989 est.) 1,555,262.

Tübingen, city, Baden-Württemberg *Land* (state), southwestern Germany. The city lies along the Neckar River at its junction with the Ammer and the Steinlach rivers. Originating as Castra Alamannorum around the castle of the counts palatine of Tübingen (first mentioned in 1078) and recorded as a town in 1231, it was purchased by the counts of Württemberg in 1342, and the county became a duchy in 1495. It was captured in 1519 by the Swabian League, and during the Thirty Years' War it fell to Holy Roman Empire troops (1634), the Swedes (1638), and the French (1647). Tübingen's important university was founded by Count Eberhard VI of Württemberg in 1477. The university's Protestant theological seminary, established by Duke Ulrich in 1534, numbered the astronomer Johannes Kepler, the poet Friedrich Hölderlin, and the philosopher G.W.F. Hegel among its students. The poet Ludwig Uhland was born (1787) in Tübingen.

The city's most conspicuous building is the



Old section of Tübingen along the Neckar River, Germany
Eric Carle—Shostal/EB Inc.

ducal castle of Hohentübingen, built in the 16th–17th century on earlier foundations and now housing several institutes of the university. The Gothic Stiftskirche of St. George (1470–90) contains fine stained glass and tombs of the dukes of Württemberg. The town hall, dating from 1435, has been much restored.

A publishing centre, modern Tübingen has metal and machinery, textile, woodworking, and paper industries. Pop. (1989 est.) 76,046.

Tübingen, University of, German in full EBERHARD-KARLS-UNIVERSITÄT TÜBINGEN, state-supported university at Tübingen, Ger. It was founded in 1477 by Count Eberhard VI (1445–96), later the first duke of Württemberg, a civic and ecclesiastic reformer who established the school after becoming absorbed in the Renaissance revival of learning during his travels to Italy.

The university has a history of innovative thought, particularly in theology. Philipp Melanchthon (1497–1560), prime mover in building the German school system and a chief figure in the Protestant Reformation, helped establish its direction. Among Tübingen's eminent students have been astronomer Johannes Kepler, poet Friedrich Hölderlin, and philosophers Friedrich Schelling and G.W.F. Hegel. The university rose to its height of prominence in the middle of the 19th century with the teachings of poet and civic leader Ludwig Uhland and the Protestant theologian Ferdinand Christian Baur, whose beliefs and disciples became known as the "Tübingen School." The University of Tübingen also was the first German university to establish a faculty of natural sciences, in 1863.

In the 20th century, Tübingen became dominated first by Marxist-Leninist philosophy and then by Adolf Hitler's Nazi regime until the beginning of the Allied occupation in 1945. In 1970 the university was restructured into a series of independent departments of study and research after the manner of French universities.

Tubman, Harriet (*b. c.* 1820, Dorchester county, Md., U.S.—d. March 10, 1913, Auburn, N.Y.), black American bondwoman who escaped from slavery in the South to become a leading abolitionist before the American Civil War. She came to be known as the "Moses of her people" as she led hundreds of bondsmen to freedom in the North along the route of the Underground Railroad—an elaborate secret network of safe houses organized for that purpose.

In 1849 Tubman escaped from a plantation on the eastern shore of Maryland and made her way north by the Underground Railroad. In 1850 she returned to Maryland to guide members of her family north to freedom. She soon became one of the "railroad's" most active "conductors," making frequent trips into the South to bring out escaping slaves. Despite huge rewards offered for her capture, she helped more than 300 slaves to escape. She maintained military discipline among her followers, often forcing the weary or the faint-hearted ahead by threatening them with a loaded revolver.

A devout Christian who relied on God for her strength and guidance, Tubman became a friend of many of the best-known abolitionists and their sympathizers. John Brown refers to her in his letters as "one of the best and bravest persons on this continent—*General* Tubman as we call her."

During the Civil War Tubman served as a nurse, laundress, and spy with the Federal forces along the coast of South Carolina. After the war she made her home in Auburn, N.Y., and, despite numerous honours, spent her last years in poverty. Not until 30 years after the war was she granted a government pension in recognition of her work for the Federal Army.

Tubman, William V(acanarat) S(hadrach) (b. Nov. 29, 1895, Harper, Liberia—d. July 23, 1971, London, Eng.), statesman whose 27 years as Liberia's 17th president constituted



William V.S. Tubman
Camera Press—Pictorial Parade/EB Inc.

the longest tenure in that office in the history of Africa's first republic (proclaimed in 1847). He was responsible for numerous reforms and social policies, including enactment of suffrage and property rights for all female residents of 21 or older; authorization of direct participation in government by all tribespeople, who comprise about 80 percent of the population; and the establishment of a nationwide public-school system.

A descendant of early American immigrants, mostly liberated slaves, Tubman grew up in poverty and under severe discipline. His father, a stonemason, required him and the other four children to attend daily family prayer services as well as church services and the local grade school. The children had to sleep on floor pallets because their father thought beds were too soft and therefore "degrading to character development."

Tubman, the second son, first planned to be a preacher and was accredited, at 19, as a Methodist lay pastor. At about the same time, he received a temporary appointment as a junior collector of customs. His record of competence and honesty led him toward public service. He studied law after hours and at 23 successfully passed the bar examination.

Tubman later won election to the local legislature and then occupied a wide range of public offices, including trial judge, public prosecutor, and arbitration referee. At 35 he won election to the Liberian Senate. At Monrovia, the capital, he undertook the David-against-Goliath task of opposing the entrenched establishment—a self-perpetuating clique of American-descended Liberians who had long dominated the national government. The witty, cigar-puffing Tubman, who gaily labeled himself the "Convivial Cannibal from the Downcoast Hinterlands," moved adroitly to advance the constitutional rights of the ma-

jority tribespeople. His maneuvers were so effective that the leadership of his party (the True Whig) proceeded to "kick him upstairs" to the Supreme Court, where he served as an associate justice until 1943. Then he unexpectedly announced his candidacy for the presidency. He won handily in the ensuing election and six times thereafter. In June 1944 Tubman and his predecessor, Edwin Barclay, were White House guests of President Franklin D. Roosevelt—the first African heads of state to be so honoured.

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Tubruq (Libya): *see* Tobruk.

Tubuai Islands (Pacific Ocean): *see* Austral Islands.

tubular bells, also called ORCHESTRAL BELLS, or ORCHESTRAL CHIMES, series of tuned brass (originally bronze) tubes of graded length, struck with wooden hammers to produce a sound. They were probably introduced in about 1885 in England by John Harrington.



Tubular bells
By courtesy of Ludwig Industries

Large tubular bells were at first used as a substitute for church bells in towers. Smaller tubes were later built to be controlled from an organ manual or, in the orchestra, to be played directly by a percussionist.

As orchestral chimes, tubular bells can attain greater rhythmic precision than true bells, and their tone is clearer, for it emphasizes fewer higher harmonics. The instrument's compass normally extends 1½ octaves upward from the C above middle C.

Tuchman, Barbara, *née* WERTHEIM (b. Jan. 30, 1912, New York City—d. Feb. 6, 1989, Greenwich, Conn.), author who was one of the foremost American popular historians in the second half of the 20th century.

She was born a member of a wealthy banking family and was educated at Waldon School in New York City. After four years at Radcliffe College (B.A., 1933), she became a research assistant for the Institute of Pacific Relations (1933–35) and then worked as a writer and correspondent for *The Nation* magazine (1935–39) and other publications. After her marriage to the physician Lester R. Tuchman in 1940, she devoted herself to the duties of a housewife and mother of three children.

Tuchman had had one book, *The Lost British Policy: Britain and Spain Since 1700* (1938), published before her marriage, but it was not until her children were partly grown that she could once again devote herself to historical research. The result was *Bible and Sword; England and Palestine from the Bronze Age to Balfour* (1956), a study of the historical background leading up to the Balfour Declaration. She first achieved some recognition with *The Zimmerman Telegram* (1958), a detailed study of the telegram that Germany sent to Mexico during World War I promising parts of the American Southwest to the Mexican government if the latter would enter the war on Germany's side.



Tuchman
© Jerry Bauer

In 1962 Tuchman's *The Guns of August* (also published as *August 1914*) was published to widespread critical and popular acclaim. This work is a detailed account of the first month of World War I, and it vividly describes the series of military errors and miscalculations that led to the ensuing stalemate of trench warfare. The book's descriptive analysis of the German offensive into northern France helped win Tuchman the Pulitzer Prize in 1963. Tuchman's next book, *The Proud Tower* (1966), subtitled *A Portrait of the World Before the War, 1890–1914,* was a survey of European and American society, culture, and politics in the 1890s. She was awarded a second Pulitzer Prize for *Stilwell and the American Experience in China, 1911–45* (1970). This was a study of the United States' relationship with 20th-century China as epitomized in the wartime experiences of Joseph Stilwell, the general who headed U.S. forces in the China–Burma–India theatre during much of World War II. Tuchman then took seven years to research and write *A Distant Mirror: The Calamitous 14th Century* (1978). In this book she made exceptionally vivid the historical events, personalities, and texture of life in 14th-century France, taking for her main character a typical French knight and nobleman of the period, Enguerrand de Coucy. Tuchman's last works were *The March of Folly: From Troy to Vietnam* (1984) and *The First Salute* (1988).

Tuchman could bring a historical period or personage to life by an accumulation of vivid and concrete details. She combined a masterful literary style with a clear and powerful grasp of complex historical issues.

Tucholsky, Kurt, pseudonyms THEOBALD TIGER, PETER PANTER, IGNAZ WROBEL, and KASPAR HAUSER (b. Jan. 9, 1890, Berlin—d. Dec. 21, 1935, Hindas, near Göteborg, Swed.), German satirical essayist, poet, and critic, best-known for his cabaret songs.

After studying law and serving in World War I, Tucholsky left Germany in 1924 and lived first in Paris and after 1929 in Sweden. He contributed to *Rote Signale* (1931; "Red Signals"), a collection of communist poetry, and to *Schaubühne,* later *Die Weltbühne,* a journal published by the pacifist Carl von Ossietzky. In 1933 Tucholsky's works were denounced by the Nazi government and banned, and he was stripped of his German citizenship. He committed suicide in 1935.

Tucholsky's output includes aphorisms, book and drama reviews, light verse, short stories, and witty satirical essays in which he criticized German militarism and nationalism and the dehumanizing forces of the modern age. His poetry was set to music and performed widely in German cabarets.

Tuckasegee River, river rising in the Blue Ridge (Pisgah National Forest), west of Brevard, in Jackson county, N.C., U.S. The Tuckasegee flows 50 miles (80 km) northwest past Cullowhee, Whittier, and Bryson City, near which it empties into Fontana Reservoir in the Little Tennessee River. Glenville Dam (1941), on a fork of the Tuckasegee, 22 miles (35 km) southwest of Bryson City, impounds Glenville Reservoir. The river's name probably comes from a Cherokee Indian village, Tsiksitsi (meaning "crawling terrapin," for the sluggish movement of the waters), that once stood on its banks.

Articles are alphabetized word by word, not letter by letter

Tucker, Richard, original name REUBEN TICKER (b. Aug. 28, 1913, Brooklyn, N.Y., U.S.—d. Jan. 8, 1975, Kalamazoo, Mich.), American operatic tenor and cantor who sang roles in more than 30 operas.

As a youth Tucker first sang as a member of a synagogue choir and on radio. He studied voice with Paul Althouse and made his Metropolitan Opera debut in 1945 as Enzo in Amilcare Ponchielli's *La Gioconda.* His European debut was in 1947 at the Verona Arena in the same role opposite Maria Callas in the title role.

Although Tucker sang in opera and recitals in many European cities—London, Milan, Vienna, Barcelona, Florence—his career was centred in the United States. He was a popular performer on radio and television and made a number of highly regarded recordings. Before his sudden death on a concert tour, he had sung with most of the leading American opera companies and orchestras and was highly praised as a cantor.

Tucker, Sophie, original name SOPHIE ABUZA (b. Jan. 13, 1884, Russia—d. Feb. 9, 1966, New York City), American singer billed



Sophie Tucker in *Follow the Boys,* 1944
By courtesy of Universal Pictures; photograph, from the Collection of Penguin Photo

as "the last of the red hot mamas," whose 62-year stage career included American burlesque, vaudeville, and nightclub and English music-hall appearances.

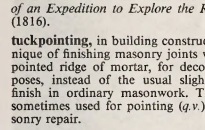
Born while her mother, a Russian Jew, was en route to the United States, Tucker began entertaining as a child singer in her father's restaurant in Hartford, Conn. In 1906 she went to New York, where she performed briefly in the *Ziegfeld Follies* of 1909. By 1914 she was a leading entertainer, appearing at the Palace Theatre in New York City. Still on stage at 78, Tucker retained her brassy, flamboyant style, applying it with equal effectiveness to sentimental ballads and risqué songs. She stirred audiences particularly with her tough, defiant theme song, "Some of These Days."

Tuckey, James Kingston (b. August 1776, Greenhill, County Cork, Ire.—d. Oct. 4, 1816, near Moanda, in modern Zaire), British naval officer and explorer who investigated the course of the Congo River and the kingdoms of the interior of West Africa.

After service in India and the Far East, Tuckey was sent to Australia in 1802 to help found the British colony of New South Wales, where he explored the interior and surveyed the harbour of Port Philip. In 1815 he was appointed commander of an expedition to search for a connection between the Congo and Niger rivers. Though the expedition failed in its primary object and Tuckey himself died of fever during it, he did travel 300 miles (480 km) up the Congo River and sent back ethnographic and geographic information on the interior for his *Introduction to the Narrative of an Expedition to Explore the River Zaire* (1816).

tuckpointing, in building construction, technique of finishing masonry joints with a fine, pointed ridge of mortar, for decorative purposes, instead of the usual slightly convex finish in ordinary masonwork. The term is sometimes used for pointing (*q.v.*) as in masonry repair.

tuco-tuco, any of several species of South American rodents constituting the genus *Ctenomys* of the family Ctenomyidae (order Rodentia). They are found from Peru southward to Tierra del Fuego. Tuco-tucos are



Tuco-tuco (*Ctenomys*)
Painting by H. Douglas Pratt

named for the sound of their call. They are highly variable animals, and about 50 different forms have been considered species; some authorities, however, recognize only about 25 species.

Tuco-tucos resemble American pocket gophers in appearance and habits but do not have the cheek pouches characteristic of the latter. Tuco-tucos are thickset, short-legged rodents 17 to 25 cm (7 to 10 inches) long, excluding the short tail, and are pale to dark brown or gray. They dig burrow systems (tucales) that include chambers for nesting and for storing roots, stems, and other food. They breed once a year, and the female bears one to five young per litter. The gestation period in one species (*C. torquatus*) was recorded at about 105 days.

Tucson, city, seat (1864) of Pima county, southeastern Arizona, U.S. Tucson lies along the Santa Cruz River in a flat plateau of the Sonoran Desert that is rimmed by the Santa Catalina and other mountains. The city lies at an elevation of 2,410 feet (735 m) and is situated about 115 miles (185 km) southeast of Phoenix.

In 1692 the Jesuit missionary Eusebio Kino visited the Indians at Stjukshon, or Chuk Shon (Tucson, meaning "village of the spring at the foot of the black mountain"), and in 1700 he established several missions in the area, including Mission San Xavier del Bac, 15 miles (25 km) from the modern city. In 1776 the small walled pueblo of Tucson was made a presidio (fort) of the Spanish army, and when Spanish rule was superseded by that of Mexico, the walled town remained the military headquarters of the province. The "Old Pueblo" has lived under four flags (Spanish, Mexican, Confederate, and U.S.).

Tucson lay in the territory that was acquired from Mexico by the United States in the Gadsden Purchase (1854), and the town served as the territorial capital of Arizona from 1867 to 1877. Its growth was further stimulated by the arrival of the Southern Pacific Railroad (1880), the discovery of silver at nearby Tombstone and copper at Bisbee, and irrigation developments. Since World War II the city has experienced remarkable growth, partly due to the annexation of suburbs. Tucson's dry, sunny climate and unique desert locale have made it a popular tourist and health resort and retirement community. The city's postwar industries have centred on aircraft and missile manufacturing and electronics research and manufacture.

Tucson remains a bilingual community with a large Spanish-speaking minority. It is the seat of the University of Arizona, which was founded in 1885, and is also home to Pima Community College (1970). Davis-Monthan Air Force Base, Old Tucson (a western movie and television location), and the Kitt Peak National Observatory are nearby. The Arizona-Sonora Desert Museum, in the foothills of the Tucson Mountains, is a living museum of desert wildlife and vegetation. The two sections of Saguaro National Park are east and west of the city. Pop. (1994 est.) city, 434,726; Tucson MSA, 731,929.

Tucumán, province, northwestern Argentina. The western fringe of the province is occupied by the Sierra del Aconquija, which consists of northeast-southwest-trending outlying ridges of the Andes with elevations of 8,000–18,000 feet (2,400–5,500 m). The eastern part of the province, by contrast, is flat, alluvial, and agriculturally fertile. Tucumán owes its prosperity to the Sierra del Aconquija, which catches the warm moist winds from the east. The resulting abundant rain feeds a number of streams that descend from the mountains to join the Sali River. Irrigation is thus easily effected on the flat central plain, which is generally free of frost.

Tucumán was part of the Inca empire in the late 15th and early 16th centuries, but by the late 1500s the Spanish had colonized the piedmont with the intent of raising agricultural produce for the silver-mining centre of Potosí, which lay in the high Andes, 500 miles (800 km) to the north. Later in the colonial period, Tucumán and Salta (to the north) specialized in trading mules raised in the Pampa to the southeast. The mules were the chief means of transportation for the merchants bringing silver and European products from Peru and Bolivia. Following the creation of the viceroyalty of La Plata (1776) and the development of Buenos Aires as a port for European products, Tucumán decreased in importance.

Sugarcane, introduced in the early 19th century, is the most important agricultural product of the irrigated areas, but beans, lemons, potatoes, tobacco, and grains are also grown. Other activities include stockbreeding and lumbering. There are local railways for transporting sugarcane to the mills, and national railways converge on San Miguel de Tucumán (*q.v.*), the provincial capital. Many menhirs (prehistoric carved standing stones) are found in the Tafí Valley in the western mountains. Area 8,697 square miles (22,524 square km). Pop. (1991) 1,142,105.

Tucumán, Congress of, assembly that met in the city of Tucumán (now San Miguel de Tucumán) and declared the independence of Argentina from Spain on July 9, 1816.

Napoleon's intervention in Spain in 1808 had plunged that country into civil war and released its American colonies from the control of the central government. In 1810 a town meeting of prominent citizens in Buenos Aires set up an autonomous government (or junta) to administer the Viceroyalty of the Río de la Plata (consisting of modern Argentina, Uruguay, Paraguay, and southern Bolivia) in the name of Ferdinand VII, heir to the Spanish throne. In 1813 the viceroyalty was renamed the United Provinces of the Río de la Plata, but the junta remained unable to solidify control over its vast territories in the face of internal anarchy and royalist attempts at reconquest.

The 32 delegates to the Congress of Tucumán met in 1816 to devise a new political structure to cope with the disarray in the country. Having formally proclaimed Argentina's independence from Spain, the delegates appointed Juan Martín de Pueyrredón as supreme dictator, while they conducted a fruitless search for a monarch. European royal candidates and even an Inca prince were considered. The congress moved to Buenos Aires in 1817, and two years later it framed a constitution providing for a strong central government. The breakaway of Paraguay, Uruguay, and Bolivia from the United Provinces was accompanied by separatism between the provinces of Argentina itself, spearheaded by the caudillos (local magnates), who finally forced the congress to disband in 1820. Confusion and disunity reigned in Argentina until the beginning of the dictatorship of Juan Manuel de Rosas in 1829.

Tucumcari, city, seat (1903) of Quay county, eastern New Mexico, U.S., in the Canadian River valley. It was established as a construction base for the El Paso and Rock Island Railroad in 1901. Tucumcari is named for a mountain (1,000 feet [305 m] above the plains), 1 mile south, associated with an Apache legend about the death of a young brave, Tocom, and his sweetheart, Kari. Its growth as a trade centre and shipping point for cattle, cotton, wheat, and broom corn was influenced by the completion of the Tucumcari Irrigation Project in 1940. The city provides tourist services for travelers on major east-west interstate and U.S. highways. It also has light diversified industries. Conchas Lake and Ute Lake state parks are nearby. Inc. 1908. Pop. (1994 est.) 6,706.

Tucuna, also spelled TICUNA, or TIKUNA, a South American Indian people living in Brazil, Peru, and Colombia, around the Amazon-Solimões and Putomayo-Içá rivers. They numbered about 25,000 in the late 1980s. The Tucunan language does not appear to be related to any of the other languages spoken in the region.

The Tucuna live in flat, moist, jungle tracts in the northwest Amazon basin and cultivate bitter and sweet cassava, yams, and corn (maize). They raise chickens for food and keep a number of wild mammals as pets around their houses. The Tucuna gather tubers and nuts from the forest and eat some types of frogs, certain larvae, and ants. They collect wild honey but do not keep bees. At one time, the Tucuna were skilled hunters, using bows and arrows, spears, blowguns, snares, and traps. In the 20th century, however, the demand for animal hides has depleted the availability of game

in the jungle and has altered old patterns of hunting.

The Tucuna manufacture a simple type of pottery but do not weave cloth or practice metallurgy. They are accomplished in the art of making and using bark cloth, out of which they make ceremonial masks and large animal figures. They manufacture many different baskets and other containers out of a variety of plant fibres.

The 20th-century Tucuna are adaptable and successful traders, just as their forebears had been. Traditionally, the Tucuna exchanged certain vegetable poisons of the Amazonian forest for goods brought down from the mountains. In recent years, the Tucuna have provided animal hides and canoes to urbanized South Americans, in exchange for money and manufactured goods.

Tucupita, city, capital of Delta Amacuro state, northeastern Venezuela. It lies along the Mánamo River, which is a main distributary of the Orinoco River. Founded about 1885, Tucupita served as a trading centre for the corn (maize), bananas, cacao, sugarcane, and tobacco grown in the hinterland. The city changed dramatically with the construction in the mid-1960s of a dam across the Mánamo River and the development of the petroleum industry west of the delta of the Orinoco River. A highway built across the top of the dam made the city accessible by road from Maturín, capital of neighbouring Monagas state. Pop. (1990 prelim.) 40,946.

Tuda, also called TUDAGA (people): *see* Teda.

Tudi (in Chinese mythology): *see* T'u-ti.

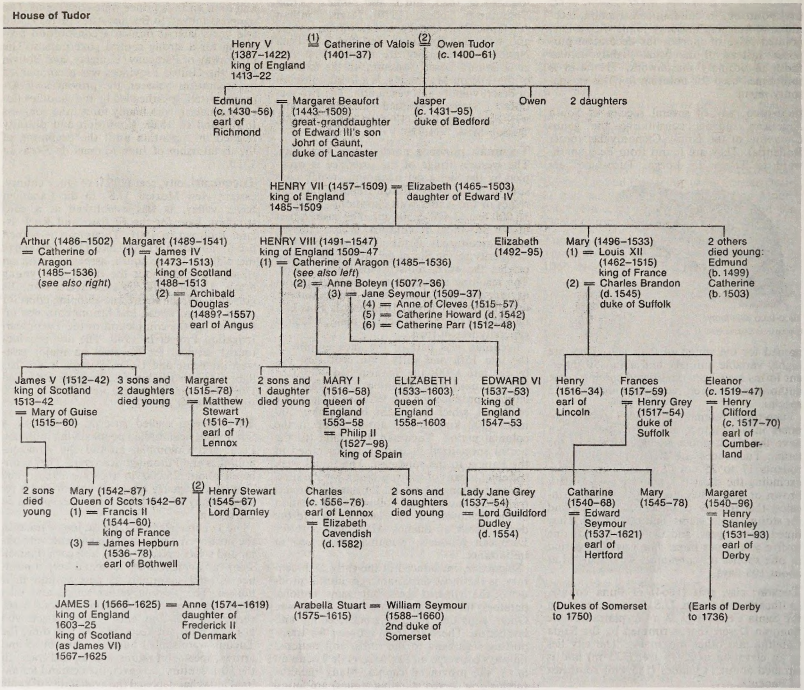
Tudmur (town, Syria): *see* Palmyra.

Tudor, HOUSE OF, an English royal dynasty of Welsh origin, which gave five sovereigns to England: Henry VII (reigned 1485–1509); his son, Henry VIII (1509–47); followed by Henry VIII's three children, Edward VI (1547–53), Mary I (1553–58), and Elizabeth I (1558–1603).

The origins of the Tudors can be traced to the 13th century, but the family's dynastic fortunes were established by Owen Tudor (*c.* 1400–61), a Welsh adventurer who took service with Kings Henry V and Henry VI and fought on the Lancastrian side in the Wars of the Roses; he was beheaded after the Yorkist victory at Mortimer's Cross (1461). Owen had married Henry V's Lancastrian widow, Catherine of Valois; and their eldest son, Edmund (*c.* 1430–56), was created Earl of Richmond by Henry VI and married Margaret Beaufort, the Lady Margaret, who, as great-granddaughter of Edward III's son John of Gaunt, held a distant claim to the throne, as a Lancastrian. Their only child, Henry Tudor, was born after Edmund's death. In 1485 Henry led an invasion against the Yorkist king Richard III and defeated him at Bosworth Field. As Henry VII, he claimed the throne by just title of inheritance and by the judgment of God given in battle, and he cemented his claim by marrying Elizabeth, the daughter of Edward IV and heiress of the House of York. The Tudor rose symbolized the union by representing the red rose of the Lancastrians superimposed upon the white rose of the Yorkists.

The Tudor dynasty was marked by Henry VIII's break with the papacy in Rome (1534) and the beginning of the English Reformation, which, after turns and trials, culminated in the establishment of the Anglican church under Elizabeth I. The period witnessed the high point of the English Renaissance. During Elizabeth's reign, too, through a generation of wars, Spain and the Irish rebels were beaten, the independence of France and of the Dutch was secure, and the unity of England was assured.

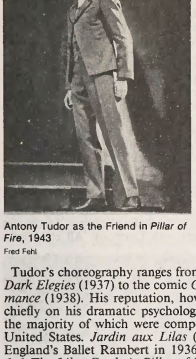
By act of Parliament (1544) and his own testament, Henry VIII left the crown to his three children in turn—Edward VI, Mary I, and Elizabeth I—and provided that, in the event that they died without issue, the crown would pass to the descendants of his younger sister, Mary, before those of his elder sister, Margaret. During her reign, Elizabeth refused to choose between Edward Seymour, Lord Beauchamp (descendant of Mary) and King



James VI of Scotland (descendant of Margaret)—the former being the heir under Henry VIII's will and act of succession and the latter being the heir by strict hereditary succession. On her deathbed, however, she selected the king of Scotland—who became James I of Great Britain, first of the English House of Stuart.

Tudor, Antony, original name WILLIAM COOK (b. April 4, 1908, London—d. April 20, 1987, New York City), British-born American dancer, teacher, and choreographer who developed the so-called psychological ballet.

He began his dance studies at 19 years of age with Marie Rambert and for her company choreographed his first ballet, *Cross-Gartered* (1931), based on an incident in Shakespeare's *Twelfth Night*. In 1938 he founded his own company, the London Ballet, but left the following year to join the newly formed Ballet Theatre (later the American Ballet Theatre) in the United States as dancer and choreographer for 10 years. In 1950 he became associated with the ballet and ballet school of the Metropolitan Opera, and in 1952 he became a faculty member of the dance department of the Juilliard School of Music. He served as an artistic director for the Royal Swedish Ballet in 1963 and 1964.



Antony Tudor as the Friend in *Pillar of Fire*, 1943
Fred Fehl

Tudor's choreography ranges from the tragic *Dark Elegies* (1937) to the comic *Gala Performance* (1938). His reputation, however, rests chiefly on his dramatic psychological ballets, the majority of which were composed in the United States. *Jardin aux Lilas* (created for England's Ballet Rambert in 1936; later retitled *The Lilac Garden*), *Pillar of Fire* (1942), *Romeo and Juliet* (1943), *Undertow* (1945), *Nimbus* (1950), *Knight Errant* (1968), *The Leaves Are Fading* (1975), and *Tiller in the Fields* (1978) explored such themes as grief, jealousy, rejection, and frustration. Although limiting himself to classical techniques, he sought to convey states of emotional conflict and aspects of character and motivation by such means as the elimination of purely decorative choreography, a subtle and painstaking use of gesture, and the symbolic as well as narrative use of the corps de ballet. Tudor danced in several of his own ballets, especially those choreographed in England. Many artists rose to prominence in his works, most notably the ballerina Nora Kaye in his first American-made ballet, *Pillar of Fire*, and the dramatic danseur Hugh Laing. In 1974 Tudor was appointed associate director of the American Ballet Theatre and in 1977 was joined in that position by Kaye.

Tudor, Henry: *see* Henry VII *under* Henry (England).

Tudor, Jasper: *see* Bedford, Jasper Tudor, duke of.

Tudor, Margaret (queen of Scotland): *see* Margaret Tudor.

Tudor, Mary: *see* Mary I *under* Mary (England and Great Britain).

Tudor style, type of British architecture, mainly domestic, that grafted Renaissance decorative elements onto the Perpendicular Gothic style between 1485 and 1558. The Tudor style in architecture coincides with the first part of the reign of the Tudor monarchs, which commenced in 1485 with the accession of Henry VII to the throne and ended with the death of Elizabeth I in 1603. Elizabeth's own reign, from 1558 to 1603, is sufficiently distinctive to be considered a separate period in the history of English building types.

The characteristic exterior features of the Tudor style as used in secular architecture are: a lavish use of half-timber work; large groups of rectangular windows; rich oriel, or bay, windows; complex roofs with many gables; interesting and sometimes fantastic chimney treatments; and much brickwork, frequently in patterns. The interiors of secular buildings featured richly wood-paneled walls and the lavish use of molded plasterwork to decorate ceilings, cornices, and walls, frequently in a naive imitation of Renaissance ornamental motifs.

Tuesday, third day of the week (*q.v.*).

tufa cave, umbrella-like canopy formed as a calcium-carbonate-saturated stream plunges over a cliff. As the water is aerated, carbon dioxide is released, causing the calcium carbonate to be deposited. Tufa caves may completely bridge a river, forming a natural tunnel. One of the largest such caves is Tonto Natural Bridge near Payson, Ariz.

tuff, a relatively soft, porous rock that is usually formed by the compaction and cementation of volcanic ash or dust. (The Italian term *tufa* is sometimes restricted to the soft, porous, sedimentary rock formed by the chemical deposition of calcite, or calcium carbonate, or silica from water as sinter.) Tuffs may be grouped as vitric, crystal, or lithic when they are composed principally of glass, crystal chips, or the debris of pre-existing rocks, respectively. Some of the world's largest deposits of vitric tuff are produced by eruptions through a large number of narrow fissures rather than from volcanic cones.

In extensive deposits, tuff may vary greatly not only in texture but also in chemical and mineralogical composition. There has probably been no geological period entirely free from volcanic eruptions; tuffs therefore range in age from Precambrian to Recent. Most of the older ones have lost all original textures and are thoroughly recrystallized; many old basaltic tuffs are represented by green chlorite and hornblende schists and many rhyolitic tuffs by sericite schists.

In some eruptions, foaming magma wells to the surface as an emulsion of hot gases and incandescent particles; the shredded pumaceous material spreads swiftly, even over gentle gradients, as a glowing avalanche (*nuée ardente*) that may move many kilometres at speeds greater than 160 km (100 miles) per hour. After coming to rest, the ejecta (erupted matter) may be firmly compacted by adhesion of the hot glass fragments to form streaky, welded tuffs (ignimbrites) such as those covering vast areas in New Zealand, Guatemala, Peru, and Yellowstone National Park in the United States. When explosions occur underground, the fragmental material may be forced violently into the surrounding rocks, forming intrusive tuffs (peperites).

tuftybell, any of about 150 species of annual and perennial herbs of the genus *Wahlenbergia*, of the bellflower family (Campanulaceae), mostly native to south temperate regions of the Old World. Ten species of the genus *Edrianthus* often are included in *Wahlenbergia*.



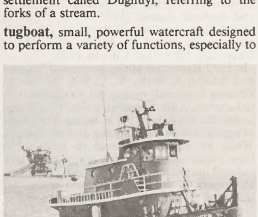
Ivy-leaved bellflower (*Wahlenbergia hederacea*)
G.E. Nicholson

The ivy-leaved bellflower (*W. hederacea*), a European annual, has delicate, hairless, creeping stems and small, pale-blue, veined, bell-shaped flowers. *W. marginata*, a hairy, erect perennial from East Asia, now is naturalized in southern North America; it is about 45 cm (18 inches) tall, with blue or white, upward facing flowers.

tug-of-war, athletic contest between two teams at opposite ends of a rope, each team trying to drag the other across a centre line. In some forms of the game, a tape or handkerchief is tied around the center of the rope, and two others are tied six feet on either side. Three corresponding lines are marked on the ground. The game ends when one team pulls the other so that the tape on the losers' side crosses the ground mark on the winners' side. The contest is decided by the best two out of three pulls. A rural pastime in England and Scotland, the tug-of-war was an Olympic event from 1900 to 1920, with five men to a side. It has often been an outdoor contest at Scottish highland games and at other large social gatherings in the 20th century.

Tugaloo River, river formed southeast of Tallulah Falls, Ga., U.S., at the confluence of the Chattooga and Tallulah rivers (which are there dammed to form Tugaloo and Yonah lakes). The river then flows southeast, serving as a portion of the Georgia–South Carolina state boundary. After a course of 45 miles (72 km), the Tugaloo joins the Seneca River to form the Savannah River, which in its upper course is called the Keowee. The name Tugaloo probably derives from an early Cherokee settlement called Dugiluyi, referring to the forks of a stream.

tugboat, small, powerful watercraft designed to perform a variety of functions, especially to



Tugboat
J.R. Burns

tow or push barges and large ships. In 1736 Jonathan Hulls of Gloucestershire, Eng., patented a boat to be powered by a Newcomen steam engine to move large vessels in and out of harbours. The first tugboat actually built was the *Charlotte Dundas,* powered by a Watt engine and paddle wheel and used on the Forth and Clyde Canal in Scotland. Screw propulsion for tugboats was introduced in the United States about 1850, the diesel engine about 50 years later. Tugs are still indispensable in berthing large ships. Oceangoing tugs are used for salvage missions.

Tugela River, principal river of KwaZulu/Natal province, South Africa. It rises as a stream on the 10,000-foot- (3,050-metre-) high Mont-aux-Sources plateau near the merger point of the Lesotho–Orange Free State province borders. Its upper course, which lies within Royal Natal National Park, flows through the Drakensberg range before hurtling down in a series of waterfalls having a total drop of 3,110 feet (948 m). The river then cuts through Tugela Gorge at the foot of the escarpment (about 5,000 feet [1,500 m] above sea level), is quickly joined by many tributaries, passes through the Ladysmith Basin, and, below Colenso, becomes narrow and deep. At Jameson's Drift it enters the wide, open Tugela Trough, at the eastern end of which it cuts deeply through a great block of sandstone to issue onto the coastal plain.

The Tugela ends its course of 312 miles (502 km) at the Indian Ocean, about 52 miles (84 km) north of Durban, its mouth almost completely blocked in times of normal flow by a sandbar. The river is navigable only in the lagoon formed behind the sandbar. Its narrow valley and scanty alluvial deposits restrict irrigation. The Spioenkop Dam (1973), west of Colenso and southwest of Ladysmith, regulates flow. Upstream, water from the Tugela headwaters is diverted across the Drakensberg into the more highly developed Vaal basin.

Historically, the Tugela (in Zulu, Thukela, meaning "something that startles") marked the southern boundary of Zululand. The total drainage basin of more than 11,000 square miles (more than 28,000 square km) includes most of western KwaZulu/Natal. The major tributary is the Buffalo.

Ṭughril Beg: *see* Toghril Beg.

Tugwell, Rexford Guy (b. July 10, 1891, Sinclairville, N.Y., U.S.—d. July 21, 1979, Santa Barbara, Calif.), American economist, one of the three members of President Franklin D. Roosevelt's so-called Brain (or Brains) Trust.

Tugwell attended the University of Pennsylvania's Wharton School of Finance and Commerce, earning his bachelor's, master's, and doctoral degrees (1915, 1916, 1922). A liberal economist who believed in economic planning, he joined the faculty of Columbia University, New York City, in 1920.

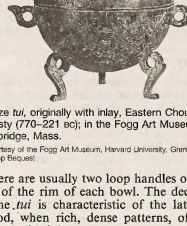
In 1932 Raymond Moley persuaded Tugwell and Adolph A. Berle, Jr., to join together in advising Roosevelt during the 1932 presidential contest. After Roosevelt's victory, Tugwell joined the administration as assistant secretary of agriculture (later becoming undersecretary). While he was instrumental in formulating farm policy—especially the planning of agricultural output and the initiation of payments to farmers for not growing certain crops—his influence extended into nearly every aspect of New Deal economic reform.

In 1936 he left the Roosevelt administration for private business and in 1938 became chairman of the New York City Planning Commission, but in 1941 he accepted appointment as chancellor of the University of Puerto Rico. Later that year he became governor of the island, where for the next five years he tried to better economic and social conditions—a goal that led to conflict with wealthy sugar planters. From his experiences in Puerto Rico, he wrote *The Stricken Land* (1946).

From 1946 to 1952, Tugwell directed the Institute of Planning at the University of Chicago, where he also served as a professor of political science (1946–57). He eventually settled in Santa Barbara, Calif., where he held the post of senior fellow at the Center for the Study of Democratic Institutions. He spent his remaining years working on a model for a new Constitution of the United States.

In 1968 Tugwell won the Bancroft prize in history for his book *The Brains Trust.*

tui, Pinyin DUI, type of Chinese bronze vessel produced in the late Chou dynasty (*c.* 600–221 BC). It is a food container consisting of two bowls—each supported on three legs—that, when placed together, form a sphere.



Bronze *tui,* originally with inlay, Eastern Chou dynasty (770–221 BC); in the Fogg Art Museum, Cambridge, Mass.

By courtesy of the Fogg Art Museum, Harvard University, Grenville L. Winthrop Bequest

There are usually two loop handles on either side of the rim of each bowl. The decoration of the *tui* is characteristic of the late Chou period, when rich, dense patterns, often enhanced with inlays, were common.

Tuileries Palace, French PALAIS DES TUILERIES, French royal residence adjacent to the Louvre in Paris before it was destroyed by arson in 1871. Construction of the original palace—commissioned by Catherine de' Medici—was begun in 1564, and in the subsequent 200 years there were many additions and alterations. Among the French architects who worked on the building in the 16th century were Philibert Delorme, who designed the first plans; Jean Bullant; and Jacques du Cerceau. Louis Le Vau, in the 17th century, also contributed to the structure.



The Tuileries Palace (foreground) adjoining the Louvre, *c.* 1860, Paris

© Roger-Viollet

Tukārām (b. 1608, Dehu, near Pune, India—d. 1649), Marathi poet who is often considered to be the greatest writer in the language. His *abhaṅgas,* or "unbroken" hymns, are among the most famous Indian poems.

The son of a shopkeeper, Tukārām was orphaned in childhood. Failing in business and family life, he renounced the world and became an itinerant ascetic. It is believed that he threw himself into a river and drowned. Tukārām is thought to have written over 4,000 *abhaṅgas,* most of which were addressed to the god Viṭhoba of Pandharpur. An edition of his poems translated into English was published in 1909–15 and reprinted in 1981.

Tukaroi, Battle of (March 3, 1575), conflict between the forces of the Indian Mughal emperor Akbar under Mun'im Khān and Dā'ūd Khān, the Afghan sultan of Bengal. The battle, which took place at a village between Midnapore and Jalesar in western Bengal, was decisive in scattering the Bengali army. The conquest of Bengal, which had been independent from Delhi since about 1338–39, was completed by the Mughals in 1576.

Tukhachevsky, Mikhayl Nikolayevich (b. Feb. 16 [Feb. 4, Old Style], 1893, near Sledenevo, Russia—d. June 11, 1937), Soviet military chief responsible for modernization of the Red Army prior to World War II.

Tukhachevsky was born to a noble family and graduated from the Alekzanderskoe Military Academy in 1914. He fought in World War I in the Imperial Army, and from 1918 he served as an officer in the Red Army—leading the defense of the Moscow district (1918), commanding forces on the Eastern Front (1918), commanding the 5th Army in the recapture of Siberia from Admiral A.V. Kolchak, and heading Cossack forces against General A.I. Denikin (1920). He also took part in the Russian war with Poland (1920–21) and in the suppression of the Kronshtadt Rebellion (1921).

After the end of the Civil War, Tukhachevsky played a leading role in military reforms and from 1931 directed the rearmament of the Soviet Union. He was responsible for extensive organizational streamlining and technological modernization of the Red Army and for the establishment of a series of modern military schools. He also wrote numerous books and articles on strategic considerations in modern warfare. He served as chief of staff (1925–28) and deputy commissar for defense (after 1931) and received the Order of Lenin for his contributions. In 1935 he was made a marshal of the Soviet Union.

Tukhachevsky was tried with seven other top Red Army commanders in June 1937, in conjunction with the Stalinist purges, on charges of conspiracy with Germany. All eight were convicted and executed. The purge of the Red Army's officer corps followed. In 1988 he was cleared judicially and rehabilitated by official decree.

Tuktoyaktuk, formerly (until 1950) PORT BRABANT, hamlet, Inuvik region, northwestern Northwest Territories, Can., on the Beaufort Sea. It is situated 20 miles (32 km) east of the Mackenzie River delta and 100 miles (160 km) northeast of Inuvik. Tuktoyaktuk (an Inuit word for "reindeer that looks like caribou") was established in 1936 as a Hudson's Bay Company trading post and transport depot. Its economic base is trapping, whaling, sealing, reindeer herding,

and handicrafts (especially bone and antler carving). It is also a centre for offshore oil exploration and during summer months is a busy transshipment point where cargoes are transferred from riverboats (that navigate the Mackenzie) to seagoing vessels. One of the world's largest concentrations of pingos (ice-cored hills that grow in permafrost) is found near Tuktoyaktuk. Pop. (1991) 918.

Tukulor, also spelled TUKOLOR, or TOUCOULEUR, a Muslim people who mainly inhabit Senegal, with smaller numbers in western Mali. Their origins are complex: they seem basically akin to the Serer and Wolof peoples, and contacts with the Fulani have greatly influenced their development. They speak the Fulani language, called Fulfulde, which belongs to the West Atlantic branch of the Niger-Congo family.

From the 10th to the 18th century the Tukulor were organized in the kingdom of Tekrur, which, until the emergence of a Tukulor empire (*q.v.*) in the 18th century, was ruled by a succession of non-Tukulor groups. In the mid-19th century, many Tukulor supported a religious war against other tribes in the area and, unsuccessfully, against the French. Defeated, many fled to present-day Mali, where many continue to live.

The Tukulor embraced Islām in the 11th century and take great pride in their strong Islāmic tradition. Their social structure is highly stratified and is based primarily on male lineage (patrilineage) groups, which are usually scattered among several villages. The typical household comprises a segment of a patrilineage (usually a father, his sons, and grandchildren), their wives, children, and sometimes more distant kin. The Tukulor are polygynous, although only some 20 percent of males have more than one wife. A bride-price, often substantial if the bride enjoys high social status, is required. High status attaches to membership in a noble lineage or a prosperous family; low status is associated with membership in certain artisan castes or with slave ancestry. Leadership in Muslim religious brotherhoods has in recent times assumed importance in status rankings.

The Tukulor economy rests equally on stock raising, fishing, and cultivating such crops as millet and sorghum. A corollary of the hierarchical social structure is a marked inequality in the distribution of land; and this, together with a steadily rising population, has resulted in the emigration of considerable numbers of youth to the cities.

Tukulor empire, Tukulor also spelled TUKOLOR, or TOUCOULEUR, Muslim theocracy that flourished in the 19th century in western Africa from Senegal eastward to Timbuktu (Tombouctou).

The founder of the empire, al-Ḥajj 'Umar (*c.* 1795–1864), was a Tukulor cleric of the austere Tijāniyah brotherhood who about 1848 moved with his followers to Dinguiraye (now in Guinea), on the borders of the Fouta Djallon region, to prepare to found a new state that would conform to the stringent moral requirements of his order. He thus set about training an elite corps in which religious, military, and commercial considerations were combined. Equipped with European firearms, this force was ready by about 1850 to embark on a jihad, or holy war, against his neighbours. It first came into conflict with the Bambara chiefdoms to the north, then two years later moved northward again across the upper Sénégal River to conquer the Bambara kingdom of Kaarta. Checked by the French in their westward return down the Sénégal River, the Tukulor quickly overran the Bambara kingdom of Segu (1861) and thereafter conquered Macina. They then extended their dominion as far north as Timbuktu (now in Mali).

This empire, though almost as large as that of the Sokoto Fulani to the east, was by no means so soundly based. Whatever 'Umar's original motives may have been, his followers seem to have been as much concerned with amassing riches and power as with converting their subjects to Islām. Numerous risings against Tukulor authority by the conquered Bambara and Fulani continually shook the empire, and in 1864 'Umar himself was killed. His son and successor, Aḥmadu Seku, inherited a patrimony disturbed by inner conflicts and rival claims to power. For the sake of internal order, in the 1880s he began to disband his army and put increasing reliance on the loyalty of subject peoples. The policy failed; not only did Aḥmadu fail to win new loyalties, but he lost the adherence of the Tukulor themselves as they saw their privileged position erode. The French exploited the situation by constructing forts within Tukulor territory and signing treaties of friendship with Tukulor's neighbours. After 1890, French troops swept the empire, conquering Segu, Macina, and Timbuktu in turn. Aḥmadu succumbed to the French in 1893, and his former empire was soon firmly incorporated into French overseas territory.

Tukulti-Ninurta I (reigned *c.* 1238–*c.* 1197 BC), king of Assyria who asserted Assyrian supremacy over King Kashtiliash IV, ruler of



Tukulti-Ninurta I approaching and kneeling before an altar bearing the emblem of the fire god Nasku, relief sculpture from Ashur; in the State Museums of Berlin, Germany
Bildarchiv Foto Marburg—Art Resource

the Kassites to the southeast (about the Persian Gulf), and subjugated ancient Armenia to the northeast and, for a time, Babylonia.

A promoter of cultic ritual, Tukulti-Ninurta erected a noted ziggurat temple to the goddess Ishtar-Dinitu ("Ishtar of the Dawn") that served as a model for Assyrian architecture. He extended Ashur's fortifications, but, after constructing a new capital, Kar-Tukulti-Ninurta, facing Ashur across the Tigris River, he was slain by his son.

Tukulti-Ninurta Epic, the only extant Assyrian epic tale; it relates the wars between Tukulti-Ninurta I of Assyria (reigned *c.* 1238–*c.* 1197 BC) and Kashtiliash IV of Babylonia (reigned *c.* 1242–*c.* 1235 BC). Written from the Assyrian point of view, the epic gives a strongly biased, though poetic, narrative. It is a late example of the primary epic style that was used especially during the late 3rd and early 2nd millennia BC.

Tula, also called TOLLAN, ancient capital of the Toltecs in Mexico; it was primarily important from about AD 900 to about 1200. Although its exact location is not certain, an archaeological site near the contemporary town of Tula in Hidalgo state has been the persistent choice of historians. Some scholars, however, are reluctant to accept this identification, preferring the site of Teotihuacán near Mexico City.

The archaeological remains near contemporary Tula are concentrated in two clusters at opposite ends of a low ridge. Recent surveys indicate that the original urban area covered at least three square miles and that the town probably had a population in the tens of thousands. The major civic centre consists of a large plaza bordered on one side by a five-stepped temple pyramid, which was probably dedicated to the god Quetzalcóatl. Other structures include a palace complex, two other temple pyramids, and two ball courts. Another large civic centre stands at the opposite end of the ridge.

The main temple pyramid and its associated structures epitomize the stylistic characteristics of Tula architecture. Though small, the pyramid was highly decorated. The sides of the five terraces were covered with painted and sculptured friezes of marching felines and canines, of birds of prey devouring human hearts, and of human faces extending from the gaping jaws of serpents. A stairway on the southern side led to a highly ornamented, two-room temple at the summit. The front room was supported by four columns in the form of erect, stiffly posed warriors, each 15



Columns that once supported the front room of the main temple at Tula, Mex.
Ursula Bernath

feet (4.58 m) high and adorned with a series of highly specific body ornaments and accoutrements representative of the Tula style.

Attached to the southern base of the pyramid was another feature of Tula architecture—great colonnaded masonry hallways with flat roofs supported on scores of masonry columns.

Separated from the main temple pyramid by a narrow alley are the partial remains of what may have been the palace of the ruler of Tula. The excavated portions consist of three great halls. Each apparently had a low bench placed along the interior walls (with projecting thrones at the midpoints), a central sunken light well, and great numbers of columns for support of the flat wood and masonry roof.

In general, the art and architecture of Tula show a striking similarity to that of Tenochtitlán, the Aztec capital, and the artistic themes indicate a close approximation in religious ideology and behaviour. In fact, many scholars believe that the Aztecs' concept of themselves as warrior-priests of the sun god was directly borrowed from the people of Tula.

Tula, *oblast* (province), western Russia, with an area of 9,925 square miles (25,700 square km) in the Central Russian Upland. The *oblast*'s rolling hills, which are much dissected by river valleys and erosion gullies, are covered by both fertile and poor soils, but the natural vegetation of mixed forest or forest-steppe has in large part been cleared for agriculture since the intensive settlement of the area in the 16th century. The climate is continental, with precipitation declining from 23 inches (575 mm) in the northwest to 18.5 inches (470 mm) in the southeast. The *oblast*'s highly developed farming includes grain cultivation (wheat and rye), dairying, livestock raising, market gardening, and sugar beet and potato growing. Since the 17th century, the area has been noted for its metallurgical industry, which has been joined in the 20th century by engineering and chemicals. A considerable amount of lignite (brown coal) has been mined there. Pop. (2000 est.) 1,746,100.

Tula, city and administrative centre of Tula *oblast* (province), western Russia. It lies along the Upa River, which is a tributary of the Oka River. First mentioned in 1146 as Taydula, Tula became the principal stronghold on the southern approaches to Moscow in the 16th century and the centre of a series of defensive lines against Tatar attack. A stone citadel of 1530, restored in 1784 and 1824, survives. In 1552 the city successfully resisted a siege by the Tatars. During the 17th century, Tula developed into the major ironworking city of Russia. It was the site of Russia's first armament factory, built in 1712 by Peter I the Great, and remains a large armament producer. Besides iron and steel, modern Tula has a range of engineering industries. Much lignite (brown coal) is mined locally and used in the chemical industry. Samovars are a traditional manufacture. The city has mechanical, mining, and teacher-training institutes and one devoted to coal-mining research. A museum founded in 1724 displays a history of weapons. Yasnaya Polyana, the home of the writer Leo Tolstoy, is located 9 miles (14 km) southwest of Tula. Pop. (2000 est.) 506,100.

Tulagi, also spelled TULAGHI, town and island in the Solomon Islands, southwestern Pacific Ocean, north of Guadalcanal. The island has a circumference of 3 miles (5 km). The town of Tulagi was the administrative seat (from 1893) of the British Solomon Islands Protectorate until it was destroyed by the Japanese (1942), after which the capital was moved to Honiara, a new town built on Guadalcanal. The narrow strait between Tulagi and Florida Island forms a good harbour. Pop. (2000 est.) Tulagi island and adjacent islands, 3,100.

Tulancingo, city, southeastern Hidalgo *estado* ("state"), north-central Mexico. Tulancingo lies along the Río Grande de Tulancingo, at 7,290 feet (2,222 m) above sea level. It was taken from the Toltec Indians by the Spaniards in the 1520s. The city, which contains several colonial churches, became the seat of a bishopric in 1862. It is an agricultural (barley and alfalfa) and industrial centre and has several woolen mills. Lying east of Pachuca, the state capital, it can be reached by railroad and by air as well as by road. Pop. (1980) 53,400.

tularemia, acute infectious disease resembling plague, but much less severe. It was described in 1911 among ground squirrels in Tulare county, Calif. (from which the name is derived), and was first reported in humans in the United States in 1914. The causative agent is the gram-negative bacterium *Francisella tularensis*. The disease is primarily one of animals; human infections are incidental. It occurs naturally in many types of wildlife. In the United States the rabbit, especially the cottontail, *Sylvilagus,* is an important source of human infection, but other mammals, birds, and insects also spread the disease. Human cases in Sweden and Norway have been transmitted by hares; in the Soviet Union, by water rats. *F. tularensis* has been found in some natural water sources, causing incidences of the disease in humans and animals. The disease is mainly acquired by humans from the animal reservoir of infection, either directly by handling the carcasses of infected rabbits or indirectly through an insect carrier, most commonly a deerfly, *Chrysops discalis;* the human disease is also called deerfly fever. Various ticks of the genera *Dermacentor, Haemaphysalis, Rhipicephalus, Amblyomma,* and *Ixodes* may be largely responsible for maintenance of the animal infection. In addition, the infection is transmitted from the adult tick to the egg, and both larvae and nymphs are infectious and form an insect reservoir of infection. No case of human-to-human contamination has been reported.

The disease in humans occurs in two forms: the more common glandular, or ulceroglandular, form and the less common typhoidal form. Local lesions occur in the first, usually beginning with a papule at the site of initial infection that breaks down to form an ulcer. The infection then spreads to the lymph glands in the armpits, which become painful and swollen and may break down and discharge purulent material. Infection of the eye is also common, with swelling of related lymph glands. The general symptoms common to both forms of the disease are headache, bodily aches, and fever. The disease persists for two to four weeks. The fatality rate is very low. Up to 300 cases of the disease are reported each year in the United States, and the disease has been encountered in all parts of the country except Hawaii, although it is most common in the Midwest. The tetracyclines are reasonably effective in treating the disease; gentamicin and streptomycin are the most effective antibiotics, and healing usually takes place within 10 days. A live attenuated vaccine has been generally successful in conferring immunity on susceptible hosts, although its use is usually limited to persons at high risk.

Tulcán, city, extreme northern highland Ecuador. Tulcán lies just south of the Carchi River near the Colombian border. It is on the former site of the Cara Indian settlement Tulcanque. Spanish colonists established the European settlement in the mid-18th century. When Ecuador seceded from Gran Colombia in 1830, the boundary between Ecuador and Colombia was fixed along the Carchi River, thus politically dividing a natural economic area—the basin of Tulcán.

In the vicinity is the natural bridge of Rumichaca over the Carchi River, which is the location of a frontier post between Colombia and Ecuador. A few miles to the northeast in Colombia, the shrine of Nuestra Señora de Las Lajas (Our Lady of the Flagstones) is visited by many pilgrims from both countries.

Tulcán is in the centre of a rich agricultural region and processes cereals, sugarcane, and coffee. It is also known for its dairy products. Tanning and the manufacture of woolen textiles (rugs and ponchos) are other leading activities. Tulcán was severely damaged by an earthquake in 1923 and has since been rebuilt. It is the seat of a Roman Catholic diocese. The Pan-American Highway passes through the city. Pop. (1995 est.) 44,900.

Tulcea, *județ* (county), southeastern Romania. It occupies an area of 3,255 square miles (8,430 square km) and is bounded on the north by Moldova and the eastward-draining Danube River. Near Tulcea city, which is the county seat, the Danube branches into the Sulina and St. George tributaries, which empty into the Black Sea. The Sulina is navigable by seagoing vessels. An area of scientific investigation, the Danube delta in Tulcea county has water lilies, among other flora, and fauna including pelicans and minks. The Măcin Massif, the oldest mountain range in Romania, rises in the western portion of the county, and Lake Razelm lies in the southeast.

Industrial activities in Tulcea and other towns in the county consist mostly of fish canning and barite and granite mining. Reeds are harvested from the Danube delta for use in the manufacture of cellulose and paper, and vineyards are cultivated in the northwest. Gorgova, Mila, and Victoria are fishing villages. The town of Chilia Veche was built on a former Greek settlement dating from the 5th century BC, and the towns of Sulina and Mahmudia were former Roman settlements. A research station and museum, containing exhibits about the reed industry, are found in Maliuc. Highways and a railway connection extend through Tulcea. Pop. (1997 est.) 265,800.

Tulcea, city, seat of Tulcea *județ* (county), southeastern Romania, situated on the St. George arm of the Danube River. Tulcea is an ancient city, founded in the 7th century BC by Greeks from Miletus. The Romans called it Aegissus. It is an important inland port, accessible from the Black Sea via the main Danube channels, and it is a centre for fishing and tourism along the smaller delta channels. Tulcea, with the largest fishing industry in Romania, refrigerates, cans, and packs fish for distribution throughout the country. Factories in the city process other foods and provide the fishing industry with tackle and small craft. Pop. (1997 est.) 97,300.

tule perch, the sole freshwater species of surfperch (*q.v.*).

Tuléar (Madagascar): *see* Toliara.

tulip (genus *Tulipa*), any of a group of cultivated bulbous herbs in the family Liliaceae. The genus *Tulipa* consists of about 100 species that are native to Eurasia from Austria and Italy eastward to Japan, with two-thirds of them native to the eastern Mediterranean and the southeastern parts of the Soviet Union. Tulips are among the most popular of all garden flowers.

Tulips were introduced to the Western world by the Viennese ambassador to Turkey, Ogier de Busbecq, who wrote of seeing the plants in Edirne, Tur., in 1551 and who later sent some seeds to Austria. The arrival at Antwerp in 1562 of a cargo of tulip bulbs from Constantinople (now Istanbul) marked the beginning of the tulip horticultural industry in Europe. A speculative frenzy over tulips in



Tulip (*Tulipa*)
Malak

the Netherlands in 1633–37 is now known as the Tulip Mania (*q.v.*).

The tulip produces two or three thick, bluish green leaves that are clustered at the base of the plant. The solitary bell-shaped flowers have three petals and three sepals. There are six free stamens, and the three-lobed ovary is terminated by a sessile three-lobed stigma. The fruit is a capsule with many seeds. Many garden tulips can be propagated only by their scaly bulbs.

Tulip flowers occur in a wide range of colours except true blue—from purest white through all shades of yellow and red to brown and deepest purple to almost black. Almost 4,000 horticultural varieties have been developed. There are several different classification schemes based on the plants' time of bloom, flower shape, and plant size. Among the tulips that appear earliest in spring are single-flowered and double-flowered early types. Tulip types that bloom in mid-season include Mendels and Darwins. Late-blooming tulips are the largest class, with the widest range of growth habits and colours. Among them are Darwins, breeders, cottage, lily-flowered, double-late, and parrot types.

Generally, solid-coloured tulips are spoken of as "self-coloured," while streaked blossoms are called "broken." The phenomenon of colour streaks in tulips is due to a harmless virus infection that causes the self colour to disappear in certain zonal patterns, leaving the flower's white or yellow underlying colour to show through in irregular streaks.

Tulips flourish in any good soil but do best in well-drained loam. The bulbs are usually planted in the autumn at a depth of four to eight inches below the surface in a soil enriched with compost. Though they will continue to flower annually for a few years, they tend eventually to degenerate. A common commercial practice is to lift the bulbs after the flowers have ceased blooming and the foliage has turned yellow; the bulbs are then stored in a cool, dry place until replanting time in the autumn. In general, tulips are remarkably free from attack by garden pests.

Tulip Mania, also called TULIP CRAZE, Dutch TULPENWOEDE, a speculative frenzy in 17th-century Holland over the sale of tulip bulbs. Tulips were introduced into Europe from Turkey shortly after 1550, and the delicately formed, vividly coloured flowers became a popular if costly item. The demand for differently coloured varieties of tulips soon exceeded the supply, and prices for individual bulbs of rare types began to rise to unwarranted heights in northern Europe. By about 1610 a single bulb of a new variety was acceptable as dowry for a bride, and a flourishing brewery in France was exchanged for one bulb of the variety Tulipe Brasserie. The craze reached its height in Holland during 1633–37. Before 1633 Holland's tulip trade had been restricted to professional growers and experts, but the steadily rising prices tempted many ordinary middle-class and poor families to speculate in the tulip market. Homes, estates, and industries were mortgaged so that bulbs could be bought for resale at higher prices. Sales and resales were made many times over without the bulbs ever leaving the ground, and rare varieties of bulbs sold for the equivalent of hundreds of dollars each. The crash came early in 1637, when doubts arose as to whether prices would continue to increase. Almost overnight the price structure for tulips collapsed, sweeping away fortunes and leaving behind financial ruin for many ordinary Dutch families.

tulip tree, also called YELLOW POPLAR, or WHITEWOOD (species *Liriodendron tulipifera*), North American ornamental and timber tree of the magnolia family (Magnoliaceae), order Magnoliales, not related to the true poplars.

The tulip tree occurs in mixed-hardwood stands in eastern North America. It is taller than all other eastern broad-leaved trees, and its trunk often has a diameter greater than 2 m (7 feet). The tulip tree can attain a height of 60 m (197 feet). Its long-stemmed, bright green leaves are bilaterally two- to four-lobed, with tips that are straight-edged or broadly notched. They turn golden yellow in the fall and have large appendages (stipules) at the base of the leafstalks; the stipule scars encircle the twigs. The large, yellowish green tuliplike flowers have six petals, orange at the base, and three bright green sepals. Other characteristics include conelike clusters of terminally winged fruits; aromatic, purplish brown twigs with winter buds resembling a duck's bill; and a straight trunk with an oblong crown. A tulip tree reaches its full stature in approximately 200 years.



Tulip tree (*Liriodendron tulipifera*)
Karl Maslowski

The light yellow to yellowish green wood is used in the manufacture of furniture parts, plywood panels, paper, millwork, boxes, and crates. The tulip tree is relatively free of pests and diseases. It is a useful large shade tree where space is available for it.

Tull, Jethro (b. 1674, Basildon, Berkshire, Eng.—d. Feb. 21, 1741, Prosperous Farm, near Hungerford, Berkshire), English agronomist, agriculturist, writer, and inventor whose ideas helped form the basis of modern British agriculture.

Tull trained for the bar, to which he was called in 1699. But for the next 10 years he chose to operate his father's farm in Oxfordshire, on which about 1701 he perfected a horse-drawn seed drill that economically sowed the seeds in neat rows. This was a notable advance over the usual practice of scattering the seeds by hand. In 1709 Tull bought a farm of his own in Berkshire. While later traveling in France and Italy, he was impressed by the cultivation methods in use in the vineyards, wherein the rows of earth between the vines had been pulverized. This reduced the need for manure and increased aeration and the access of water to and from plant roots, though Tull mistakenly believed that earth was the food of plants and that pulverization made it easier for plants to absorb it. He developed a horse-drawn hoe and successfully adopted the vineyard method to his farm. His success led to the publication of his *The New Horse*



Jethro Tull, detail of an oil painting by an unknown artist; in the collection of the Royal Society for Agriculture, London
BBC Hulton Picture Library

Houghing Husbandry: Or an Essay on the Principles of Tillage and Vegetation (1731). Tull's methods were initially subjected to violent attack, but they were eventually adopted by the large landowners and laid the basis for more modern and efficient British farming.

Tullahoma, city, Coffee and Franklin counties, south-central Tennessee, U.S. It lies 60 miles (97 km) southeast of Nashville on the site of a Cherokee Indian village. It was settled by 1850 by pioneers from eastern Tennessee. Originally an agricultural community, the city developed in the late 19th century as a summer resort. Growth was stimulated during World War II with the establishment nearby of Camp Forrest Infantry Training Center, which later became the site of the Arnold Engineering Development Center (an aeronautical and testing installation) and the University of Tennessee Space Institute (1964). Motlow State Community College opened in 1967. The city's manufactures include aircraft components, shoes, wood products, and sports equipment (notably baseballs). Whiskey distilling and the cultivation of grain, cotton, and tobacco are important. Inc. 1903. Pop. (1990) 16,761.

Tullamore, Irish TULACH MHÓR ("Big Hill"), market town, urban district, and the seat of County Offaly, Ireland, situated on the River Tullamore. The High Cross is all that remains of Durrow Abbey, which once stood to the north of Tullamore. The Book of Durrow, an illuminated manuscript of the four Gospels in Irish script, was written there about 700 and is now in Trinity College, Dublin. The neighbourhood contains Bronze Age and early Christian monuments. Local trade in farm produce is augmented by food-processing industries and by brewing. Pop. (1986) 8,484.

Tulle, town, capital of Corrèze *département*, Limousin *région*, central France. It is situated on the western edge of the upland block known as the Massif Central. The town is strung out along the deep, narrow Corrèze valley, and its streets climb steep hill slopes. Only the 12th-century nave and the belfry remain of its ancient Cathedral of Saint-Martin,

part of which collapsed in 1796. The town is the site of a national firearms factory. Its name was given to what was once an important regional industry, the making of tulle, a fine silk net. Pop. (1990) 17,164.

Tullius, Servius: *see* Servius Tullius.

Tullus Hostilius, traditionally, the third king of Rome, reigning from 673 to 642 BC. He was a legendary figure, the legend probably influenced by that of Romulus. Both Tullus and Romulus supposedly carried on war with the neighbouring cities of Fidenae and Veii, doubled the number of Roman citizens, organized the army, and disappeared from earth in a storm. Such legends are accepted as fact by the historians Livy (59 BC–AD 17) and Dionysius of Halicarnassus (flourished late 1st century BC). It is possible that Alba Longa, about 12 miles (19 km) southeast of Rome, was destroyed during the years in which Tullus is thought to have reigned. His reported policy of incorporating Alba into the Roman state and enrolling its chiefs in the Senate is entirely in accord with the historical fact of Rome's early expansion by amalgamation rather than by subjugation. The founding by Tullus of the Curia Hostilia, an early meeting place of the Roman Senate, may also be regarded as authentic.

Tully: *see* Cicero, Marcus Tullius.

Tulsa, city, Osage and Tulsa counties, seat (1907) of Tulsa county, northeastern Oklahoma, U.S., situated on the Arkansas River. It originated in 1836 as a settlement of Creek Indian immigrants who named it for their former town in Alabama. White settlement began after the arrival in 1882 of the St. Louis–San Francisco Railway; the city was incorporated in 1898. The discovery of oil in nearby Red Fork (1901) and Glenn Pool (1905) launched the mid-continent oil and gas boom, and phenomenal growth followed. More than 800 major oil companies now have plants and offices in the city, which is the site of the International Petroleum Exposition. The main economic activity is based on petroleum—exploration, drilling, production, refining, and research. The aviation-aerospace industry also is important to Tulsa's economy, which includes a wide range of manufacturing and wholesale distribution activities. The city serves as the commercial and financial centre of a rich agricultural area and is the national headquarters of the U.S. Jaycees.



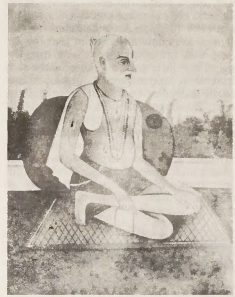
The Prayer Tower, Oral Roberts University, Tulsa, Okla.

By courtesy of the Oklahoma Tourism and Information Division

The municipally owned Spavinaw Water System brings clear water from the Ozark foothills, 70 miles (110 km) away. Surrounded by man-made lakes and reservoirs, Tulsa, with the nearby port of Catoosa on the Verdigris River, is the head of navigation for the Arkansas-Mississippi Waterway. It thus has access to the Great Lakes and the Gulf of Mexico and to barge transportation complementing airlines, railroads, and trucklines. The city's cultural institutions include the Thomas Gilcrease Institute of American History and Art (1949), the University of Tulsa (1894), and Oral Roberts University (1963). Pop. (1990) city, 367,302; Tulsa MSA, 708,954.

Tulsī Rām (Hindu religious leader): *see* Śiva Dayāl Sāheb.

Tulsīdās (b. 1543?, probably Rājāpur, India—d. 1623, Vārānasi), Indian sacred poet whose principal work, the *Rāmcaritmānas* ("Sacred Lake of the Acts of Rāma"), is the greatest achievement of medieval Hindi literature and has exercised an abiding influence on the Hindu culture of northern India.



Tulsīdās, detail of an oil painting by an unknown artist, early 17th century

By courtesy of Acharya Vishwanath Prasad Mishra, Professor Navin Chair, Vikram University, Ujjain, M.P., India

The *Rāmcaritmānas* expresses par excellence the religious sentiment of bhakti ("loving devotion") to the Vaiṣṇava avatar, Rāma, who is regarded as the chief means of salvation. Although Tulsīdās was above all a devotee of Rāma, he remained a Smārta Vaiṣṇava (a follower of the more generally accepted traditions and customs of Hinduism rather than a strict sectarian), and his poem gives some expression both to orthodox monistic Vedānta doctrine and to the polytheistic mythology of Hinduism—though these are everywhere subordinated to his expression of bhakti for Rāma. His eclectic approach to doctrinal questions meant that he was able to rally wide support for the worship of Rāma in northern India, and the success of the *Rāmcaritmānas* has been a prime factor in the replacement of the Krishna (Kṛṣṇa) cult by the cult of Rāma as the dominant religious influence in that area.

Little is known about Tulsīdās' life. He was probably born at Rājāpur and lived most of his adult life at Vārānasi. The *Rāmcaritmānas* was written between 1574 and 1576 or 1577. A number of early manuscripts are extant—some fragmentary—and one is said to be an autograph. The oldest complete manuscript is dated 1647. The poem, written in Awadhi, an Eastern Hindi dialect, consists of seven cantos of unequal lengths. Although the ultimate source of the central narrative is the Sanskrit epic *Rāmāyaṇa,* Tulsīdās' principal immediate source was the *Adhyātma Rāmāyaṇa,* a late medieval recasting of the epic that had already sought to harmonize the Advaita system and the Rāma cult. The influence of the *Bhāgavata-Purāṇa,* the chief scripture of the Krishna cult, is also discernible, with that of a number of minor sources.

Eleven other works are attributed with some certainty to Tulsīdās. These include *Kṛṣṇa gītāvalī,* a series of 61 songs in honour of Krishna; *Vinay pattrikā,* a series of 279 verse passages addressed to Hindu sacred places and deities (chiefly Rāma and Sītā); and *Kavitāvalī,* telling incidents from the story of Rāma.

A prose translation of the *Rāmcaritmānas,* with a useful introduction, is W.D.P. Hill's *The Holy Lake of the Acts of Rama* (1952).

Tulu language, also spelled TULU, language of the Dravidian family, spoken in southern Karnātaka (formerly Mysore) state, India. Tulu has borrowed many words from Kannada (*q.v.*), the official language of Karnātaka, but they are not closely related. Tulu has no written tradition or literature.

Tuluá, city, Valle del Cauca *departamento,* western Colombia. The site, originally settled by the Putimáes Indians, was called Villa de Jerez by early explorers. The Indians resisted all Spanish attempts at conquest from that of Bartolomé Giraldo Gil de Estupiñán in 1556 until subdued by Juan de Lemos y Aguirre in 1636. The latter established a large cattle ranch called Tuluá, from which he administered the outlying regions. After constant petitioning, in 1814 Tuluá won municipal status, discarding its former designation as an Indian village, although it retained its Indian name. Its economy has remained basically agricultural; beef, milk, yeast, and foodstuffs are produced. An annual fair is held to display prize cattle and industrial goods. The city is located on the Pan-American Highway and the Puerto Berrío-Popayán railroad. Pop. (1985) 99,721.

Tulun, city, Irkutsk *oblast* (province), east-central Russia. It lies along the Iya River and the Trans-Siberian Railroad. Incorporated first in 1922, it changed to a rural settlement in 1924 and was reincorporated in 1927. It is a centre for the Azey lignite (brown coal) field and of the wood and forest industry. Pop. (1991 est.) 53,700.

Ṭūlūnid DYNASTY, first local dynasty of Egypt and Syria to exist independently of the ʿAbbāsid caliphate in Baghdad, ruling 868–905. Its founder, Aḥmad ibn Ṭūlūn, a Turk, arrived in Egypt in 868 as vice governor and promptly (868–872) established a military and financial foothold in the province by organizing an independent Egyptian army and securing the management of the Egyptian and Syrian treasuries. Insufficient payment of tribute brought caliphal troops against him in 877, but Aḥmad maintained his position by



Arcade and courtyard of the Mosque of Aḥmad ibn Ṭūlūn, Cairo, completed 879, Ṭūlūnid period

Bright—M. Grimoldi

occupying Syria (878). During his rule (868–884), the most significant in Ṭūlūnid history, the provinces developed agriculturally, commerce and industry were encouraged, and the artistic traditions of the 'Abbāsids of Baghdad and Sāmarrā' were introduced into western Islām. A public building program was initiated, in which Al-Qaṭā'i', the Ṭūlūnid capital, and the great Mosque of Aḥmad ibn Ṭūlūn were constructed. The mosque, modeled after the Great Mosque of al-Mutawakkil in Sāmarrā', is made of brick and plaster, materials rarely used previously in Egyptian architecture but popular in Iraq.

The subsequent Ṭūlūnids, Khumārawayh (884–896), Jaysh (896), Hārūn (896–905), and Shaybān (905), were ineffectual rulers, totally reliant on a Turkish-black military caste. Under the administration of Khumārawayh, Aḥmad's son, the Syro-Egyptian state's financial and military stability was destroyed, and the state finally reverted to the 'Abbāsids in 905.

After the fall of the Ṭūlūnids, the arts in Egypt deteriorated and did not recover until the Fāṭimids took power. They were strongly influenced by the Ṭūlūnids and, by the 11th century, had made Egypt the cultural centre of western Islām.

Tum (Egyptian god): *see* Atum.

Tumaco, city, Nariño *departamento,* southwestern Colombia. It is situated on the Pacific coast, on a small island at the south end of Tumaco Bay. Named for an Indian chief, Tumaco, who founded the settlement in 1570, Tumaco experienced prosperity as the point of export for rubber and cinchona bark gathered in the eastern rain forest. After the boom period, Tumaco declined until it became the terminus of a pipeline from the Putumayo oil fields about 100 miles (160 km) to the southeast. There is some light industry in the city, which is a centre of lumbering activity including plywood and molding factories, and gold mines are worked nearby. Tumaco is also a major fishing port with tuna and sardine canneries. It is accessible by road from Pasto, in the Andes, and has an airport. Pop. (1985) 45,456.

Tumāḍir bint 'Amr ibn al-Ḥārith ibn ash-Sharīd: *see* Khansā', al-.

Tuman River (North Korea): *see* Tumen River.

Tumba, Lake, lake, part of the Congo River basin, northwestern Zaire. Lake Tumba lies 75 miles (120 km) northwest of Lake Mai-Ndombe (formerly Lake Léopold II). It covers 190 square miles (500 square km) and is 6–20 feet (2–6 m) deep. The lake empties into the Congo (Zaïre) River by Irebu channel, just opposite its confluence with the Ubangi River. Lake Tumba is shallow, with low shores, and is navigable by river steamer.

Tumbes, also spelled TUMBEZ, smallest and northernmost department (formed 1942) of Peru. It is bounded on the northwest by the Pacific Ocean and on the north and east by Ecuador. The department is located near the northern end of the Peruvian coastal desert and occupies an area of 1,827 square miles (4,732 square km). Tumbes has been an area of strategic military importance in the nearly 150-year-old (intermittent) boundary conflict between Peru and Ecuador. Crops grown in irrigated areas, especially around the departmental capital of Tumbes (*q.v.*), include corn (maize), rice, and bananas. Some cattle and goats are raised, and there is a small fishing industry. In 1864 oil was discovered at Zorritos; the field is still productive, although it is less important than its southern extension in Piura department. Pop. (1990 est.) 144,000.

Tumbes, also spelled TUMBEZ, city and capital, Tumbes department, northwestern Peru. It is located on the Pacific coastal plain and on high banks overlooking the Tumbes River, 20 miles (30 km) from the Ecuadorian border.

In 1532 Francisco Pizarro landed at what is now Puerto Pizarro (the port for Tumbes, 12 miles [19 km] north), to begin his conquest of Peru. The town, originally a minor Inca fortress on the road to Quito, Ecuador, did not flourish, however, until after local border conflicts with Ecuador were resolved in 1942, which made trade with border towns profitable. Tumbes also became a city in 1942.

Nearby irrigated fields yield tobacco, cotton, rice, corn (maize), and bananas. Charcoal burning and rice milling are local activities, and fishing and tourism also provide income. Tumbes has an airfield and is 828 miles (1,332 km) northwest of Lima via the Pan-American Highway. Pop. (1990 est.) 64,800.

tumblebug: *see* dung beetle.

tumbling, execution of acrobatic movements such as rolls, twists, handsprings, or somersaults on floor mats or on the ground.

The activity goes back to ancient times as that part of acrobatics done without apparatus. Tumbling was performed by traveling bands of entertainers in the European Middle Ages and later by circus and stage performers.

Once an international competitive sport, it has been superseded by gymnastics and has gravitated to high-school and age-group competition in the United States, Canada, and some European countries. Competition in the United States is governed by the Amateur Athletic Union.

A modern competitive routine consists of three or four series, or "trips down the mat," one of which must demonstrate backward moves, another forward moves, and another twisting skills. The mats are arranged in rows 60 feet (18.2 m) long and 5 to 6 feet (1.5 to 1.8 m) wide. Tumblers may rest briefly between series but may take no more than two minutes for the entire performance, including rests.

Although competitive activity has diminished, tumbling still enjoys worldwide popularity as a gymnastic developmental exercise and forms an integral element of gymnastic floor exercises.

tumbling flower beetle, any member of the approximately 650 species of the insect family Mordellidae (order Coleoptera). The name



Tumbling flower beetle (*Mordella*)
William E. Ferguson

derives from the jumping, turning, and tumbling motion of the beetles when disturbed or caught. These black beetles are small, usually between 3 and 7 mm (0.1 to 0.3 inch) in length, and are most often seen on flowers. They are covered with fine hairs and are humpbacked and wedge-shaped, with a broad anterior end tapering to a pointed abdomen that extends beyond the forewings. The larvae live in rotten wood and plant stems and feed on moth or beetle larvae.

tumboa, plant species that is the sole member of the family Welwitschiaceae (*q.v.*).

tumbrel, also spelled TUMBRIL, French two-wheeled dumpcart or wagon designed to be drawn by a single draft animal. Originally used to carry agricultural supplies, it was most often associated with the cartage of animal manure. It was also used, however, by artillery units to carry tools and ammunition, and during the French Revolution it gained wide celebrity as the vehicle used to bear prisoners to the guillotine.

T'umen' (Russia): *see* Tyumen.

Tumen River, Korean TUMAN-GANG, river, forming the northeastern frontier of North Korea with China and Russia. It originates in the frontier Mount Paektu (Chinese: Pai-t'ou; 9,003 feet [2,744 m]), the highest mountain in Korea, and flows with its short tributaries through narrow gorges east-northeast to Hoeryŏng, north to Onsŏng, and southeast to the Sea of Japan (East Sea). Flowing swiftly through mountainous, heavily forested districts, it is the third longest river in Korea, with a length of 324 miles (521 km); but its drainage basin is only 4,059 square miles (10,513 square km), and the plain area is formed only downstream, in the southeast. It is navigable for only 53 miles (85 km). The districts through which it flows contain mining industries. Upstream, near Musan, iron is found; in the middle course near Chongsŏng, Onsŏng, and Aoji, there is brown coal; and downstream is the country's best district for mineral resources. Unggi, near the river's mouth, is connected by railway to Kraskino, Russia. Along the river's banks are many historic battle sites.

Tumkūr, city, eastern Karnātaka (formerly Mysore) state, southern India. Tumkūr lies at the foot of Devarayadurga Hill, which has a picturesque health resort at about 3,900 feet (1,190 m). The city, a road and rail centre, has a cluster of small-scale industries, which include a tool factory, soap works, and rice and oil mills. The chief crops grown in the surrounding area are millet, rice, and oilseeds. Pop. (1991 prelim.) city, 138,598.

Tummel, river and lake, Central region, Scotland. The River Tummel rises on Rannock Moor and drains via Loch Laidon through the heavily glaciated east-west valley containing the ribbon lakes (Lochs Rannoch and Tummel) until it joins the River Tay just northwest of Pitlochry. The extensive Tummel-Garry Hydroelectric Scheme, comprising eight main power stations, is a major feature of the Tummel River basin. Loch Tummel is a popular scenic spot, as are the Falls of Tummel near the confluence of the Tummel and Garry.

tumour, also spelled TUMOR, also called NEOPLASM, a mass of abnormal tissue that arises without obvious cause from preexisting body cells, has no purposeful function, and is characterized by a tendency to autonomous and unrestrained growth. Tumours are quite different from inflammatory or other swellings because the cells in tumours are abnormal in their appearance and other characteristics. Abnormal cells—the kind that generally make up tumours—differ from normal cells in having undergone one or more of the following alterations: (1) hypertrophy, or an increase in the size of individual cells; this feature is occasionally encountered in tumours but occurs commonly in other conditions; (2) hyperpla-

sia, or an increase in the number of cells within a given zone; in some instances it may constitute the only criterion of tumour formation; (3) anaplasia, or a regression of the physical characteristics of a cell toward a more primitive or undifferentiated type; this is an almost constant feature of malignant tumours, though it occurs in other instances both in health and in disease.

In some instances the cells of a tumour are normal in appearance, faithful reproductions of their parent types; the differences between them and normal body cells can be discerned only with some difficulty. Such tumours are more often benign than not. Other tumours are composed of cells that appear different from normal adult types in size, shape, and structure; they usually belong to tumours that are malignant. Such cells may be bizarre in form or be arranged in a distorted manner. In more extreme cases, the cells of malignant tumours are described as primitive, or undifferentiated, because they have lost the appearance and functions of the particular type of (normal) specialized cell that was their predecessor. As a rule, the less differentiated a malignant tumour's cells are, the more quickly may that tumour be expected to grow.

Malignancy refers to the ability of a tumour to ultimately cause death. Any tumour, either benign or malignant in type, may produce death by local effects if it is appropriately situated. The common and more specific definition of malignancy implies an inherent tendency of the tumour's cells to metastasize (invade the body widely and become disseminated by subtle means) and eventually to kill the patient unless all the malignant cells can be eradicated.

Metastasis is thus the outstanding characteristic of malignancy. Metastasis is the tendency of tumour cells to be carried from their site of origin by way of the circulatory system and other channels, which may eventually establish these cells in almost every tissue and organ of the body. In contrast, the cells of a benign tumour invariably remain in contact with each other in one solid mass centred on the site of origin. Because of the physical continuity of benign tumour cells, they may be removed completely by surgery if the location is suitable. But the dissemination of malignant cells, each one individually possessing (through cell division) the ability to give rise to new masses of cells (new tumours) in new and distant sites, precludes complete eradication by a single surgical procedure in all but the earliest period of growth.

A mass of tumour cells usually constitutes a definite localized swelling that, if it occurs on or near the surface of the body, can be felt as a lump. Deeply placed tumours, however, may not be palpable. Some tumours, and particularly malignant ones, may assume physical characteristics other than that of lumps. They may appear as ulcers, indurated cracks or fissures, wartlike projections, or a diffuse, ill-defined infiltration of what appears to be an otherwise normal organ or tissue.

Pain is a variable symptom with tumours. It most commonly results from the growing tumour pressing on adjacent nerve tracts. In their early stages all tumours tend to be painless, and those that grow to a large size without interfering with local functions may remain painless. Eventually, however, most malignant tumours cause pain by the direct invasion of nerve trunks or the destruction of bone.

A benign tumour may undergo malignant transformation, but the cause of such change is unknown. It is also possible for a malignant tumour to remain quiescent, mimicking a benign one clinically, for a long time. The regression of a malignant tumour to benign is unknown, however.

All benign tumours tend to remain localized at the site of origin. Many benign tumours are encapsulated. The capsule consists of connective tissue derived from the structures immediately surrounding the tumour. Well-encapsulated tumours are not anchored to their surrounding tissues. These benign tumours enlarge by accretion, pushing aside the adjacent tissues without involving them intimately. Malignant tumours, by contrast, do not usually possess a capsule; more important for the affected individual, they invade the surrounding tissues, thereby becoming fixed to them and making surgical removal more difficult or risky.

Among the major types of benign tumours are the following: lipomas, which are composed of fat cells; angiomas, which are composed of blood or lymphatic vessels; osteomas, which arise from bone; chondromas, which arise from cartilage; and adenomas, which arise from glands. For malignant tumours, *see* cancer. For plant tumours, *see* gall.

tumour necrosis factor (TNF), also called CACHECTIN, a naturally occurring protein that is produced in the human body by the phagocytic cells known as macrophages. (The latter can engulf and destroy bacteria, viruses, and other foreign substances.) TNF is produced by macrophages when they encounter the poisonous substance in bacteria that is known as endotoxin. TNF seems to perform both helpful and harmful functions within the body. It helps cause the profound weight loss (cachexia) seen in some persons suffering from chronic bacterial and parasitic infections, as well as from cancer. TNF has been further implicated in the acute circulatory collapse and shock experienced by some persons who are suffering from acute bacterial infections. The release of TNF in response to the presence of endotoxins thus appears to be responsible for most of the manifestations of septic shock in humans. Its survival benefits of TNF's bodily protein with these negative physiological effects remains unclear. But TNF has also been found to play a much broader (and more positive) role in regulating inflammatory and immune responses throughout the body. It seems to help the body defend itself against malarial parasites, and laboratory research has shown it has the ability to destroy some types of cancer cells, though clinical tests of its anti-cancer properties have been disappointing.

tumour suppressor gene, also called ANTI-ONCOGENE, any of a class of genes that are normally involved in regulating cell growth but that may become cancer-causing when damaged. Tumour suppressor genes encode for proteins that are involved in inhibiting the proliferation of cells, which is crucial to normal cell development and differentiation. Because of this ability, tumour suppressor genes can also act to stem the uncontrolled growth of cancer cells. Genetic damage, or mutation, that occurs to these genes contributes to the development of a cancerous tumour.

Cancer research has led to the identification and characterization of many tumour suppressor genes. In 1971 Alfred Knudson, Jr., postulated that a rare form of eye cancer called retinoblastoma is caused by mutations in a gene called the *RB* gene. Subsequent research revealed that mutations in this gene also play a role in cancers of the bone, lung, breast, cervix, prostate, and bladder. A number of other tumour suppressor genes, such as *p53*, have been identified. The mutated form of *p53* has been implicated in more than 50 percent of all cancers. Mutations in two other tumour suppressor genes, BRCA1 and BRCA2, are associated with an increased susceptiblity to breast cancers; they are found in 5 to 10 percent of all cases and in about 85 percent of all cases of inherited breast cancer.

The tumour suppressor genes in a healthy cell work together with another class of genes, called proto-oncogenes, to control cell reproduction. Tumour suppressor genes code for proteins that restrain cell growth, and proto-oncogenes specify proteins that stimulate cell growth. Mutations in either type of gene can disrupt the delicate balance between inhibition and activation of the molecular processes that regulate a cell's life cycle, leading to the uncontrolled cell growth characteristic of cancer. A mutation in one gene alone does not cause a malignant tumour to develop; a number of genetic insults occurring in a few different genes over time are necessary for a cell to undergo transformation to a malignant state. For example, a proto-oncogene becomes a cancer-causing oncogene (*q.v.*) when mutated in a manner that increases the cell's propensity to divide excessively. In order for a cell to give rise to cancer, other mutations, such as damage to a tumour suppressor gene, must arise.

Usually many decades are required for mutations leading to cancer to be accumulated. Cases do occur, however, in younger individuals, many of which are believed to result from a mutation passed from parent to child. Some forms of cancer are associated with an inherited mutation in a tumour suppressor gene. One such familial syndrome, called familial adenomatous polyposis, is a condition in which tumours of the colon arise due to an inherited mutation in the tumour suppressor gene *APC*.

Tumuc-Humac Mountains, Portuguese SERRA TUMUCUMAQUE, French MASSIF DES TUMUC-HUMAC, Dutch TOEMOEK-HOEMAK GEBERGTE, mountain range that forms the Brazilian border with French Guiana and Suriname. An eastern extension of the Acarai Mountains, the range extends for about 180 miles (290 km) in an east-west direction and attains elevations of 2,800 feet (850 m). The range constitutes part of the northern watershed of the Amazon River basin. During the Spanish colonial era it was thought to hide El Dorado, the fabulous country of gold. The area, however, was little explored until the 20th century, and it was only in 1952 that the Francis Mazière expedition made the first recorded crossing of the range from French Guiana into Brazil.

tumulus, prehistoric grave form in continental Europe. *See* burial mound.

Tumulus period, Japanese KOFUN JIDAI ("Old Mound period"), also called GREAT BURIAL PERIOD, early period (*c.* AD 250–552) of tomb culture in Japan, characterized by large earthen keyhole-shaped burial mounds (*kofun*) surrounded by moats. The largest of the 71 known tumuli, 1,500 feet (457 m) long and 120 feet (36 m) high, lie in the Nara (Yamato) Basin of Nara prefecture. Their impressive size indicates a highly organized aristocratic society with rulers powerful enough to command huge numbers of workers. Improved armour and iron weapons in the tombs suggest a society of conquest dominated by horse-riding warriors.

The most noteworthy objects found in and around the tombs are the hollow clay *haniwa* sculptures. Mounted on clay cylinders embedded in the dirt, they stand in erect position along the approach to the burial place. Also found among the funerary gifts is the *magatama,* a comma-shaped green jade ornamental jewel that, with the sword and mirror, forms part of the imperial regalia. It is believed that the present Japanese imperial line dates back to the tomb-culture rulers. *See also* haniwa; magatama.

Tumut River, river, south New South Wales, Australia. It rises on the northwestern slopes of the Snowy Mountains and flows 90 miles (145 km) to join the Murrumbidgee River, east of the town of Gundagai.

The Tumut River is a major part of the Snowy Mountains Hydroelectric Project. Its

upper reaches are impounded to create Tumut Pond Reservoir, which also receives water from the Tooma Reservoir on the Tooma River. At Tumut Pond is the first of four hydroelectric-power stations.

Below Tumut Pond is the second power station. Below that, the river widens into Talbingo Reservoir, which is impounded by Talbingo Dam. This dam, when built in 1971, was the highest dam in Australia (532 feet [162 m]); its power station is the largest in the Snowy Mountains project.

Below Talbingo Reservoir, the river is again impounded by the Jounama Dam; there, water can be returned to Talbingo Reservoir or can be passed downstream to Blowering Reservoir, impounded by Blowering Dam. This reservoir serves mainly as storage for the irrigation of the Murrumbidgee River valley, but some of its waters pass through the river's fourth power station and on to the confluence with the Murrumbidgee River.

T'un-hsi (China): *see* Huang-shan.

Tun-huang, Pinyin DUNHUANG, city in western Kansu *sheng* (province), China. Situated in an oasis in the Kansu-Sinkiang desert, Tun-huang is at the far-western limit of traditional Chinese settlement along the Silk Road across Central Asia. It was the first trading town reached by foreign merchants entering Chinese-administered territory from the west.

In ancient times it was the point at which the two branches of the Silk Road, running around the Tarim Basin on the north and on the south, converged. Tun-huang was first brought under Chinese control in the Han dynasty (206 BC–AD 220) during an expansionist period at the end of the 2nd century BC. A Tun-huang commandery was established there either in 111 BC or, according to some accounts, in 93–92 BC. A defensive line for protection from the Mongols was built to the north, and a sizable military force was stationed there. After the decay of Han central power, Tun-huang became semi-independent; in the 4th and 5th centuries AD, it successively formed part of kingdoms centred in Kansu. Throughout this period Tun-huang remained an important caravan town and commercial centre for trade with Central Asia.

In the late 5th century the Northern Wei dynasty (386–534/535) brought Tun-huang back under Chinese domination, under the name Kua-chou. In 618 the area passed to the T'ang dynasty (618–907), who renamed it Sha-chou in 633. It remained under T'ang administration until 781, when it fell into the hands of the Tibetans. On the breakup of the Tibetan state in the 840s, Tun-huang nominally reverted to T'ang rule but in fact remained in the hands of local rulers. The Mongols (who ruled China from 1206 to 1368) took the city in 1227, and, after the fall of Mongol rule, the Ming dynasty (1368–1644) established a garrison there. In the 15th century, however, Tun-huang was overrun by the Turfan kingdom and remained a part of Uighuristan until 1723, when the Ch'ing dynasty (1644–1911/12) occupied the area. A civil government was restored in 1760.

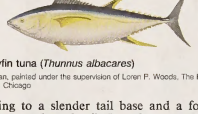
Tun-huang was a great centre of Buddhism from AD 366 to the fall of the Western Hsia dynasty in the early 13th century. It was one of the chief places of entry for Buddhist monks and missionaries from the kingdoms of Central Asia, and these Buddhists founded the first of Tun-huang's caves—known as the Cave of the Thousand Buddhas (Ch'ien-fo Tung)—in 366. From this period onward the town became a major Buddhist centre and place of pilgrimage. There were numbers of monastic communities (many of them non-Chinese) that played a predominant role in local society and to which successive governors were generous patrons. In one of the cave temples a rich collection of about 60,000 paper manuscripts, printed documents, and fragments dating from the 5th to the 11th century was walled up about 1015, to be discovered in 1900. This collection included not only Buddhist but also Taoist, Zoroastrian, and Nestorian scriptures, as well as vast numbers of secular texts. Although most of the manuscripts and documents were sold to foreigners, the caves still contain murals and painted statuary. Many of the nearly 500 caves, collectively referred to as the Mogao Caves, were opened to the public after 1949, and the caves were designated a World Heritage Site in 1987.

By the early 1970s Tun-huang's importance as a trading centre had been largely lost, since the new highway and railway across the Uighur Autonomous Region of Sinkiang pass to the north at An-hsi. Pop. (1988 est.) 20,200.

Tun Ismail bin Dato' Abdul Rahman: *see* Ismail bin Dato' Abdul Rahman, Tun.

tuna, also called TUNNY, any of seven species of oceanic fishes, some very large, that constitute the genus *Thunnus* and are of great commercial value as food. They are related to mackerels and are commonly placed with them in the family Scombridae (order Perciformes). Tunas vary considerably, both within and among species. Their classification is also variable and may differ from one authority to another.

Tunas are elongated, rather robust fishes that are streamlined and have a rounded body tapering to a slender tail base and a forked or crescent-shaped tail. In colour, tunas are generally dark above and silvery below, often with an iridescent shine. They have a conspicuous keel on either side of the tail base, a row of small finlets behind dorsal and anal fins, and a corselet of enlarged scales in the shoulder region. Another notable feature is a well-developed network of blood vessels below the skin that acts as a temperature-regulating device associated with long-term, slow swimming. Owing to this vascular system, tunas are unique among fishes in their ability to maintain the temperature of their bodies above that of the surrounding water, sometimes by as much as 14° C (20° F).



Yellowfin tuna (*Thunnus albacares*)
Tom Dolan, painted under the supervision of Loren P. Woods, The Field Museum, Chicago

The seven species of tunas in the genus *Thunnus* are the bluefin tuna (*T. thynnus*), albacore (*T. alalunga*), yellowfin tuna (*T. albacares*), southern bluefin tuna (*T. maccoyii*), bigeye tuna (*T. obesus*), blackfin tuna (*T. atlanticus*), and longtail tuna (*T. tonggol*). These different species range from moderate to very large in size. The giant of the group is the bluefin tuna, which grows to a maximum length and weight of about 4.3 m (14 feet) and 800 kg (1,800 pounds). The yellowfin tuna reaches a maximum weight of about 180 kg, and the albacore grows to about 36 kg.

The bluefin tuna characteristically has yellow finlets and is often marked with silvery spots or bars; it is important in commercial and sport fishing, with anglers rating it among the greatest trophies obtainable. The other commercially important species are the albacore, marked with a shining blue stripe on each side; the yellowfin, with yellow fins and a golden stripe on each side; and the bigeye, a robust fish with relatively large eyes.

Tunas migrate long distances over all the world's oceans and occupy tropical, temperate, and even some cooler waters. The only two species of relatively limited distribution are the blackfin tuna (western Atlantic) and the longtail tuna (Indo-Pacific region). Tunas feed on fishes, squid, shellfish, and a variety of planktonic organisms. They spawn in the open sea over very large areas. The canned meat of albacore and yellowfin tunas is one of the world's most popular fish foods. Measures were undertaken in the late 20th century to prevent large numbers of dolphins from being killed by the nets used to catch tuna in the world's oceans.

Several other species in the family Scombridae are commonly known as tuna, among them the skipjack tuna (*Katsuwonus*, or *Euthynnus, pelamis*), a fish that is found worldwide and grows to about 90 cm (3 feet) and 23 kg. The bonitos, of the genus *Sarda*, are tunalike fishes found worldwide and have both commercial and sporting value.

Tunbridge Wells, borough and district, county of Kent, England. It lies about 30 miles (48 km) southeast of London. The town of Royal Tunbridge Wells, now included in the borough of Tunbridge Wells, grew up as a spa after a medicinal spring (containing mild chalybeate waters) was discovered at the site in 1606. The spa drew added popularity from its location on several hills of the wooded district known as The Weald. The springs, or "wells," lie at one end of the colonnaded promenade known as the Pantiles Parade, which was first paved in 1700. From then until the early Regency period, when it was superseded by the seaside resort of Brighton, Tunbridge Wells was one of the chief resorts of fashionable London society. It reached its height under the dandy Richard "Beau" Nash and was patronized by Colley Cibber, Samuel Johnson, David Garrick, and Sir Joshua Reynolds, among others. The Pantiles Parade, with other 17th-century features, is preserved beside the Church of St. Charles the Martyr (1684).

Tunbridge Wells was designated a royal borough in 1889 and added "Royal" to its name in 1909. During and after World War II it grew in importance as a shopping and administrative centre, and it also has some light industry. The making of Tunbridge ware—*i.e.*, tables, boxes, and toys made of such veneered hardwoods as beech, sycamore, and cherry—declined during the 20th century. Area 128 square miles (332 square km). Pop. (1991) town, 60,272; (1992 est.) district, 101,800.

tundra, treeless, level or rolling ground in polar regions (Arctic tundra) or on high mountains (alpine tundra), characterized by bare ground and rock or by such vegetation as mosses, lichens, small herbs, and low shrubs.

A brief treatment of tundras follows. For full treatment, *see* MACROPAEDIA: Biosphere.



Deer *jātaka*, fresco painting from Cave 257, Tun-huang, Kansu province, China, 8th century, T'ang dynasty
Holle Bildarchiv, Baden-Baden

The plant life of tundras tends to be greenish brown in colour, and species succession takes place slowly. The foggy tundras found along coastal areas produce matted and grassy swards. Algae and fungi are found along rocky



Late summer Arctic tundra in the Brooks Range, Gates of the Arctic National Park and Preserve, Alaska
Jeff Gnass

cliffs, and rosette plants grow in rock cornices and shallow gravel beds. In the drier inland tundras, spongy turf and lichen heaths develop.

Tundra climates vary, the most severe being the Arctic regions where polar deserts fluctuate in temperature extremes from 40° F (4° C) at midsummer to −25° F (−32° C) during the winter months. Alpine tundra has a more moderate climate, with cool summers and moderate winters (rarely falling below 0° F [−18° C] in winter). The freezing climate of the Arctic produces a layer of permanently frozen soil, called the permafrost, which can reach soil depths of between 300 and 1,500 feet (90 and 456 m). An overlying layer of soil alternates between freezing and thawing with seasonal variations in temperature. The permafrost layer exists only in Arctic tundra, but both Arctic and alpine tundras have a freeze-thaw layer.

Arctic tundra. Arctic tundra covers about one-tenth of the total surface of the Earth. Its southern boundary meets the northernmost timberline, where boggy soils are threaded with numerous streams and lakes. Precipitation is less than 15 inches (38 cm) annually, and the sparse vegetation has a growing season between two and four months long. Most of the biological activity is confined to the freeze-thaw layer, because the softer soils of spring through autumn (thaw periods) allow animals to burrow, plant roots to extend down, and organic matter to decompose into food for microorganisms. Coastal tundras are dominated by mosses, sedges, and cotton grass. On more elevated sites, like hummocks, the soil is peatier and supports low willows, grasses, and rushes. Sunflower plants and legumes of various kinds thrive along the sandy banks of streams and lakes. Many of the plant species are perennials that flower within a few days of maturity, after the snows have begun to melt. They may germinate as soon as four to six weeks after maturing.

Animals common in Arctic tundras are the polar bear, Arctic fox, Arctic wolf, Arctic hare, and Arctic weasel. Many of these develop a white coat during the winter months as camouflage against the snow and ice. Large herbivores, such as caribou, musk-oxen, and reindeer, are adapted for the cold by virtue of their large body-surface areas, which prevent heat from dispersing to the outside. Lemmings are an important species in the Arctic tundra. They remain active throughout the long winters, burrowing under the snow to feed on the roots of grasses and sedges. The accumulation of manure around their burrows adds nitrogen and other nutrients to the soil, stimulating plant growth.

Insects like mosquitoes and black flies, common to Arctic tundras, have adapted darkly coloured bodies to absorb as much heat from sunlight as possible. Many geese and other tundra birds are migratory, remaining in the tundra only long enough to nest and molt. Birds of prey (*e.g.*, jaegars and snowy owls) and predatory animals (*e.g.*, wolves and foxes) fluctuate in population levels according to the availability of their prey, particularly lemmings. In general, the food web in the tundra is simple and is easily subject to imbalance if a critical species fluctuates rapidly in population.

Alpine tundra. Alpine tundras begin above the timberline of spruce and firs, either on gentle slopes where the soil has developed large meadow areas or on windswept slopes where cushion plants dominate. Annual precipitation is higher than in Arctic tundra; blinding snowstorms, or whiteouts, obscure the landscape during the winter months, and summer rains can be heavy. The stratification of the soil and the inclination of the alpine slopes allow for good drainage, however. Alpine tundra is dominated by shrubs and herbs; willows are common along streams or where snowdrifts are deep, as in basins or on the lee side of rock ridges. In the higher mountains, where the climate is more severe than along lower slopes, only lichens and mosses can survive.

Animal species are limited and only partially adapted to their wintry environment. Many enter into vertical migration patterns according to seasonal changes. Mountain sheep, ibex, chamois, wildcats, and many birds descend to warmer slopes to seek food in the winter. Some animals, like marmots and ground squirrels, consume large amounts of vegetation in the summer and early autumn and hibernate during the winter. Others, like rabbits, forage for what they can find in the snow; pikas and voles store large amounts of hay for winter feeding.

Tune Stone, 5th-century monument bearing the most important Norwegian runic inscription, written vertically on two sides of the stone. Discovered in 1627 in southeastern Norway, it is now in Oslo. Authorities do



Tune Stone
By courtesy of the Universitetets Oldsaksamling, Oslo

not agree on the translation, but it is clear that WiwaR carved the runes in memory of WoduridaR. The latter part of the inscription tells how WoduridaR was honoured after his death and that he left three daughters, but no sons or male relatives.

tuned circuit, any electrically conducting pathway containing both inductive and capacitive elements. If these elements are connected in series, the circuit presents low impedance to alternating current of the resonant frequency, which is determined by the values of the inductance and capacitance, and high impedance to current of other frequencies.

In a parallel-connected tuned circuit, the impedance is high at the resonant frequency, low at others. *See also* resonance.

Tung, Pinyin DONG, Tung KAM, also called (Wade-Giles) TUNG-CHIA, or TUNG-JEN, an ethnic minority of China found in southeastern Kweichow province and in neighbouring Chuang Autonomous Region of Kwangsi and Hunan province. The Tung first appeared in China during the Sung dynasty (AD 960–1279), moving southwest in a series of migrations, possibly forced by the advancing Mongols. Concentrated today in sparsely populated Kweichow, they share the area with the Puyi (Chung-chia). They speak a Kam-Sui language that is closely related to the Tai languages. Kam is remarkable for having some 15 tone distinctions.

Influenced by the Yao (Mien), the Miao (Hmong), and other Austroasiatic peoples, the Tung live at intermediate elevations in large houses built on pilings. Pagoda-like wooden drum towers up to 100 feet (30 m) high are characteristic of their architecture. Their elaborate covered bridges are also notable. They grow paddy rice, use bamboo pipes for irrigation, and raise water buffalo. The Tung raise fish in some of the flooded paddy fields and hunt with falcons. In the late 20th century they numbered 2.7 million, about one-third of whom were located in Kweichow. The Tung of Kweichow grow cotton, tobacco, soybeans, and rapeseed. Their fine woven cotton cloth is marketed in Kweichow and in Yunnan province. Weekly markets, often coinciding with festival days, are the centre of Tung social life and trade. Little is known of the Tung religion; it has been described as polytheistic.

In 1957 the Tung were incorporated into the province of Kweichow and allocated four minority deputies to be sent to the National People's Congress.

T'ung-ch'eng, Pinyin TONGCHENG, town in Anhwei *sheng* (province), eastern China. It stands on the edge of the Yangtze River floodplain, the area to the south being a maze of lakes, the largest of which is Lake Ts'ai-tzu.

It was founded as a county under the Sui dynasty (AD 581–618) and received the name T'ung-ch'eng during the T'ang dynasty (618–907). From the beginning of the Ming dynasty (1368–1644), it was administratively and commercially dependent upon An-ch'ing. Many immigrants came there from southern Anhwei and Chekiang provinces in the 14th and 15th centuries, when large-scale drainage and reclamation of the marshy southern part of the county were undertaken both by the local authorities and by individual families.

The area became noteworthy from the 15th century onward, when a group of wealthy local clans became not only both rich and prosperous but also remarkable for their scholarship. By the mid-16th century the area was already famed as the most important centre of scholarship north of the Yangtze. It was seriously devastated by a series of local risings in the period from 1634 to 1644 at the end of the Ming period, which continued for a few years thereafter. The preeminence of the local scholars was again reestablished, however, with the local Yao and Chang clans producing a great

number of high-ranking officials throughout the 18th century. Not only was T'ung-ch'eng thus a centre of a strong political faction but it also became the focus of the T'ung-ch'eng school, one of the chief literary schools that flourished during the Ch'ing period (1644–1911). The school advocated the philosophy of the Neo-Confucians, who had flourished in Sung times (960–1279), combining this with emphasis upon rigorous textual scholarship and the use of simple and unadorned prose. The T'ung-ch'eng school was of national importance in the late 19th century, one of its advocates being the great general and modernizer Tseng Kuo-fan. Several of the earliest translators and experts in Western affairs belonged to the school. Pop. (mid-1980s est.) 10,000–50,000.

Tung Ch'i-ch'ang, Pinyin DONG QICHANG (b. 1555, Hua-t'ing, Kiangsu province, China—d. 1636), Chinese painter, calligrapher, and theoretician who was one of the finest artists of the late Ming period. The most distinguished connoisseur of his day, Tung Ch'i-ch'ang set forward ideas that have continued to be influential in Chinese aesthetic theory.

Tung Ch'i-ch'ang was born to a poor but scholarly family, and, though he at first failed the government examinations, he passed the *chin-shih* ("advanced scholar") examination at the age of 34 in 1589 and was appointed to the first of a series of official positions within the Ming government.

Tung Ch'i-ch'ang is perhaps best known for his writings on Chinese painting. Dividing it into "Northern" and "Southern" schools as first suggested by his older contemporary and friend, Mo Shih-lung (d. 1587), he traced the lineage and analyzed the traditions of both branches. He maintained that the Southern school emphasized sudden, intuitive realization of truth, whereas the Northern taught the more gradual acquisition of such insight. Painters associated with the Southern school were then those "literati" (*wen-jen*), sensitive poets and scholars who were also gentlemen painters, who painted intuitively (like an "amateur") without conscious thought of function or beauty—appealing to a similarly sensitive élite rather than popular taste. In contrast, the "professional" painter of the Northern school worked to create a handsome surface of immediate visual appeal with little suggestion of his own inner nature. At the very centre of the scholarly ideal of the Southern school was the art of calligraphy. It expressed abstractly the real nature of the individual who wielded the brush without interposing any pictorial description.

Tung Ch'i-ch'ang's calligraphy followed the eminent calligraphers Chao Meng-fu and Wen Cheng-ming and ultimately masters of the Chin and T'ang dynasties. Like those two artists, his creative approach was conscientious, disciplined, scholarly, and systematic, seeking out the spirit rather than slavishly reproducing the outward appearance of his models in trying to recapture antiquity.

Tung Ch'i-ch'ang especially favoured the Four Masters of the Yüan dynasty (Huang Kung-wang, Wu Chen, Wang Meng, and Ni Tsan), who had both the selfless personality and personal style indicative of the artist-scholar's highest ideal. His own paintings reveal his debt to them in both style and motif, yet he went considerably beyond them in banishing all immediate attraction from his art and stressing instead stark forms, seemingly anomalous spatial renderings, and clumsy handling of ink and brush. Tung Ch'i-ch'ang's writings appear on his paintings as well as in various compilations of his writings—including the anthologies *Hua-yen* ("The Eye of Painting"), *Hua-chih* ("The Meaning of Painting"), and *Hua-ch'an-shih sui-pi* ("Notes from the Painting-Meditation Studio [of Tung Ch'i-ch'ang]").

Tung-chia (people): *see* Tung.

T'ung-chih, Pinyin TONGZHI (reign name, or *nien-hao*), personal name (Wade-Giles) TSAI-CH'UN, posthumous name (*shih*) I TI, temple name (*miao-hao*) (CH'ING) MU TSUNG (b. April 27, 1856, Peking, China—d. Jan. 12, 1875, Peking), emperor (reigned 1861–75) of the Ch'ing dynasty (1644–1911/12), during whose reign occurred a short revitalization of the beleaguered Ch'ing government, known as the T'ung-chih Restoration.

Ascending the throne at the age of six, the young ruler assumed the reign title of T'ung-chih ("Union for Order"). He ruled under the regency of a triumvirate that was headed by his mother, the empress dowager Tz'u-hsi (1835–1908).

The restoration under T'ung-chih followed the examples of the great restorations in the middle of the Han (206 BC–AD 220) and T'ang (AD 618–907) dynasties. In the first years of the T'ung-chih reign, the Chinese government finally quelled the great Taiping Rebellion (1850–64), which had been threatening South China, and crushed the Nien Rebellion (1853–68) in North China. The finances of the imperial treasury were restored, and an attempt was made to recruit good men into the government. The system of civil-service examinations was once again held in areas that had long been under rebel control. The government also made an effort to revive agricultural production by distributing seeds and tools and helping to develop new land. A program was also undertaken to manufacture Western arms, although the effort to adopt foreign technology was only superficially successful because the study of the Confucian Classics, not Western science, remained the only sure path to official advancement.

The Tsungli Yamen ("Office for General Management") was created to handle foreign affairs, and the government began attempts to understand and deal with the West. T'ung-chih assumed personal control of the government in 1873 when he was 17. One of his first acts was to grant an audience to the representatives of six foreign countries. For the first time in Chinese history, the emperor did not demand the ceremonial kowtow—kneeling and touching the forehead to the ground as a sign of supplication. The government concluded a détente with the Western powers with the treaties of Tientsin (1858) and Peking (1860).

T'ung-chih was a weak, uninterested ruler, whose affairs were constantly scrutinized by the empress dowager Tz'u-hsi. He died a little more than two years after assuming control of the government.

Tung Cho (d. AD 192, China), general whose seizure of power and tyrannical rule ended the Han dynasty (206 BC–AD 220) and divided the Chinese empire.

In AD 190 Tung Cho burned Lo-yang, the capital, and removed himself and the emperor to the ancient capital of Ch'ang-an. He had the city of Mei-wu, said to have been an exact duplicate of the capital, built for his clansmen. Opposition to his rule sprang up throughout the country, and the empire gradually became divided into satrapies ruled by rival generals. Tung was assassinated by one of his own lieutenants at the bidding of a rival.

Tung Chung-shu, Pinyin DONG ZHONGSHU (b. *c.* 179 BC, Kuang-ch'uan, China—d. *c.* 104 BC, China), scholar instrumental in establishing Confucianism in 136 as the state cult of China and as the basis of official political philosophy—a position it was to hold for 2,000 years. As a philosopher, Tung merged the Confucianist and Yin-Yang schools of thought.

As a chief minister to the emperor Wu (*c.* 140–87) of the Han dynasty, Tung was chiefly responsible for the dismissal of all non-Confucian scholars from government. His proposal that Confucianism become the unifying ideology of the Han empire was put into effect, as were his proposals to set up an imperial college (*t'ai-hsüeh*) for training promising students and to require nobles and governors to recommend annually persons of talent and good moral character for official appointment. Out of these institutional means developed the civil-service examinations that became the basis of recruitment into the bureaucracy, guaranteeing that men of humble birth and high ability might rise to positions of power and influence.

As a philosopher, Tung made the theory of the interaction between heaven (t'ien) and man his central theme. The emperor is heaven's ambassador on earth, and natural catastrophes such as floods and droughts are Heaven's way of warning the emperor to examine his personal conduct and correct his mistakes. Yang (light, positive, male) and yin (dark, negative, female) are the two fundamental forces of the universe and as such should be kept in harmony. The ruler has the duty to preserve that harmony. He must prevent disturbances by caring for and educating his people. He may reform institutions when necessary but may never alter or destroy the basic moral principles of heaven. In Tung's system the ruler has the central position—undoubtedly one of the major reasons that Confucianism was accepted by Emperor Wu. Confucian scholars, however, are given an equal if less obvious power. It is they who interpret the portents and thus exercise a check on the policies of the ruler.

Tung's *Ch'un-ch'iu fan-lu* ("Luxuriant Dew of the Spring and Autumn Annals") is one of the most important philosophical works of the Han period. In it, Tung interpreted the Confucian Classic "Spring and Autumn Annals" (*Ch'un-ch'iu*), a chronicle of the events in Confucius' native state of Lu between 722 BC and 481 BC, supposedly edited by Confucius. Tung felt that Confucius not only recorded events in such a way as to exercise judgment upon them but that he also laid down the rules to be used in governing future dynasties. According to Tung, Confucius understood the relationship between man and nature and therefore the way to interpret portents and omens.

Tung Hai: *see* East China Sea.

T'ung-hua, Pinyin TONGHUA, city, southern Kirin *sheng* (province), China. T'ung-hua is situated in the valley of the Hun River in the densely forested Ch'ang-pai Mountains—an area well known from early times for the manufacture of various forest products and for ginseng (a medicinal preparation made from an aromatic root).

The history of Chinese colonization in the area began in the mid-19th century, when the region was officially opened for settlement in the period 1862–74. Most of the first settlers came from Shantung province, many of them during and after the great famines of the 1870s. T'ung-hua was constituted a county seat in 1876. During the early period, most of T'ung-hua's trade went via the Hun and Yalu rivers; but under the Japanese occupation after 1932, a railway was constructed linking T'ung-hua with the main Manchurian rail network and with northern Korea. The area was found to be rich in coal and iron ore. The Japanese planned to establish a base of heavy industry there and constructed a power station on the Hun River. Iron ore from the area was sent to the great steelworks at An-shan in Liaoning province.

Since 1949, T'ung-hua has changed from a centre of light industry, producing vegetable oils, wines, and various handicrafts, into an

industrialized city. A large paper industry has been set up, and engineering plants making such products as electrical and power equipment and mining machinery have been established. The most important development, however, has been the construction of a large integrated iron and steel complex. Coal is mined in the area. Pop. (1985 est.) 285,100.

Tung-jen (people): *see* Tung.

T'ung-kan (Chinese Muslims): *see* Hui.

T'ung-kuan, Pinyin TONGGUAN, town in the extreme east of Shensi *sheng* (province), China. Situated on the south bank of the Huang Ho (Yellow River), just below its confluence with the Wei River where the Huang bends to the east, it is opposite the town of Feng-ling-tu in Shansi Province. It is located in an extremely narrow and precipitous pass. T'ung-kuan ("T'ung Pass") has always stood at the eastern gateway into the Wei River Valley and Shensi Province, known to the people of the North China Plain to the east as Kuan-chung, or Kuan-nei ("Within the Pass"). T'ung-kuan town was originally some 1¼ miles (2 km) southeast and was moved to its present site in 611. Under the T'ang dynasty (618–907) it was known as Lung-chin *hsien* (county) and was the key to the defenses of the T'ang capital, Ch'ang-an. With the transfer after 907 of the capital to the eastern plains, T'ung-kuan lost its major defensive role; it remained an important strategic place, however, and was the site of a *wei* (guard) under the Ming dynasty (1368–1644). It became T'ung-kuan *hsien* under the Ch'ing dynasty (1644–1911). After 1949, under Communist rule, it was merged with Wei-nan Prefecture to the west. T'ung-kuan is connected by a spur line to the Lunghai Railway at Hsien-yang. Pop. (mid-1970s est.) less than 10,000.

T'ung-liao, formerly PAI-YIN T'AI-LAI, Pinyin TONGLIAO, or BAIYIN TAILAI, town located in the Inner Mongolia Autonomous *ch'ü* (region), China. Situated on the east bank of the Hsi-liao River, T'ung-liao was originally the centre of the Barin tala horse pastures, which were established in the 17th century under the Manchu dynasty. When the area was opened up for Chinese settlement in 1912, a colonization bureau (*huang-wu-chü*) was created, but it met with little success because of its corrupt officials. Many Chinese did, however, settle in the vicinity, and they founded a town called Little Pa-lin t'ai-lai, which in 1912 was officially named T'ung-liao Chen. In 1915 the nearby community of Little Pai-in t'ai-lai (almost identical in name) was destroyed by a flood; its people moved to T'ung-liao, which then grew considerably. In 1918 it was constituted a county (*hsien*) seat, and it subsequently developed as a regional communication and commercial centre for the surrounding plain and as a collecting point for pastoral products—cattle, sheep, horses, hides, and furs. It later became industrialized and developed as the focus of a road network with connections to the Inner Mongolian interior, to Ch'ih-feng (southwest), and to Shen-yang (Mukden) and Ch'ang-ch'un on the Manchurian (Northeast) Plain. Railway spurs also link it with the main Ha-erh-pin–Shen-yang (Harbin–Mukden) line at Ssu-p'ing, with the Shen-yang–Peking line, and with the Chinese Eastern main line northwest of An-ta, between Ha-erh-pin and Tsitsihar. Pop. (1985 est.) 184,400.

Tung-liao (city, China): *see* Liao-yüan.

Tung-lin, Pinyin DONGLIN, party of Chinese scholars and officials who attempted to combat the moral laxity and intellectual weakness they felt was undermining public life during the last years of the Ming dynasty (1368–1644).

The party was founded by Ku Hsien-ch'eng, a government official forced out of office because of his outspoken criticism of those in power. In 1604 he established the Tung-lin ("Eastern Forest") Academy at Wu-hsi in south-central China as a centre for private learning and philosophic discussion. Many of the group that gathered around Ku were also active champions of governmental integrity; many were simply scholars; all were interested in returning to what they felt were the traditional Confucian values. Interpretations of this varied, but the Tung-lin scholars were united in their denunciation of Buddhist and Taoist influences that had crept into Confucian philosophy. Their prestige soon spread among scholar-officials, and between 1620 and 1623 they were able to dominate many government offices.

Their sense of moral outrage, however, made many enemies. When a Tung-lin leader, Yang Lien, attacked the powerful court eunuch Wei Chung-hsien in 1624, Wei mobilized the enemies of the reformers. Over the next two years hundreds of Tung-lin supporters were barred from the government, and leading figures were tortured, imprisoned, and executed. By 1627 the Tung-lin party had been practically wiped out, but their martyrdom became an example to all of China.

T'ung-ling, Pinyin TONGLING, city and industrial centre located in southern Anhwei Province (*sheng*), China. Located on the southeast bank of the Yangtze River between An-ch'ing and Wu-hu, T'ung-ling grew into an industrial city of consequence only in the second half of the 20th century but has been a mining centre since at least the 7th century AD. The T'ung-kuan Shan copper mines take their name from the official mint and copper-mining bureau originally established there. Under the Sung dynasty (960–1279) it was a special industrial prefecture named Li-kuo-chün. Under the Ming dynasty (1368–1644) iron mining and smelting also began, the operations being greatly expanded in the 18th century. In 1902 mining rights there were obtained by British interests, but no exploitation followed. Under the Japanese occupation during 1938–45, copper mining was revived on a moderate scale, the ore being sent to Manchuria for smelting. After 1949 the mines were modernized and a smelter built to produce crude copper, which was sent elsewhere for further refining. Large new copper deposits were discovered in the vicinity. In 1959–60 iron mining and smelting were again begun on a large scale, and a chemical industry was also established. T'ung-ling was dependent on the Yangtze River for transport until 1969, at which time a railroad was constructed to connect the city with Wu-hu. Pop. (1985 est.) 169,500.

tung oil, also called WOOD OIL, or CHINA WOOD OIL, pale-yellow, pungent drying oil obtained from the seeds of the tung tree. On long standing or on heating, tung oil polymerizes to a hard, waterproof gel that is highly resistant to acids and alkalies. It is used in quick-drying varnishes and paints, as a waterproofing agent, and in making linoleum, oilcloth, and insulating compounds. Tung oil is produced chiefly in China from the tung tree (*q.v.; Aleurites fordii*).

Tung-pei (China): *see* Manchuria.

T'ung-shan (China): *see* Suchow.

Tung-t'ing Lake, Wade–Giles romanization TUNG-T'ING HU, Pinyin DONGTING HU, large lake in northern Hunan Province, China. It lies in a basin to the south of the Yangtze River. The lake is connected to the Yangtze by four channels; some 40 percent of the river's waters (more in flood periods) flow into the lake. The lake is also fed from the south by almost the entire drainage of Hunan Province, with the Hsiang River flowing in from the south and the Tzu, Yüan, and Li rivers from the southwest and west. The waters of the entire lake system discharge into the Yangtze at Yüeh-yang.

The lake's size varies greatly from season to season. Its normal size is about 95 miles (150 km) from east to west and 60 miles (95 km) from north to south, while its area is 1,089 square miles (2,820 square km). In flood periods its water level may rise by as much as 50 feet (15 m), and the inundated area may increase up to 7,700 square miles (20,000 square km).

The lake, like P'o-yang Lake farther east, acts as a huge retention reservoir for the Yangtze. In the flood season, from June until October, the Yangtze waters flood into the lake. At this time, not only the Yüeh-yang outlet but also two of the inflow channels (the T'ai-p'ing and Ou-ch'ih streams) are navigable by large craft, which can also pass up the southern rivers. From October to April, however, more water is discharged from the lake than enters it, the water level falls, and much of the lake's area becomes dry land.

Much construction work has been done to supplement the role played by Tung-t'ing Lake in regulating flooding on the Yangtze. In the northwest angle between the lake and the Yangtze, a huge artificial retention basin was built in 1954–56, with floodgates through which the Yangtze can be diverted in time of need. The basin is kept empty, and its floor is under cultivation, except during the flood season. Called Ta-t'ung Lake, it is regulated by a great barrage (dam) across the T'ai-p'ing Stream entering to T'ung-t'ing Lake. Between the 1930s and the 1950s, much of the land along the lake banks and inside the dikes surrounding Tung-t'ing Lake was reclaimed—a fact hastened over the years by the gradual silting up of the lake from the huge amounts of sediment carried in by its inflowing rivers, especially the Yangtze. As a result, the area of the lake was said to be 400 square miles (1,000 square km) less in the 1970s than it was in 1937. At one time, as a result of such reclamation, the lake was almost divided in two and no longer fulfilled its regulatory function adequately, causing floods on the lower courses of the various rivers flowing into the lake. In the 1950s, however, such reclamation was prohibited, and works were undertaken to reconnect the different sections of the lake system.

Tung-t'ing Lake provides a communication link between the various rivers of Hunan and also between northern Hunan and the Yangtze, the cities around the lake's margin being the chief agricultural collection and distribution centres for a fertile plain. The lake is also a fishing ground, particularly during winter, being noted for its carp. The Changling Oil Refinery, built in 1971, is located on the edge of Tung-t'ing Lake and provides fuel oil for the province.

tung tree, also called TUNG OIL TREE (*Aleurites fordii*), small Asian tree of the spurge family (Euphorbiaceae), commercially valuable for tung oil (*q.v.*), which is extracted from its nutlike seeds. In the Orient tung oil was traditionally used for lighting, but it also has important modern industrial uses.

The tung tree grows to a height of 7.5 m (25 feet). It has large leaves, lobed or unlobed, attractive white flowers with reddish centres, and apple-sized globular fruit. The tung and its relatives, the candlenut tree (*Aleurites moluccana*), mu tree (*A. montana*), Japan wood oil tree (*A. cordata*), and lumbang tree (*A. trisperma*), are decorative and are planted as shade trees or as sources of tung oil in the subtropical and tropical areas of many countries, including the American Deep South, where they grow rapidly under favourable soil conditions.

T'ung-wen kuan, Pinyin TONGWEN GUAN ("Interpreters College"), first institution in China for the study of Western thought and society.

The T'ung-wen kuan was originally established in 1862 to teach Western languages and thereby free Chinese diplomats from reliance on foreign interpreters. In 1866 the study of astronomy and mathematics was added to the curriculum, and gradually the school curriculum began to resemble that of a small liberal arts college. The enrollment, initially 30, increased to 100 in 1869 and to 163 in 1879, but, with several notable exceptions, the quality of the students remained low.

The school helped disseminate Western knowledge in China. Many of the professors and students made translations of Western writings, and in 1873 a primitive sort of university press was established, which printed works in the fields of international law, political science, chemistry, physics, and natural philosophy. In 1902 the T'ung-wen kuan was absorbed by the Imperial University.

tungstate mineral: *see* molybdate and tungstate minerals.

tungsten (W), also called WOLFRAM, chemical element, an exceptionally strong refractory metal of Group VIb of the periodic table, used in steels to increase hardness and strength and in lamp filaments.

Tungsten metal was first isolated (1783) by the Spanish chemists and mineralogists Juan José and Fausto Elhuyar by charcoal reduction of the oxide (WO_3) derived from the mineral wolframite. Earlier (1781) the Swedish chemist Carl Wilhelm Scheele had discovered tungstic acid in a mineral now known as scheelite, and his countryman Torbern Bergman had concluded that a new metal could be prepared from the acid. The names tungsten and wolfram have been used for the metal since its discovery, though everywhere Jön Jacob Berzelius' symbol W prevails. In British and American usage tungsten is preferred; in Germany and a number of other European countries wolfram is accepted.

Occurrence, properties, and uses. The amount of tungsten in the Earth's crust is estimated to be 1.5 parts per million, or about 1.5 grams per ton of rock. Tungsten is about as abundant as tin or as molybdenum, which it resembles, and half as plentiful as uranium. The two economically important minerals are wolframite and scheelite. For information on the mining, recovery, and applications of tungsten, *see* MACROPAEDIA: Industries, Extraction and Processing.

Tungsten metal has a nickel-white to grayish lustre. Among metals it has the highest melting point, the highest tensile strength at temperatures of more than 1,650° C (3,002° F), and the lowest coefficient of linear thermal expansion (4.43×10^{-6} per °C at 20° C). Tungsten is ordinarily brittle at room temperature. Pure tungsten can, however, be made ductile by mechanical working at high temperatures and can then be drawn into very fine wire. Tungsten was first commercially employed as a lamp filament material and thereafter used in many electrical and electronic applications. It is used in the form of tungsten carbide for very hard and tough dies, tools, gauges, and bits. Much tungsten goes into the production of tungsten steels, and some has been used in the aerospace industry to fabricate rocket-engine nozzle throats and leading-edge reentry surfaces.

Natural tungsten is a mixture of five stable isotopes: tungsten-180 (0.12 percent), tungsten-182 (26.3 percent), tungsten-183 (14.28 percent), tungsten-184 (30.7 percent), and tungsten-186 (28.6 percent). Tungsten crystals are isometric and, by X-ray analysis, are seen to be body-centric-cubic.

Compounds. Chemically, tungsten is relatively inert. Compounds have been prepared, however, in which the element has oxidation states from 0 to +6. The states above +2, especially +6, are most common. In the +4, +5, and +6 states tungsten forms a variety of complexes.

The most important tungsten compound is tungsten carbide (WC), which is noted for its hardness (9.5 on the Mohs scale). It is used alone or in combination with other metals to impart wear-resistance to cast iron and the cutting edges of saws and drills.

atomic number	74
atomic weight	183.85
melting point	3,410° C (6,152° F)
boiling point	5,660° C (10,220° F)
density	19.3 (20° C)
valence	2, 3, 4, 5, or 6
electronic config.	2-8-18-32-12 or $(Xe)4f^{14}5d^4 6s^2$

tungsten carbide, an important member of the class of inorganic compounds of carbon, used alone or with 6 to 20 percent of other metals to impart hardness to cast iron, cutting edges of saws and drills, and penetrating cores of armour-piercing projectiles.

Tungsten carbide is a dense, metallike substance, light gray with a bluish tinge, that decomposes, rather than melts, at 2,600° C (4,700° F). It is prepared by heating powdered tungsten with carbon black in the presence of hydrogen at 1,400°–1,600° C (2,550°–2,900° F). For fabrication, a process developed in the 1920s is employed: the powdered tungsten carbide is mixed with another powdered metal, usually cobalt, and pressed into the desired shape, then heated to temperatures of 1,400°–1,600° C; the other metal, which melts, wets and partially dissolves the grains of tungsten carbide, thus acting as a binder or cement. The cemented composites of tungsten carbide–cobalt are known by many trade names, including Widia and Carboloy.

Tungus (people): *see* Evenk.

Tunguska event, enormous aerial explosion that, at about 7:40 AM on June 30, 1908, flattened approximately 2,000 square km (500,000 acres) of pine forest near the Podkamennaya Tunguska River, central Siberia (60° 55′ N, 101° 57′ E), in Russia. The energy of the explosion was equivalent to that of 10 to 15 megatons of TNT. Uncertain evidence of various kinds suggests that the explosion was perhaps caused by a comet fragment colliding with the Earth. Such an object, composed mainly of ice and dust, would disintegrate in the atmosphere high above the Earth's surface, creating a fireball and blast wave but no crater. It has been estimated that the object encountered the Earth at about 100,000 km per hour (62,000 miles per hour) and weighed anywhere from 100,000 to more than 1,000,000 tons.

The remote site of the explosion was first investigated from 1927 to 1930 in expeditions led by Russian scientist Leonid Alekseyevich Kulik (1883–1942). Around the epicentre he found felled, splintered trees lying radially for some 15 to 30 km (9 to 18.6 miles); everything had been devastated and scorched, and very little was growing two decades after the event. The epicentre was easy to pinpoint because the felled trees all pointed away from it, but at the centre there was no crater, just a marshy bog. Eyewitnesses who had observed the event from a distance spoke of a fireball lighting the horizon, followed by trembling ground and hot winds strong enough to throw people down and shake buildings as in an earthquake. (At the time, seismographs in western Europe recorded seismic waves from the blast.) The blast had been initially visible from about 800 km (500 miles) away; and, because the object (whatever it was) vaporized, gases were dispersed into the atmosphere, thus causing the abnormally bright nighttime skies in Siberia and Europe for some time after the event.

Tunguska River, either of two roughly parallel rivers of western Siberia, Russia, both tributaries of the Yenisey. Both rivers flow generally northwest, but the Podkamennaya Tunguska River turns west at about 62° N to join the Yenisey, whereas the Nizhnyaya Tunguska River continues its northwestward course to about 66° N before flowing west to the Yenisey. *See also* Nizhnyaya Tunguska River; Podkamennaya Tunguska River.

tunic, Latin TUNICA, basic garment worn by men and women in the ancient Mediterranean world. It was fashioned from two pieces of linen sewn up the sides and across the top, with holes left for the head and arms. It reached to the knees or lower, was with or without sleeves, belted at the waist, and held at the shoulders by clasps. Essentially an undergarment, it was usually covered by a mantle but might be worn alone by the young or by workingmen. It was made of dark or light linen or white wool. Tunics that were worn by Roman senators and other dignitaries were decorated with broad purple stripes, and children's tunics were often decorated with various colours. The garment was worn into the European Middle Ages by both laity and clergy until finally replaced by the fitted body garment in the 14th century. Even after secular fashions changed, the tunic was retained in ecclesiastical vestments such as the alb and dalmatic. In the 20th century, the word usually refers to a long blouse.

tunicate, also called UROCHORDATE, any member of the subphylum Tunicata (Urochordata) of the phylum Chordata. Small marine animals found in great numbers throughout the seas of the world, they are either sessile (permanently attached to the seafloor or other surfaces) or pelagic (floating).

A brief treatment of tunicates follows. For full treatment, *see* MACROPAEDIA: Chordates.

Tunicates show their chordate relationship in the possession of a muscular tail, gill slits, a notochord, and a nerve cord in the larval stage, which is resorbed at metamorphosis. Their name derives from their characteristic tunic, a secreted protective covering containing cellulose, a glucose polysaccharide not normally found in animals. Tunicates include more than 2,000 species grouped in three classes: Ascidiacea, Thaliacea, and Appendicularia. The Ascidiacea, or sea squirts, are sessile; the Thaliacea are pelagic and often form colonies; and the Appendicularia are free-swimming. The sea squirts attach themselves to the bottoms of ships and the sides of pilings, to seaweed, coral reefs and shellfish, as well as the seafloor. They range in size from a few millimetres (a fraction of an inch) to 30 cm (1 foot). The Thaliacea usually form floating colonies that may reach 4 m (13 feet) in length. The Appendicularia are often too small for the human eye to see unaided.

Tunicates typically have two apertures, or siphons, in the tunic. Water, carrying food and oxygen, enters the body through the branchial aperture; it is filtered and passes out through the atrial aperture. In colonial species of ascidians, the individuals, called zooids, retain individual branchial apertures, but they may share a common atrial aperture or retain individual ones, depending on the structure of the colony. Some colonies of Thaliacea assume a thimble shape; water discharged into the thimble from the atrial apertures serves to move the colony forward.

Most tunicates are hermaphroditic, but asexual reproduction also takes place in colonial forms. In cooler regions spawning takes place in spring and summer, while in the tropics it occurs year-round. An embryo may develop into a larva in just a few hours. The larvae have notochords and nerve cords, as well as

muscular tails twice as long as their bodies. The sessile forms are equipped with sticky protuberances, called papillae, by which they fasten themselves to a surface at the end of the larval stage, which may range from six hours to several days. After attachment, the body resorbs the tail, using it as a food supply during metamorphosis into its adult form. Pelagic species achieve metamorphosis, which takes only a short time, without attaching themselves. Larvae do not feed during their extremely brief life; adults feed on microorganisms.

Asexual reproduction in colonial forms is effected through budding, that is, by the formation of new individuals by the development of outgrowths on the parent, which then break off. Budding may be achieved by the growth of rootlike stolons on the posterior end of the zooid, or of buds on the pharynx or on the body wall. In some pelagic groups sexually differentiated individuals (gonozooids) produce a larva that becomes an oozoid, or asexually reproducing form, which in turn produces another gonozooid generation.

The tunic, also called the test, consists of cellulose. It is composed of living tissues sustained by blood vessels. Within the tunic is the muscular body wall, which controls the opening of the siphons and encloses the pharynx and the atrial cavity. The pharynx, a sac into which the branchial siphon opens, is separated from the body wall by the atrial cavity, which leads to the outside through the atrial siphon. The branchial sac is perforated; each of the many perforations (stigmas) has small, hairlike processes (cilia) that drive water into the body.

The branchial sac excretes mucus, to which food adheres before it enters the esophagus, where it is carried to the digestive tract. Waste is passed from the anus into the atrial cavity near the atrial aperture, from which it is discharged with the water passing out of the body. The openings of the genital ducts are situated near the anus. In the simpler forms of ascidians, the viscera are enclosed by membranes called epicardia. In more advanced species, the epicardia assume other functions such as storage. At the end of every 50 to 100 beats the tunicate heart reverses the flow of blood; it stops and then resumes functioning in the opposite direction. The blood includes several different types of cells.

Tunicates are important links in food chains. They become a nuisance when they grow on ships' hulls, but some species are useful in making pharmaceuticals. Because tunicates are soft-bodied, there is no fossil record of early tunicate forms.

tuning and temperament, in music, the adjustment of one sound source, such as a voice or string, to produce a desired pitch in relation to a given pitch, and the modification of that tuning to lessen dissonance. The determination of pitch, the quality of sound that is described as "high" or "low," is based upon the frequency of vibration of sound waves. The sounding of a sustained pitch produces other vibrations called overtones, or partials, whose frequencies are the integral multiples of the frequency of the principal note.

A brief treatment of tuning and temperament follows. For full treatment, *see* MACROPAEDIA: Music, The Art of.

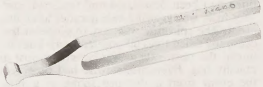
Fundamental to the concept of tuning is the mathematical relationship between intervals (the distance between two pitches). The earliest development of the system of simple mathematical ratios of intervals was that of the school of Pythagoras, in the 6th century BC. The starting point for all tuning systems in Western music is the interval of the octave. The diatonic scale (the basis of all Western music, as represented by the white keys on a keyboard) consists of seven intervals: five large (whole tones) and two small (semitones). Their frequency ratios are irrational numbers; these result in dissonance, subjectively described as harsh and unpleasant to the ear. The intervals whose frequency ratios are simple, *i.e.*, the unison, octave, perfect fifth, perfect fourth, and major third, result in consonance, described as pleasing and harmonious. Dissonance results from the acoustical phenomenon of beats, the interference between sound waves of a close frequency, and consonance is the absence of beats.

Temperament, or the modification of tuning in order to lessen dissonance, was first mentioned in Franchinus Gafurius' treatise *Practica Musica* (Milan, 1496). He advocated diminishing the fifths by a slight amount, spreading the D to A dissonance over several octaves. In mean-tone temperament, customary in the 16th century, the interval of two octaves and one third is tuned perfectly to the overtone series, and the difference is spread through the four fifths, which flattens them and sharpens the sixths by one fourth of a comma. Equal whole tones are created, thereby giving its name, the mean, or average, whole tone being exactly one-half of the pure third. This worked well within a limited number of keys, each of these being similar enough to the others to be harmonious but different enough to maintain highly individual characteristics. However, the use of enharmonic notes, often differing by almost a quarter of a tone, created problems.

The move to equal temperament, which began in the 17th century, was brought about by the expansion of tonalities, chromaticism, and enharmonic modulation (changing key by using one note to serve as a pivot to another key). Here the octave is divided into 12 equal semitones of 100 cents each, and the only remaining pure interval is the octave. All of the others are tempered to some extent. The fifth is two cents flat, for example, and the major third is 14 cents sharp. Although equal temperament sacrifices purely tuned intervals, numerous gains result from its use. The complex harmonies and tonalities of 19th- and 20th-century music would be impossible without the concept of enharmonics, which is completely dependent upon equal temperament. The "twelve tone" music of Arnold Schoenberg, Alban Berg, and Anton Webern would not have developed without the complete equality of semitones, and though new techniques are gradually being used, this system still holds fast today.

tuning fork, narrow, two-pronged steel bar that when tuned to a specific musical pitch retains its tuning almost indefinitely. It was apparently invented by George Frideric Handel's trumpeter John Shore shortly before Shore's death in 1752.

Because it produces a nearly pure tone (without overtones), it is useful in experimental



Tuning fork
By courtesy of J.C. Deagan, Inc.

study of the physics of sound. It has also been used in musical instruments—*e.g.*, the dulcitone, or typophone, a set of graduated tuning forks struck by felt hammers by means of a keyboard mechanism.

Tunis, Arabic TŪNIS, or TŪNUS, capital and largest city of Tunisia, on the northern African coast, between the western and eastern basins of the Mediterranean Sea. Tunis was built at the end of the shallow Lake of Tunis, an inlet of the Gulf of Tunis, and is linked with its port, Ḥalq al-Wādī, 6 miles (10 km) to the northeast.

Tunis was founded by the Libyans, who in the 9th century BC surrendered the site of Carthage to the Phoenicians from Tyre. In 146 BC, during the Third Punic War between



A street in al-Madīnah, the old city of Tunis
Andy Berhaut—Photo Researchers

Carthage and Rome, Tunis and Carthage were destroyed. The city flourished under Roman rule, but its importance dates chiefly from the Muslim conquest in the 7th century AD. It became the capital city under the Aghlabids (800–909) and reached its greatest prosperity under the Ḥafṣid dynasty (1236–1574). The Holy Roman emperor Charles V took possession of it in 1535, and in 1539 the city passed into the hands of the Turks. It was retaken by the Spaniards, who held it from 1573 to 1574 but who were obliged to yield it to the Ottoman Empire, under which it remained until the French protectorate (1881–1956). Occupied by the Germans in 1942 and liberated by British forces and Allied troops in 1943, it became the national capital of Tunisia when independence was achieved in 1956.

Agriculture remains a major source of income. Olives and cereals are the principal crops grown, and olive oil and foodstuffs are processed. Manufactures include textiles and clothing, carpets, and cement and metal building structures. There are also chemical (superphosphate), metallurgical, machine, and electrical industries and railway workshops. There are several thermoelectric plants at Ḥalq al-Wādī, and Maqrīn has a lead smelter. Tourism is of particular economic importance. Al-'Uwaynah International Airport and the International Airport of Tunis-Carthage are located northeast of the city.

Tunis has two cultural centres, as well as a theatre that is used by international theatre groups. The summer festival—the Festival of Carthage, held in July—has achieved a certain renown. Among the city's attractions are its thermal baths, dating from the time of Rome's Antonine emperors (who reigned in the 2nd century), the heights of Sīdī-Bū Sa'īd,

the exoticism of its markets (souks), and the mosque of Az-Zaytūnah (8th century), the oldest and most venerated monument in Tunis. The University of Tunis was founded in 1960. Southeast of the city, along the valley of the Wadi Milyān, are magnificent remains of the aqueduct built by the Romans to link Mount Zaghwān to Carthage. Pop. (1994) city (commune), 674,000; (1990 est.) metropolitan area, 1,479,000.

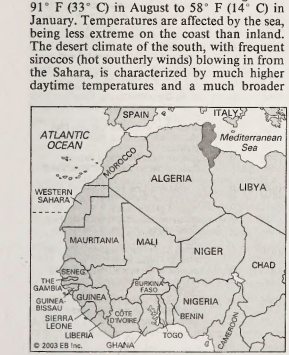
Tunisia, officially REPUBLIC OF TUNISIA, Arabic AL-JUMHŪRĪYAH AT-TŪNISĪYAH, country of North Africa, lying along the Mediterranean coast. The capital is Tunis. It is the smallest country of the region, with a maximum length from north to south of 470 miles (756 km) and a maximum width from east to west of 218 miles (351 km). Tunisia is bordered by Algeria to the west and southwest, Libya to the southeast, and the Mediterranean Sea to the east and north. It has a 750-mile- (1,200-kilometre-) long coastline. Area 59,664 square miles (154,530 square km). Pop. (2002 est.) 9,764,000.

A brief treatment of Tunisia follows. For full treatment, *see* MACROPAEDIA: North Africa.

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

The land. Tunisia can be divided into four physiographic regions from north to south. The mountainous northern region, occupying one-third of the total land area, is dominated by two mountain chains—the Northern Tell (north) and the High Tell (south)—that are continuations, respectively, of the Tell Atlas and the Saharan Atlas mountains of Algeria. The highest point in Tunisia, Mount Ash-Sha'nabī (5,066 feet [1,544 m] above sea level), is located near the Algerian border. The central region is an extensive plateau that is about 1,600 feet (500 m) in elevation. Farther south lies a series of low-lying *shaṭṭ* (chotts, or shallow salt lakes), the largest of which is the Shaṭṭ al-Jarīd. The southernmost portion of Tunisia is given over to the sand and rock of the Sahara (desert). Rich artesian water sources make possible well-cultivated oases here and there in the southern part of Tunisia. The Majardah (Medjerda) is the country's largest river (286 miles [460 km] long), and the only perennial one; it is much used for hydroelectric power and irrigation. The Majardah valley has the country's most fertile soil and is its prime agricultural area.

The Mediterranean climate of northern Tunisia has mild, rainy winters and hot, dry summers. Average daily high temperatures at Tunis on the Mediterranean coast range from 91° F (33° C) in August to 58° F (14° C) in January. Temperatures are affected by the sea, being less extreme on the coast than inland. The desert climate of the south, with frequent siroccos (hot southerly winds) blowing in from the Sahara, is characterized by much higher daytime temperatures and a much broader temperature range. Precipitation ranges from 40 to 60 inches (1,000 to 1,500 mm) annually in the north to only 4 to 8 inches (100 to 200 mm) in the south. Green cork and oak forests dominate the wetter mountain slopes, and the central steppes support a sparse ground cover of esparto grass. Some shrubs, such as acacia and saltbush, are found in the arid south, but most of the Sahara is devoid of vegetation except at oases.



Tunisia

Tunisia's principal mineral resource is phosphate rock, of which it has some of the largest reserves in Africa. The country also has substantial oil reserves and some of the largest natural gas fields on the continent.

The people. Tunisia's population is largely a mixture of Arab and Berber elements. Arabs came to North Africa beginning in the 7th century and eventually conquered the indigenous Berbers. The Arabs brought their language and religion with them and intermarried with the local people. Most Tunisians today claim Arab ancestry and culture, and only traces of Berber culture remain. The country's official language is Arabic, though French is also widely spoken. The overwhelming majority of the people are Muslim.

Nearly one-third of Tunisia's population is under 15 years of age. The annual rate of population growth is near the world standard but is comparatively low for the Middle East and North Africa. Governmental efforts to promote family planning and a high rate of emigration have in part suppressed the rate of population growth. The country's population density is the highest in North Africa, with most people living near the coast and nearly two-thirds living in urban areas. The entire southern half of Tunisia is only lightly populated.

The economy. Tunisia has a mixed economy in which both the public and private sectors participate. Services, agriculture, light industries, and the production and export of petroleum and phosphates are the largest sectors of the economy. Unemployment and underemployment are widespread, and economic development has been heavily subsidized by Western countries and international organizations. The gross national product (GNP) is growing faster than the population; the GNP per capita is among the highest in Africa but is near the average for the Middle East and North Africa.

Private agriculture has traditionally been the mainstay of Tunisia's economy, though the manufacturing sector has assumed a larger place in the economy in recent decades. Agriculture accounts for roughly one-tenth of the gross domestic product (GDP) and employs almost one-fifth of the work force. Tunisian agriculture remains plagued by the country's uncertain rainfall patterns, and the size of its harvests varies as a result. Dry farming predominates, though an ambitious water development program begun in the 1980s has greatly increased the country's irrigated acreage.

Harvests of wheat and barley, which are the chief staples, frequently fall short of domestic demand. Wheat is grown mostly in the north, and barley primarily in central Tunisia, where the rainfall is lower. Cash crops include olives, sugar beets, citrus fruits, and vegetables. Sheep are the primary livestock.

The mineral industry is dominated by the production of petroleum and phosphates. Petroleum has become a chief Tunisian export, though heavy grades of petroleum must be imported. Most phosphate is used domestically to produce chemicals and fertilizers for export.

Manufacturing industries account for approximately one-fifth of the GDP and employ an equal proportion of the workforce. The nation's industries are concentrated in Tunis. Most manufacturing establishments employ no more than five workers, and traditional artisanship remains an important source of income for many Tunisians. Principal manufactures include processed construction material, foods, crude steel, chemicals, textiles, and leather goods.

Electricity is generated almost entirely by thermal plants using domestic fuels, though some hydroelectric power is also produced along the Majardah River. Tunisia's road and rail network is sufficiently dense that all its cities and major towns are linked up. The country has several ports along its lengthy coastline. Tourism, based on Tunisia's long beaches as well as its ancient Roman sites and later Islāmic buildings, is an important component of the economy.

Tourism, foreign aid, and remittances from Tunisians working abroad are important sources of foreign exchange and help to offset the country's unfavourable balance of trade. Petroleum and petroleum products, textiles, fertilizers, and agricultural commodities are chief among Tunisia's exports. Its chief trading partners include France, which supplies up to one-third of Tunisia's imports, Germany, Italy, and Belgium-Luxembourg.

Government and social conditions. Tunisia is a republic. Its 1959 constitution vests legislative power in the unicameral Chamber of Deputies, consisting of 182 members directly elected to five-year terms. Executive power resides with the president, who is directly elected to a five-year term. The president governs with the assistance of an appointed cabinet headed by a prime minister. The Democratic Constitutional Assembly (former Destourian Socialist Party) has been the dominant and often the only officially recognized party since independence, and opposition parties have not participated in elections frequently or with effect.

Health conditions in Tunisia are improving, though far from adequate, and compare favourably to those of many developing countries. A substantial increase in the numbers of health facilities and personnel, though a shortage still prevails, has contributed to the control of major infectious diseases such as typhoid, diphtheria, and typhus. Diseases of infancy and childhood constitute the most serious health problem. The average life expectancy is among the highest in Africa at 70 years for men and 74 for women.

The government accords a high priority to education, which regularly receives nearly one-fourth of the national budget. The adult literacy rate is about 85 percent for males and 65 percent for females. Public education is free but not compulsory. There are six-year primary, seven-year secondary, and three-year vocational schools, and institutions of higher education. Arabic, the language of instruction in early primary grades, is gradually replaced by French in later grades.

The government controls all print and electronic news media. Self-censorship of the press is increasingly being replaced by official censorship. The broadcasting industry has been a state monopoly since independence.

Cultural life. Tunisia's history as either a centre or vassal of Phoenician, Carthaginian, Roman, Berber, and Arabic power has left a rich heritage of architectural remains, particularly in the north. Modern Tunisians utilize both Arabic and French in literature but generally use French in the scientific disciplines.

History. From the 12th century BC the Phoenicians had a series of trading posts and ports of call on the North African coast. Carthage was founded in the 8th century BC in the general vicinity of present-day Tunis, and by the 6th century the Carthaginian kingdom encompassed most of present-day Tunisia. Carthage became part of Rome's African province in 146 BC after the Punic Wars. Roman rule endured until the Muslim Arab invasions in the mid-7th century AD.

Since then Tunisia has been fought over, won, and lost by the 'Abbāsids; the Aghlabids; the Shī'ite Fāṭimids; the Almohads; the Ḥafṣids; Spain; and finally the Ottoman Turks, who conquered the area in 1574 and held it until their own decline in the late 19th century.

As Ottoman power declined, Tunisia was caught between French, British, and Italian aspirations in the region, and for some time their conflicting interests helped maintain Tunisia's autonomy. In a deal consummated in 1881, the British occupied Cyprus and the French took Tunisia as a protectorate.

In theory the beys, rulers of Tunisia, continued to hold sway, but actual power resided in French hands. In the early 20th century Tunisians began to demand more participation in government, although they rallied behind the French in World War I. After the war, agitation resumed. In 1920 the Destour Party demanded equal Tunisian participation in the government. A Neo-Destour party arose in the 1930s, led by Habib Bourguiba and supported by the French Popular Front government. Dissolved during World War II, it returned after the war to lead the independence movement.

In 1956 France granted full independence to Tunisia, and Bourguiba headed its government. The rule of the beys was abolished and a republic declared. The Neo-Destour Party took the name Destourian Socialist Party (Parti Socialiste Destourien; PSD) and became the ruling party of the state. The party (later known as the Constitutional Democratic Assembly) undertook progressive social reforms, such as the enfranchisement of women, and, under Bourguiba's rule, economic development proceeded steadily, if slowly. Amid widespread unrest in 1987, the aged Bourguiba was declared mentally unfit and was removed from office. He was succeeded as president by Gen. Zine al-Abidine Ben Ali, who won re-election in 1995 and 2000; his tenure was marked by tensions with the Islāmic fundamentalist movement and with opposition groups. Tunisia's human rights record was repeatedly criticized at home and abroad. Steady progress was made, however, in the economic sphere, and an important and far-reaching free-trade agreement was concluded with the European Union in 1998.

Tunja, city and capital of Boyacá *departamento,* north-central Colombia. It lies in the high valley of the Teatinos, or Boyacá, River. Founded in 1539 by Captain Gonzalo Suárez Rendón, the settlement was originally called Hunza by the local Chibcha Indians. In 1819 it served as Simón Bolívar's operating base for his victory over the Spanish at the Battle of Boyacá, 5 miles (8 km) to the south.

The city is a communications, commercial, and agricultural centre and is a market for the cattle country of the Llanos region to the east. Gold and emerald mines are in the vicinity. Many of the city's colonial buildings survive, including the 16th-century churches of Santo Domingo and San Laureano. The Pedagogical and Technological University of Colombia was founded in Tunja in 1953. The city is situated on the Pan-American Highway linking Cúcuta and Bogotá; railway connections are with Bogotá to the southwest. Pop. (1995 est.) 120,210.

tunnel, horizontal or nearly horizontal subsurface passageway that occurs naturally or is constructed. Man-made tunnels are used for various purposes, including finding and exploiting mineral deposits; providing passageways for trains and motor vehicles; conducting water for domestic supplies, power, and irrigation; diverting rivers; and housing such underground installations as power plants.

A brief treatment of tunnel building follows. For full treatment, *see* MACROPAEDIA: Public Works.

The earliest tunnels were probably extensions of prehistoric cave dwellings. Ancient civilizations used tunnels to carry water for irrigation and for drinking, and in the early 22nd century BC a tunnel for pedestrian traffic was built in Babylonia under the Euphrates River. The Egyptians excavated temple rooms inside cliffs, while the Romans built aqueduct tunnels through mountains. By the 17th century AD tunnels were being constructed for canals. During the 19th and 20th centuries the development of railroad and later motor-vehicle transportation led to a tremendous expansion in the number of tunnels and in their length. (*See* the Table.)

Tunnels can be divided into four general categories, depending on the material through which they pass: soft ground, solid rock, soft rock, and subaqueous. Soft-ground tunnels are generally shallow and are often built for use as subways, water-supply systems, and sewers. Excavation is much easier than it is in solid rock, but the "stand-up time" (the time an excavated section will safely stand up without support) is very short. In order to prevent the tunnel from collapsing, a support structure is continuously built around the heading, or excavation face. A circular or arch-shaped design has been found to be the best at bearing the ground load from above. Brick and stone were used for support in early tunnels, but in modern tunneling steel is generally used to provide temporary support until a concrete lining can be installed.

Soft-soil excavation can be accomplished by a number of methods, from simple hand mining with shovel and pickax to full-face boring with sophisticated machinery. One such device, the tunneling mole, utilizes a rotating wheel set with teeth that continuously excavates material and loads it onto a conveyor belt. In some machines the cutter is pressed against the face, forcing earth through sieve-like holes and onto the belt.

Although tunnels through solid rock can be excavated at only about half the rate of tunnels through soft earth, rock bores have the advantage of much longer stand-up times. If a tunnel is pushed through unfractured blocks, it may need little or no additional support. Tunnelers often encounter areas of defective rock, however, and must be able to quickly change their method of tunneling to suit the conditions.

Great railway and highway tunnels of the world

tunnel	location	length km	length miles	year completed	use*	notes
Seikan	Japan	53.9	33.5	1988	R	passes under stormy Tsugaru Strait between islands of Honshu and Hokkaido
Channel Tunnel (Eurotunnel)	England–France	50.5	31.4	1994	R	passes under English Channel between Folkestone, Eng., and Calais, Fr.
Iwate-Ichinohe	Japan	25.8	15.7	2002	R	carries Tōhoku high-speed line through mountains between Tokyo and northern Honshu
Lærdal	Norway	24.5	15.3	2000	H	carries main cross-country highway through mountains in central Norway
Daishimizu (Great Shimizu)	Japan	22.2	13.8	1982	R	on Jōetsu high-speed line across Honshu between Tokyo and Niigata
Simplon II	Italy–Switzerland	19.8	12.3	1922	R	rail link under Simplon Pass, the traditional divide between northern and southern Europe
Simplon I	Italy–Switzerland	19.8	12.3	1906	R	rail link under Simplon Pass, the traditional divide between northern and southern Europe
Vereina	Switzerland	19.1	11.9	1999	R	rail link under Flüela Pass between upper Rhine and lower Engadin valleys
Shin-Kanmon (New Kanmon)	Japan	18.7	11.6	1975	R	carries Sanyo high-speed line under Kanmon Strait between islands of Honshu and Kyushu
Great Apennine	Italy	18.5	11.5	1934	R	rail link through mountains between Bologna and Florence
Tsinling	China	18.5	11.5	2001	R	traverses Tsinling Mountains, historic barrier between northern and southern China
St. Gotthard	Switzerland	16.9	10.5	1980	H	links Uri and Ticino cantons under St. Gotthard Pass
Haruna	Japan	15.4	9.6	1982	R	on Jōetsu Line across Honshu between Tokyo and Niigata
Severomuiskiy	Russia	15.3	9.5	2003	R	link on Baikal-Amur railway in Russian republic of Buryatia
St. Gotthard	Switzerland	15.0	9.3	1882	R	carries Zürich–Milan line under St. Gotthard Pass between Uri and Ticino cantons
Lötschberg	Switzerland	14.6	9.1	1913	R	rail link under Lötschen Pass between Bern and Valais cantons
Mount MacDonald	British Columbia, Canada	14.6	9.1	1988	R	carries Canadian Pacific Railway under Rogers Pass in Glacier National Park
Ta-yao Shan	China	14.3	8.9	1988	R	carries dual-track line through Nan Mountains, northern Kwangtung province
Arlberg	Austria	14.0	8.7	1978	H	provides road link under Arlberg Pass between Tirol and Vorarlberg provinces
Hokuriku	Japan	13.9	8.6	1962	R	on Hokuriku Line along Sea of Japan
Mount Cenis	France–Italy	13.7	8.5	1871	R	carries main Paris–Turin line through Alps at Fréjus Pass
Hex River	South Africa	13.4	8.3	1989	R	penetrates mountains between Hex River valley and Great Karoo upland
Fréjus	France–Italy	12.9	8.0	1980	H	carries Lyon–Turin highway through Alps at Fréjus Pass
Cascade	Washington, U.S.	12.5	7.8	1929	R	penetrates Cascade Range, linking American Midwest and Pacific Northwest
Mont Blanc	France–Italy	11.6	7.2	1965	H	road link between Haute Savoie, Fr., and Valle d'Aosta, Italy, under Europe's highest peak

*Key: R, railway; H, highway.

One of the greatest advances in solid-rock excavation was the introduction of gunpowder blasting in the 17th century. The basic method has remained the same, although different explosives are used. Conventional blasting done with dynamite is a cyclical process in which pilot holes are first drilled for the explosives, the blast is detonated, and fumes and rubble are cleared from the shaft. In order to preserve the strength of the rock, Swedish engineers perfected a technique called sound-wall blasting, in which numerous small charges are placed according to complicated plans. Another method that cuts a smooth surface in the tunnel is the rock mole, which dislodges rock with disk cutters or drill bits.

The problem of water inflow, in which water from a subterranean source fills up the shaft, can occur in any type of tunneling operation; it is a constant danger during the construction of subaqueous tunnels. An early solution involved using a pressurized excavation chamber that held back incoming water; but the danger, expense, and slow progress of this method made it prohibitive. Alternate methods include the construction of parallel drainage tunnels and the use of prefabricated sections that can be floated into position, sunk, and attached to other sections.

Tunnel building has become increasingly efficient and safe, especially with the use of innovations that stabilize the heading. In soft soils concretelike substances called grout are often injected into the tunnel area to stabilize the soil and to check water seepage. This helps prevent soil loss (the settling of earth from above), which is a major concern when tunnels are built under city buildings. A method of tunnel support, called shotcreting, was developed in Sweden. It involves the spraying of a cement mixture (shotcrete) onto the tunnel crown with a long robot arm shortly after the excavation. Shotcreting provides immediate support and minimizes soil loss. A permanent shield can then be built by thickening the concrete lining; steel ribs can be used for additional support.

tunneling, also called BARRIER PENETRATION, in physics, passage of minute particles through seemingly impassable force barriers. The phenomenon first drew attention in the case of alpha decay, in which alpha particles (nuclei of helium atoms) escape from certain radioactive atomic nuclei. Because nuclear constituents are held together by a force that the alpha particles have insufficient energy to overcome, their tunneling is contrary to the conventional understanding of classical physics and requires instead explanation in terms of quantum mechanics.

On the basis of quantum mechanics, particles of subatomic size make their way across barriers even though their energies are too small to carry them over in the conventional way. Such particles follow the undulations of a quantum-mechanical (de Broglie) wave, accumulating where the wave grows and thinning out where it diminishes. Thus, the alpha particles, which seem to be tunneling through an impenetrable barrier, really penetrate it as a natural consequence of their wave properties.

tunneling shield, machine for driving tunnels in soft ground, especially under rivers or in water-bearing strata. The problem of tunneling under a river had defied the engineering imagination for centuries because of the difficulty of preventing mud and water from seeping in and collapsing the tunnel heading. In 1818 Marc Isambard Brunel, an émigré French naval officer in England, observed the action of a tiny marine borer, the shipworm, whose shell plates permitted it to bore through timber and push the sawdust out behind it. Brunel built a giant iron casing, or shield, that could be pushed forward through soft ground by means of screw jacks, while miners dug through shutter openings in the face.



Tunneling shield for San Francisco subway
By courtesy of Robert S. Mayo, C.E., Mayo Tunnel & Mine Equipment, Inc., Lancaster, Pa.

Brunel's shield, rectangular in plan, was successfully employed in driving the world's first underwater tunnel, under the Thames at London, 1825–42. In 1865 Peter Barlow patented a much simpler shield, of circular cross section with which James Henry Greathead drove a small-bore tunnel under the Thames in less than a year at modest cost. Simultaneously, Alfred Ely Beach of New York City devised a similar shield, which he used to drive a short experimental subway under Broadway. In the 1880s Greathead successfully used compressed air behind his shield in a London subway tunnel to prevent flooding while the lining was being installed. The combination of shield and compressed air made tunneling possible under the largest rivers.

Modern tunneling shields are essentially the same as the Greathead design; that is, powerful steel cylinders shoved forward by hydraulic jacks. A diaphragm, or curtain, in the front has a door that permits men to work in front of the shield. In front of the diaphragm the cylinder is prolonged by a circular cutting edge that projects farther at the top, forming a protective hood for those working in front of the shield. Behind the diaphragm an erector arm constructs the tunnel lining by successively setting segments of steel rings in place. Hydraulic jacks to advance the shield are braced against the end of the completed lining.

Tunnell, Emlen, in full EMLEN LEWIS TUNNELL (b. March 29, 1925, Bryn Mawr, Pa., U.S.—d. July 23, 1975, Pleasantville, N.Y.), American football player who in 1967 became the first African American to be enshrined in the Pro Football Hall of Fame. He was a key member of National Football League championship teams in New York (1956) and Green Bay (1961).

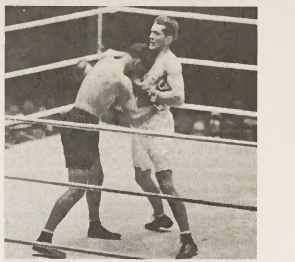
Tunnell played collegiate football at the University of Toledo and the University of Iowa but was forced to leave both schools because of injuries. In 1948 he signed with the New York Giants and concentrated on defense. His brilliant pass coverage and unerring tackling made him the first player to receive widespread public acclaim as a defensive back. At the same time, he was recognized as the most dangerous punt returner in the league.

Tunnell was traded in 1959 to the Green Bay Packers, where he played for three seasons. At his retirement he held several league records, including career interceptions (79) and punt returns (258).

Tunney, Gene, byname of JAMES JOSEPH TUNNEY (b. May 25, 1898, New York, N.Y., U.S.—d. Nov. 7, 1978, Greenwich, Conn.), American boxer who beat Jack Dempsey in 1926 to become the world heavyweight boxing champion.

Tunney began boxing while working as a clerk in New York City. He joined the U.S. Marine Corps during World War I and in 1919 won the light heavyweight championship of the American Expeditionary Force in Paris. He returned home to his boxing career and won the U.S. light heavyweight championship in 1922. After 1924 he fought as a heavyweight.

Dempsey was the favoured fighter in the world championship bout in Philadelphia on Sept. 23, 1926, but Tunney won by decision after 10 rounds. The rematch in Chicago on Sept. 22, 1927, gave rise to the lasting controversy of the "long count." In the seventh round Tunney was knocked to the canvas, Dempsey failed to retire immediately to a neutral corner, and the count did not begin until he had done so, several seconds later. Tunney then rose on the count of nine and completed the 10-round fight, again winning by decision. Tunney defended his title against Tom



Tunney (right) fighting Jack Dempsey, 1927
UPI—EB Inc.

Heeney in 1928 and then announced his retirement on July 28 of that year. From 1915 to 1928 Tunney had 77 bouts, winning 65, 43 by knockout.

Tunney entered the business world, becoming an executive of banks, manufacturing companies, insurance firms, and a newspaper (the *Toronto Globe and Mail*). He wrote *A Man Must Fight* (1932) and the autobiographical *Arms for Living* (1941).

tunny (fish): *see* tuna.

Tunstall, Cuthbert, Tunstall also spelled TONSTALL (b. 1474, Hackforth, Yorkshire, Eng.—d. Nov. 18, 1559, Lambeth, London), prelate, bishop of London (1522–30) and of Durham (1530–52 and 1553–59), who was a leading conservative in the age of the English Reformation. He wrote an arithmetic textbook, *De arte supputandi libri quattuor* (1522) and a treatise on the Eucharist in which he defended the Roman Catholic doctrine.

Tunstall studied law at Oxford, Cambridge, and Padua universities. In 1508–09 he became chancellor to William Warham, archbishop of Canterbury, and from 1514 he advanced rapidly in Thomas (later Cardinal) Wolsey's service, being employed particularly on diplomatic negotiations abroad. In the Reformation he reluctantly broke with Rome and firmly opposed doctrinal innovation, yet remained in Henry VIII's favour, while his European reputation made his eventual submission politically valuable. In 1537–38 he served as president of the Council of the North.

Imprisoned and deprived under Edward VI (though initially a member of the council of regency), he was reinstated by Mary but refused the oath of supremacy under Elizabeth and was again deprived (1559).

Tunxi (China): *see* T'un-hsi.

Tupã, city, western São Paulo estado ("state"), Brazil, situated in the highlands at 1,676 feet (511 m) above sea level, between the Peixe and Tietê rivers. The settlement was given town status in 1936 and was made the seat of a municipality in 1938. Economic activity in Tupã centres on the processing of products from the hinterland, including cotton, coffee, rice, and timber. The city is linked by road, railway, and air to São Paulo, 260 miles (420 km) southeast. Pop. (2000 prelim.) 60,332.

Tupac Amaru II, original name JOSÉ GABRIEL CONDORCANQUI (b. 1740–42?, Peru—d. May 18, 1781, Cuzco, Peru), Peruvian Indian revolutionary, a descendant of the last Inca ruler, Tupac Amaru, with whom he was identified when he led the Peruvian peasants in an unsuccessful rebellion against Spanish rule.

Tupac Amaru II was a cacique (hereditary chief) in the Tinta region of southern Peru. He received a formal Jesuit education but maintained his identification with the Indian population. In 1780 he arrested and executed the *corregidor* (provincial administrator), Antonio Arriaga, on charges of cruelty. This act led to the last general Indian rebellion against Spain, at first with the support of some Creoles (Spaniards born in America). The revolt, which spread throughout southern Peru and into Bolivia and Argentina, lost this support, however, when it became a violent battle between Indians and Europeans. Tupac Amaru II and his family were captured in March 1781 and taken to Cuzco. After being forced to witness the execution of his wife and sons, he was mutilated, drawn and quartered, and beheaded. The revolution continued until the Spanish government issued a general pardon of the insurgents.

Tupamaro, member of NATIONAL LIBERATION MOVEMENT, Spanish MOVIMIENTO DE LIBERACIÓN NACIONAL, an Uruguayan leftist urban guerrilla organization founded in about 1963. The group was named for Tupac Amaru II, the leader of an 18th-century revolt against Spanish rule in Peru.

The chief founder was Raúl Sendic, a labour organizer; and the earliest Tupamaro efforts were a mixture of idealism, public relations, and theft—robbing banks and businesses and then, in Robin Hood fashion, distributing food and goods to the poor. About 1968 the Tupamaros began more earnestly to undermine the established order, raiding arsenals, engaging in arson, and mounting a wave of violence, chiefly through political kidnappings and assassinations of police and officials. Their success was brief, however; in the early 1970s they had reached the zenith of their power. Thereafter, a military government (brought to power in a coup in 1973), using hard-line tactics and a disciplined army, managed to kill some 300 Tupamaros and imprison 3,000 others. After democratic rule returned to Uruguay in 1985, most of those jailed, including Sendic, were released, and the Tupamaros were reorganized as a legal political party.

Tupelo, city, seat (1866) of Lee county, northeastern Mississippi, U.S. It is located 63 miles (101 km) north-northeast of Columbus. It is the headquarters and focal point of the Natchez Trace Parkway. In 1859 the original settlement of Harrisburg was moved 2 miles (3 km) east to the Gulf, Mobile, and Ohio Railroad line. The new community, Gum Pond, was later renamed Tupelo for the local tupelo trees that supplied construction timber. It developed as a processing and shipping centre for cotton and dairy produce and later acquired diversified manufactures including textiles, electronic equipment, and furniture.

Within the city limits is Tupelo National Battlefield, where the Confederates under Nathan B. Forrest and Stephen D. Lee were contained by A.J. Smith's Federal troops (July 14–15, 1864) during the American Civil War. Also in the vicinity are Brices Cross Roads National Battlefield Site (June 10, 1864, where the Federals were defeated by Forrest); the Ackia Battleground National Monument (marking the spot where the Chickasaw Indians and the British defeated the Choctaws and French in 1736); Tombigbee State Park; and a U.S. fish hatchery. Disaster struck the city on April 5, 1936, when a tornado killed 201 people and injured 1,000. The rock and roll star Elvis Presley (1935–77) was born in Tupelo, and his house is open to the public. Inc. 1891. Pop. (2000) 34,211.

tupelo, any of about seven species of trees constituting the genus *Nyssa,* and belonging to the sour gum family (Nyssaceae). Five of the species are found in moist or swampy



Black tupelo (*Nyssa sylvatica*)
Joan E. Rahn

areas of eastern North America, one in eastern Asia, and one in western Malaysia. They all have horizontal or hanging branches and broad alternate leaves, and they are dioecious (male and female flowers on different plants).

The most widely distributed member in North America is the black tupelo (*Nyssa sylvatica*), also known as black gum, sour gum, or pepperidge tree. It grows in woods and moist areas from Maine southward to the Gulf Coast and westward to Oklahoma. This tree typically grows to a height of 60 feet (18 m) and occasionally attains a height of 100 feet (30 m). It is sometimes grown as an ornamental and is prized for the brilliant scarlet autumnal foliage. A variety of the black tupelo called the swamp black tupelo (*N. sylvatica,* variety *biflora*) grows in swamps along the East coast and in the Deep South. The water tupelo (*N. aquatica*), also called cotton gum, or swamp gum, grows in swamps of the southeastern and Gulf coasts and in the Mississippi River valley northward to southern Illinois. It grows in pure stands or in association with bald cypress and other swamp trees. The water tupelo typically reaches heights of 80–100 feet (24–30 m), and its trunk is conspicuously enlarged at the base. The ogeechee lime (*N. ogeche*) is a rarer North American tupelo that produces edible fruits and a fine honey. All the North American tupelos produce small greenish white flowers and small bluish black or purple berries (fruits).

Tupelo wood, most of which comes from the water tupelo, is pale yellow to light brown, fine-textured, and strong. It is used for crates and boxes, flooring, wooden utensils, and veneers.

Tupí-Guaraní languages, one of the most widespread groups of South American Indian languages (after Arawakan). It is divided by some scholars into two major divisions: Tupí in eastern Brazil and Guaraní in Paraguay and Argentina. These languages were used by the first European traders and missionaries as contact languages in their dealings with the Indians. Guaraní became the national language of Paraguay, although not with official status; persons not speaking Guaraní are in a minority in that country. The language is also a literary language for works of a popular character, especially for songs. Some scholars classify Tupí-Guaraní with a number of other less important groups in a Tupian grouping.

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Tupian, South American Indians who speak languages of the Tupian linguistic group. Tupian-speaking peoples were widespread south of the Amazon. The similarity between dialects suggests that their scattering was fairly recent. Aboriginal Tupian speakers were found from the mouth of the Amazon to the Río de la Plata, both along the Atlantic coast and in the interior.

The Tupians were tropical rain forest farmers, rivermen, and coastal navigators. Using slash-and-burn cultivation, they grew cassava, sweet potatoes, corn (maize), beans, peanuts (groundnuts), cotton, and dyes. They collected turtles and turtle eggs and caught fish and river mammals with arrows and harpoons from large dugout canoes. They also used vegetable drugs for fishing. The hunting of wild game was secondary.

The basic unit of Tupian society was the extended family (including parents, married children, and their families), occupying a single large thatched house, but some Tupians had patrilineal clans. On the lower Amazon and the coast, palisaded multi-house villages of several thousand persons occurred. These villages warred incessantly, capturing, torturing, and eating their victims. Religion was largely shamanistic with little village ceremonialism. *See also* Guaraní; Sirionó; Tupinambá; Kawaíb.

Tupinambá, South American Indian peoples who spoke Tupian languages and inhabited the eastern coast of Brazil from Ceará in the north to Pôrto Alegre in the south. The various groups bore such names as Potiguara, Caeté, Tupinambá, Tupinikin, and Guaraní but are known collectively as Tupinambá.

The Tupinambá lived in unusually large patrilineal villages that numbered from 400 to 1,600 persons. They supplemented farming with ocean fishing. Cassava and corn (maize) were among their staple foods. Not much is known of their social organization.

Warfare among the Tupinambá groups was constant, and indeed their religious and social values centred upon warfare and, it was alleged, on cannibalism. Ordinary Tupinambá social relations, on the other hand, were marked by gentleness and cooperation. The Tupinambá believed in demons and also in a great many ghosts who haunted dark places and often caused harm. They had shamans who communicated with spirits and were able to cure sickness. *See also* Tupian.

Tupolev, officially ANTK IMENI A.N. TUPOLEVA, formerly OKB-156, Russian aerospace design bureau that is a major producer of civilian passenger airliners and military bombers. It also manufactures freight aircraft, unmanned aerial vehicles, and test aircraft for research and development projects. Headquarters are in Moscow.

The company originated in 1922 with the formation of a group within the Soviet Union's Central Aerohydrodynamics Institute to design and develop all-metal military air-

craft. Under the leadership of Andrey N. Tupolev (*q.v.*), it created the TB-1 (ANT-4), the world's first all-metal, twin-engine, cantilever-wing bomber (first flights 1925–26). In 1937, at the height of the U.S.S.R.'s great purges, Tupolev was arrested and put in charge of a design team, which, under confinement, planned and built the Tu-2 tactical bomber. In 1943, after he had gained his freedom, Tupolev reestablished the team as the design bureau OKB-156.

At the end of World War II, OKB-156 was given the task of replicating the Boeing B-29 bomber from U.S. planes that had been impounded during the war. The result was the Tu-4, the first truly strategic Soviet bomber. In the 1950s, the design bureau produced the swept-wing turboprop Tu-95 (NATO designation "Bear"), an intercontinental strategic heavy bomber that became one of the longest-lived aircraft in the Soviet strategic arsenal. It also created the first Soviet jet airliner, the twin-engine Tu-104 (first flown 1955), which was derived from its Tu-16 bomber. From the late 1950s through the early '80s, the design bureau introduced a new generation of supersonic jet bombers, which included the twin-engine Tu-22, the twin-engine, variable-wing Tu-22M (Tu-26; NATO, "Backfire"), and the four-engine, variable-wing Tu-160 ("Blackjack"). These were in addition to its development of civilian airliners such as the four-turboprop, 220-passenger Tu-114 and the 160-passenger Tu-154 trijet. During the 1960s OKB-156 also undertook development of a delta-wing supersonic transport, the Tu-144, a counterpart to the British-French Concorde.

In 1989, in posthumous recognition of Tupolev (died 1972), the organization took the name ANTK imeni A.N. Tupoleva (Aviation Scientific and Technical Complex named after A.N. Tupolev) as part of a restructuring that united the core design bureau with its production affiliates. In 1992, after the dissolution of the U.S.S.R., it became a joint stock company with the Russian government holding a limited financial interest.

In the 1990s the Tupolev firm struggled to survive in an extremely strained economy. Its few viable projects involved passenger airliners such as the Tu-204 (in service 1996) and the Tu-324, its first aircraft supported solely by financing from a commercial customer, the republic of Tatarstan.

Tupolev, Andrey Nikolayevich (b. Oct. 29 [Nov. 10, New Style], 1888, Pustomazovo, Russia—d. Dec. 23, 1972, Moscow), one of the Soviet Union's foremost aircraft designers, whose bureau (*see* Tupolev) produced a number of military bombers and civilian airliners—including the world's first supersonic passenger plane.



Tupolev, 1968
Tass—Sovfoto

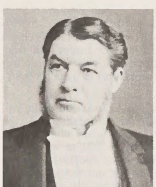
In 1909 Tupolev entered the Moscow Imperial Technical School, where he was a student and disciple of Nikolay Y. Zhukovsky, widely considered the father of Russian aviation. In 1918 they organized the Central Aerohydrodynamics Institute, of which Tupolev became assistant director in 1918. He became head of the institute's design bureau in 1922 and supervised the work of various designers—including Pavel O. Sukhoy, Vladimir M. Myasischev, and Vladimir M. Petlyakov—who later became notable in their own right. This bureau, in producing aircraft that were designated by Tupolev's initials, ANT, made all-metal construction a standard feature of Soviet aviation.

In 1937 Tupolev, in common with many Soviet designers at the time, was arrested on charges of activities against the state. After his imprisonment, he was placed in charge of a team that was to design military aircraft. From this came the Tu-2, a twin-engine bomber that saw wide use in World War II and, in 1943, earned Tupolev his freedom and a Stalin Prize. After the war he was given the job of copying the U.S. B-29 Superfortress, three of which had force-landed in the Soviet Far East. This project resulted in the Tu-4, which first flew in 1947 and was the U.S.S.R.'s principal strategic bomber until the mid-1950s.

After adapting jet propulsion to several piston-engine airframes, Tupolev in 1952 introduced the Tu-16, a medium-range bomber that featured swept wings and light alloy construction. A team under Aleksandr A. Arkhangelsky, Tupolev's longtime associate, designed the Tu-95, a huge turboprop bomber that first flew in 1954 and proved to be one of the most durable military aircraft ever built.

In 1963 Tupolev's son Alexey became chief designer of a team that produced the Tu-144 supersonic transport. The aircraft broke the sound barrier on a test flight in 1969 and reached twice the speed of sound a year later, but it was plagued by design problems and mismanagement and had only a short life as a passenger jet in 1977–78.

Tupper, Sir Charles, 1ST BARONET (b. July 2, 1821, Amherst, Nova Scotia [now in Canada]—d. Oct. 30, 1915, Bexleyheath, Kent, Eng.), premier of Nova Scotia from 1864 to 1867 and prime minister of Canada in 1896, who was responsible for the legislation that made Nova Scotia a province of Canada in 1867. As Canada's minister of railways and canals (1879–84), Tupper introduced the bill giving the Canadian Pacific Railway its charter in 1881.



Tupper, 1883
By courtesy of the Public Archives of Canada

In 1855 Tupper was elected to the Nova Scotia Legislative Assembly. He became provincial secretary (1856–60) and later premier. Tupper was interested in the union of the British North American provinces, and he worked to make Nova Scotia a province of Canada, a goal that he accomplished in 1867. Local opposition to Tupper's action was violent, but attempts to defeat him failed and he was elected to the new Canadian House of Commons (1867). He served in Sir John Macdonald's Conservative cabinet from 1870 until 1873 and served again after 1878. From 1884 until 1896 he held the post of high commissioner to London, except for an interval (1887–88) when he returned to Canada as minister of finance in Macdonald's cabinet. He became prime minister of Canada in 1896. After his party's defeat later in that year, Tupper became leader of the opposition. Earlier he had been knighted (1879) and created a baronet (1888). Reminiscences of Tupper's career are set forth in his *Recollections of Sixty Years* (1914).

Tura, Cosimo, Cosimo also spelled COSMÈ (b. *c.* 1430, Ferrara [Italy]—d. 1495, Ferrara), early Italian Renaissance painter who was the founder and the first significant figure of the 15th-century School of Ferrara.

Tura was court artist at the celebrated Renaissance court of the Este dukes at Ferrara and served successively dukes Borso and Ercole I. He was probably trained in Francesco Squarcione's workshop in Padua and was influenced by Andrea Mantegna and by Piero della Francesca, when the latter artist was working in Ferrara (*c.* 1449–50).



"Primavera" ("Allegorical Figure"); wood panel painting by Cosimo Tura, *c.* 1460; in the National Gallery, London
By courtesy of the trustees of the National Gallery, London; photograph, J.R. Freeman & Co. Ltd.

Tura was a master of allegory and a considerable decorative painter. The important part played by him in the complex and erudite cycle of frescoes in the Schifanoia Palace at Ferrara (1469–71) can still be seen. Other important works include his "Primavera" (*c.* 1460) in the National Gallery, London; the organ doors showing the "Annunciation" (1469) in Ferrara Cathedral; a "Pietà" (*c.* 1472) in the Correr Municipal Museum, Venice; and a "Lamentation" from the Roverella altarpiece (*c.* 1472).

Tura remained within the tradition of Squarcione throughout his life, but within that tradition he developed his own personal idiom. His work is characterized by a mannered, nervous, and wiry line and the use of carefully rendered detail and brilliant colour. His figures are usually draped in metallic, angular folds.

turaco, also spelled TOURACO, also called LOURIE, or PLANTAIN-EATER, any of about 18 species of African birds constituting the family Musophagidae, placed with the cuckoos (order Cuculiformes) or separated as a distinct order, Musophagiformes. Certain of the grayish species are called go-away birds, in imitation of their calls.

Turacos are remarkable for their coloration. Some species are predominantly gray, brown, and white, but the 10 species of the genus *Tauraco* and the 2 of *Musophaga* possess a unique and beautiful red pigment, turacin, and a green pigment, turacoverdin. The for-

mer occurs in the wing feathers of all 12 species and in the crests of a few; turacoverdin is found in the body plumage of these species and some of *Corythaixoides*.



Turaco (*Tauraco hartlaubi*)
Lilyan Simmons

Musophagids vary in size from approximately 35 cm (14 inches) in the predominantly green and blue species of *Tauraco* to about 70 cm (28 inches) in the great blue turaco (*Corythaeola cristata*). Long-tailed and short-winged, they spend their time entirely in trees in search of fruit, taking a few invertebrates; despite their alternative name, the birds do not eat plantains (bananas). They are social, moving in small, noisy flocks, but they nest solitarily. The nest consists of a flat platform of twigs. Two or three white eggs are laid, producing young with thick down that are able to clamber about at an early age aided by well-developed claws on their wings.

Turan Plain, Russian TURANSKAYA NIZMENNOST, extensive lowland in southwestern Kazakhstan and northwestern Uzbekistan and Turkmenistan. It is bounded by the Kazakh Upland in the north, the foot of the Tien Shan and Pamir-Alay mountains in the east, the Kopet-Dag Mountains in the south, and the Caspian Sea in the west. It consists mainly of sand and clay desert. There are a number of hills up to 3,300 feet (1,000 m), as well as several depressions below sea level. The lowland is traversed by the lower courses of the Sur Darya and Amu Darya.

turban, Arabic 'IMĀMAH, Persian DULBAND, a headdress, of obscure Oriental origin, consisting of a long scarf wound round the head or an inner hat.

Early Persians wore a conical cap sometimes encircled by bands of cloth, which perhaps may be considered one of the origins of the turban. The turban did not become common among the Turks, however, until after the capture of Constantinople in 1453, when the Ottoman sultan adopted the style of the Prophet Muḥammad by surrounding his cap with a large amount of white muslin wound round and round. Since then, the turban has been worn by men of the Muslim faith and of such offshoots of Islām as Sikhism, though after the early 19th century it was no longer obligatory for Muslims.

The turban varies in shape, colour, and size, some up to 50 yards (45 m) long, depending on one's position in society—the larger the turban, the higher the status. In wearing a turban, the forehead must be left bare so that the skin may touch the ground when one prays.

The turban was adopted for a time by Europeans in the 14th century, when men wrapped their hoods around their heads, turban fashion. At times from the late 18th century until the present, women have worn turbans fashioned of silk scarves, satin, silk moiré, gauze, or tulle over wire, crepe, and the like.



"A Man in a Turban," oil painting by Jan van Eyck, *c.* 1433; in the National Gallery, London
By courtesy of the National Gallery, London; photograph, A.C. Cooper Ltd.

turban shell, any marine snail of the family Turbinidae (subclass Prosobranchia of the class Gastropoda) that has a wide aperture in the first whorl of the stout shell, which is topped by a bulbous, turbanlike coil. The



Turban shell (*Turbo sarmaticus*)
J.M. Clayton from the Natural History Photographic Agency

shell may be beaded, knobbed, or ridged. The largest species of turban shell is the 20-centimetre (8-inch) green turban (*Turbo marmoratus*), native to the East Indies and Australia; its broad, round "cat's-eye" operculum (lid for closing the aperture) is used for making buttons.

Turbat, town, Balochistān province, Pakistan. The town is located on the left bank of the Kech River, which is a tributary to the Dasht River. The area in which Turbat is situated is drained to the south by the Dasht River; the Makrān Range to the north and east descends to coastal plains in the south. The town is a marketplace for dates grown in the surrounding region and has a date-processing factory. Jowar (sorghum), barley, wheat, and rice are also grown, and livestock are raised. Points of interest in Turbat include the former palace of the nawab (a provincial governor of the Mughal empire) of Makrān, the Jama Mosque, and a rest house. Roads link Turbat with Panjgūr and Kalāt to the northwest and with Pasni to the southeast. Pop. (1981) 52,337.

Turbay Ayala, Julio César, byname TURCO (b. June 18, 1916, Bogotá, Colom.), president of Colombia from 1978 to 1982, a centrist liberal who proved unable to end his country's continuing social unrest.

Born into a middle-class family descended from Lebanese immigrants, Turbay Ayala was educated at the National Commercial School (Bogotá) and University College of Botero. He served in the House of Representatives from 1943 to 1953 and became a leader of the Liberal Party. He was appointed minister of mines and energy in 1957 and became minister of foreign affairs in 1958 under President Alberto Lleras Camargo.

Turbay was elected to two successive terms in the Senate (1962–69), serving concurrently as UN ambassador (1967–69). In the latter role he was responsible for negotiating Colombia's resumption of diplomatic relations with the Soviet Union after a 20-year break. Between 1970 and 1976 he served as ambassador to Great Britain (1973–75), chairman of the Liberal Party, and ambassador to the United States (1975–76).

After a stormy campaign, Turbay won the 1978 presidential election, narrowly defeating the Conservative candidate, Belisario Betancur Cuartas. He took office in the midst of the continuing labour and student unrest and guerrilla violence that had plagued his predecessor, and he found it necessary to decree a "security statute" that curtailed personal freedoms, restricted news coverage, and permitted civilians who had been accused of terrorism to be tried in military courts. In response, the four main guerrilla armies stepped up their kidnappings and attacks on banks and military bases in 1981. Turbay broke relations with Cuba, claiming that it aided the guerrillas, who in turn spurned his offers of a limited amnesty. Turbay was unable by law to run for reelection in 1982 and was succeeded by Betancur Cuartas.

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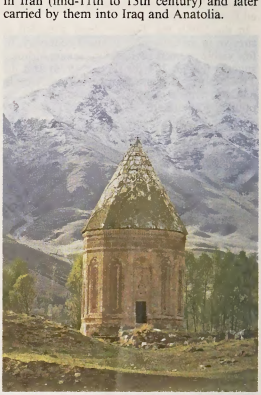
türbe (Turkish: "tomb-tower"), Persian GONBAD, form of mausoleum architecture developed by and popular among the Seljuq Turks in Iran (mid-11th to 13th century) and later carried by them into Iraq and Anatolia.



Anatolian *türbe* near Lake Van, Tur., 1322
Roland Michaud—Rapho/Photo Researchers

The tower form of the tomb may have been based on the cylindrical and conical forms of Seljuq tents. The earliest towers, varying in height up to 200 feet (60 m), were traditionally built on a circular ground plan, but square and polygonal configurations had become popular by the 12th century.

The oldest surviving *türbe* is the Gonbad-e Qābūs, in the Gorgān region of northeastern

Iran, which was built in 1006–07 for the emir Shams al-Maʿālī Qābūs (d. 1012). The tower rises to a height of 200 feet (60 m). Its conical roof created a type, but its 10-pointed, star-shaped ground plan remained unique. An example of the more common, round form is the *türbe* at Radkan, in Rayy, dated roughly to the 13th century. It is ornate, as Persian monuments tended to be, featuring the deeply incised, regular, concave grooves known as fluting.

In Anatolia, *türbe* architecture was simpler but no less monumental than that of Iran. A number have survived there, the earliest dated from the 12th century. Round and polygonal forms occur with equal frequency. The interior typically has a vaulted dome; the exterior, a cone. These forms were used continually from their introduction in the 12th century through the early Ottoman period (14th century). Although under the Ottomans the domed mausoleum became more popular than the funerary tower, *türbe*s were still being built in the 17th century.

Turberville, George, Turberville also spelled TURBERVILE (b. 1540?, Winterbourne Whitchurch, Dorset, Eng.—d. before 1597), first Elizabeth poet to publish a book of verses to his lady, a genre that became popular in the Elizabethan age.

After attending the University of Oxford, Turberville went to Russia (1568–69) as secretary to Thomas Randolph, the first English ambassador there, and later settled at Shapwick, Dorset. In *Epitaphes, Epigrams, Songs and Sonets*... (1567), Turberville followed models in Tottel's *Miscellany* and the *Greek Anthology,* addressing poems to his lady, the Countess of Warwick. He was also notable for his translations of Ovid and Mantuanus (1567), which included some of the first attempts at blank verse in English.

turbidimetry (chemistry): *see* nephelometry and turbidimetry.

turbinal, also called TURBINATE, or TURBINATED BONE: *see* nasal concha.

turbine, any of various devices that convert the energy in a stream of fluid into mechanical energy by passing the stream through a system of fixed and moving fanlike blades and causing the latter to rotate.

A brief treatment of turbines follows. For full treatment, *see* MACROPAEDIA: Energy Conversion.

There are four broad classes of turbines: water (hydraulic), steam, wind, and gas. The most important application of the first three is the generation of electricity, while gas turbines are most frequently employed in aircraft to provide the motive power for jet propulsion.

The principles of turbine operation were applied in ancient times. The waterwheel, the ancestor of the water turbine, was used for grinding grain by the Romans about 70 BC. Early devices of this sort were simple paddle wheels immersed in streams where the flow of water was available to turn the wheels. A precursor of the steam-driven turbine was supposedly constructed by Hero of Alexandria about the 1st century AD. This device operated on the principle of reaction; rotation was achieved by steam issuing from curved tubes in a manner similar to that of water issuing from a rotating lawn sprinkler. The windmill, from which the modern wind turbine developed, was already in use by the mid-7th century AD in Persia. Windmills with vertical sails on horizontal shafts appear to have reached Europe through contact with the Arabs several hundred years later.

Water turbines. There are two major classes of water turbines, impulse and reaction. Hydraulic conditions at dams and waterfalls determine in large part the type of turbine that will be most effective. Impulse turbines are generally employed for high heads of water and low flow rates, whereas reaction turbines are primarily used for heads ranging down from about 450 m (1,500 feet) and moderate or high flow rates.

Impulse turbines extract energy from water by first converting the head of water into kinetic energy. This is accomplished by passing the water through a specially shaped nozzle that discharges a jet into the air. This jet is directed onto buckets that are fixed on the rim of the runner (rotor) and formed in such a way as to remove the maximum velocity from the water. The most widely used kind of impulse turbine is the Pelton turbine, or Pelton wheel, in which each bucket is divided in the centre by a double-curved wall so that the jet of water is split upon hitting the bucket and diverted to either side, transmitting a maximum amount of energy to the turbine.

The reaction turbine achieves rotation chiefly through the reactive force produced by the acceleration of water in the runner rather than in the supply nozzles, as in the case of impulse turbines. The precise way in which this acceleration occurs differs in the three major kinds of reaction turbines—the Francis, the Kaplan, and the Deriaz. In all of them, however, a fraction of the hydraulic pressure is first converted into velocity in the passage of the water through the inlet structure, which consists of a spiral casing and a gate device that leads to the runner. The energy from the water is transformed into mechanical energy in a single-stage runner (*i.e.,* rotor with only one wheel of buckets or blades) that absorbs the full energy of the water.

Steam turbines. This type of machine transforms thermal energy stored in steam into work. It has supplanted all other prime movers in applications involving the generation of large amounts of electric power. The steam required to drive turbines of this kind is produced chiefly by nuclear reactors and boilers that burn coal or oil.

A steam turbine typically consists of a shaft (rotor) resting in bearings and enclosed in a cylindrically shaped casing. Jets of steam issuing from nozzles located on the periphery of the turbine cylinder and impinging on the blades or buckets attached to the shaft cause the shaft to turn. In effect, a steam turbine generates motive power in a manner akin to a windmill, except that it utilizes high-pressure steam rather than a current of air as its working medium.

Steam turbines may be classified as condensing or noncondensing, depending on whether or not the steam is exhausted to a condenser. In the first type, exhaust steam is condensed by circulating large amounts of cold water through the tubes of the condenser. This water absorbs the heat given up during condensation and carries it away. The process of continuous condensation maintains a low pressure in the condenser, thus increasing the expansion ratio of the steam (*i.e.,* the ratio of the expanded volume of steam to its original volume) and the consequent efficiency and work output of the turbine. Because of the need to maintain the highest possible efficiency, all central-station power plants employ condensing turbines, which are connected directly to large electric generators.

In noncondensing turbines, steam, after expanding through the turbine, is exhausted to the atmosphere, a heating system, or some other kind of equipment. Machines of this type are most widely used in industrial plants where steam is needed at low or intermediate pressures and where by-product power can be generated economically by installing a noncondensing turbine between the steam generator and the equipment requiring steam.

Wind turbines. These devices convert the tremendous energy in wind to electric power. Wind turbines are generally classified into two basic types: vertical-axis machines and horizontal-axis machines.

Vertical-axis units are perhaps best exemplified by the Darrieus turbine, which features two blades consisting of twisted aluminum strips tied to the shaft at the top and bottom and bowed out in the middle, much like the blades of a food mixer. Horizontal-axis wind turbines have a rotor with metal blades that are twisted like the propeller of an airplane. The blades are located about their support axis by an automatic governor to maintain proper generator speed. Clusters of hundreds of wind turbines of this kind, known as wind farms, have been constructed in areas of high, nearly continuous winds, as, for example, the Tehachapi Mountains, near Barstow, Calif., and certain locations in Hawaii and New Hampshire. The millions of kilowatt-hours of electricity generated by these wind farms are fed into the electric-utilities network.

Gas turbines. The term gas turbine properly refers only to a turbine that utilizes gas as the working fluid, but it is commonly used to describe a complete internal-combustion engine consisting of a compressor, combustion chamber, and turbine. Such a heat engine can drive an electric generator, pump, or propeller; in the case of pure jet aircraft, it can develop thrust by accelerating the turbine exhaust flow through a nozzle (*see also* jet engine).

turbo train, high-speed passenger train powered by a gas-turbine engine similar to that used in jet aircraft. Unlike conventional trains, the turbo variety does not have a separate locomotive; its turbine power unit is small enough to be built into a passenger car. A typical turbo train consists of several passenger cars with power units located in each of the end cars. The cars are constructed of aluminum, and this, with various other design features aimed at reducing weight, minimizes the power required for high-speed locomotion. A pendulous banking suspension system enables the turbo train to travel around corners safely and smoothly at speeds 30 to 40 percent faster than other types of trains. With such a suspension system, a car is suspended above its centre of gravity so as to swing freely from a special frame, which causes the train to bank inward rather than outward around curves under centrifugal force.

The turbo train was developed during the early 1960s by engineers at the United Aircraft Corporation (now United Technologies Corporation) and was first produced by a unit of the Sikorsky Aircraft Division. These American-built turbo trains operated in the 1970s between Boston and New York City and also provided rail service between Montreal and Toronto during this period but were then abandoned. French-designed models were still operating in New York state in the mid-1980s.

The success of the Japanese Shinkansen high-speed electric trains and the sharp rise of fuel prices in the 1970s caused a serious decline in the use of turbo trains, although the suspension system developed for turbo trains continued in use.

turbojet, jet engine in which a turbine-driven compressor draws in and compresses air, forcing it into a combustion chamber into which fuel is injected. Ignition causes the gases to expand and to rush first through the turbine and then through a nozzle at the rear. Forward thrust is generated as a reaction to the rearward momentum of the exhaust gases.

The first turbojet-powered aircraft, a Heinkel He 178, was flown in Germany in 1939. A turbojet had been devised some years earlier in England by Sir Frank Whittle, but the first flight using his engine did not take place until 1941.

During the 1960s the turbofan, or fanjet, a modification of the turbojet, came into common use. Some of the incoming air is by-

passed around the combustion chamber and is accelerated to the rear by a turbine-operated fan. The turbofan moves a much greater mass of air than the simple turbojet, providing advantages in power and economy. *Compare* ramjet.

turboprop, also called P JET, hybrid engine that provides jet thrust and also drives a propeller. It is basically similar to a turbojet except that an added turbine, rearward of the combustion chamber, works through a shaft and speed-reducing gears to turn a propeller at the front of the engine.

The first experimental turboprop aircraft, a modified Gloster Meteor fighter equipped with two Rolls-Royce Trent units, flew in 1945 in England. The first turboprop commercial airliner to enter scheduled service was the Vickers Type 701 Viscount, April 18, 1953.

As a consequence of improvements in turbojet design, the turboprop—less efficient at high speeds—lost much of its importance in the 1960s, although it was retained for relatively short range aircraft.

turbot (*Scophthalmus maximus*), broad-bodied European flatfish of the family Scophthalmidae or, in some classifications, Bothidae. A highly valued food fish, the turbot lives along sand and gravel shores. It is a left-sided flatfish, with its eyes normally on the left side of the head, and it is scaleless, though its head and body are studded with numerous bony knobs, or tubercles. It reaches a maximum length of 1 metre (40 inches) and weight of about 25 kilograms (55 pounds). Colour varies with the surroundings but is usually gray brown or light brown with darker markings.

Several other flatfish are also called turbot. Among them are the Black Sea turbot (*S. maeoticus*), a relative of the European species, and certain right-sided, Pacific Ocean flatfish of the genus *Pleuronichthys* and the family Pleuronectidae.

turbulence (meteorology): *see* atmospheric turbulence; clear-air turbulence.

turbulent flow, type of fluid (gas or liquid) flow in which the fluid undergoes irregular fluctuations, or mixing, in contrast to laminar flow, in which the fluid moves in smooth paths or layers. In turbulent flow the speed of the fluid at a point is continuously undergoing changes in both magnitude and direction. The flow of wind and rivers is generally turbulent in this sense, even if the currents are gentle. The air or water swirls and eddies while its overall bulk moves along a specific direction.

Most kinds of fluid flow are turbulent, except for laminar flow at the leading edge of solids moving relative to fluids or extremely close to solid surfaces, such as the inside wall of a pipe, or in cases of fluids of high viscosity (relatively great sluggishness) flowing slowly through small channels. Common examples of turbulent flow are blood flow in arteries, oil transport in pipelines, lava flow, atmosphere and ocean currents, the flow through pumps and turbines, and the flow in boat wakes and around aircraft-wing tips.

Turcoman (people): *see* Turkmen.

Turda, city, Cluj *judeţ* (district), west central Romania, on the Arieş River. Turda was first a Dacian settlement (Dierna) and later a Roman castrum (Potaissa), around which grew a *municipium* and later a colony. On the outskirts of the city are the salt mines worked in Roman times. In the Middle Ages, Turda was the meeting place of the Transylvanian Diet. The city is now an important industrial centre, with a cement mill, a glass and ceramics factory, a chemical works, and other plants producing silicon furnace linings and material



Turda Pass, one of the gorges in the tourist district near Turda, Romania
Editura Encyclopedica Romana

for insulating electrical products. It is also the centre for a tourist district, which includes the Turda Gorges (Cheile Turzii), an impressive feature of karst geology that is a national monument, and the Arieş Valley, which provides access to the Apuseni Mountains. Pop. (1982 est.) 58,744.

Turdidae, songbird family, order Passeriformes, consisting of the thrushes, bluebirds, robins, and other birds—about 305 species of the most renowned songbirds in the world, absent only from the polar regions and certain islands.

Members range in size from 11.5 to 33 centimetres (4.5 to 13 inches) long. They have slender bills and stout legs and feet, the lower leg smooth rather than scaly. Included here are such delightful songsters as the nightingale (*Luscinia megarhychos*), American robin (*Turdus migratorius*), and wood thrush (*Hylocichla mustelina*); as well as the bluebirds (*Sialia*) of poetry and the European blackbird (*T. merula*). Kittlitz's, or Bonin, thrush (*Zoothera terrestris*), last seen in 1828 on Peel Island, the Bonins (southeast of Japan) and the Raiatea thrush (*T. ulietensis*), not seen since 1774 on Raiatea, Society Islands (near Tahiti), are both extinct.

The Turdidae belongs to the songbird suborder (Passeres).

tureen, covered container, sometimes made to rest on a stand or dish, from which liquids, generally soup or sauce, are served at table. The earliest silver and pottery examples, dating from the early 18th century, were called terrines or terrenes (from Latin *terra,* "earth"), which suggests a pottery origin for the form. Most tureens are crafted in a bowl-like shape that has been influenced by the decorative conventions of their time, but novel pottery

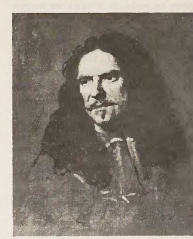


Faience tureen from Samadet, Fr., c. 1760; in the Campbell Museum, Camden, N.J.
By courtesy of the Campbell Museum, Camden, N.J.

types, in the form of realistically modelled animals and vegetables, have also been popular.

Turenne, Henri de La Tour d'Auvergne, vicomte de (viscount of) (b. Sept. 11, 1611, Sedan, Fr.—d. July 27, 1675, Sasbach, Baden-Baden), French military leader, marshal of France (from 1643), one of the greatest military commanders during the reign of Louis XIV. Beginning his military career in the Thirty Years' War (from 1625), he subsequently commanded the royal armies in the civil war of the Fronde (1648–53), in the French invasion of the Spanish Netherlands (1667), and in the third Dutch War (begun in 1672). Napoleon later deemed him history's greatest military leader.

Background and early military successes. Henri was a son of the Protestant Henri, duc de Bouillon, by his second wife, Elizabeth of Nassau, daughter of William the Silent, the stadholder of the Netherlands. When his father died in 1623, Turenne was sent to learn soldiering with his mother's brothers, Maurice and Frederick Henry, the princes of Orange who were leading the Dutch against the Spaniards in the Netherlands. Though he was given command of an infantry regiment in



Turenne, detail of a portrait by Charles Le Brun; in the Musée National de Versailles et des Trianons
Cliche des Musees Nationaux, Paris

the French service for the campaign of 1630, he was back with Frederick Henry in 1632.

In 1635, however, when Louis XIII's minister Cardinal de Richelieu brought France into open war against the Habsburgs (later called the Thirty Years' War), Turenne, with the rank of *maréchal de camp,* or brigadier, went to serve under Cardinal de La Valette (Louis de Nogaret) on the Rhine. He was a hero of a retreat from Mainz to Metz and was wounded in the assault on Saverne in July 1636. After a mission to Liège to hire troops for the French, he was sent to the Rhine again in 1638 to reinforce Bernhard of Saxe-Weimar at the siege of Breisach; he conducted the assault and won the respect of Bernhard's German troops. Two campaigns fought in Italy, culminating in the capture of Turin on Sept. 17, 1640, confirmed his reputation.

In 1642, when the French army was besieging Spanish-held Perpignan, Turenne was second in command. The conspiracy of the King's favourite, the Marquis de Cinq-Mars, against Richelieu was then brought to light, and the Duc de Bouillon was arrested. Turenne remained loyal to Louis XIII and to Richelieu; but Bouillon had to surrender Sedan in order to obtain his freedom. When Louis XIII died in 1643, the queen, Anne of Austria, became regent for her infant son Louis XIV. She gave Turenne a command in Italy in the same year, but his brother's conduct made him suspect to Richelieu's successor, Cardinal Mazarin, and no fresh troops were sent to him. Anne made Turenne a marshal of France, however, on May 16, 1643.

Command of the French forces in Germany. On Dec. 3, 1643, news reached Paris that France's Army of Germany had been scattered in the Black Forest, and its commander was dead. The command was given to Turenne, who made an effective army from this broken force—mainly Germans who had followed Bernhard of Saxe-Weimar. But he had barely 10,000 men and remained weaker than his Bavarian opponents, a fact that dictated his conduct from 1644 to 1648. The Rhineland was devastated, and Turenne could act only by marching far into Germany to seize control of new forage lands. Unless he could join forces with another army, therefore, he could do nothing.

In 1644 Turenne watched the Bavarians take Freiburg im Breisgau, appealed for help, and was joined by the small army of the Duke d'Enghien, Louis II de Bourbon, prince de Condé. The latter was younger by 10 years than Turenne but took command of both armies because a French prince was senior to a French marshal; even so, they were good colleagues. Three fierce actions near Freiburg induced the Bavarians to leave the Rhine River valley; and Enghien and Turenne took Philippsburg in September and gained control of the Rhine towns as far north as Bingen.

In 1645 Turenne, intending to effect a junction with France's Swedish allies in Germany, marched through Württemberg. But in May the Bavarians made a surprise attack, and half of Turenne's army was lost in the Battle of Marienthal (Mergentheim). Turenne fell back, and Mazarin sent Enghien to rescue him. Their united forces met the Bavarians in the Battle of Nördlingen and reached the Danube River but with such heavy losses in infantry that they soon had to return to the Rhine.

In 1646 Turenne achieved his plan of joining the much stronger Swedish army, though Mazarin feared the Protestant supremacy in Germany that might be the result. Turenne crossed the Rhine at Wesel and met the Swedes under Field Marshal Carl Gustav Wrangel. The two commanders evaded the Austro-Bavarians on the Main River, marched straight for the Danube, and threatened Augsburg and Munich. The elector Maximilian I of Bavaria then began negotiations with the French and, by the Treaty of Ulm (March 14, 1647), abandoned his alliance with the Holy Roman emperor Ferdinand III. But Turenne was thwarted, and Ferdinand's Austrians were saved, when Mazarin ordered the Army of Germany to operate in Luxembourg. Then, when the army reached the Vosges, the German cavalry mutinied and turned back across the Rhine. For three months Turenne marched with them far into Germany. In the end his powerful personality brought most of them back to the French service.

When Bavaria returned to the emperor's side in 1648, Turenne rejoined Wrangel, and they reached the Danube, the Lech, and—after the Battle of Zusmarshausen—the Inn River, the nearest point to Austria yet attained by the French. Maximilian fled from Bavaria, and the emperor agreed to the Peace of Westphalia, ending the Thirty Years' War.

Participation in the Fronde. The same year marked the beginning of the so-called Fronde, an aristocratic rebellion against Mazarin. Turenne's family's interests and the friendship of Condé's sister, the Duchess de Longueville, led him to intervene on the side of the rebellion in the first war of the Fronde, precipitated by the unpopularity of Mazarin's fiscal measures. The cardinal at once sent a new general and arrears of pay to the Army of Germany, and Turenne fled to Holland just when the compromise peace was being negotiated at Rueil. He returned to Paris in May 1649.

When Mazarin arrested the overbearing Condé on Jan. 18, 1650, Turenne again fled, joining the Duchess de Longueville at Stenay on the eastern border of Champagne. They tied themselves by treaty to the Spaniards, then at war with France, and waged war in Champagne until Turenne was completely defeated in the Battle of Rethel (Dec. 15, 1650) by superior forces under Marshal du Plessis-Praslin (César, later Duke de Choiseul) and narrowly escaped capture.

Mazarin's voluntary exile from Paris and Condé's release brought Turenne back to Paris in May 1651, with his credit at a low point. In August 1651 he married the firmly Protestant Charlotte de Caumont. He stood aloof from politics without committing himself to Condé's faction. It was his brother, the Duke de Bouillon, who came to terms with the queen regent in March 1652, with the result that Turenne was promptly put in command of one of the two divisions of the royal army, each 4,000 strong, which had been assembled on the Loire River to oppose Condé and his allies.

A few days later his courageous and clear-sighted action in blocking the bridge at Jargeau saved the young king Louis XIV from capture by the rebels; and in April, at Bléneau, he checked Condé and rescued his defeated colleague, Marshal d'Hocquincourt (Charles de Monchy). His campaign of 1652–53, first on the Loire, then before Paris, and in Champagne, was Turenne's greatest service to the monarchy: his resources were small, and but for his great skill he might have been overwhelmed; yet he staunchly kept the queen regent's court from taking refuge far from Paris and thus enabled Louis XIV at last to reenter his capital.

The Franco-Spanish War. With the defeat of the rebellion, good troops from other parts of France could be brought to reinforce those in the northeast and to prosecute the struggle there against the Spaniards, with whom Condé was now serving. The turning point came in 1654, when Turenne and his colleagues stormed three lines of trenches and expelled the army that was besieging Arras. In 1658 Turenne surmounted the physical obstacles to investing Dunkirk and, when the Spaniards advanced, defeated them in the Battle of the Dunes (June 14), skilfully using the difficult ground into which his enemy had unwisely moved. His victory enabled him to hand Dunkirk over to France's English allies and allowed him to move freely in Flanders, taking Ypres and threatening Ghent and Brussels. The Franco-Spanish Peace of the Pyrenees followed in 1659. For the second time Turenne's operations had won an advantageous peace.

Last campaigns. On April 5, 1660, Turenne was appointed "marshal-general of the camps and armies of the King," an extraordinary honour that implied that he might have been constable (ex officio commander in chief in war) of France if he abjured his Protestant faith. When he abjured in 1668, after his wife's death (1666), however, he was not made constable. The development of the Ministry of War by the Marquis de Louvois enabled Louis XIV to command in person, and in the War of Devolution (1667–68) and in the invasion of Holland (1672) Turenne marched at his side. Then, when the German allies of the Dutch menaced the lower Rhineland, Turenne was once more sent east of the Rhine, but with only 16,000 men, a secondary command.

Yet these campaigns of 1672–75 brought him enduring fame. Turenne had long been a master of "strategic chess moves," but he was bolder now; he offered battle more often and looked for opportunities when his more powerful adversaries were weakened by detachments. By January 1673 he had broken the German coalition for a time and by invading the county of Mark had forced the elector Frederick William of Brandenburg to negotiate; he had also prevented the enemy from crossing the Rhine. Later in the year his wider maneuvering against the emperor Leopold I's army had such success that he could have reached Bohemia; but Louvois refused him reinforcement for a decisive operation, and when Turenne was called back to cover Alsace, the emperor's forces struck at Bonn and so broke the French control of the lower Rhine.

Greatly superior German forces moved toward the Rhine in 1674. Turenne defeated a detached corps at Sinzheim, near Heidelberg, on June 16 and ravaged the Palatinate. But by September he was again west of the Rhine, with little hope of barring the advance of the main enemy forces. At Enzheim, near Strassburg, he attacked them on October 4, but he drew back before a decisive point was reached; and as the Brandenburgers also joined the emperor's forces, their 57,000 men seemed in secure possession of Alsace. Turenne replied in December with the most famous of his marches. He turned south on the French side of the Vosges, reappeared at Belfort, and, at Turckheim on Jan. 5, 1675, delivered so heavy a blow on the flank of the main army that the Germans decided to recross the Rhine. Alsace was saved.

In June 1675 Turenne was on the east bank of the Rhine maneuvering against the Italian field marshal in imperial service, Raimondo Montecuccoli, for the control of the crossing near Strassburg. The armies were in contact at Sasbach, and Turenne was examining a position when he was killed by a cannon shot on July 27, 1675. He was buried with the kings of France at Saint-Denis. Later the emperor Napoleon had his remains transferred to the Invalides in Paris. (I.D'O.E.)

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turf, in horticulture, the surface layer of soil with its matted, dense vegetation, usually grasses grown for ornamental or recreational use. Such turf grasses include Kentucky bluegrass, creeping bent grass, fine or red fescue, and perennial ryegrass among the popular cool-season types and Bermuda grass, zoysia grass, and St. Augustine grass among the warm-season types.

Turf grasses are often grown on turf, or sod, farms. Portions of the sod—as plugs, blocks, squares, or strips of turf grass—are cut and transplanted to areas where they quickly establish and grow. Lawns are fine-textured turfs that are mowed regularly and closely to develop into dense, uniformly green coverings that beautify open spaces and provide sports playing surfaces, as in tennis lawns, golf and bowling greens, and racing turfs. *See also* bent grass; Bermuda grass; bluegrass; carpet grass; fescue; ryegrass; Zoysia.

Turfan, Chinese (Wade-Giles) T'U-LU-P'AN, (Pinyin) TURPAN, city in the Uygur autonomous *ch'ü* (region) of Sinkiang, China. It lies about 95 miles (150 km) southeast of the city of Urumchi (Wu-lu-mu-ch'i) in a mountain basin between the Po-ko-ta Mountains (an eastern extension of the T'ien Shan) and the K'u-lu-k'o-t'a-ko range, on the northern side of the Turfan Depression. It has long been the centre of a fertile oasis and an important trade centre on the main northern branch of the Silk Road from Ha-mi to Kashgar (K'o-shih), with an alternative northern route, via Urumchi, running into the Dzungarian Basin, the I-li River valley, and Central Asia.

Traditionally, Turfan was on the border between the nomadic peoples of the north and the settled oasis dwellers of Sinkiang. Under the Han dynasty (206 BC–AD 220) the Chinese knew it as the Chü-shih kingdom. In 450 it became the new state of Kao-ch'ang. In 640 western expeditions sent by the T'ang dynasty (618–907) destroyed Kao-ch'ang. Eventually taken in the 13th century by the Mongols, Turfan enjoyed a new commercial prosperity

as the Central Asian land routes flourished as never before. When Mongol rule collapsed, the Turfan Depression was divided into three independent states, and in the early 15th century Turfan itself became the most important of these. During the 18th-century wars between the Ch'ing dynasty (1644–1911) and the Dzungars, Turfan was a key point. In 1759 a Chinese protectorate was established over Turfan. The area had long been predominantly Muslim, and a second Chinese city was built next to the old Muslim one. In 1912 Turfan was given county status.

The city's economy is based on agriculture and fruit farming in the Turfan Depression; principal products are cotton, mulberry trees, apricots, melons, and grapes. A rail line links Turfan with the main line to Urumchi to the northwest and with K'u-erh-le in the Tarim Basin to the southwest. Pop. (mid-1980s est.) 10,000–50,000.

Turfan Depression, Wade-Giles romanization T'U-LU-F'AN P'EN-TI, Pinyin TURPAN PENDI, deep mountain basin in the Uygur autonomous *ch'ü* (region) of Sinkiang, China. The Turfan Depression is a fault trough, descending at its lowest point to 505 feet (154 m) below sea level (the lowest elevation in China) at Lake Ai-ting, whereas the neighbouring Tarim River and Lop Nor (Lop Lake) areas are between 2,000 and 3,000 feet (600 and 900 m) above sea level. The basin has an area of 20,000 square miles (50,000 square km).

The basin lies between the Po-ko-ta Mountains to the north and the northern section of the K'u-lu-k'o-t'a-ko range to the south. Within this depression another major fault forms the Chüeh-lo-t'a-ko Mountains, which divide the basin into two sections. The northern section forms a zone at the foot of the Po-ko-ta range. This area, about 500 feet (150 m) above sea level, drains into the lower southern depression through steep canyonlike gorges. The lower basin, once the site of a lake, slopes toward the south where there is a salt swamp called Ai-ting Lake.

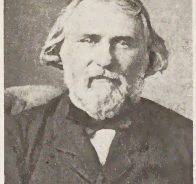
The whole basin is irrigable, either (in the north) using surface water or (in the south) by the Persian technique of using tunnels that tap groundwater from higher areas. The area has great climatic extremes: the average monthly temperature is 14° F (−10° C) in January and 90° F (32° C) in July. Daily variations from these averages, however, can be enormous. The highest temperature recorded in China, 118° F (48° C), was at Turfan in the northern part of the basin, while the lowest recorded temperature, −62° F (−52° C), was at Fu-yun, not far from Turfan. Rainfall in the depression is scanty, with only 0.6–1.2 inches (16–30 mm) per year. The extreme temperatures and windblown sands are major problems for the basin's inhabitants.

The basin is intensively farmed and is well known for its fruit, particularly Hami melons and grapes. Watermelons, apples, peaches, apricots, and nuts are also produced. The area also grows cotton and silk in addition to grain crops, especially wheat. The inhabitants are almost entirely Uighur Muslims.

The higher northern part of the depression forms long-established natural routes leading from the trade route known as the Kansu, or Hosi, Corridor to the southeast. The main centres of population in the depression are the cities of Turfan to the north and T'o-k'o-sun (Toksun) at the western end.

Turgay Valley, also spelled TURGAI, or TURGAJ, Russian TURGAYSKAYA DOLINA, also spelled TURGAJSKAJA DOLINA, depression in western Kazakhstan. Some 12–125 miles (20–200 km) wide, it runs roughly north-south for about 375 miles (600 km) through the middle of the Turgay Plateau. It was formed by a caving-in of the ancient foundation, and in the Ice Age, water flowed along it from the West Siberian Plain to the Turan Plain. Today it contains a chain of fresh and saline lakes, with the Ubagan River flowing north and the Turgay south. The valley is a major spring and autumn migration route for birds.

Turgenev, Ivan Sergeyevich (b. Oct. 28 [Nov. 9, New Style], 1818, Oryol, Russia—d. Aug. 22 [Sept. 3], 1883, Bougival, near Paris, France), Russian novelist, poet, and playwright, whose major works include the short-story collection *A Sportsman's Sketches* (1852) and the novels *Rudin* (1856), *Home of the Gentry* (1859), *On the Eve* (1860), and *Fathers and Sons* (1862). These works offer realistic, affectionate portrayals of the Russian peasantry and penetrating studies of the Russian intelligentsia who were attempting to move the country into a new age. Turgenev poured into his writings not only a deep concern for the future of his native land but also an integrity of craft that has ensured his place in Russian literature. The many years that he spent in western Europe were due in part to his personal and artistic stand as a liberal between the reactionary tsarist rule and the spirit of revolutionary radicalism that held sway in contemporary artistic and intellectual circles in Russia.



Ivan Turgenev
From the collection of David Magarshack

Early life and works. Turgenev was the second son of a retired cavalry officer, Sergey Turgenev, and a wealthy mother, Varvara Petrovna, née Lutovinova, who owned the extensive estate of Spasskoye-Lutovinovo. The dominant figure of his mother throughout his boyhood and early manhood probably provided the example for the dominance exercised by the heroines in his major fiction. The Spasskoye estate itself came to have a twofold meaning for the young Turgenev, as an island of gentry civilization in rural Russia and as a symbol of the injustice he saw inherent in the servile state of the peasantry. Against the Russian social system Turgenev was to take an oath of perpetual animosity, which was to be the source of his liberalism and the inspiration for his vision of the intelligentsia as people dedicated to their country's social and political betterment.

Turgenev was to be the only Russian writer with avowedly European outlook and sympathies. Though he was given an education of sorts at home, in Moscow schools, and at the universities of both Moscow and St. Petersburg, Turgenev tended to regard his education as having taken place chiefly during his plunge "into the German sea" when he spent the years 1838 to 1841 at the University of Berlin. He returned home as a confirmed believer in the superiority of the West and of the need for Russia to follow a course of Westernization.

Though Turgenev had composed derivative verse and a poetic drama, *Steno* (1834), in the style of the English poet Lord Byron, the first of his works to attract attention was a long poem, *Parasha,* published in 1843. The potential of the author was quickly appreciated by the critic Vissarion Belinsky, who became Turgenev's close friend and mentor. Belinsky's conviction that literature's primary aim was to reflect the truth of life and to adopt a critical attitude toward its injustices became an article of faith for Turgenev. Despite the influence of Belinsky, he remained a writer of remarkable detachment, possessed of a cool and sometimes ironic objectivity.

Turgenev was not a man of grand passions, although the love story was to provide the most common formula for his fiction, and a love for the renowned singer Pauline Viardot, whom he first met in 1843, was to dominate his entire life. His relation with Viardot usually has been considered platonic, yet some of his letters, often as brilliant in their observation and as felicitous in their manner as anything he wrote, suggest the existence of a greater intimacy. Generally, though, they reveal him as the fond and devoted admirer, in which role he was for the most part content. He never married, though in 1842 he had had an illegitimate daughter by a peasant woman at Spasskoye; he later entrusted the upbringing of the child to Viardot.

During the 1840s, Turgenev wrote more long poems, including *A Conversation, Andrey,* and *The Landowner,* and some criticism. Having failed to obtain a professorship at the University of St. Petersburg and having abandoned work in the government service, he began to publish short works in prose. These were studies in the "intellectual-without-a-will" so typical of his generation. The most famous was "The Diary of a Superfluous Man" (1850), which supplied the epithet "superfluous man" for so many similar weak-willed intellectual protagonists in Turgenev's work as well as in Russian literature generally.

Simultaneously, he tried his hand at writing plays, some, like *A Poor Gentleman* (1848), rather obviously imitative of the Russian master Nikolay Gogol. Of these, *The Bachelor* (1849) was the only one staged at this time, the others falling afoul of the official censors. Others of a more intimately penetrating character, such as *One May Spin a Thread Too Finely* (1848), led to the detailed psychological studies in his dramatic masterpiece, *A Month in the Country* (1855). This was not staged professionally until 1872. Without precedent in the Russian theatre, it required for its appreciation by critics and audiences the prior success after 1898 of the plays of Anton Chekhov at the Moscow Art Theatre. It was there in 1909, under the great director Konstantin Stanislavsky, that it was revealed as one of the major works of the Russian theatre.

Sketches of rural life. Before going abroad in 1847, Turgenev left in the editorial offices of the literary journal *Sovremennik* ("The Contemporary") a short study, "Khor and Kalinych," of two peasants whom he had met on a hunting trip in the Orel region. It was published with the subtitle "From a Hunter's Sketches," and it had an instantaneous success. From it was to grow the short-story cycle *A Sportsman's Sketches,* first published in 1852, that brought him lasting fame. Many of the sketches portrayed various types of landowners or episodes, drawn from his experience, of the life of the manorial, serf-owning Russian gentry. Of these, the most important are "Two Landowners," a study of two types of despotic serf-owners, and "Hamlet of Shchigrovsky Province," which contains one of the most profound and poignant analyses of the problem of the "superfluous man." Far more significant are the sketches that tell of Turgenev's encounters with peasants during his hunting trips. Amid evocative descriptions of the countryside, Turgenev's portraits suggest that, though the peasants may be "children of

nature" who seek the freedom offered by the beauty of their surroundings, they are always circumscribed by the fact of serfdom.

Turgenev could never pretend to be much more than an understanding stranger toward the peasants about whom he wrote, yet through his compassionate, lucid observation, he created portraits of enormous vitality and wide impact. Not only did they make the predominantly upper class reading public aware of the human qualities of the peasantry, but they also may have been influential in provoking the sentiment for reform that led eventually to the emancipation of the serfs in 1861. He added to the *Sketches* during the 1870s, including the moving study of the paralyzed Lukeriya in "A Living Relic" (1874).

When the first collected edition appeared, after appearing separately in various issues of the *Sovremennik,* Turgenev was arrested, detained for a month in St. Petersburg, then given 18 months of enforced residence at Spasskoye. The ostensible pretext for such official harrassment was an obituary of Gogol, which he had published against censorship regulations. But his criticism of serfdom in the *Sketches,* certainly muted in tone by any standards and explicit only in his references to the landowners' brutality toward their peasants, was sufficient to cause this temporary martyrdom for his art.

First novels. Although Turgenev wrote "Mumu," a remarkable exposure of the cruelties of serfdom, while detained in St. Petersburg, his work was evolving toward such extended character studies as *Yakov Pasynkov* (1855) and the subtle if pessimistic examinations of the contrariness of love found in "Faust" and "A Correspondence" (1856). Time and national events, moreover, were impinging upon him. With the defeat of Russia in the Crimean War (1854–56), Turgenev's own generation, "the men of the forties," began to belong to the past. The two novels that he published during the 1850s—*Rudin* (1856) and *Home of the Gentry* (1859)—are permeated by a spirit of ironic nostalgia for the weaknesses and futilities so manifest in this generation of a decade earlier.

The first of Turgenev's novels, *Rudin,* tells of an eloquent intellectual, Dmitry Rudin, a character modeled partly on Bakunin, whose power of oratory and passionately held belief in the need for progress so affect the younger members of a provincial salon that the heroine, Natalya, falls in love with him. But when she challenges him to live up to his words, he fails her. The evocation of the world of the Russian country house and of the provincial atmosphere that form the backdrop to the tragicomedy of this relationship is evidence of Turgenev's power of perceiving and recording the constancies of the natural scene. The vaster implications about Russian society as a whole and about the role of the Russian intelligentsia are present as shading at the edges of the picture rather than as colours or details in the foreground.

Turgenev's second novel, *Home of the Gentry,* is an elegiac study of unrequited love in which the hero, Lavretsky, is not so much weak as the victim of his unbalanced upbringing. The work is notable for the delicacy of the love story, though it is a shade mawkish on occasion. More important in terms of the author's thought is the elaborate biography of the hero. In it is the suggestion that the influence of the West has inhibited Turgenev's generation from taking action, forcing them to acknowledge finally that they must leave the future of Russia to those younger and more radical than themselves.

The objectivity of Turgenev as a chronicler of the Russian intelligentsia is apparent in these early novels. Unsympathetic though he may have been to some of the trends in the thinking of the younger, radical generation that emerged after the Crimean War, he endeavored to portray the positive aspirations of these young men and women with scrupulous candour. Their attitude to him, particularly that of such leading figures as the radical critics Nikolay Chernyshevsky and Nikolay Dobrolyubov, was generally cold when it was not actively hostile. His own rather self-indulgent nature was challenged by the forcefulness of these younger contemporaries. He moved away from an emphasis on the fallibility of his heroes, who had been attacked as a type by Chernyshevsky, using the short story "Asya" (1858) as his point of departure. Instead, Turgenev focused on their youthful ardour and their sense of moral purpose. These attributes had obvious revolutionary implications that were not shared by Turgenev, whose liberalism could accept gradual change but opposed anything more radical, especially the idea of an insurgent peasantry.

The novel *On the Eve* (1860) deals with the problem facing the younger intelligentsia on the eve of the Crimean War and refers also to the changes awaiting Russia on the eve of the emancipation of the serfs in 1861. It is an episodic work, further weakened by the shallow portrayal of its Bulgarian hero. Although it has several successful minor characters and some powerful scenes, its treatment of personal relations, particularly of love, demonstrates Turgenev's profound pessimism toward such matters. Such pessimism became increasingly marked in Turgenev's view of life. It seems that there could be no real reconciliation between the liberalism of Turgenev's generation and the revolutionary aspirations of the younger intelligentsia. Turgenev himself could hardly fail to feel a sense of personal involvement in this rupture.

Turgenev's greatest novel, *Fathers and Sons* (1862), grew from this sense of involvement and yet succeeded in illustrating, with remarkable balance and profundity, the issues that divided the generations. The hero, Bazarov, is the most powerful of Turgenev's creations. A nihilist, denying all laws save those of the natural sciences, uncouth and forthright in his opinions, he is nonetheless susceptible to love and by that token doomed to unhappiness. In sociopolitical terms he represents the victory of the nongentry revolutionary intelligentsia over the gentry intelligentsia to which Turgenev belonged. In artistic terms he is a triumphant example of objective portraiture, and in the poignancy of his death he approaches tragic stature. The miracle of the novel as a whole is Turgenev's superb mastery of his theme, despite his personal hostility toward Bazarov's antiaestheticism, and his success in endowing all the characters with a quality of spontaneous life. Yet at the novel's first appearance the radical younger generation attacked it bitterly as a slander, and the conservatives condemned it as too lenient in its exposure of nihilism.

Turgenev's novels are "months in the country," which contain balanced contrasts such as those between youth and age, between the tragic ephemerality of love and the comic transience of ideas, between Hamlet's concern with self and the ineptitudes of the quixotic pursuit of altruism. The last two contrasts he amplified into a major essay, "Hamlet and Don Quixote" (1860). If he differed from his great contemporaries Fyodor Dostoyevsky and Leo Tolstoy in the scale of his work, he also differed from them in believing that literature should not provide answers to life's question marks. He constructed his novels according to a simple formula that had the sole purpose of illuminating the character and predicament of a single figure, whether hero or heroine. They are important chiefly as detailed and deft sociopsychological portraits. A major device of the novels is the examination of the effect of a newcomer's arrival upon a small social circle. The circle, in its turn, subjects the newcomer to scrutiny through the relation that develops between the heroine, who always belongs to the "place" of the fiction, and the newcomer-hero. The promise of happiness is offered, but the ending of the relation is invariably calamitous.

Self-exile and fame. Always touchy about his literary reputation, Turgenev reacted to the almost unanimously hostile reception given to *Fathers and Sons* by leaving Russia. He took up residence in Baden-Baden in southern Germany, to which resort Viardot had retired. Quarrels with Tolstoy and Dostoyevsky and his general estrangement from the Russian literary scene made him an exile in a very real sense. His only novel of this period, *Smoke* (1867), set in Baden-Baden, is infused with a satirically embittered tone that makes caricatures of both the left and the right wings of the intelligentsia. The love story is deeply moving, but both this emotion and the political sentiments are made to seem ultimately no more lasting and real than the smoke of the title.

The Franco-German War of 1870–71 forced the Viardots to leave Baden-Baden, and Turgenev followed them, first to London and then to Paris. He now became an honoured ambassador of Russian culture in the Paris of the 1870s. The writers George Sand, Gustave Flaubert, the Goncourt brothers, the young Émile Zola, and Henry James were only a few of the many illustrious contemporaries with whom he corresponded and who sought his company. He was elected vice president of the Paris international literary congress in 1878, and in 1879 he was awarded an honorary degree by the University of Oxford. In Russia he was feted on his annual visits.

The literary work of this final period combined nostalgia for the past—eloquently displayed in such beautiful pieces as "A Lear of the Steppes" (1870), "Torrents of Spring" (1872), and "Punin and Baburin" (1874)—with stories of a quasi-fantastic character—"The Song of Triumphant Love" (1881) and "Klara Milich" (1883). Turgenev's final novel, *Virgin Soil* (1877), was designed to recoup his literary reputation in the eyes of the younger generation. Its aim was to portray the dedication and self-sacrifice of young populists who hoped to sow the seeds of revolution in the virgin soil of the Russian peasantry. Despite its realism and his efforts to give the war topicality, it is the least successful of his novels. His last major work, *Poems in Prose,* is remarkable only for its wistfulness and for its famous eulogy to the Russian language.

Evaluation. Turgenev's work is distinguished from that of his most famous contemporaries by its sophisticated lack of hyperbole, its balance, and its concern for artistic values. His greatest work was always topical, committed literature, having universal appeal in the elegance of the love story and the psychological acuity of the portraiture. He was similarly a letter writer of great charm, wit, and probity. His reputation may have become overshadowed by those of Dostoyevsky and Tolstoy, but his own qualities of lucidity, humanity and, above all, his sense of the extreme preciousness of the beautiful in life endow his work with a magic that has lasting appeal.

(R.H.Fr./Ed.)

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Age (1926, rev. ed. 1959); David Magarshack, *Turgenev: A Life* (1954); and Henri Troyat, *Turgenev* (1988), are useful complementary biographies. See also H. Granjard, *Ivan Tourguénev et les courants politiques et sociaux de son temps* (1954), a valuable study of Turgenev's political evolution; R.H. Freeborn, *Turgenev: The Novelist's Novelist* (1960), a guide to Turgenev's novels; and Patrick Waddington, *Turgenev and England* (1980), a study of England's influence on the writer.

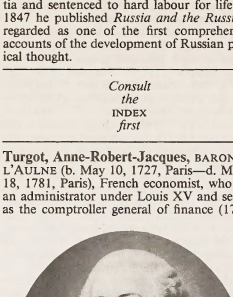
Turgenev, Nikolay Ivanovich (b. Oct. 23 [Oct. 12, Old Style], 1789, Simbirsk, Russia—d. Nov. 10 [Oct. 29], 1871, Paris), Russian government official and economist who was a cofounder of the revolutionary Northern Society, which staged the Decembrist uprising of 1825 in St. Petersburg.

Born into the middle class, Turgenev was one of a number of Russian youths infected by the liberal spirit that emerged in Europe after the French Revolution. He belonged to the Union of Welfare, a reformist society, many of whose members eventually came to advocate the overthrow of the autocracy. In 1821 the group formally disbanded but covertly reorganized itself into several secret branches, including the Northern Society in St. Petersburg.

An opponent of serfdom, Turgenev wrote a number of books on taxation and serfdom that had a wide influence prior to the 1825 revolt, the most prominent of these being *Experience of the Theory of Taxation* (1818). Abroad at the time of the December uprising, Turgenev became an emigré (having been tried in absentia and sentenced to hard labour for life). In 1847 he published *Russia and the Russians,* regarded as one of the first comprehensive accounts of the development of Russian political thought.

Consult the INDEX *first*

Turgot, Anne-Robert-Jacques, BARON DE L'AULNE (b. May 10, 1727, Paris—d. March 18, 1781, Paris), French economist, who was an administrator under Louis XV and served as the comptroller general of finance (1774–76) under Louis XVI. His efforts at instituting financial reform were blocked by the privileged classes.



Turgot, portrait, 18th century; in the Musée de Versailles
Giraudon—Art Resource

Youth. Turgot was born into an old Norman family whose members had already held some important administrative posts. (His father, Michel-Étienne [1690–1751], was to be "provost of merchants," the head of the Paris municipality, from 1729 to 1740.) Destined for the church, he entered the Seminary of Saint-Sulpice (1743) and the Sorbonne (1749), exhibiting both as a schoolboy and as an advanced student a precocious but sound maturity of intellect. He was influenced from his adolescence by all the fashionable ideas of his day: scientific curiosity, liberalism, tolerance, and an interest in social evolution. In 1751, on the threshold of ordination, he drew back, explaining to his relatives that it would have been impossible for him always to have lived under false pretenses, being, in fact, a deist. His occasional attendance at mass was necessitated by his rank.

From that time on, Turgot's friends comprised such philosophes as the Marquis de Condorcet and Pierre-Samuel du Pont de Nemours, who were both attached to the famous physiocratic school of thought, which generally has been regarded as the first scientific school of economics. Late in 1751 he announced his intention of seeking a career in the royal administration and entered the law, becoming a deputy solicitor general in January 1752 and later a counselor magistrate to the Parlement (supreme court of law) in Paris (December 1752).

Early career. In 1753 he bought, as was the custom, the office of examiner of petitions, thus entering the branch of the magistracy that provided officials for the bureaucracy and that upheld the royal authority. With 39 other examiners he was called upon to serve in the Royal Chamber, which acted as a supreme court in 1753–54, when the Parlement was exiled for defying the crown. He combined his duties with other forms of intellectual activity. In 1753 he translated into French Josiah Tucker's *Reflections on the Expediency of a Law for the Naturalization of Foreign Protestants* (1752) and the following year published *Lettres sur la tolérance* (*Letters on Tolerance*). Between 1753 and 1756 Turgot accompanied J.-C.-M. Vincent de Gournay, the mentor of the physiocratic school and an intendant of commerce, on his tours of inspection to various French provinces.

By 1761 Turgot had drawn enough attention to himself for Louis XV to accept his nomination as intendant to the administrative region of Limoges. He occupied this post, then considered one of the least desirable available, for 13 years and there displayed his extraordinary capacities as an administrator, reformer, and economist. In 1766 he published his best-known work, *Reflections on the Formation and Distribution of Wealth,* to which he was to add—among other famous works—*Lettres sur la liberté du commerce des grains* (1770; "Letters on the Freedom of the Grain Trade"). He introduced new methods to the peasant region he administered, substituting a small tax in money for the *corvée* (unpaid work required of peasants for the upkeep of roads); compiling a land register (*cadastre*) for tax purposes; and combatting the famine of 1770–71, during which—despite opposition—he maintained the free commerce in grain. He was appointed comptroller general by Louis XVI on Aug. 24, 1774.

Ministry. Turgot was all that a successful courtier should not be. Large and fat, with regular and quite distinguished features, he was nevertheless a shy and awkward bachelor who blushed easily, spoke with hesitation, and was rarely convivially gay. Though his customary serious manner was tinged with humour, he was not persuasive and could irritate a questioner with the brusqueness of his statements, his theoretical cast of thought, and the suppressed irony of his half smile.

Realizing that the young king was inexperienced and wishing to avoid political storms, Turgot temporized during the first days of his ministry, but later, feeling himself threatened by his adversaries, a frenzy for public service drove him to accumulate reforms. He introduced his Six Edicts in 1776. Four of them (suppressing certain dues and offices) were of no great importance, and the fifth (suppressing the guilds of Paris) encountered no serious opposition. It was against the sixth edict, that abolishing the corvée, that his enemies, who defended privilege, concentrated their attack. Appealing in vain to the good sense and courage of the young king from whom he had been alienated by a coalition of financiers, place-holders, privileged classes, and the religious party at court, he saw his reforms abandoned and, after his dismissal on May 12, 1776, forgotten. Five years later, having published nothing since his public disgrace, he died in Paris attended by a few friends.

(Je.B.)

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Türgovishte, also spelled TĂRGOVIŠTE, formerly (until 1934) ESKI DZHUMAYA, town, eastern Bulgaria, on the Vrana River. Known formerly for its great cattle fair, which attracted visitors from throughout the Balkans, it continues as a craft centre, producing textiles, furniture, pottery, and processed foods. It has long been a centre for the Muslim faith in Bulgaria. Its former Turkish name was Eski Cumaya (Dzhumaya), but the modern town has subdued its Oriental character. It was taken from the Turks by the Russians in 1878 and restored to Bulgaria. Five major roads radiate from the town. Pop. (1988 est.) 71,201.

Turin, Italian TORINO, Latin AUGUSTA TAURINORUM, city, capital of Torino *provincia* and of Piemonte (Piedmont) *regione,* northwestern Italy, on the Po River, near its junction with the Sangone, the Dora Riparia, and the Stura di Lanzo. The original settlement of Taurisia, founded by the Taurini, was partly destroyed by the Carthaginian invader Hannibal in 218 BC. It later became a Roman military colony, known successively as Julia Taurinorum and Augusta Taurinorum, rebuilt by the emperor Augustus in the form of an enclosed rectangle divided into 72 blocks (*insulae*). The remains of the walls and the Palatine Gate and the Palatine Towers are still visible. Dominated by barbarians after the decline of Rome in the



Palatine Gate, Turin, Italy
Marzari—SCALA from Art Resource

4th century, the city became part of the Lombard kingdom and then of the Frankish empire. It was linked to Savoy in 1046 by the marriage of Countess Adelaide to Count Odo of Savoy, and it recognized the supremacy of Savoy in 1280 after an intervening period of semi-independence and conflict. Occupied by the French from 1536 to 1562, Turin became the capital of the duchy of Savoy in 1563. It was besieged in 1640 and 1706 (during the War of the Spanish Succession) by the French, who were defeated by Eugene of Savoy in 1706, and it was occupied again by the French during the Napoleonic Wars. The city became the capital of the kingdom of Sardinia in 1720 and in the 19th century became the political and intellectual centre of the Risorgimento, the movement for Italian political unification. It served as the first capital of a united Italy from 1861 to 1865. Turin sustained heavy air-raid damage during World War II.

Turin has been a bishopric since about 415 and an archbishopric since 1510 and is rich in ecclesiastical architecture. Noteworthy churches include the Renaissance-style Cathedral of San Giovanni Battista (1492–98), with the brilliantly original Santa Sindone Chapel by the Baroque architect Guarino Guarini; La Consolata (1679; completed 1714), also by Guarini; the Waldensian Church (1850–53), the first Protestant church in Turin; and the nearby Basilica of Superga (1717–31), long the royal burial church. A ducal and royal city for centuries, Turin has many fine palaces. The Madama Palace, begun in the 13th century, owes its name to the resident-widows of the 17th-century dukes of Savoy. Used by the Sardinian Senate in 1848–60 and by the Italian Senate in 1861–64, it now houses the Museum of Ancient Arts. The Carignano Palace (1680), the birthplace (1820) of King Victor Emmanuel II and once the meeting place of the Sardinian chamber of deputies and of the first Italian Parliament, now houses the National Museum of the Italian Risorgimento. The Royal Palace (1646–58) houses the Royal Armoury, with one of the finest collections of arms in Europe. The Academy of Science (1678), formerly a Jesuit college, now houses the Museum of Antiquities, the Egyptian Museum, and the Sabauda Gallery. Other secular structures include the remains of the old citadel; the Mole Antonelliana, begun in 1863 as a synagogue and later completed by the city; the modern Turin Exhibition Buildings and Gallery of Modern Art; and numerous public monuments to notable figures in Turin's past. Other museums display collections on artillery, automobiles, mountains, cinema, and natural history, zoology, paleontology, and mineralogy. There are also several fine libraries.

The University of Turin was founded in 1404. Other educational institutions include the Turin Polytechnic (1859), the Gallery of the Albertina Academy (1652), the Giuseppe Verdi State Musical Conservatory (1867), the Institute of Business and Industrial Organization Studies (1935), and the University Institute of European Studies (1952).

Situated on a broad, fertile plain east of the Alps, Turin is one of Italy's most important industrial and communications centres. Turin is a major road and rail junction and has an international airport. The city is preeminent in Italy's automotive industry, with Fiat and Lancia plants that produce most of the national output of automobiles. Airplane, ball-bearing, rubber, and paper industries are also important, as are tanning and leatherworking, and typography and lithography. There are metallurgical, chemical, plastics, and electrotechnical industries, and chocolate and wines (especially vermouth) are also notable products. Pop. (1993 est.) mun., 952,736.

Turin, Shroud of, also called HOLY SHROUD, Italian SANTA SINDONE, a length of linen that for centuries was purported to be the burial garment of Jesus Christ; it has been preserved since 1578 in the royal chapel of the Cathedral of San Giovanni Battista in Turin, Italy. Measuring 14 feet 3 inches long and 3 feet 7 inches wide, it seems to portray two faint brownish images, those of the back and front of a gaunt, sunken-eyed, 5-foot 7-inch man—as if a body had been laid lengthwise along one half of the shroud while the other half had been doubled over the head to cover the whole front of the body from face to feet. The images contain markings that allegedly correspond to the stigmata of Jesus, including a thorn mark on the head, lacerations (as if from flogging) on the back, bruises on the shoulders, and various stains of what is presumed to be blood.



Photographic negative of the face imprinted on the Shroud of Turin
By courtesy of the Holy Shroud Guild, Esopus, N.Y.

The shroud first emerged historically in 1354, when it is recorded in the hands of a famed knight, Geoffroi de Charnay, Seigneur de Lirey. In 1389, when it went on exhibition, it was denounced as false by the local bishop of Troyes, who declared it "cunningly painted, the truth being attested by the artist who painted it." The Avignon antipope Clement VII (reigned 1378–94) sanctioned its use as an object of devotion provided that it were exhibited as a "representation" of the true shroud. Subsequent popes, from Julius II on, however, took its authenticity for granted. In 1453, Geoffroi de Charnay's granddaughter Marguerite gave the shroud to the house of Savoy at Chambéry, and there it was damaged by fire and water in 1532. It was moved to the new Savoyard capital of Turin in 1578. Ever since, it has been publicly exhibited only rarely, as, in recent times, on the marriage of Prince Umberto (1931) and on the 400th anniversary of its arrival in Turin (1978).

Scholarly analyses—attempting to use scientific methods to prove or disprove its authenticity—have been applied to the shroud since the late 19th century. It was early noticed (1898) that the sepia-tone images on the shroud seem to have the character of photographic negatives rather than positives. Beginning in the 1970s, tests were made to determine whether the images were the result of paints (or other pigments), scorches, or other agents; none of the tests proved conclusive. In 1988 the age of the cloth itself was finally determined. Three laboratories in different countries were provided with postage-stamp–sized pieces of the shroud's linen cloth. Having subjected these samples to carbon-14 dating, all three laboratories concluded that the cloth of the shroud had been made sometime between AD 1260 and 1390. The Roman Catholic church accepted the results and announced that the Shroud of Turin was not authentic, but the church encouraged Christians to continue venerating the shroud as an inspiring pictorial image of Christ.

Turin, University of, Italian UNIVERSITÀ DEGLI STUDI DI TORINO, autonomous coeducational state institution of higher learning in Turin, Italy, that was founded in 1404. Erasmus was a graduate of the school in 1506. The university was reorganized and reestablished in 1713. An Institute of Business and Economics was added in 1906, a veterinary medicine faculty was added in 1934, and faculties of agriculture, pharmacy, and commerce were added in 1935. Among the university's faculties are law, political science, letters and philosophy, education, mathematics and natural sciences, medicine, and veterinary medicine.

Turin Papyrus, also called TURIN PAPYRUS OF KINGS, or TURIN CANON, hieratic manuscript of the 19th dynasty of Egypt, listing the kings of Egypt from earliest times to the reign of Ramses II (1279–13 BC), under whom it was written. Although the papyrus, now in the Egyptian Museum in Turin, Italy, is in very fragmentary condition, it is still considered the most detailed and reliable of the existing Egyptian king lists. It lists not only names but also regnal years, months, and days and also divides pharaonic history into dynasties and into three major periods, labeled by scholars the Old Kingdom, the Middle Kingdom, and the New Kingdom. Manetho's *History* (3rd century BC) was derived from a source like the Turin Papyrus but was far less reliable.

Turina, Joaquín (b. Dec. 9, 1882, Seville, Spain—d. Jan. 14, 1949, Madrid), Spanish composer who helped to promote the national character of 20th-century Spanish music.

After studying in Seville and Madrid, Turina went in 1905 to Paris, where he was a pupil of Moritz Moszkowski for piano and Vincent d'Indy for composition. Though he absorbed elements of the French style, he was inspired in Paris by Isaac Albéniz to write distinctively Spanish music. He wrote the *Sonata española* for violin and piano and the symphonic poem *La procesión del rocío* (1912) and in 1914 returned to Spain. His native city, Seville, figures largely in his mostly picturesque works, notably in the *Sinfonía sevillana* (1920), in the *Canto a Sevilla* (1927; "Song to Seville") for voice and orchestra, and in his albums of piano miniatures, among them *Rincones sevillanos* ("Sevillian Nooks") and *La leyenda de la Giralda* ("The Legend of Giralda"). He was most successful in his many songs. He also wrote two operas, *Margot* (1914) and *Jardín de oriente* (1923; "Garden of the East"), incidental music, and chamber works. His *Danzas fantásticas* (1920; "Fantastic Dances") for orchestra and *La oración del torero* (1925; "The Torero's Speech") for string quartet or string orchestra were particularly popular. He was critic for the Madrid paper *El Debate* and wrote a short encyclopaedia of music.



Turina
Archivo Mas, Barcelona

Turing, Alan M., in full ALAN MATHISON TURING (b. June 23, 1912, London, Eng.—d. June 7, 1954, Wilmslow, Cheshire), English mathematician and logician who pioneered in the field of computer theory and who contributed important logical analyses of computer processes.

The son of a British member of the Indian Civil Service, Turing studied at Sherborne school and at King's College, Cambridge. Many mathematicians in the first decades of the 20th century had attempted to eliminate all possible error from mathematics by establishing a formal, or purely algorithmic, procedure for establishing truth. The mathematician Kurt Gödel threw up an obstacle to this effort with his incompleteness theorem; Gödel showed that any useful mathematical axiom system is incomplete in the sense that there must exist propositions whose truth can never be determined (undecidable propositions within the system). Turing was motivated by Gödel's work to seek an algorithmic method of determining whether any given propositions were undecidable, with the ultimate goal of eliminating them from mathematics. Instead, he proved in his seminal paper "On Computable Numbers, with an Application to the *Entscheidungsproblem* [Halting Problem]" (1936) that there cannot exist any such universal method of determination and, hence, that mathematics will always contain undecidable (as opposed to unknown) propositions.

To illustrate this point, Turing posited a simple device that possessed the fundamental properties of a modern computing system: a finite program, a large data-storage capacity, and a step-by-step mode of mathematical operation. This Turing machine, as it was later called, is frequently used as a point of reference in basic discussions of automata theory and was also the theoretical basis for the digital computers that came into being in the 1940s. Turing's work, along with that of Gödel, put to rest the hopes of David Hilbert and his school that all mathematical propositions could be expressed as a set of axioms and derived theorems.

Turing continued his mathematical studies at Princeton University, completing a Ph.D. (1938) under the American mathematician Alonzo Church. He then returned to England and accepted a renewed fellowship at King's College. During World War II he served with the Government Code and Cypher School, at Bletchley, Buckinghamshire, where he played a significant role in deciphering the German Enigma codes. (*See* Ultra.) In 1945 he joined the staff of the National Physical Laboratory in London to lead the design, construction, and use of a large electronic digital computer that was named the Automatic Computing Engine (ACE). In 1948 he became deputy director of the Computing Laboratory at the University of Manchester, where the Manchester Automatic Digital Machine (MADAM, as it was called in the press), the computer with the largest memory capacity in the world at that time, was being built. His efforts in the construction of early computers and the development of early programming techniques were of prime importance. He also championed the theory that computers eventually could be constructed that would be capable of human thought, and he proposed a simple test, now known as the Turing test, to assess this capability. Turing's papers on the subject are widely acknowledged as the foundation of research in artificial intelligence.

In 1952 Turing published the first part of his theoretical study of morphogenesis, the development of pattern and form in living organisms. He left his work unfinished, however. He apparently committed suicide, probably because of the depressing medical treatment that he had been forced to undergo (in lieu of prison) to "cure" him of homosexuality.

BIBLIOGRAPHY. Andrew Hodges, *Alan Turing: The Enigma* (1983; reissued 1992), includes a well-written account of Turing's diverse scientific ideas. Ted Gottfried, *Alan Turing: The Architect of the Computer Age* (1996), is a short biography for the general reader.

Turing machine, hypothetical computing device introduced in 1936 by the English mathematician and logician Alan M. Turing. He originally conceived the machine as a mathematical tool that could infallibly recognize undecidable propositions—*i.e.,* those mathematical statements that, within a given formal axiom system, cannot be shown to be either true or false. (The mathematician Kurt Gödel had demonstrated that such undecidable propositions exist in any system powerful enough to contain arithmetic.) Turing instead proved that there can never exist any universal algorithmic method for determining whether a proposition is undecidable.

The Turing machine is not a machine in the ordinary sense but rather an idealized mathematical model that reduces the logical structure of any computing device to its essentials. As envisaged by Turing, the machine performs its functions in a sequence of discrete steps and assumes only one of a finite list of internal states at any given moment. The machine itself consists of an infinitely extensible tape, a tape head that is capable of performing various operations on the tape, and a modifiable control mechanism in the head that can store directions from a finite set of instructions. The tape is divided into squares, each of which is either blank or has printed on it one of a finite number of symbols. The tape head has the ability to move to, read, write, and erase any single square and can also change to another internal state at any moment. Any such act is determined by the internal state of the machine and the condition of the scanned square at a given moment. The output of the machine—*i.e.,* the solution to a mathematical query—can be read from the system once the machine has stopped. However, in the case of Gödel's undecidable propositions, the machine would never stop, and this became known as the "halting problem."

By incorporating all the essential features of information processing, the Turing machine became the basis for all subsequent digital computers, which share the machine's basic scheme of an input/output device (tape and reader), memory (control mechanism's storage), and central processing unit (control mechanism).

Turing test, in artificial intelligence, a test proposed (1950) by the English mathematician Alan M. Turing to determine whether a computer can "think."

There are extreme difficulties in devising any objective criterion for distinguishing "original" thought from sufficiently sophisticated "parroting"; indeed, any evidence for original thought can be denied on the grounds that it ultimately was programmed into the computer. Turing sidestepped the debate about exactly how to define thinking by means of a very practical, albeit subjective, test: if a computer acts, reacts, and interacts like a sentient being, then call it sentient. To avoid prejudicial rejection of evidence of machine intelligence, Turing suggested the "imitation game," now known as the Turing test: a remote human interrogator, within a fixed time frame, must distinguish between a computer and a human subject based on their replies to various questions posed by the interrogator. By means of a series of such tests, a computer's "thinking" can be measured by its probability of being misidentified as the human subject.

Turing predicted that by the year 2000 a computer "would be able to play the imitation game so well that an average interrogator will not have more than a 70-percent chance of making the right identification (machine or human) after five minutes of questioning." No machine has come close to this standard.

Turishcheva, Lyudmila Ivanovna (b. Oct. 7, 1952, Grozny, Russia, U.S.S.R.), Soviet gymnast who was European champion (1971, 1973), world champion (1970, 1974), and an Olympic medal winner (1968–76).

Turishcheva graduated from the Rostov Pedagogical Institute in 1974. At the 1968 Olympic Games in Mexico City, she won a gold medal as a team member in the combined exercises, as she also did at the 1972 Games in Munich and the 1976 Games in Montreal. She won a gold medal for individual performance in the combined exercises in 1972 and silver medals for the floor exercises in 1972 and 1976 and for the vault in 1976. She won bronze medals in 1972 for the vault and in 1976 for individual performance in the combined exercises. She competed at first for the Dinamo Club, Grozny; from 1973 for Rostov-na-Donu; and from 1978 for Kiev. After she retired from competition she became a coach and teacher.

Turkana, a people living in the arid, sandy expanse of northwestern Kenya, from Lake Rudolf (Lake Turkana) to the Ugandan border. The Turkana speak a language of the Eastern Nilotic group that closely resembles Teso. They apparently moved to their present lands about 200 years ago from an area now in northeastern Uganda where the closely related Jie and Karamojong still live.

The Turkana resisted British conquest, and a military expedition in 1918 caused considerable loss of life and cattle but did not establish effective British administration. The region was not completely occupied until 1942.

Turkana are ardent pastoralists who give names to, sing to, and diligently care for their cattle. Milk and other dairy products (butter, ghee, and yogurt) as well as blood are important to the Turkana diet; hides, horns, and bones are likewise to their material culture. Camels provide milk and meat and are used for bridewealth payments. Goats and sheep are also kept. Livestock are slaughtered and meat shared in the community. Turkana practice transhumance, visiting the same general pastures from season to season and returning to rainy season sites for millet and vegetable farming. Wild nuts, berries, game, and fish are also important foods. Their houses are temporary structures made of leafy boughs or palm fronds; a thorny, encircling fence is used for protection from predators. A father, his wives, and their sons and wives live together or in adjacent homesteads.

Turkana marry outside their clans, and upon marriage women join their husbands' clans. Cattle are given clan brands. Turkana men belong to either of two alternating age sets, called Stones and Leopards; a man is of the set opposite to that of his father. In the past, Stones and Leopards wore different ornaments, ate apart at feasts, and raided in separate columns as warriors. The oldest men in extended families provide leadership. Turkana make many wooden containers and other useful objects that are prized by collectors of African art.

Turkana, Lake (East Africa): *see* Rudolf, Lake.

Turkestan, city, southern Kazakhstan, in the Syr Darya plain. An ancient centre of the caravan trade, known earlier as Shavgar and later as Yasi, it became a religious centre known as Khazret (Hazrat) because of the 12th-century Ṣūfī (Muslim mystic) Ahmed Yesevi, whose 14th-century mausoleum is the city's chief monument. Captured by the Russians in 1864, Turkestan now has several industries. Pop. (1999 est.) 85,600.

Turkey, officially REPUBLIC OF TURKEY, Turkish TÜRKIYE CUMHURIYETI, Middle Eastern country that lies mainly in southwestern



Turkey

Asia, with a small area extending into southeastern Europe. The capital is Ankara. Turkey is bordered to the north by the Black Sea, to the east by Georgia, Armenia, and Iran, to the south by Iraq, Syria, and the Mediterranean Sea, and to the west by the Aegean Sea, Greece, and Bulgaria. The Asian part of Turkey, which is called Anatolia, is separated from the European part, Thrace, by the Bosporus, the Sea of Marmara, and the Dardanelles Strait. Area 300,948 square miles (779,452 square km). Pop. (1995 est.) 62,526,000.

A brief treatment of Turkey follows. For full treatment, *see* MACROPAEDIA: Turkey and Ancient Anatolia.

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

The land. Asiatic Turkey includes a belt of young mountain ranges with a mean elevation of about 3,600 feet (1,100 m) that dominate the north and south and encircle the central Anatolian Plateau. The Pontic Mountains north of the plateau and the Taurus Mountains south of it generally run east-west, separating the plateau from the narrow coastal lowlands. The central plateau itself is a semiarid massif that is divided into several basins. Eastern Anatolia comprises lofty ranges and recent volcanic cones, such as Mount Ararat, the highest peak in Turkey at 16,853 feet (5,137 m). Western Anatolia has elongated mountain ridges separated by depressed floors. The plateaus around Istanbul, in northwestern Turkey, are deeply dissected by valleys, such as those occupied by the Bosporus and the Dardanelles straits.

The water divide between the drainage basins of the Atlantic and Indian oceans runs obliquely through eastern Anatolia. The country west and north of the main divide drains northward to the Black Sea through the Kizil and Sakarya rivers. The western regions of the country drain to the Sea of Marmara. The principal rivers of the Mediterranean basin are the Göksu, Seyan, and the lower course of the Orontes. The Tigris and Euphrates rivers, rising in the eastern mountains, drain southeastward toward the Persian Gulf and the Indian Ocean.

Turkey's climate is heavily influenced by the sea and the mountains, which produce contrasts between the interior and the coastlands. The southern and western coasts have a Mediterranean climate and experience average temperatures of 77° to 86° F (25° to 30° C) in July. The Black Sea coast is the wettest region, with warm summers and mild winters. The high northeastern plateaus have warm summers but severe winters with average temperatures of 10° F (−12° C). The central plateau generally has hot, dry summers and cold, moist winters.

Large areas in the south, west, and northwest are covered by secondary Mediterranean vegetation of thick, scrubby underbrush. The Black Sea coast is the most densely forested region. The dry Anatolian interior is a region of steppes, with short grasses and bushes.

Almost two-fifths of Turkey's land area is arable, with about half of the cultivated land devoted to cereals. About one-eighth of the cultivated land is used for vineyards, orchards, olive groves, and vegetable gardens.

The people. Turkey has been a melting pot of ethnically and culturally distinct groups since early prehistoric times. The most decisive influence was the incursion of Turkic peoples from the east from the 11th century AD onward. Turkish is the mother tongue of about nine-tenths of the country's population. The principal linguistic minority groups are Kurds and Arabs. Kurdish is widely spoken by the predominantly rural populations of the eastern and southeastern regions. There are small numbers of Arabic speakers, principally in southeastern Anatolia. Nearly all Turks are Muslims, and the Sunnite sect is predominant. Turkey's population increased rapidly after World War II, but the rate of growth declined by the end of the 20th century.

The economy. Turkey's developing economy is part private and part publicly owned; the industrial and service sectors now predominate over agriculture. The economy underwent a sustained expansion during the second half of the 20th century, but Turkey remains poorer than most European countries.

Agriculture accounts for about one-sixth of the gross domestic product (GDP) and employs about two-fifths of the workforce. Turkey is normally self-sufficient in most foodstuffs. The bulk of the cropland is devoted to field crops, of which wheat and barley occupy the largest area. Cash crops such as cotton and tobacco are important for export. The narrow coastal lowlands are extensively irrigated and produce hazelnuts, sultana raisins, and fruits (including oranges, lemons, and melons); vegetables are also grown for the foreign market. Sheep and lesser numbers of cattle and goats graze the permanent pastureland. Forests, mainly coniferous, occupy about one-fourth of the country, mainly around the Black Sea, but are little exploited.

Mining by mostly state-owned companies accounts for only a small proportion of the economy. Locally mined iron ore, coal, lignite, bauxite, and copper provide raw materials for the country's key manufacturing industries. Turkey is a major producer of chromite, much of which is exported. The country's limited reserves of petroleum meet only a fraction of Turkey's needs, compelling it to use much of its foreign exchange to buy oil imports. About half the country's electricity is generated by thermal power plants, with the remainder coming primarily from hydroelectric sources.

Manufacturing employs about one-seventh of the workforce and accounts for one-fifth of the GDP. Locally grown cotton and local wages made textiles (including yarn, fabrics, and rugs) the chief industrial growth sector in the 1960s and '70s. The petrochemical industry expanded rapidly in the early 1980s. Turkey has become the Middle East's leading steel producer, and its engineering industries have grown rapidly. Tourism is also an important source of national income.

Labour unions were legalized by the Trade Union Law of 1947 and have grown significantly since. In the 1970s many unskilled Turks traveled to western Europe (principally West Germany) to find employment, but after 1980 the foreign employment trend shifted away from Europe and toward Middle Eastern countries.

Turkey's railway system extends more than 5,200 miles (8,400 km), but truck transport over the road system dominates transport. The ports of Istanbul, İzmir, and Mersin handle international and coastal traffic, and the principal marine terminal for petrochemicals is near İskenderun. International airports are located near Istanbul, Ankara, and İzmir.

Exports include a broad range of agricultural and industrial products; textiles are the largest export commodity. Among Turkey's leading trading partners for export are Germany, Italy, and the United States. Petroleum is the major import; Germany is Turkey's principal source for machinery and equipment.

Government and social conditions. The Turkish republic, founded by Mustafa Kemal Atatürk in 1923 after the fall of the Ottoman Empire, was a one-party state until 1946. Since then many parties have contested power, and Turkey has had a civilian parliamentary government most of the time. The 1982 constitution, amended in 1987 and 1995, provides for a democratic parliamentary system of government. Under the constitution, the head of state is the president, who is elected to a nonrenewable seven-year term by the Turkish Grand National Assembly (the national parliament). The 550 members of the Assembly are elected to five-year terms by direct popular vote. The president appoints a prime minister and cabinet that manage the day-to-day affairs of the government. The chief political parties are the centre-right Motherland Party, the centre-right True Path Party, the centre-left Social Democratic Populist Party, and the pro-Islāmic Welfare Party.

When the Turkish Republic was formed in 1923, only one-tenth of the population was estimated to be literate. Atatürk's programs stressed national education, and by the end of the 20th century more than four-fifths of the adult population was literate. The state education system provides primary education on a free and compulsory basis for five years. Secondary education extends for six years, and there are about 20 institutions of higher education with university status. The government administers public health programs, operates a large number of hospitals and dispensaries, and provides medical services free to the poor. Life expectancy at birth has increased to 71 years.

Turkey's long and varied cultural heritage is based on the Persian, Arabic, Byzantine, Ottoman, and Western civilizations. Among the most important of Atatürk's reforms were the substitution of Latin for the Arabic alphabet in writing Turkish and the reduction of Islāmic influence upon the nation.

History. Originally settled before 7000 BC, Anatolia was occupied about 1900 BC by the Indo-European Hittites, who subsequently made it an international power until their collapse about 1200 BC. Subsequently, Phrygians and Lydians invaded Anatolia, but in the east the indigenous Urartu (Armenian) kingdom ruled. The Persian empire occupied the area in the 6th century BC, and it subsequently passed under Greek-Hellenistic rule and, ultimately, Roman rule by the 1st century BC. The Armenian kingdom remained a border state between the rival Romans (later Byzantines) and the Parthians and, later, Sāsānians to the east. Byzantine rule emerged when Constantine the Great made Constantinople (now Istanbul) his capital.

During the 11th century a group of nomadic Turkic tribes, the Oğuz, invaded Anatolia from the east. One of the Oğuz tribes, the Kayı, came to occupy eastern and central Anatolia during the 12th century. Osman I, a Kayı, established the Ottoman dynasty. In their initial stages of expansion, the Ottomans were leaders of the Turkish ghazis, or fighters for the faith of Islām against the Byzantine Empire. In the 13th and 14th centuries the Ottomans took over the Byzantine territories of western Anatolia and southeastern Europe, making the Christian Balkan states their vassals, and conquered the Turkmen principalities of eastern Anatolia. In the 15th century the Ottoman sultans imposed direct rule on

their Balkan vassals, conquered Constantinople (1453), and extended their rule eastward to the Euphrates River (1468) and westward into Hungary. By the end of the 16th century, the Ottoman Empire included most of the Balkans, a large portion of Hungary in central Europe, and the bulk of the Middle East and North Africa.

After the reign of Sultan Süleyman I the Magnificent (1494–1566), the Ottoman Empire began to decline politically, administratively, and economically. By 1718 Austria had driven the Turks out of Hungary, and Russia annexed the Crimea in 1783. In the 19th century the Ottoman Empire lost control of Egypt and most of the Balkans. During the late 19th century the millet system, under which religious and ethnic minorities had been granted local autonomy, began to deteriorate, leading to growing unrest and culminating in the genocidal massacre of the Armenians during World War I. The Revolution of the Young Turks in 1908 attempted to revive the empire, which nonetheless continued to suffer military and territorial losses in the Balkans. Turkey sided with Germany and Austria-Hungary in World War I. After the war Turkey lost its Arab provinces and part of Anatolia, but after a fierce civil war and a war with Greece, Turkey's present boundaries were drawn in 1923 at the Conference of Lausanne, and Turkey became a republic with Atatürk as the first president.

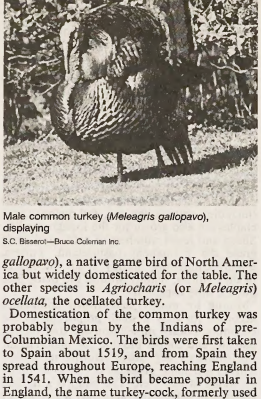
Atatürk radically reformed Turkey's political, economic, and social systems. He secularized Turkish society, reducing Islām's role and replacing Arabic with the Latin alphabet for writing the Turkish language. He also instituted a policy of state-controlled economic development that proved of lasting influence. After Atatürk's death in 1938, parliamentary government and a multiparty system gradually took root in Turkey, despite periods of instability and intervals of military rule.

After remaining neutral in World War II, Turkey aligned itself with the West and received U.S. military and economic aid. Turkey joined NATO (1952), was a signatory in the Balkan Entente (1953), and joined the Baghdad Pact (1955; later CENTO), the Organization for European Economic Co-operation (OEEC), and the Council of Europe. In 1959 Turkey temporarily resolved a three-year dispute with Greece over Cyprus. The Second Turkish Republic was created, and a new constitution was adopted in 1961. Turkey became an associate member of the Common Market (now the European Community within the European Union) in 1963.

Disputes between ethnic Greeks and Turks in Cyprus resulted in a civil war there in 1963. Greece and Turkey approached the brink of war, but pressure from the United Nations helped control the conflict, which again flared over territorial disputes in 1987 and 1996. In 1974 a coup occurred on Cyprus with support from the Greek military government; Turkish forces invaded and occupied northern Cyprus in response. After increasing domestic instability and political turmoil in Turkey itself, the armed forces took over the government in a bloodless coup and instituted martial law in 1980. Two years later a new constitution was approved by a majority of voters. Parliamentary elections followed in 1983, and martial law was gradually lifted. The emergence of a militant Kurdish separatist campaign in 1983 was a source of ongoing conflict during the 1980s and '90s. Turkey experienced relative political stability and economic growth during the prime ministership (1983–89) of Turgut Özal of the Motherland Party and was governed by generally centrist governments into the 1990s, despite increasing electoral support for the pro-Islāmic Welfare Party.

Disenchantment with the secular parties led to an election victory by the Welfare Party in 1996, but opposition by the military and secularists led to its removal from power in 1997. Abdullah Öcalan, the leader of the Kurdish Workers Party, was captured in 1999. During that year several powerful earthquakes hit the country; one centred near İzmit killed more than 15,000 and injured many more. In 2003 requests by the United States to move troops through Turkey during the former's invasion of Iraq were declined. The former mayor of Istanbul and one-time Welfare Party member, Recep Tayyip Erdogan, became head of government later that year.

turkey, either of two species of birds in the family Meleagrididae (order Galliformes). The best known is the common turkey (*Meleagris gallopavo*), a native game bird of North America but widely domesticated for the table. The other species is *Agriocharis* (or *Meleagris*) *ocellata,* the ocellated turkey.



Male common turkey (*Meleagris gallopavo*), displaying
S.C. Bisserot—Bruce Coleman Inc.

Domestication of the common turkey was probably begun by the Indians of pre-Columbian Mexico. The birds were first taken to Spain about 1519, and from Spain they spread throughout Europe, reaching England in 1541. When the bird became popular in England, the name turkey-cock, formerly used for the guinea fowl of Islāmic (or "Turkish") lands, was transferred to it. English colonists then introduced European-bred strains of the turkey to eastern North America in the 17th century. Turkeys were mainly bred for their beautifully coloured plumage until about 1935, after which the breeding emphasis changed to their meat qualities.

Races of the common turkey found today in Mexico and in the southeastern and southwestern United States differ slightly in feather markings and in rump colour, but all are basically dark, with iridescent bronze and green plumage. Adult males have a naked, heavily carunculated (bumpy) head that is normally bright red in colour but turns to white overlaid with bright blue when the birds are excited. Other distinguishing features of the common turkey are a long red fleshy ornament (called a snood) that grows from the forehead over the bill; a fleshy wattle growing from the throat; a tuft of coarse, black, hairlike feathers (known as a beard) projecting from the breast; and more or less prominent leg spurs. The male turkey, or gobbler, or tom, may be 130 cm (50 inches) long and weigh 10 kg (22 pounds), though average weight is less. Female turkeys, or hens, generally weigh only half as much as the males and have less warty heads than do the males. Domesticated strains of the common turkey, developed for their fine-tasting flesh, may be much heavier.

Roast turkey in many European countries has long been a customary Christmas dish. In the United States the bird is especially associated with the holiday of Thanksgiving. Turkey production once tended to be seasonal, but the popularity of processed foods such as turkey bacon, sausage, and deli meats has evened out demand.

The wild turkey prefers woodlands near water. It eats seeds, insects, and an occasional frog or lizard. When alarmed it may run rapidly to cover, but it can fly strongly only for short distances (about 0.4 km, or 0.25 mile). Formerly diminished under hunting pressure, *M. gallopavo* has come back well under various state game management programs in the United States.

In courtship display the male spreads his tail, droops his wings and shakes the quills audibly, retracts his head, struts about, and utters rapid gobbling sounds. He assembles a harem, and each hen lays 8–15 brownish spotted eggs in a hollow in the ground. The young (poults) hatch in 28 days.

The ocellated turkey, of Central America, is smaller than *M. gallopavo.* It has a blue head with reddish yellow bumps, bright-tipped feathers, almost peacocklike, and, in addition to the long bill wattle, a yellow-tipped knob on the crown. It has never been domesticated.

turkey vulture, also called TURKEY BUZZARD (*Cathartes aura*), long-winged, long-tailed vulture (family Cathartidae, the New World vultures) that has dark plumage, a whitish beak, white legs, and a bare red head (black in immature birds) that is covered with whitish bumps. Its wingspread is about 1.8 m (6 feet), and its length is about 75 cm (30 inches). The



Turkey vulture (*Cathartes aura*)
Allan D. Cruickshank from The National Audubon Society Collection/Photo Researchers

turkey vulture has an elaborate olfactory canal and uses its keen sense of smell in finding food. The bird subsists predominantly on carrion. The species occurs throughout the Americas except northern Canada; northerly and southernmost populations are migratory. The one to three eggs, which are white with brown spots, are laid in a crude nest; the sexes share incubation. Hatching takes place in five or six weeks.

Turkic PEOPLES, any of various peoples whose members speak languages belonging to the Turkic subfamily of the Altaic family of languages. They are historically and linguistically connected with the T'u-chüeh, the name given by the Chinese to the nomadic people who in the 6th century AD founded an empire stretching from Mongolia and the northern frontier of China to the Black Sea. With some exceptions, notably in the European part of Turkey and in the Volga region, the Turkic peoples are confined to Asia. With the exception of the Yakut of eastern Siberia and the Chuvash of the Volga region of Russia, they are all Muslim.

The Turkic peoples may be divided into two main groups: the western and the eastern. The western group includes the Turkic peoples of southeastern Europe and those of southwestern Asia inhabiting Anatolia (Asian Turkey) and northwestern Iran. The eastern group comprises the Turkic peoples of Central Asia, Kazakstan, and the Uighur Autonomous Region of Sinkiang in China. Turkic peoples display a great variety of ethnic types. Generally, those in the eastern group belong to the Asiatic geographic race, while the western peoples have more affinity to the European geographic race.

Little is known about the origins of the Turkic peoples, and much of their history even up to the time of the Mongol conquests in the 10th–13th century is shrouded in obscurity. Chinese documents of the 6th century AD refer to the empire of the T'u-chüeh as consisting of two parts, the northern and western Turks. This empire submitted to the nominal suzerainty of the Chinese T'ang dynasty in the 7th century, but the northern Turks regained their independence in 682 and retained it until 744. The Orhon inscriptions, the oldest known Turkic records (8th century), refer to this empire and particularly to the confederation of Turkic tribes known as the Oğuz; to the Uighur, who lived along the Selenga River (in present-day Mongolia); and to the Kyrgyz, who lived along the Yenisey River (in north-central Russia). When able to escape the domination of the T'ang dynasty, these northern Turkic groups fought each other for control of Mongolia from the 8th to the 11th century, when the Oğuz migrated westward into Iran and Afghanistan. In Iran the family of Oğuz tribes known as Seljuqs created an empire that by the late 11th century stretched from the Amu Darya south to the Persian Gulf and from the Indus River west to the Mediterranean Sea. In 1071 the Seljuq sultan Alp-Arslan defeated the Byzantine Empire at the Battle of Manzikert and thereby opened the way for several million Oğuz tribesmen to settle in Anatolia. These Turks came to form the bulk of the population there, and one Oğuz tribal chief, Osman, founded the Ottoman dynasty (early 14th century) that would subsequently extend Turkish power throughout the eastern Mediterranean. The Oğuz are the primary ancestors of the Turks of present-day Turkey.

Farther east, in Central Asia, the Uighurs were driven out of Mongolia and settled in the 9th century in what is now the Sinkiang region of northwestern China. Some Uighurs moved westward into what is now Uzbekistan, where they forsook nomadic pastoralism for a sedentary lifestyle. These people became known as Uzbeks, named for a ruler of a local Mongol dynasty of that name.

The Mongol conquests, which began in the early 13th century, caused a general series of movements of the Turkic peoples that continued for several centuries. The Mongols eventually brought under their domination almost all the areas held or inhabited by Turkic peoples. The Kipchak, a Turkic people who had moved from the Irtysh River southwest across Kazakstan to establish themselves in what is now southwestern Russia, were destroyed by the expanding Mongols in 1239, and the last remnants of the declining Seljuq empire in Iran were likewise subjugated. But when the Mongol empire was divided following Genghis Khan's death (1227), a process of Islāmization and Turkification ensued that resulted in the virtual absorption by the Turks of those Mongols outside Mongolian territory. The influence of the Mongol rulers diminished, and real power in Central Asia passed to their Turkic provincial governors, one of whom, Timur, was able to extend his own authority over most of southwest and parts of South Asia in the late 14th century. In the 15th century, Russian expansion south toward the Caspian Sea drove the Turkic inhabitants there eastward into what is now Kazakstan, where they are now known as Kazaks.

Because of these processes of migration, conquest, intermarriage, and assimilation, many of the Turkic peoples that now inhabit Central and Southwest Asia are of mixed origins, often stemming from fragments of many different tribes, though they speak closely related languages. Apart from the Turks of Turkey, none of the Turkic peoples can be said to have had any continuous national or political existence until the formation, after the Russian Revolution of 1917, of the various Soviet republics and, after 1955, of the Sinkiang region in China. The achievement of independence by Kazakstan, Uzbekistan, Kyrgyzstan, and Turkmenistan in 1991 was the most important political development among the Turkic peoples since the Russian Revolution of 1917.

The most numerous of the Turkic peoples, after the Turks of Turkey, are the Uzbeks of Uzbekistan and Afghanistan. Their name seems to have originated from Öz Beg, the greatest khan of the Golden Horde (*q.v.*), who embraced Islām; the name came to be applied to the Muslim ruling class of the Golden Horde.

Another numerous group are the Kazak, who are thought to have been formed from the Kipchak tribes that constituted part of the Golden Horde. Most of them live in Kazakstan; there are also a large number of Chinese Kazak in Sinkiang and neighbouring Kansu and Tsinghai provinces of China.

The Kyrgyz, whose origin is obscure, chiefly inhabit Kyrgyzstan. There is a small minority of Kyrgyz in Afghanistan and western China.

The Turkmen were until 1924 a nomadic, tribal people with no political unity. Most of them live in Turkmenistan; there are also large groups in Iran and Afghanistan and others in Iraq, Syria, and Turkey.

The Azerbaijani, who inhabit Azerbaijan and northwestern Iran, are one people; they were divided between the Russian and Persian empires in 1828 by the Treaty of Turkmanchay.

The Karakalpak, who are closely allied to the Kazak, inhabit Karakalpakstan (*q.v.*), which is a portion of Uzbekistan. The Tatars consist of two groups, those living in Tatarstan, a republic in Russia, and those inhabiting the Crimean Peninsula; the latter were deported from their homes en masse in 1944 and forcibly resettled in Uzbekistan, but since 1989 they have been returning to Crimea. The Tatars in Tatarstan are thought to be descended from indigenous Turkic tribes of the Kipchak group. It is probable, however, that they also contain Bulgarian elements.

The Bashkirs are widely dispersed in the eastern part of European Russia, where they have their own republic, and beyond the Ural Mountains. Although the Bashkir language is purely Turkic, their culture is mixed; some ethnographers believe that they were originally Hungarian.

The Karachay and Balkar of the Russian Caucasus Mountains are of uncertain origin. In the course of many centuries, they have become mixed with the Ossetes (Ossetians), from whom they are anthropologically indistinguishable. They were deported during World War II to areas in Central Asia but have since been allowed to return.

The Yakut of Siberia are classified as a Turkic people because of their language, but little is known of their origin. They are believed to have emigrated northward from the region of Lake Baikal; their culture is in some respects identifiable with that of adjoining Siberian peoples.

The Chuvash are one of the largest non-Slav communities inhabiting the Volga region of southwestern Russia. They are Russian Orthodox Christians, and only their language suggests that they are of Turkic origin.

The Uighur form the predominant population of the Sinkiang region of western China; a small number live in the Central Asian republics as well. *See also* Azerbaijani; Bashkir; Chuvash; Kazak; Kyrgyz; Tatar; Turkmen; Uighur; Uzbek; Yakut.

Turkic languages, group of closely related languages that form a subfamily of the Altaic languages. The Turkic languages show close similarities to each other in phonology, morphology, and syntax, though Chuvash, Khalaj, and Yakut differ considerably from the rest. The earliest linguistic records are Old Turkic inscriptions, found near the Orhon River in Mongolia and the Yenisey River valley in south-central Russia, which date from the 8th century AD.

Classification. The Turkic languages may be classified according to linguistic, historical, and geographic criteria into the following branches:

1. The southwestern, or Oğuz, branch includes Turkish (Ottoman Turkish), Gagauz, Azeri (Azerbaijani), Turkmen, and Khorāsān Turkic.

2. The northwestern, or Kipchak, branch includes Kazak, Karakalpak, Nogay, Kyrgyz, Tatar, Bashkir, West Siberian dialects, Crimean Tatar, Kumyk, Karachay-Balkar, and Karaite.

3. The southeastern, or Uighur-Chagatai, branch includes Uzbek, Uighur, Yellow Uighur, and Salar (of Oğuz origin).

4. The northeastern, or Siberian, branch includes Yakut (Sakha), Dolgan, Altay, Khakas, Shor, Tuvan, and Tofa.

5. Chuvash, a strongly divergent language of the Volga region.

6. Khalaj, a strongly divergent language of central Iran.

The development of distinct Turkic literary languages began in the 8th century in Central Asia. The Uighur literary language flourished in the 9th–14th century, and the Qarakhanid literary language came into existence in the 11th century. Khwārezmian (13th–14th century) and Chagatai (15th–16th century), the latter with its postclassical products of the 17th–19th century, were the antecedents of the modern Uzbek and Uighur (New-Uighur) literary languages. In the Oğuz group, Turkish has the most significant literary tradition. Its antecedent is the Ottoman Turkish language, which developed from the Old Anatolian Turkish literary language (13th–15th century) of the Seljuq Turks, the first Turkish conquerors of Anatolia (11th century).

The Arabic script was generally used by all Turkic peoples writing Turkic languages until the early 1920s, when the Latin script began to be introduced to the Turkic peoples of the Soviet Union. After 1939 the Latin script was almost completely replaced in the Soviet Union by modified forms of the Cyrillic alphabet. Turkey officially adopted a Latin script in 1928. Currently, the Arabic alphabet is used only by Turkic peoples living in China, Iran, and the Arab countries.

Linguistic characteristics. One notable characteristic of the Turkic languages is vowel harmony. The vowels are of two kinds—front vowels, which are produced at the front of the mouth (*e,i,ö,ü*), and back vowels, produced at the back of the mouth (*a,ı,o,u*). Purely Turkic words can contain only all front or all back vowels, and all suffixes and affixes must conform to the vowel of the syllable preceding them in the word. Thus, Turkish *kül* 'ash,' *kül-ler* 'ashes,' *kül-ler-i* 'its ashes,' *kül-ler-in-den* 'from its ashes,' as opposed to *kul* 'slave,' *kul-lar* 'slaves,' *kul-lar-ı* 'his slaves,' *kul-lar-ın-dan* 'from his slaves.' Besides this "palatal harmony," most Turkic languages also adopt a "labial harmony" between syllables with respect to rounded and unrounded vowels. Only

rounded vowels may occur after an initial rounded vowel in a word, with the same pattern holding true for unrounded vowels—*e.g.,* Turkish *pul-u* 'his stamp,' versus *pil-i* 'his battery.' These harmony rules vary considerably across the various languages. Due to foreign influence, harmony is phonetically differently realized, though far from lost, in the Karaite, Gagauz, and Uzbek languages.

The morphology of the Turkic languages is agglutinative; i.e, it offers rich possibilities of expanding word stems by means of relatively unchangeable suffixes, many of which designate grammatical notions. For example, the word *evlerimde* 'in my houses' is composed of *ev* 'house,' *ler* = plural suffix, *im* = possessive suffix 'my,' and *de* = locative suffix 'in.' When attached to a word with back vowels, such as *oda* 'room,' these suffixes change their vowels according to the law of vowel harmony but retain their meaning: *odalarımda* 'in my rooms.'

The Turkic languages mostly lack subordinative conjunctions and relative pronouns, using verbal nouns, participles, and converbs instead. Thus the sentence 'I know that the person who had come went away' is rendered in Uzbek *Kelgän kišining ketgänini bilämän,* literally 'Having-come person-of having-gone-his know-I.'

Turkish bath, kind of bath that originated in the Middle East and combines exposure to warm air, then steam or hot-air immersion, massage, and finally a cold-water bath or shower. The Turkish bath typically requires movement from one room or chamber to the next. Separate wash rooms and soaking pools may be included in the bath building, as are dressing and rest rooms. The Turkish bath has been used for weight reduction, cleansing, and relaxation purposes.

Authorities believe the Turkish bath originally combined some massage and cosmetic aspects of East Indian bathing with Roman plumbing techniques, but it also had distinctive features. A description from 1699 points out an environmental difference: instead of a high-windowed, light-flooded tepidarium (warm room), the Turkish bath had "cupolas sparsely pierced by the glow of coloured bullions, or . . . stalactite cupolas in the smaller rooms. Half-light, quiescence, seclusion from the outside world are preferred."

Christian crusaders returning from wars in the Middle East brought the Turkish bath concept back to western Europe. Europeans at the time, however, could not easily supply the great quantities of hot water that were required for a Turkish bath, so the bath did not become popular in Europe until much later. It survives today in the United States, western Europe, Turkey, and many other countries and regions. Many baths, including those in Turkey, have special days for men and women. The Turkish bath may be a weekly or monthly practice that is used in addition to the more frequent tub bath or shower.

Turkish crescent (musical instrument): *see* jingling Johnny.

Turkish language, Turkish TÜRKÇE, or TÜRKİYE TÜRKÇESI, the major member of the Turkic language family, which is a subfamily of the Altaic languages. Turkish is spoken in Turkey, Cyprus, and elsewhere in Europe and the Middle East. With Gagauz, Azeri (Azerbaijani), Turkmen, and Khorāsān Turkic, it forms the southwestern, or Oğuz, branch of the Turkic languages.

Modern Turkish is the descendant of Ottoman Turkish and its predecessor, so-called Old Anatolian Turkish, which was introduced into Anatolia by the Seljuq Turks in the late 11th century AD. Old Turkish gradually absorbed a great many Arabic and Persian words and even grammatical forms and was written in Arabic script. After the founding of the Turkish republic in 1923, the Arabic script was replaced by the Latin alphabet (1928). The reform of the language was initiated and supported by the Turkish republican government. In spite of disputes and resistance, the movement contributed greatly to purifying the Turkish vocabulary of foreign elements. An essentially new literary language emerged, and the older one soon became obsolete.

From the point of view of linguistic development, four periods of Turkish may be differentiated: Old (Anatolian and Ottoman) Turkish, 13th–16th century; Middle (Ottoman) Turkish, 17th–18th century; Newer (Ottoman) Turkish, 19th century; and Modern Turkish, 20th century.

Turkish morphology is subject to sound harmony, of which palatal and labial vowel harmony is the most salient feature. Palatal harmony is based on a distinction between front vowels (*e, i, ö, ü*) and back vowels (*a, ı, o, u*). As a rule, all the vowels of a word belong to the same class (back or front)—*e.g., sazgı* 'bandage,' *sergi* 'exhibition'—and the vowels of suffixes vary according to the class of vowels in the primary stem—*e.g., ev-de* 'in the house,' but *oda-da* 'in the room.' In morphology Turkish is marked by its tendency to expand the primary stem with different suffixes, of which many designate grammatical notions. Thus *parasızlıklarından* 'because of their poverty' is composed of *para* 'money,' *-sız* '-less,' *-lık* '-ness,' *-lar* = plural, *ı(n)* = possessive, *-dan* = ablative 'from, due to.'

Syntactically, Turkish, like other Turkic languages, tends to use constructions with verbal nouns, participles, and converbs in cases where English would use constructions with subordinative conjunctions or relative pronouns—*e.g., geleceğini biliyorum* 'I know that (s)he will come' (literally 'come-[future]-its-[accusative] know-[present]-I'), *otelde kalan dostumuz* 'our friend who is staying in the hotel' (literally 'hotel-in staying friend-our'), and *gülerek girdi* '(s)he entered laughing' (literally 'laughing enter-[past]-(s)he').

Turkish literature, writings of all the Turkish peoples, in several languages and over a period of some 12 centuries.

A brief treatment of Turkish literature follows. For full treatment, *see* MACROPAEDIA: Islāmic Arts.

Turkish literature can be divided into three main periods: the purely Turkish period before the conversion of the Turks to Islām, covering approximately the 8th to the 11th century AD; the period of Islāmic culture, from the 11th to the mid-19th century, when Arabic and Persian influences were strong; and the modern period, from the accession of Sultan Abdülmecid I in 1839, when the influence of Western thought and literature became predominant.

The Pre-Islāmic period. The oldest literary legacy is to be found in the Orhon inscriptions (*q.v.*), discovered in the valley of the Orhon River, northern Mongolia, in 1889 and deciphered in 1893 by the Danish philologist Vilhelm Thomsen. They are carved in a script used also for inscriptions found in Mongolia, Siberia, and western Turkistan and called by Thomsen "Turkish runes." They relate in epic and forceful language the origins and ancient history of the Turks. Their polished style suggests considerable earlier development of the language.

The Islāmic period. With conversion to Islām, the Turks gradually adopted Arabo-Persian metres and literary traditions. Linguistically there arose three traditions. First, the Chagatai language of the eastern Turks was used mainly in Central Asia, by the Golden Horde; in Egypt; and in the Indian courts of the Mughal period. Lacking a political and literary centre, it was influenced by local spoken dialects. 'Alī Shir Navā'ī and the Mughal emperor Babur were among the great classical writers in this dialect. The second tradition centred on Azeri, the literary language of the eastern Oğuz in western Persia, Iraq, and eastern Apatolia before the Ottoman conquest. Seyid İmadeddin Nesimi is its first outstanding representative; his poems have rare beauty and religious feeling. Shah Ismā' il, founder of the Şafavid dynasty of Persia, had a lasting influence on popular religious literature in Anatolia. His poems, a blend of religious emotion and political propaganda, preach the Shi'ite doctrine. Mehmed bin Süleyman Fuzuli, the greatest representative of the classical school, influenced Azeri and Ottoman poets of all succeeding generations.

The third and most prolific Turkish literature was written in Anatolian, or Ottoman, Turkish, the language of Anatolian Seljuqs and of the Ottoman Empire after the 13th century. In the earliest, preclassic period, spanning the 14th and 15th centuries, the influence of the Persian classics was paramount. But by the mid-15th century, with the establishment of the Turks in Istanbul, the golden age of Turkish letters began, lasting through the 17th century. The Persian classics were no longer mechanically imitated but had been fully assimilated, enabling Turkish poets to evolve a genuine classical poetry that bore the imprint of their own individuality. A price had to be paid, however, for this assimilation. The Turkish language lost some of its purity by accepting many Persian and Arabic words and constructions. As a result, Turkish literature was restricted to a small educated class. The two greatest poets among the many splendid poets of this era were Fuzuli and Bāki. The prose of the classical period also showed great variety—with folktales, half-religious and half-epic narratives, belles lettres written in a rather heavy and artificial style, and, particularly, the work of the chroniclers, who were masters of classical prose. Notable in the postclassic period, beginning in the 18th century, was Ahmed Nedim, who sang in colourful poems of the so-called Tulip Age of Istanbul under the sultan Ahmed III. In the second half of the century, Gālib Dede, the last great classical author, wrote the original mystical romance *Hüsn ü Aşk* ("Beauty and Love").

The modern period. In the 19th century the introduction of Western reforms had its effect on literature. Mainly under French influence, various writers adopted and adapted Western literary forms, such as the novel, the drama, and the essay, while the rigid forms and attitudes of classical poetry gradually went out of fashion in the country. In the 20th century a Turkish nationalist literature flourished, and an especially rich and varied literature developed after Kemal Atatürk's reforms. Particularly after the 1930s, a fundamental change began to take place; for the first time, a native and original literature began to develop. Unlike the preceding literary schools, which dealt only with the life and problems of the upper and middle classes of the old capital of Istanbul, republican literature—such as that of Yashar Kemal—was increasingly concerned with the problems and destiny of the people in every part of Turkey.

Turkish style, also called MOORISH STYLE, a fashion of furniture and decorative design based on Middle Eastern styles that flourished from the latter half of the 19th century until the late 1920s. It was favoured especially for the men's smoking rooms once found in every gentleman's residence, then for clubs, and finally, when they proliferated at the turn of the century, for cafés and restaurants. The style may have originated in the tendency to associate tobacco with the Middle East, but, more fundamentally, it was part of a nostalgia for the exotic as expressed partly in ideas

culled from the Muslim world that had first manifested themselves in poetry and painting much earlier in the century. Closely associated with this romanticism was the notion that decor of this kind was somehow raffish and provided a suitable setting for any form of male self-indulgence.

With a velvet smoking cap, based on the tarboosh worn by Muslim men, the 19th-century man-about-town smoked his cigar in surroundings of this kind, assured that he was playing the role of a hedonistic sheikh, of the kind later to be popularized by the film actor Rudolph Valentino. Later, cafés, too, began to assume this kind of decorative flavour—emphasized by the fact that they served coffee. During this period, private homes frequently had a Turkish corner, with mats, a divan, and small tables heavily inlaid with Arabic designs. Fretted Saracenic arches, bead curtains, potted palms, and heavily sprung ottomans were other characteristic features.

Turkistan, also spelled TURKESTAN, in Asian history, the regions of Central Asia lying between Siberia on the north; Tibet, India, Afghanistan, and Iran on the south; the Gobi (desert) on the east; and the Caspian Sea on the west. The term was intended to indicate the areas inhabited by Turkic peoples, but the regions also contained peoples who were not Turkic, such as the Tajiks, and excluded some who were, including the Turks of the former Ottoman Empire and the Turko-Tatar peoples of the Volga River area. The total area of more than 1,000,000 square miles (2,600,000 square km) was divided by the Pamir and Tien Shan ranges between West Turkistan (Russian)—covering present-day Turkmenistan, Uzbekistan, Tajikistan, Kyrgyzstan, and the southern part of Kazakstan—and East Turkistan (Chinese), formerly the province of Sinkiang and now the Uighur Autonomous Region of Sinkiang. For a time after the mid-1920s West Turkistan was known as Soviet Central Asia (administratively excluding Kazakstan).

Early history. Turkistan may be said to have entered history with the conquest of Kashgaria by the Huns at the beginning of the 2nd century BC. After the breakup of the Hun empire, East Turkistan was annexed by the Chinese. About AD 400 the Hephthalites created an empire in West Turkistan. During the 6th century the Turks first appeared and established themselves in Transoxiana, consisting of the lands east of the Amu Darya (ancient Oxus River).

Transoxiana was conquered by the Arabs in the 8th century and attained its greatest prosperity under their successors, the Persian Sāmānid dynasty. About the same time the Uighurs from Mongolia occupied East Turkistan, where they have remained the majority population. The whole of Turkistan was under various Turkic rulers until the appearance of the Mongols under Genghis Khan, who occupied Transoxiana in 1220. Genghis Khan assigned Turkistan to his second son, Chagatai, whose descendants eventually divided into two branches, the khans of Transoxiana and those of East Turkistan. In 1369 Timur conquered Transoxiana and made Samarkand the capital of his empire. After his death there were rival claimants to his territories; and in 1500 the Uzbek chief, Muḥammad Shaybānī Khan, supplanted the Timurid dynasty in Transoxiana. After a century of uncertain rule, the Shaybānids were displaced by the Ashtarkhanid (or Astrakhan) dynasty, which was in turn overthrown by Nādir Shāh in 1740. During the next century, West Turkistan was mainly controlled by the three rival khanates of Bukhara, Khiva (Khorezm), and Kokand.

In East Turkistan the rule of the Chagatai khans gave way in the northeast to the Dzungar branch of the western Mongols, or Kalmyks, while the southwestern oases were ruled by the religious aristocracy known as the Khojas. All of East Turkistan was annexed by the Ch'ing (Manchu) dynasty of China in 1762, and thereafter its history developed independently from that of West Turkistan.

Russian penetration. During the 18th century, Russia penetrated deeply into what is now Kazakstan; and by the mid-19th century it had established itself on the northern frontiers of Turkistan and held a line of forts running roughly east and west, on both sides of the Aral Sea. Between the 1850s and the 1880s economic and strategic considerations impelled the Russian government to bring the whole of West Turkistan under its control, only the khanates of Bukhara and Khiva being left partially independent under their traditional rulers. The imposition of Russian rule brought peace to West Turkistan and also a number of improvements in the economy, communications, and irrigation. The government interfered very little in the traditional life of the people and largely ignored their education, with the result that at the outbreak of the Russian Revolution of 1917 illiteracy stood at about 97 percent. During Pyotr Stolypin's administration (1906–11), the colonization of Turkistan from European Russia was greatly hastened, and a large number of Russians and Ukrainians entered the region. The preferential land and water rights given to these new settlers was a root cause of the 1916 revolt, which was precipitated by the decision to recruit military labour units from the local population, previously exempt from compulsory military service. The revolt was put down with great severity, thus to some extent predisposing the population in favour of the forthcoming Soviet regime.

Nationalist stirrings that occurred prior to the Revolution of 1917 were aimed at cultural and judicial recognition rather than at political separation from Russia. The Russian Civil War after the revolution resulted in some genuine nationalist uprisings, but West Turkistan eventually came under Soviet control. The policy of Soviet leaders Vladimir Lenin and Joseph Stalin toward the region involved the precise categorization of nationalities and culminated in the administrative redistribution of 1924, which led to the establishment of a union republic for each of the five main peoples (the Uzbeks, Turkmen, Kyrgyz, Tajiks, and Kazaks). All five of these republics gained their independence when the Soviet Union collapsed in 1991.

Although East Turkistan, or Sinkiang, had been under Chinese dominion since 1762 and a province of China since 1884, Russian influence was considerable there in the second half of the 19th century. Russian forces occupied Kuldja (I-ning) and the Taranchi sultanate from 1871 to 1881. Russian influence increased after the collapse of the Ch'ing dynasty in 1912 and particularly after the consolidation of the Soviet regime in West Turkistan.

Uighur Autonomous Region of Sinkiang. After 1912 Sinkiang was under the rule of warlords, but in 1942 the governor, Shen Shih-tsai, declared his allegiance to the Chinese government. After a succession of revolts against Chinese authority, mainly in the north, a measure of autonomy was granted. With the establishment of the People's Republic of China in 1949, Sinkiang allegedly recognized the authority of the communist regime and in 1950 was occupied by the Chinese People's Liberation Army. In 1955 the communist government announced the creation of the Uighur Autonomous Region of Sinkiang, within which certain non-Chinese national communities other than the Uighur were given a degree of regional autonomy. The Soviet Union relinquished its joint ownership of oil, metallurgical, and other enterprises, and Soviet influence virtually came to an end.

Turkistan Range, also called TURKESTAN MOUNTAINS, mountain range in Kyrgyzstan, Tajikistan, and Uzbekistan. Branching off from the Alay Mountains, it extends for 200 miles (320 km) east-west between the Fergana and Zeravshan valleys. Its highest point is Piramidalny Peak (18,077 feet [5,510 m]). The range is composed mainly of schists, sandstones, and limestones. Below the snow line, groves of trees grow on the northern slopes, while the drier, sheer southern slopes are almost devoid of vegetation. In Tajikistan the road between Ura-Tyube (Ūroteppa) and Dushanbe crosses the Shakhristan Pass at 11,083 feet (3,378 m).

Turkmen, also spelled TURKOMAN, or TURCOMAN, people who speak a language belonging to the southwestern branch of the Turkic languages. The majority live in Turkmenistan and in neighbouring parts of Central Asia and numbered more than 3 million by the end of the 20th century. About one-third of the total population lives in Iran, especially in the north, and another 400,000 live in northeastern and northwestern Afghanistan. These groups are called the Transcaspian Turkmen. Pockets of Turkmen are found in northern Iraq and Syria. Smaller groups live in central Turkey, where they have experienced minority discrimination, especially after 1958.

The territory of the Turkmen is generally arid. They were by tradition a nomadic pastoral people, living in tent villages and raising sheep, goats, horses, camels, asses, and cattle. With the help of irrigation and fertilizers, those Turkmen who were under Soviet rule took up agriculture, and their stock breeding is no longer nomadic. Outside the Soviet Union some Turkmen continued their nomadic pastoral life. An important adjunct to the economy is rug weaving. For the Transcaspian Turkmen, government control began in Iran in 1925 at the order of Reza Shah Pahlavi of Iran. Flight into the Soviet Union was in vain, and they fled back. Many added cotton farming and fishing to their pastoralism. Later many of the Turkmen in the Soviet Union fled to Afghanistan.

Turkmen social organization is based on descent in the paternal line. Although most of the Central Asian Turkic peoples were divided into a noble and a common stratum, the Turkmen had a division according to economic function, herding carrying more prestige than farming. At the head of each division was a khan (ruler). This mode of organization no longer exists among those Turkmen who lived under Soviet rule but continues elsewhere.

The Turkmen are Muslims but, like most Turkic nomads, are not as deeply influenced by Islām as are the sedentary Turks.

Turkmen language, member of the Turkic language family, which is a subfamily of the Altaic languages. Turkmen is spoken in Turkmenistan, in parts of neighbouring Kazakstan and Uzbekistan, and, by fewer people, in Iran and Afghanistan.

Turkmen is a member of the southwestern, or Oğuz, branch of the Turkic languages. Its literary tradition dates back to the 14th century AD. Later, Turkmen writers began to use the Chagatai literary language of the southeastern (Chagatai) Turkic language branch. In the 18th and 19th centuries an exclusively Turkmen literary language began to emerge. A new development began after the Russian Revolution of 1917 with the introduction of a literary language based on spoken Turkmen. The language was written with the Arabic alphabet before 1927, when the Latin alphabet (as modified for the Turkish language) was adopted. In the Soviet Union the Latin alphabet was replaced by a Cyrillic alphabet in 1940. *See also* Turkic languages.

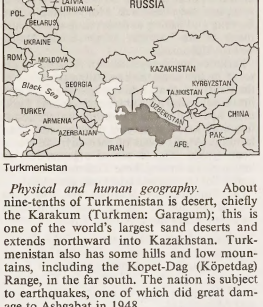
Turkmenbashi, formerly KRASNOVODSK, port city, western Turkmenistan. It lies on the eastern shore of the Caspian Sea, at the foot of the Kopet-Dag (Turkmen: Köpetdag) Range. It was founded in 1869 as a Russian fort, and its importance was enhanced when the terminus of the Transcaspian Railway was transferred there in 1896.

Today Turkmenbashi is an important transshipment centre and terminus of the Central Asian Railway, and it has a rail-ferry link to Baku, Azerbaijan. An oil refinery and a petrochemical industry in the city are linked by pipelines to Nebit-Dag (Nebitdag), Koturdepe (Goturdepe), and other oil and gas fields nearby. There are also ship-repair yards, a clothing factory, and various food-processing industries. Pop. (1991 est.) 59,500.

Turkmenistan, Turkmen TÜRKMENISTAN, country of Central Asia that gained independence from the Soviet Union in 1991. Turkmenistan is bounded by Kazakhstan on the northwest, Uzbekistan on the north, northeast, and east, Afghanistan on the south and southeast, and Iran on the south and southwest. The Caspian Sea forms the western border. The capital is Ashgabat (Ashkhabad). Area 188,500 square miles (488,100 square km). Pop. (1994 est.) 4,044,000.

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

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



Turkmenistan

Physical and human geography. About nine-tenths of Turkmenistan is desert, chiefly the Karakum (Turkmen: Garagum); this is one of the world's largest sand deserts and extends northward into Kazakhstan. Turkmenistan also has some hills and low mountains, including the Kopet-Dag (Köpetdag) Range, in the far south. The nation is subject to earthquakes, one of which did great damage to Ashgabat in 1948.

Turkmenistan has a dry and harshly continental climate, with hot summers and cold winters. The temperature is seldom lower than 95° F (35° C) during summer days, but in winter the temperature can drop to −27° F (−33° C). Rainfall is very meagre, amounting to 3 inches (80 mm) annually in the deserts and 12 inches (300 mm) in mountainous areas. Irrigation is consequently very important for the country's agriculture.

Most of Turkmenistan's rivers flow in the east, away from the country's scant fertile lands, which lie chiefly in the south, northeast, and west. The main rivers are the Amu Darya (ancient Oxus), which flows along the northeastern border to the Aral Sea, and the Tedzhen (Tejen) Morghāb (Murgab, or Murgap), and Atrek in the south. Many irrigation canals and reservoirs have been built, including the Karakum Canal, which runs from the Amu Darya westward to the Caspian Sea for a distance of 870 miles (1,400 km).

Turkmenistan's vegetation is of a pronounced desert character except for that of the oases and the mountains, where wild grape, almond, fig, and walnut are found. Along riverbanks are found stands of black poplar, willow, and reeds and canes.

Turkmenistan's people live mainly in oasis regions situated along the waterways or in the mountains. The city of Ashgabat is the chief centre of the Kopet-Dag oasis strip in the south. The Turkmen, who make up more than 70 percent of the country's population, are a Turkic people who speak a language belonging to the Oğuz, or southwestern, branch of that language group. They are overwhelmingly Muslim in religion. Russians make up about 10 percent of the population, followed by Uzbeks, Kazakhs, Tatars, Ukrainians, and Armenians. The population of Turkmenistan has a high natural rate of increase, owing to a high birth rate and a low mortality rate.

The Turkmen were a nomadic, pastoral people organized into tribes when they were conquered by tsarist Russia in the 19th century. They ceased to be nomads under Soviet rule, and by 1930 their economy had been radically reconstructed. The republic now specializes in cotton growing and in oil and natural gas extraction. Western Turkmenistan fronting the Caspian Sea is the most industrially developed part of the republic, emphasizing oil extraction and refining, chemical and mining industries, and fisheries and fish processing. The Karakum portion of the desert near the city of Mary has major reserves of natural gas. The country's light industries centre on the production of silk, cotton, and wool fibres and fabrics and on the weaving of Turkmen carpets. The cultivation of cotton and the raising and breeding of Karakul sheep and horses and camels are the main agricultural pursuits. The oasis strip along the middle Amu Darya River in eastern Turkmenistan is a major centre for the raising of silkworms and cotton.

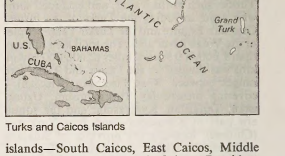
During the Soviet period Turkmenistan's governmental structure was similar to that of other Soviet republics, with the Turkmen Communist Party (TCP) holding de facto power. The TCP was renamed the Democratic Party of Turkmenistan in 1991 and continued to hold power after independence. The government of Turkmenistan—a republic with one legislative house (Majlis)—remains more authoritarian than those functioning in the other newly independent Central Asian republics. Health facilities in the country have greatly improved during the 20th century. Education is free and compulsory between ages 7 and 17, and there are vocational schools and institutions of higher education.

History. The area of Turkmenistan has yielded the earliest traces of human settlement in Central Asia, dating back to Paleolithic times. The Turkmen probably entered the area in the 11th century AD and subsequently came under the rule of the Seljuqs and the Mongols. Until the early 20th century the Turkmen were organized solely by tribes, which fought each other when they were not in conflict with other peoples. Dispersed over much of Central Asia, the Turkmen were well known as mercenaries and as robbers of caravans until their final conquest by the Russians in the 19th century. The first Russian incursion into the area, in 1717, was unsuccessful, but in 1869 a foothold was established. The Russians assumed complete control of the region after breaking Turkmen resistance at the Battle of Gök-Tepe in 1881. In that year they created the Transcaspian *oblast* (province), which became part of the governorate-general of Turkistan in 1899. Meanwhile the Turkmen clung to their nomadic lifestyle under Russian rule. The Bolsheviks established control over the area in 1920.

Under the Bolsheviks, the Transcaspian *oblast* was renamed the Turkmen *oblast* in 1921, and in 1924 the Turkmen Soviet Socialist Republic was assembled from the Turkmen *oblast* and the Turkmen districts of the former Khorezmian and Bukharan republics. The Turkmen S.S.R. became part of the Soviet Union in 1925. In 1990 the parliament of the Turkmen S.S.R. passed a resolution claiming sovereignty, and the country gained full independence from the Soviet Union in 1991 under the name Turkmenistan.

Turkoman (people): *see* Turkmen.

Turks and Caicos Islands, British dependency in the West Indies, comprising two small groups of islands at the southeastern end of The Bahamas and about 90 miles (145 km) north of the Dominican Republic. The Turks group is the smaller of the two and consists of Grand Turk, Salt Cay, and lesser cays. The Caicos group consists of six principal



Turks and Caicos Islands

islands—South Caicos, East Caicos, Middle (or Grand) Caicos, North Caicos, Providenciales, and West Caicos—and several cays. The seat of government is at Cockburn Town on Grand Turk Island. Area 193 square miles (500 square km). Pop. (1993 est.) 13,400.

For information about regional aspects of the Turks and Caicos Islands, *see* MACROPAEDIA: West Indies.

The land. The islands are geographically an extension of The Bahamas chain and are of similar geologic composition. Elevations do not reach more than 250 feet (75 m). The 22-mile- (35-kilometre-) wide Turks Islands Passage separates the Turks group on the east from the Caicos group on the west. The islands are surrounded by coral reefs. They have a warm, pleasant, and rather dry climate, with temperatures ranging from 75° to 90° F (24° to 32° C) during the year. Rainfall averages only 21 inches (533 mm) annually, and drinking water is scarce. The surrounding waters are rich in sea life, abounding especially with crustaceans.

The people. More than 90 percent of the inhabitants of the Turks and Caicos Islands are blacks, the descendants of African slaves. The remainder of the population is either racially mixed or white. The official language is English, and the Protestant denominations have the largest church memberships. Of the eight Turks islands, only two, Grand Turk and Salt Cay, are inhabited. The main populated islands of the Caicos are South Caicos, Middle Caicos, North Caicos, and Providenciales. The most populous island is Grand Turk, and the two main communities are Cockburn Town on that island and Cockburn Harbour on South Caicos.

The economy. Because of limited natural resources, the main industries on Turks and Caicos are tourism, offshore financial services, and fishing (mainly lobster and conch, which are exported). Salt production, once the economic mainstay of the islands, became unprofitable and ceased in 1964.

The islands' road network extends for only about 75 miles (120 km), and Grand Turk, Providenciales, and South Caicos have some surfaced roads. The chief ports are Grand Turk, Salt Cay, Providenciales, and Cockburn Harbour on South Caicos. International airports operate on Grand Turk, South Caicos, Providenciales, and North Caicos.

Government and social conditions. The Turks and Caicos Islands are a British crown colony administered in accordance with the 1976 constitution (amended 1988). The British monarch is the head of state and is represented by a governor, who has executive power. The governor is president of, and is advised by, the Executive Council, which includes the various ministers. The Legislative Council comprises both appointed and elected members, including a speaker who is elected.

Living conditions on the islands are generally poor. Unemployment is often severe, and such basics as fresh water and electricity have limited availability. Nevertheless, health on the islands is good; a modern cottage hospital operates on Grand Turk, and there are outpatient and dental clinics on the other populated islands. Education is free and is compulsory at the primary level; the government also provides secondary education, and most of the people are literate. A government-owned radio station broadcasts out of Grand Turk, and cable television is available.

History. There is evidence that a primitive culture once existed on Turks and Caicos. At the time of the Spanish explorer Juan Ponce de León's arrival in 1512, the islands were inhabited by Indians. They remained unsettled by Europeans until 1678, when British settlers from Bermuda established a salt-panning industry. The islands were at first placed under The Bahamas government, but in 1874 they were annexed to the colony of Jamaica, remaining a part of that territory until 1959. In that year they received a new constitution providing for separate government, and in 1962 the islands became a crown colony. The Bahamas governor was also the governor of Turks and Caicos from 1965 until 1973, when the islands received their own governor. In 1976 a new constitution took effect, and elections were held establishing a ministerial type of government. Some efforts toward independence were made in the early 1980s, but these ceased in 1985–86 when scandals forced the governor to dissolve the executive council and assume administrative control. In 1988 elections were held to restore representative rule.

Turku, Swedish Åbo, city, capital of Turku ja Pori *lääni* (province), southwestern Finland, at the mouth of the Aura River, west-northwest of Helsinki. Finland's oldest city, it was originally a trading centre a few miles north of its present site, to which it was transferred at the beginning of the 13th century. It received its first known charter in 1525. The Court of Appeals was set up there in 1623, as was a university in 1640 (transferred to Helsinki in 1828). Finland's capital under Swedish and then Russian rule until 1812, Turku was almost entirely destroyed by fire in 1827. The city was rebuilt according to plans by the architect Carl Ludwig Engel, but it was again damaged during World War II. Turku remains an important industrial and cultural centre. It is Finland's fifth largest city and largest winter port and contains a major tobacco factory and important naval shipyards. Industries include sugar refining and production of steel, lumber, flour, pottery, and textiles.

A bilingual city, Turku has universities for Swedish speakers (established 1918) and Finnish speakers (1920), several specialized institutes of higher education, art galleries, libraries, and museums. It is the seat of the archbishop of the Evangelical Lutheran Church of Finland. Historical sites include a cathedral (consecrated 1290, enlarged in the 16th century); a medieval castle, now a museum; a Swedish Theatre (1838); and a Greek Orthodox church (1846). Pop. (1994 est.) 160,390.



The medieval castle at Turku, Fin.
Art Resource

Turku ja Pori, in full TURUN JA PORIN, Swedish ÅBO OCH BJÖRNEBORGS, *lääni* (province), southwestern Finland, northwest of Helsinki, bounded by the Gulf of Bothnia to the west and southwest. Turku ja Pori includes numerous small lakes; the Kokemaen River is the principal waterway, with the port of Pori near its mouth. The land is generally level and fertile. Agriculture and dairying are important, as are timber processing and the manufacture of wood products. Along the coast and on the numerous offshore islands, farming dominates the local economy. Turku ja Pori's administrative capital, Turku, at the mouth of the Aura River, is the province's chief seaport and industrial centre. Rauma (Raumo), Pori, Salo, and Uusikaupunki (Nystad) are other industrial towns and seaports. The main horticultural-research station in Finland is at Pikkiö (Pikis). Area 7,705 square miles (19,955 square km). Pop. (1993 est.) 731,792.

Turloch O'CONNOR, also spelled TURLOUGH O'CONOR, Old Irish TOIRDELBACH UA CONCHUBAIR (b. 1088, Connaught, Ire.—d. 1156), king of Connaught and from 1121 the most powerful Irish prince. In 1118 he divided Munster into two coequal kingdoms; in 1125 he deposed the king of Meath and appointed three kings in his stead; in 1126 he made his son Conchobar king of Dublin and Leinster; and in 1129 he built Ireland's first castle, on the River Shannon at Athlone.

Turlock, city, Stanislaus county, central California, U.S., in the San Joaquin Valley, 40 miles (64 km) southeast of Stockton. It was founded (*c.* 1860) by John Mitchell, a grain farmer. After the Central Pacific Railroad came through the valley in the 1870s, Turlock (from the Irish *turlough,* "dry lake") became a shipping point for wheat. In 1901 Turlock Irrigation District transformed the dry farming of the valley into diversified farming (fruit growing, poultry raising, dairying). Food processing is supplemented by warehousing and light manufacturing. California State University, Stanislaus (1957), is in the city. Turlock Lake State Park is to the east. Inc. 1908. Pop. (1992 est.) 45,743.

turmeric (*Curcuma longa*), perennial herbaceous plant of the ginger family (Zingiberaceae), the tuberous rhizomes, or underground stems, of which have been used from antiquity as a condiment, a textile dye, and medically as an aromatic stimulant. In biblical times it was used as a perfume as well as a spice. In the Middle Ages it was called Indian saffron because of its orange-yellow colour. The rhizome has a pepperlike aroma and a somewhat bitter, warm taste. It is the ingredient that colours and flavours prepared mustard and is used in curry powder, relishes, pickles, spiced butters for vegetables, in fish and egg dishes, and with poultry, rice, and pork. In parts of Asia turmeric water is applied as a cosmetic to lend a golden glow to the complexion.

Native to southern India and Indonesia, turmeric is cultivated on the mainland and in the islands of the Indian Ocean. Production involves a boiling process, which is followed by exposure of the rhizomes to sunlight for five to seven days to dry. Then they are polished by hand rubbing or by rotation in a mounted drum. Dried rhizomes vary from about 2.5 to 7.5 cm (1 to 3 inches) in length. The spice is usually sold in ground form. Distillation yields 1.3 to 5.5 percent essential oil, the main



Turmeric (*Curcuma longa*)
W.H. Hodge

components of which are turmerone and *ar*-turmerone. The colouring matter is curcumin.

Paper tinged with a tincture of turmeric, on addition of alkali, turns from yellow to reddish brown, becoming violet on drying, thus providing a test for alkalinity.

Turnbull, Herbert Westren (b. Aug. 31, 1885, Tettenhall, Wolverhampton, Eng.—d. May 4, 1961, Grasmere, Westmoreland), English mathematician who made extensive and notable contributions to the study of algebraic invariants and concomitants of quadratics.

After serving as lecturer at St. Catharine's College, Cambridge (1909), the University of Liverpool (1910), and the University of Hong Kong (1912), Turnbull became master at St. Stephen's College in Hong Kong (1911–15), and warden of the University Hostel (1913–15). He was a fellow at St. John's College, Oxford (1919–26), and from 1921 held a chair of mathematics at United College of St. Salvator and St. Leonard, St. Andrews.

Turnbull became an outstanding contributor to the symbolic calculus of German mathematicians Rudolf Clebsch and Paul Gordan. His major works include *The Theory of Determinants, Matrices, and Invariants* (1928), *The Great Mathematicians* (1929), *Theory of Equations* (1939), *The Mathematical Discoveries of Newton* (1945), and *An Introduction to the Theory of Canonical Matrices* (1945), which was cowritten with A.C. Aitken.

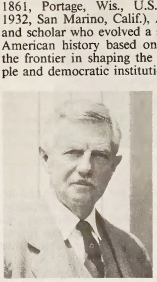
Turner, Big Joe, byname of JOSEPH VERNON TURNER (b. May 18, 1911, Kansas City, Mo., U.S.—d. Nov. 24, 1985, Englewood, Calif.), black American blues singer, or "shouter," whose records were imitated by white musicians in the early days of rock and roll.

Singing in his youth in church choirs and informally for tips, Turner drew attention as a singing bartender, accompanied by pianist Pete Johnson, in Kansas City saloons. Discovered by jazz critic John Hammond, Turner, with his convincing baritone voice, was taken to New York City for the 1938 Carnegie Hall "Spirituals to Swing" concert and stayed on

to become a popular attraction, with boogie-woogie piano accompaniment, at New York nightclubs. He began recording with top jazz musicians and touring the United States and Canada, sometimes with blues players or Count Basie's orchestra. In 1951 he made a top-selling rhythm-and-blues record, "Chains of Love," and followed it with "Sweet 16," "Honey, Hush," "Shake, Rattle and Roll," and "Flip, Flop and Fly," which were rerecorded by young white musicians, notably Bill Haley, using censored lyrics. Turner appeared in several movies (including the documentary *Last Of The Blue Devils*, 1979), at major jazz and folk festivals in the United States and Europe, on television, and in jazz clubs, recording continually into the 1980s.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Turner, Frederick Jackson (b. Nov. 14, 1861, Portage, Wis., U.S.—d. March 14, 1932, San Marino, Calif.), American teacher and scholar who evolved a seminal theory of American history based on the influence of the frontier in shaping the character of people and democratic institutions over a period



Frederick Jackson Turner
By courtesy of the Henry E. Huntington Library and Art Gallery, San Marino, Calif.

of almost 300 years. His overall emphasis, however, was on a multicausal interpretation of history, with such forces as politics, economics, culture, and geography all interreacting. Turner's penetrating analyses changed the direction of much American historical writing.

Deeply influenced by his observations of Wisconsin life during boyhood days, Turner, while in graduate school at Johns Hopkins University, rejected the doctrine that American institutions could be traced mainly to European origins. He earned his Ph.D. at Johns Hopkins in 1900. As an instructor at the University of Wisconsin at Madison, from 1889, he demonstrated his own theories in a series of original essays. In the first, "The Significance of History" (1891), Turner expounded the idea that history was rewritten by each age in terms of its own conditions and must be so understood. This article was followed the next year with "Problems in American History," in which he first pegged the country's evolution to the continuous settlement of an ever-receding Western frontier.

Turner's most significant contribution was his essay "The Significance of the Frontier in American History" (1893). Employing arresting literary imagery in combination with incisive reasoning, the young historian presented his new theory concerning the influence of environment on transplanted peoples, in what came to be known as the "frontier school" of historiography. He traced the social evolution of frontier life as it continually developed across the continent from the primitive conditions of explorer, trapper, and trader, through maturing agricultural stages, finally reaching the complexity of city and factory. Turner held that the American character was decisively shaped by conditions on the frontier, in particular the abundance of free land, the settling of which engendered such traits as self-reliance, individualism, inventiveness, restless energy, mobility, materialism, and optimism.

Two more articles on the West followed (1896, 1903), but by this time Turner was focusing his main attention on the phenomenon of sectionalism as a major force in U.S. development. Turner's first book of essays was *The Frontier in American History* (1920). A second essay collection, *Significance of Sections in American History* (1932), was awarded the Pulitzer Prize posthumously in 1933, and an unfinished study was published in 1935 as *The United States, 1830–1850: The Nation and Its Sections*.

Having been made a full professor in 1892, Turner taught at the University of Wisconsin until 1910 and at Harvard University for the next 14 years. He served as president of the American Historical Association (1909–10) and on the editorial board of the *American Historical Review* from 1910 to 1915. Poor health led to his move to the Henry E. Huntington Library, San Marino, Calif., where he remained as a research associate until his death.

A collection of his selected essays can be found in *Frontier and Section* (1961), with an excellent biographical introduction by Ray Allen Billington.

Turner, Herbert Hall (b. Aug. 13, 1861, Leeds, Yorkshire, Eng.—d. Aug. 20, 1930, Stockholm, Sweden), English astronomer who pioneered many of the procedures now universally employed in determining stellar positions from astronomical photographs.

In 1884 Turner was appointed chief assistant at the Royal Observatory, Greenwich, and in 1893 he became Savilian professor of astronomy and director of the University Observatory at Oxford. A plan for international cooperation in compiling an astrographic chart and catalog had been formulated in 1887 at Paris. Turner worked unceasingly on Oxford's share of the project and made innovations in astronomical photography that contributed to the success of the project. Through his efforts, Oxford was the second observatory to finish its share of the catalog, and he then turned to helping others finish their zones. After the formation of the International Astronomical Union in 1919, he was appointed president of the committee in charge of the project. He also contributed much to worldwide seismological studies and established Oxford as an international centre of seismological research.

A prolific writer as well as an exceptional speaker, Turner produced four popular expositions of astronomy: *Modern Astronomy* (1901); *Astronomical Discovery* (1904); *The Great Star Map* (1912); and *A Voyage in Space* (1915). At his suggestion the ninth planet, discovered by the American astronomer Clyde W. Tombaugh in 1930, was named Pluto.

Turner, J.M.W., in full JOSEPH MALLORD WILLIAM TURNER (b. April 23, 1775, London, Eng.—d. Dec. 19, 1851, London), English Romantic landscape painter whose expressionistic studies of light, colour, and atmosphere were unmatched in their range and sublimity. His marine paintings are particularly notable.

Early life and works. Turner was the son of a barber, but nothing is known about his mother except that she died insane in 1804. At the age of 10 Turner was sent to live with an uncle at Brentford, Middlesex, where he attended school. Several drawings dated as early as 1787 are sufficiently professional to corroborate the tradition that his father used to sell the boy's work to his customers. After some instruction under Thomas Malton, a topographical watercolourist, Turner entered the Royal Academy schools in 1789 and soon began exhibiting his watercolours there. He used to spend the summer holidays touring the country in search of subjects for his sketchbooks, which he filled with drawings to be worked up later into finished watercolours. His early work is topographical (concerned with the accurate depiction of places) in character and imitative of the best English masters of the day. In 1794 Turner began working for engravers, supplying designs for the *Copper Plate Magazine* and the *Pocket Magazine*. Engraved views of picturesque ruins of castles and abbeys were much in demand at the time. He was also employed at making copies or elaborations of unfinished drawings by the recently deceased landscape painter Robert Cozens. The influence of Cozens and of the Welsh landscape painter Richard Wilson helped broaden Turner's outlook and revealed to him a more poetic and imaginative approach to landscape, which he would pursue to the end of his career with ever-increasing brilliance.

From 1796 Turner began to exhibit oil paintings as well as watercolours at the Royal Academy. The first one, "Fishermen at Sea," is a moonlight scene and was acclaimed by a contemporary critic as the work "of an original mind." In 1799, at the youngest permitted age (24), Turner was elected an associate of the Royal Academy, and in 1802 he became a full academician, a dignity he marked by a series of large pictures in which he emulated the achievements of the old masters, especially the 17th-century painters Nicolas Poussin,



"The 'Fighting Téméraire' Tugged to Her Last Berth To Be Broken Up, 1838," oil on canvas by J.M.W. Turner, 1839; in the National Gallery, London
Reproduced by courtesy of the Trustees of The National Gallery, London

Claude Lorrain, Aelbert Cuyp, and the Van de Veldes. He took his duties seriously, attending academic functions regularly, filling various offices, and ultimately bequeathing £20,000 to the Academy. He was helpful and encouraging to other artists insofar as his shyness and brusque manner allowed. In 1807 he was appointed professor of perspective. His infrequent lectures were said to have been difficult to follow but worth it for his diagrams. About 1800 Turner took a studio at 64 Harley Street, London, and in 1804 opened a private gallery, where he continued to show his latest work for many seasons. He was by this time overwhelmed with commissions, and the success of his career was assured.



J.M.W. Turner, detail of a self-portrait in oil, 1798; in the Tate Gallery, London

By courtesy of the trustees of the Tate Gallery, London

In 1800 Turner's mother became hopelessly ill and was committed to a mental hospital. His father came to live with him and devoted the rest of his life to serving as a studio assistant and general agent. Turner's private life, such as it was, was secretive, unsociable, and somewhat eccentric. In 1798 he entered into an affair, which was to last about 10 years, with Sarah Danby, a widow who bore him two children. As he never married, was close with money, and devoted his time almost entirely to his art, he was able to amass a considerable fortune.

Turner continued to travel in search of inspiration. His travels took him in 1797 to Yorkshire and the Lake District, in 1798 to Wales again, in 1801 to Scotland, and in 1802 to the European continent for the first time. The crossing to Calais was rough, and in his picture "Calais Pier" (1802–03; National Gallery, London) he left a vivid record of his experience on arrival. He made more than 400 drawings during this tour of France and Switzerland and continued for many years after to paint pictures of scenes that had impressed him on the tour. The most important of these are three pictures of Bonneville, Savoy (1803 and 1812); "The Festival upon the Opening of the Vintage at Macon" (1803; Graves Art Gallery, Sheffield); the watercolours "Devil's Bridge" and "The Great Falls of the Reichenbach" (1804; Cecil Higgins Museum, Bedford); "Falls of the Rhine at Schaffhausen" (1806; Museum of Fine Arts, Boston); and "Snowstorm: Hannibal and his Army Crossing the Alps" (1812; Tate Gallery, London).

Turner's many seapieces, in which he surpasses the Dutch 17th-century marine painters, reveal his methodical attempt to master every landscape style he admired and the ease with which he accomplished this. The rivalry he felt with painters who had influenced his style—Poussin, Wilson, and Claude, for example—is suggested by his bequest to the National Gallery of his "Dido Building Carthage, or the Rise of the Carthaginian Empire" (1815) and "Sun Rising Through Vapour: Fishermen Cleaning and Selling Fish" (1807) on condition that they be hung beside his two favourite Claudes. The treatment of landscape in the oil Thames sketches of about 1807 and "The Shipwreck" (1805; Tate Gallery) suggests that at this time Turner was developing his original approach to landscape—emphasizing luminosity, atmosphere, and romantic, dramatic subjects.

In 1807 Turner began his great enterprise of publishing a series of 100 plates known as the *Liber Studiorum.* His aim was to perpetuate the great variety and range of his work; some of the subjects were taken from existing paintings and watercolours; others were specially designed for the *Liber.* He employed several engravers, although he supervised the work at every stage, etched some of the plates himself, and made innumerable preparatory drawings. The publication was issued in parts consisting of five plates each, covering all the styles of landscape composition, such as historical, architectural, mountainous, pastoral, and marine. The first part appeared in June 1807 and the last in 1819, when Turner evidently lost interest in the project and abandoned it after the publication of 71 plates.

Middle years. During the second decade of the 1800s, Turner's painting became increasingly luminous and atmospheric in quality. Even in paintings of actual places, as "St. Mawes at the Pilchard Season" (1812; Tate Gallery) and the two pictures of Oxford painted between 1809 and 1812 (exhibited in 1812), the hard facts of topography are diffused behind pearly films of colour; other pictures, such as "Frosty Morning" (1813; Tate Gallery), are based entirely on effects of light. Among the most ethereal landscapes of this period are "Lake of Geneva" (1810; Los Angeles County Museum), "Crossing the Brook" (1815; Tate Gallery), and "England; Richmond Hill, on the Prince Regent's Birthday" (1819; Tate Gallery), one of his largest and most ambitious pictures. Turner was much in demand as a painter of castles and countryseats for their owners. Two examples of such paintings are "Somer Hill, Tunbridge" and "Linlithgow Palace" (1810; Walker Art Gallery, Liverpool). He also continued to excel in marine painting, one of the most ambitious works being "Wreck of a Transport Ship" (1810; Gulbenkian Foundation, Lisbon).

With "Dido and Aeneas, Leaving Carthage on the Morning of the Chase" (1814; Tate Gallery), Turner began a series of Carthaginian subjects. The last exhibits of his life, at the Academy in 1850, included four works on the same theme. By appending long poetic quotations either from James Thomson's *Seasons,* from works by Lord Byron, John Milton, William Shakespeare, and Alexander Pope, or from his own long poetic composition *Fallacies of Hope,* Turner showed that he regarded literary-historical interpretation of his works as of paramount importance.

As if he felt that he had done all he could with the beauty of his native country, Turner set out in the summer of 1819 on his first visit to Italy. He spent three months in Rome—visited Naples, Florence, and Venice—and returned home in midwinter. During his journey he made about 1,500 drawings, and in the next few years he painted a series of pictures inspired by what he had seen. They show a great advance in his style, particularly in the matter of colour, which becomes purer, more prismatic, with a general heightening of key. A comparison of "The Bay of Baiae, with Apollo and the Sibyl" (1823; Tate Gallery) with any of the earlier pictures reveals a far more iridescent treatment resembling the transparency of a watercolour. The shadows are as colourful as the lights, and he achieves contrasts by setting off cold and warm colours instead of dark and light tones.

During the 1820s, tours of the continent alternated with visits to various parts of England and Scotland. In 1825 Turner revisited The Netherlands and Belgium and the following year the Meuse, Moselle, and Loire rivers. Notable among the pictures of this period are such views as "The Harbor of Dieppe," "Cologne: The Arrival of a Packet Boat: Evening," and "Mortlake Terrace: Early Summer Morning" (Frick Collection, New York City). In 1827 he painted the brilliant sketches of the regatta now at the Tate Gallery, and in 1828 he went to Italy again. After his father's death in 1829, Turner often visited the Earl of Egremont at Petworth, Sussex. His splendid sketches of Petworth probably belong to the early 1830s.

Later life and works. In the last years of his life, Turner was more famous, richer, and more secretive than ever. After several years of inactivity as professor of perspective at the Royal Academy, he resigned in 1838. In 1839 he bought a cottage in Chelsea, where he lived incognito under the assumed name of Booth. He was looked after by his old housekeeper, who guarded his privacy so zealously that she made it difficult for people to gain admission to his gallery. Turner continued to travel, however. In the last 15 years of his life, he revisited Italy, Switzerland, Germany, and France. Observers have recorded the untiring energy with which he sketched while abroad, and the drawings, numbering about 19,000 in the Turner Bequest, bear witness to this labour.

While Turner's earlier paintings and drawings show the most accurate observation of architectural and natural detail, in his later work this is sacrificed to general effects of colour and light with the barest indication of mass. His composition tends to become more fluid, suggesting movement and space; some of his paintings are mere colour notations, barely tinted on a white ground, such as "Norham Castle, Sunrise" and "Sunrise, with a Boat Between Headlands" (1835–45; Tate Gallery). This approach may account for the large number of slightly brushed-in canvases found in Turner's studio at the time of his death. These colourful abstractions are far more appreciated now than the historical and mythological subjects he exhibited.

Apart from fanciful reconstructions of ancient Rome and the scintillating Venetian cityscapes, which found ready purchasers in his day, the outstanding examples of his late work are "The Parting of Hero and Leander" (1837; National Gallery), a daring composition of sunset and moonlight with visions of spirits rising from the waters; "The 'Fighting Téméraire' Tugged to Her Last Berth To Be Broken Up, 1838" (1839; National Gallery), a tribute to the passing age of sailing ships as they were about to be replaced by steam-powered vessels; and "Rain, Steam, and Speed—the Great Western Railway" (1844; National Gallery), which expresses Turner's intense interest in the changes brought by the Industrial Revolution. Actually, the first picture to be hung in Britain's National Gallery was the opalescent "Venice from the Steps of the Europa" (1842), presented in 1847, while Turner was still alive. Turner's preoccupation with the elements of fire and water appears in the "Burning of the Houses of Parliament" (1835; Tate Gallery), in the large sketch "Fire at Sea" (Tate Gallery), and in "Rockets and Blue Lights" (1840; Sterling and Francine Clark Art Institute, Williamstown, Mass.).

Turner died in 1851 and was buried in St. Paul's Cathedral. By his will he intended to leave most of his fortune of £140,000 to found a charity for "decayed artists," and he bequeathed his finished paintings to the National Gallery, on condition that a separate gallery be built to exhibit them. As a result of protracted litigation with his rather distant relatives, most of the money reverted to them, while the paintings and drawings of the Turner

Bequest became national property. It was not until 1908 that a special gallery was built by Sir Joseph Duveen to house some of the oil paintings at the Tate Gallery. All the drawings and watercolours were transferred to the British Museum for safety after the Thames flood of 1928, when the storerooms at the Tate Gallery were inundated. The oil paintings of the Turner Bequest are now divided between the Tate Gallery and the National Gallery. Those at the Tate are housed in the Clore Gallery (1987), an addition designed by James Stirling expressly for that purpose.

Assessment. Turner was perhaps the greatest landscapist of the 19th century. Although brought up in the academic traditions of the 18th century, he became a pioneer in the study of light, colour, and atmosphere. He anticipated the French Impressionists in breaking down conventional formulas of representation; but, unlike them, he believed that his works must always express significant historical, mythological, literary, or other narrative themes. A line of development can be traced from his early historical landscapes that form settings for important human subjects, such as the plagues of Egypt or the story of Dido and Aeneas, to his later studies of sea and sky. Even without figures, these late works are expressions of important subjects: the relationship of man to his environment, to the power of nature as manifested in the terror of the storm or the beneficence of the sun. Unmatched in his time in the range of his development, Turner was also unrivaled in the breadth of his subject matter and the searching innovation of his stylistic treatment.

Even early in the 19th century, Turner was strongly criticized by the more conservative critics for his dynamic compositions and high-keyed colour. By the end of his life, although his Venetian subjects and more finished watercolours still appealed to some purchasers, his style had developed along lines totally different from the contemporary taste for realism and high finish typified by the Pre-Raphaelite movement (founded 1848). Turner's immense reputation in the second half of the 19th century was in fact due largely to the championship of the influential English art critic John Ruskin, who published the first part of *Modern Painters* in 1843 to prove Turner's superiority to all previous landscape painters and to extol his accurate rendering of natural appearance. The 20th century has witnessed a new appreciation of the abstract qualities of Turner's late colour compositions, and thereby strengthened his status as one of the most innovative and technically gifted painters of his own century.

(Ma.Bu./M.Ch./Ed.)

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Turner, Joe (American musician): *see* Turner, Big Joe.

Turner, John Napier (b. June 7, 1929, Richmond, Surrey, Eng.), Canadian lawyer and politician who in June 1984 succeeded Pierre Elliott Trudeau as head of the Liberal Party and prime minister of Canada. In general elections of September of the same year, his party was routed by the Progressive-Conservatives under Brian Mulroney.

Turner's family immigrated to Canada in 1932, and Turner gained his early education in Ottawa. After graduating in political science from the University of British Columbia (A.B., 1949), he studied for a year in Paris and attended the University of Oxford as a Rhodes scholar, receiving a degree in law in 1952 and a master's degree in 1957.

Turner returned to Canada and worked for various corporations, winning his first election to the House of Commons as a Liberal Party member in June 1962. In 1965 he was appointed to his first cabinet post but lost a bid for leadership of the Liberals in 1968 to Trudeau. Under Trudeau, Turner first served as justice minister and in 1972 was appointed minister of finance, a post he abruptly resigned in September 1975, followed by his resignation from Parliament in February 1976. He returned to corporate law and for the next eight years also served as director of several companies while retaining close connections with political associates.

When Trudeau announced in February 1984 that he would not seek reelection as head of the Liberal Party, Turner ran for the leadership and won. His premiership, however, was brief, lasting less than three months, since the general elections he called were won by the Progressive Conservatives. Turner resigned as leader of the Liberal Party in 1989 after his party lost a second general election to the Conservatives in the previous year.

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Turner, Nat (b. Oct. 2, 1800, Southampton county, Va., U.S.—d. Nov. 11, 1831, Jerusalem, Va.), black American bondsman who led the only effective, sustained slave revolt (August 1831) in U.S. history. Spreading terror throughout the white South, his action set off a new wave of oppressive legislation prohibiting the education, movement, and assembly of slaves and stiffened proslavery, anti-abolitionist convictions that persisted in that region until the American Civil War (1861–65).

Turner was born the property of a prosperous small-plantation owner in a remote area of Virginia. His mother was an African native who transmitted a passionate hatred of slavery to her son. He learned to read from one of his master's sons, and he eagerly absorbed intensive religious training. In the early 1820s he was sold to a neighbouring farmer of small means. During the following decade his religious ardour tended to approach fanaticism, and he saw himself called upon by God to lead his people out of bondage. He began to exert a powerful influence on many of the nearby slaves, who called him "the Prophet."

In 1831, shortly after he had been sold again—this time to a craftsman named Joseph Travis—a sign in the form of an eclipse of the Sun caused Turner to believe that the hour to strike was near. His plan was to capture the armoury at the county seat, Jerusalem, and, having gathered many recruits, to press on to the Dismal Swamp, 30 miles (48 km) to the east, where capture would be difficult. On the night of August 21, together with seven fellow slaves in whom he had put his trust, he launched a campaign of total annihilation, murdering Travis and his family in their sleep and then setting forth on a bloody march toward Jerusalem. In two days and nights about 60 white people were ruthlessly slain. Doomed from the start, Turner's insurrection was handicapped by lack of discipline among his followers and by the fact that only 75 blacks rallied to his cause. Armed resistance from the local whites and the arrival of the state militia—a total force of 3,000 men—provided the final crushing blow. Only a few miles from the county seat the insurgents were dispersed and either killed or captured, and many innocent slaves were massacred in the hysteria that followed. Turner eluded his pursuers for six weeks but was finally captured, tried, and hanged.

Nat Turner's rebellion put an end to the white Southern myth that slaves were either contented with their lot or too servile to mount an armed revolt. In Southampton county black people came to measure time from "Nat's Fray," or "Old Nat's War." For many years in black churches throughout the country, the name Jerusalem referred not only to the Bible but also covertly to the place where the rebel slave had met his death.

Turner has been most widely popularized by William Styron in his novel *The Confessions of Nat Turner* (1967).

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Turner, Ted, byname of ROBERT EDWARD TURNER III (b. Nov. 19, 1938, Cincinnati, Ohio, U.S.), broadcasting entrepreneur and sportsman who became a major figure in American business in the late 20th century.

Turner was the son of the owner of a billboard-advertising company based in Atlanta, Ga. After incomplete schooling at Brown University (Providence, R.I.) and stints as an account executive in his father's firm, he became general manager of one of the latter's branch offices in 1960. After business troubles drove his father to commit suicide in 1963, Turner took over the ailing family business and restored it to profitability.

In 1970 Turner purchased a financially troubled UHF television station, Channel 17, in Atlanta, and within three years he had made it one of the few truly profitable independent stations in the United States. In 1975 Turner's company was one of the first to use a new communications satellite to broadcast Channel 17 (later renamed WTBS, or TBS, the Turner Broadcasting System) to a nationwide cable television audience, thereby greatly increasing his station's revenues. Besides TBS, Turner went on to create two other highly successful and innovative cable television networks: CNN (Cable News Network; 1980) and TNT (Turner Network Television; 1988). He also purchased the Atlanta Braves professional baseball team in 1976 and the Atlanta Hawks basketball team in 1977. In 1986 he purchased the MGM/UA Entertainment Company, which included the former Metro-Goldwyn-Mayer motion-picture studio and its library of more than 4,000 old films. Many of the black-and-white films he proceeded to have "colorized," setting off a storm of protest from the film community and film critics.

The large debt burden sustained from his MGM and other purchases compelled Turner to subsequently sell off not only MGM/UA but also a sizable share of his own company,

Turner Broadcasting System, Inc., though he retained control of it. He also retained ownership of the MGM film library, which contained many Hollywood classics. Turner resumed the expansion of his media empire in the 1990s with the creation of the Cartoon Network (1992) and the purchase (1993) of two film production companies, New Line Cinema and Castle Rock Entertainment.

In 1996 the media giant Time Warner Inc. acquired the Turner Broadcasting System for $7.5 billion. As part of the agreement, Turner became a vice-chairman of Time Warner and headed all the merged company's cable television networks. When Time Warner merged with the Internet company AOL, Turner became vice-chairman and senior adviser of AOL Time Warner Inc.

Turner was also a noted yachtsman who piloted his yacht *Courageous* to win the America's Cup in 1977. In 1986 he founded the Goodwill Games in the hope of easing Cold War tensions through friendly athletic competition. The Games were concluded after 2001.

Turner, William (b. 1508?, Morpeth, Northumberland, Eng.—d. July 7, 1568, London), English naturalist, botanist, and theologian known as the "father of English botany."

Turner studied at Pembroke Hall, Cambridge. His dissatisfaction with derivative herbals led him to write *Libellus de re herbaria novus* (1538), the first essay on scientific botany in English. Turner's fervent Protestant beliefs led to several periods of exile to the European continent, during which he studied with and met numerous naturalists and learned about contemporary discoveries in botany. An extended version of the *Libellus* entitled *The Names of Herbes* (1548) was written in English, containing German and French synonyms, and included unorthodox and original observations. He served as the dean of Wells Cathedral from 1550 until the accession of Queen Mary in 1553 sent him into exile. After her death he returned to Wells until his suspension for nonconformity in 1564.

Turner's best-known work, *A New Herball* (in three parts; 1551–68), demonstrated his medical bias. He chose to write in English, the vernacular language, so that practical botanical and medical knowledge would be widely available. Turner's works were used extensively by later botanists such as John Ray and Jean Bauhin.

Turner's syndrome, also called GONADAL DYSGENESIS, relatively uncommon sex-chromosome disorder that causes aberrant sexual development in human females. Signs and symptoms include: low hairline; webbed neck; shield-shaped chest with widely spaced nipples; usually kidney and heart malformations with coarctation (narrowing) of the aorta; a 10 percent frequency of moderate to severe mental retardation; underdeveloped secondary sex characteristics; and, most importantly, ovarian dysgenesis—*i.e.*, a condition wherein the ovaries are absent or are present only as primitive streaks.

The disorder sometimes is not recognized until the individual fails to undergo puberty. Treatment with estrogen hormones enables the patient to experience puberty, look mature, and have a normal sex drive. She will remain sterile, however, and malformations (*e.g.*, webbed neck, coarctation of the aorta) can be corrected only by surgery.

Typically, the body cells of individuals with Turner's syndrome have only one sex chromosome, X, instead of the normal two (XX in females and XY in males). This abnormal chromosomal complement, or karyotype, is designated as 45,X. Turner's syndrome can also arise when only a portion of the body's cells have the 45,X karyotype. Deletion or translocation of part of a sex chromosome can also cause the disorder.

Turner's syndrome occurs once in every few thousand female births. Most fetuses with the 45,X karyotype are aborted spontaneously.

Turnhout, municipality, Antwerp *province,* northern Belgium. It lies on the Antwerp-Turnhout Canal near the Dutch border, northeast of Antwerp. Believed to date back to Frankish times, it was first recorded in the 12th century as a market centre. Historical structures include the 15th-century castle of the dukes of Brabant (now the Palace of Justice), the Church of St. Peter (begun 1484) with a carillon, and a *béguinage* (a secular retreat for nuns) dating from the 14th century. The Taxandria Museum has a collection of local antiquities; also notable is the Playing Card Museum. Turnhout is the commercial centre of an agricultural district; but its economy is based on services and manufacturing. Diamond cutting and the production of paper, bricks, cement, leather goods, tobacco products, lace, playing cards, books, and electrical equipment are the main activities. Pop. (2000 est.) mun. 38,596.

turnip, hardy biennial plant cultivated for its fleshy roots and tender growing tops. There are two species, belonging to the family Brassicaceae: the turnip proper, of the Rapifera Group in *Brassica rapa;* and the Swedish turnip, or rutabaga, of the Napobrassica Group in *Brassica napus.* The true turnip



Turnip (*Brassica rapa*)
G.R. Roberts

probably originated in middle and eastern Asia and by cultivation has spread throughout the temperate zone.

The turnip "root" is formed by the thickening of the primary root of the seedling together with the base of the young stem immediately above it. The stem remains short during the first year; the leaves form a rosettelike bunch at the top of the root. In the second season the bud in the centre of the rosette forms a strong, erect, branched stem bearing somewhat glaucous smooth leaves. Stem and branches end in clusters of small, bright yellow flowers, which are succeeded by smooth, elongated, short-beaked seed pods.

The rutabaga differs from the turnip in several ways: its first foliage leaves are glaucous, rather than grass-green, in colour, and the later leaves are smooth and glaucous; the root bears a distinct neck with well-marked leaf scars; the flesh is firmer and more nutritious; and the roots keep much better during winter. The white-fleshed varieties of rutabaga have a rough, green skin and are of irregular form; the flowers have a bright canary colour. Yellow-fleshed rutabagas have a smooth skin of a green, purple, or bronze colour; flowers are buff yellow or pale orange.

Both the turnip and rutabaga are cool-season crops. The rutabaga grows less rapidly, requiring a longer season. In the lower latitudes turnips are sown either in early spring or in late summer, developing rapidly enough to produce a crop before extremes of summer or late fall weather occur. Rutabagas, however, are sown only as a main or late crop and are more hardy to cold. Rutabagas are extensively cultivated, often as a cattle fodder crop, in Canada, Great Britain, and northern Europe and to a lesser extent in the United States.

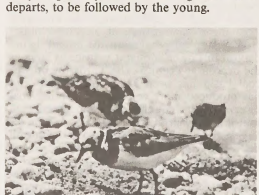
Young turnip roots are eaten raw in salads or pickled, and the young leaves may be cooked and served. The roots are also cooked and served whole or mashed and are used in stews.

turnover, an individual pie (*q.v.*), formed by folding a piece of pastry in half over a filling. The open edges are pressed or crimped together to enclose the filling during cooking and eating. Turnovers may be baked or fried. Many turnovers contain savoury fillings; the *empanada* of South and Central America frequently contains a mixture of chopped meats, hard-boiled eggs, minced vegetables, olives, and raisins, highly seasoned. Russian *pirozhki* may be filled with meat, fish, cabbage, mushrooms, or cheese. Cornish pasties are large turnovers filled with beef, onions, and turnips; they are the traditional midday meal carried into the pits by miners. Turnovers may also be filled with sweet mixtures or fruit.

Tŭrnovo (Bulgaria): *see* Veliko Tŭrnovo.

turnstone, either of two species of shorebirds (genus *Arenaria*) that constitute the subfamily Arenariinae (family Scolopacidae). The birds use their short, flattened bills, which are slightly upturned at the tip, to overturn pebbles and shells in search of food. Turnstones grow to a length of about 20 cm (8 inches).

The ruddy turnstone (*A. interpres*), pied black, white, and reddish, is a notable migrant: it breeds chiefly in the Arctic and migrates south to winter on seacoasts in Argentina, Chile, South Africa, Australia, and New Zealand. (A banded bird is known to have traveled 720 km [450 miles] in a single day.) On their wintering grounds, ruddy turnstones feed primarily on small crustaceans and other invertebrates but have been known to eat berries and terns' eggs. On the breeding ground the male may make many false nests, while the female makes a single true nest, in which she lays four eggs. The male incubates by day; the female, at night. As soon as the young are fledged, the female departs alone for the wintering ground; the male remains with the young nearly two weeks longer and then departs, to be followed by the young.



Ruddy turnstone (*Arenaria interpres*)
E.R. Degginger

The black turnstone (*A. melanocephala*), which breeds in Arctic Alaska and winters as far south as Mexico, has a black and white wing pattern but is otherwise dark.

turntable, in sound reproduction, rotating platform that carries a phonograph record. Turntables commonly revolve at 16⅔, 33⅓, 45, or 78 revolutions per minute; many record players have gearing that allows the user to choose among these speeds. For best sound reproduction, constant turning speed is crucial; transcription turntables used by radio stations are weighted to minimize speed variations and are driven by synchronous motors. Though several different types of driving mechanism were tried in early phonographs, the electric motor, cushion-mounted to minimize vibration, became the most widely employed.

Turnus, in Roman legend, king of the Rutuli (an ancient Italic tribe on the coast of Latium), and the accepted suitor of Lavinia, daughter of Latinus, king of the Latins. After Latinus betrothed Lavinia instead to the hero Aeneas (*q.v.*), Turnus, joined by the Rutuli and the Latins, made war against Aeneas and the Trojans. Though Turnus was protected by the goddess Juno, Aeneas finally succeeded in pursuing and killing him.

turnverein (from German *turnen,* "to practice gymnastics," and *Verein,* "club, union"), association of gymnasts founded by the German teacher and patriot Friedrich Ludwig Jahn in Berlin in 1811. The term now also denotes a place for physical exercise. The early turnvereins were centres for the cultivation of health and vigour through gymnastic exercise, including the use of such modern gymnastic equipment as the horizontal bar, parallel bars, side horse, and vaulting horse. The organizations were also intended to prepare German youth to defend their country against Napoleonic France, and gymnasts were encouraged to develop a spirit of patriotism and *Deutschheit* ("Germanness").

In the German states during the Revolution of 1848, some turnverein members sided with factions who unsuccessfully revolted against the monarchy, and they were forced to leave the country. Turnvereins were subsequently established by such émigrés in other countries, notably the United States, at Cincinnati, Ohio, in 1848, where the organization now called the American Turners was founded. Similar organizations, called Sokols (*see* Sokol), formed in Bohemia (modern Czech Republic) in the 1860s, emphasized social and communal unity rather than nationalism.

Turnvereins continue to foster citizenship and cultural programs together with health and physical-education activities, particularly gymnastics.

Turoszów Coal Basin, coalfield in Jelenia Góra *województwo* (province), southwestern Poland, at the border of Poland with the Czech Republic and Germany. The Turoszów Coal Basin has an area of 52 square miles (135 square km), making it the largest lignite deposit in Lower Silesia; it is twice as large as the deposit at Legnica. The Turoszów brown-coal basin has been extensively mined and has produced more coal than any other coal reserve in the country. Two open-cast coal mines (Turów I and Turów II) and Poland's largest thermoelectric power plant operate in the basin near the town of Bogatynia.

Turpan (city, China): *see* T'u-lu-p'an.

Turpan (basin, China): *see* Turfan Depression.

turpentine, the resinous exudate or extract obtained from coniferous trees, particularly those of the genus *Pinus*. Turpentines are semi-fluid substances consisting of resins dissolved in a volatile oil; this mixture is separable by various distillation techniques into a volatile portion called oil (or spirit) of turpentine and a nonvolatile portion called rosin. Although the term turpentine originally referred to the whole oleoresinous exudate, it now commonly refers to its volatile turpentine fraction only, which has various uses in industry and the visual arts.

Oil of turpentine is a colourless, oily, odorous, flammable, water-immiscible liquid with a hot, disagreeable taste. It is a good solvent for sulphur, phosphorus, resins, waxes, oils, and natural rubber. It hardens upon exposure to air. Chemically, oil of turpentine is a mixture of cyclic monoterpene hydrocarbons, the predominant constituent being pinene.

Formerly, the largest use for turpentine oil was as a paint and varnish solvent. Oil painters generally prefer it as a paint thinner and brush cleaner to petroleum solvents (mineral spirits), even though the latter are less expensive. But the largest use of turpentine oil is now in the chemical industry, as a raw material in the synthesis of resins, insecticides, oil additives, and synthetic pine oil and camphor. Turpentine oil is also used as a rubber solvent in the manufacture of plastics.

Turpentine oil is generally produced in countries that have vast tracts of pine trees. The principal European turpentines are derived from the cluster pine (*P. pinaster*) and the Scotch pine (*P. sylvestris*), while the main sources of turpentine in the United States are the longleaf pine (*P. palustris*) and the slash pine (*P. caribaea*).

Turpentine oil is classified according to the way it is produced. Sulfate turpentine, used widely in the chemicals industry, is obtained as a by-product of the kraft, or sulfate, process of cooking wood pulp in the course of the manufacture of kraft paper. Wood turpentine is obtained by the steam distillation of dead, shredded bits of pine wood, while gum turpentine results from the distillation of the exudate of the living pine tree obtained by tapping. Crude turpentine obtained from the living pine by tapping typically contains 65 percent gum rosin and 18 percent gum turpentine.

Various other oleoresins (solutions of resins dispersed in essential oils) are known as turpentines. Venice turpentine, for example, is a pale green, viscous liquid that is collected from the larch (*Larix decidua,* or *L. europea*). It is used for lithographic work and in sealing wax and varnishes. *See also* balsam; Canada balsam.

Crude turpentine is one of a group of pine-tree derivatives that are known as naval stores (*q.v.*).

Turpin, Dick, byname of RICHARD TURPIN (baptized Sept. 25, 1705, Hempstead, Eng.—d. April 7, 1739, Knavesmire, near York), English robber who became celebrated in legend and fiction.

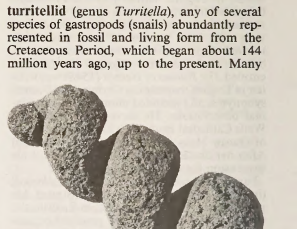
Son of an alehouse keeper, Turpin was apprenticed to a butcher, but, having been detected at cattle stealing, he joined a notorious gang of deer stealers and smugglers in Essex. When the gang was broken up, Turpin in 1735 went into partnership with Tom King, a well-known highwayman, whom he accidentally killed while firing at a constable (or, by some accounts, an innkeeper). To avoid arrest he finally left Essex for Lincolnshire and Yorkshire, where he set up under an assumed name (John Palmer) as a horse dealer. He was finally convicted at York assizes of horse stealing and hanged in 1739.

Harrison Ainsworth, in his romance *Rookwood* (1834), gave a spirited account of a ride by Dick Turpin on his mare, Black Bess, from London to York, but the incident is pure fiction.

turquoise, hydrated copper and aluminum phosphate $[CuAl_6(PO_4)_4(OH)_8 \cdot 4H_2O]$ that is extensively used as a gemstone. It is a secondary mineral deposited from circulating waters, and it occurs chiefly in arid environments as blue to greenish, waxy veinlets in alumina-rich, weathered, volcanic, or sedimentary rocks. Turquoise was obtained from the Sinai Peninsula before the 4th millennium BC in one of the world's first important hard-rock mining operations. It was transported to Europe through Turkey, probably accounting for its name, which is French for "Turkish." Highly prized turquoise has come from Neyshābūr, Iran. Numerous deposits in the southwestern United States have been worked for centuries by American Indians. Turquoise also occurs in northern Africa, Australia, Siberia, and Europe. For detailed physical properties, *see* phosphate mineral (table).

The colour of turquoise ranges from blue through various shades of green to greenish and yellowish gray. A delicate sky blue, which provides an attractive contrast with precious metals, is most valued for gem purposes. Delicate veining, caused by impurities, is desired by some collectors as proof of a natural stone. Turquoise is opaque except in the thinnest splinters, takes a fair to good polish, and has a feeble, faintly waxy lustre. The stone's colour and lustre tend to deteriorate with exposure to sunlight, heat, or various weak acids. For most gem uses, turquoise is cut *en cabochon,* with a low-convex, polished upper surface. It may be carved or engraved, and irregular pieces are often set in mosaics with jasper, obsidian, and mother of pearl. Turquoise matrix, which is any natural aggregate of turquoise with limonite or other substances, is also valued.

turritellid (genus *Turritella*), any of several species of gastropods (snails) abundantly represented in fossil and living form from the Cretaceous Period, which began about 144 million years ago, up to the present. Many



Turritellid from Highlands, N.J.
By courtesy of the Buffalo Museum of Science, Buffalo, N.Y.

forms or species of turritellids are known; all are characterized by a high, pointed shell that narrows greatly at the apex. The shell is frequently ornamented by lines, ridges, or grooves.

Tursunzade, formerly (until 1978) REGAR, city, Tajikistan. It lies in the west-central part of the republic, near the border with Uzbekistan. The city developed as a regional centre for an agricultural district in the western part of the Gissar valley. In 1975, however, the city's economic emphasis changed when one of the largest aluminum plants in the Soviet Union began operation there. Power for the complex is supplied by the Nursk hydroelectric station on the Vakhsh River. Pop. (1991 est.) 40,400.

turtle (order Chelonia), reptile chiefly characterized by a protective shell that encloses the vital organs of the body.

A brief treatment of turtles follows. For full treatment, *see* MACROPAEDIA: Reptiles.

Turtles are toothless, generally slow-moving and unaggressive animals that range in length from less than 10 cm (4 inches) to more than

2 m (6.5 feet). They have sturdy, sprawling limbs with short feet or (in marine turtles) paddlelike flippers, and they have a protective bony shell overlaid with horny shields. The shell is separated into an upper section, the carapace, joined at the sides to a lower section, the plastron.



Gulf coast box turtle (*Terrapene carolina major*)
John H. Gerard

Turtles are found in most parts of the world and have existed in relatively the same form for the last 200 million years. Most of the 200 to 250 living species are aquatic or semiaquatic, and the majority are found in or near the tropics, but many range into temperate regions. Some turtles are terrestrial, and a few are marine, with the rest living in freshwater. Turtles feed on soft plant material or small animals or both. They are able to fast for long periods. Breeding usually takes place once yearly; the female lays her whitish, rounded or elongated eggs on land, usually in a hole she has dug with her hind legs.

Turtles have provided humans with meat, eggs, and tortoiseshell. Some species of turtles are kept as pets. Nonmarine turtles are commonly called tortoises in Great Britain, while in the United States some edible turtles are known as terrapins.

The world's living species of turtles are placed in two suborders. In the members of one, Pleurodira, the neck is bent sideways to draw the head into the shell, and in those of the other, Cryptodira, the head and neck are withdrawn backward into the shell. The pleurodires are now restricted in range to South America, Africa, Madagascar, Australia, New Guinea, and adjacent islands. The cryptodires, by contrast, are found on all the continents except Australia and include about four-fifths of all living species of turtles.

The largest family among the cryptodires is that of the common freshwater turtles (Emydidae), which includes about one-third of all living species and has a geographic range equal to that of the suborder as a whole. These turtles, many of which occur in the eastern half of the United States, are mostly aquatic or semiaquatic in habitat. Next in number of species are the true tortoises (family Testudinidae), with about half as many species as are found in Emydidae. The slow, plodding tortoises of fable belong to this widely distributed terrestrial group, the gigantic species of which are confined to the Galápagos and other oceanic islands. (*See* tortoise.) The other families of cryptodires include mud and musk turtles (family Kinosternidae); sea turtles (family Cheloniidae), which are found in all the warmer oceanic waters of the world; and snapping turtles (family Chelydridae), which are fairly large and aggressive turtles common in North America.

The suborder Pleurodira, with its members now restricted in range to the continents of the Southern Hemisphere, includes about 20 percent of all living species of turtles. The two (living) families in it are the snake-necked turtles (family Chelidae), so named for their long head and neck; and the side-necked turtles (family Pelomedusidae), from which the common name of the suborder as a whole is derived.

Turtle, one-man submarine, the first to be put to military use, built and designed by the American inventor David Bushnell (*q.v.*) in 1775 for use against British warships. The pear-shaped vessel, made of oak reinforced with iron bands, measured about 2.3 m (7.5 feet) long by 1.8 m (6 feet) wide. It was equipped with a mine that was to be attached to the hull of an enemy ship. In 1776, in New York harbour, the *Turtle* tried to sink the British warship HMS *Eagle* but failed; none of its succeeding missions was successful.

turtledove, also spelled TURTLE DOVE (*Streptopelia turtur*), European and North African bird of the pigeon family, Columbidae (order Columbiformes), that is the type species, or namesake, of its genus. The turtledove is 28 cm (11 inches) long. Its body is reddish



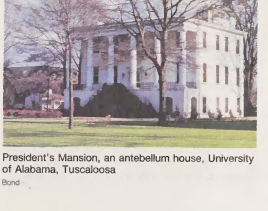
Turtledove (*Streptopelia turtur*)
Stephen Dalton

brown, the head blue-gray, and the tail is marked with a white tip. It is a ground feeder that eats prodigious amounts of small seeds. *Streptopelia turtur* is migratory and winters in northern Africa.

The name turtledove is commonly applied to the other *Streptopelia* species, including other turtledoves, collared doves, and ring-necked doves. These slim-bodied, fast-flying gamebirds are found throughout the temperate and tropical Old World. The ringed turtledove, or ringdove (*S. risorea*), has feral New World populations in California and Florida. The laughing dove (*S. senegalensis*) and spotted dove (*S. chinensis*) have also been introduced outside their native habitats.

Turun ja Porin lääni (Finland): *see* Turku ja Pori.

Tuscaloosa, city, seat of Tuscaloosa county, western Alabama, U.S., on the Black Warrior River. Founded in 1816 by Thomas York on land opened to settlement after the Creek War, it was named for the Choctaw Indian chief Tuscaloosa ("Black Warrior"), who fought the Spanish explorer Hernando de Soto in south-



President's Mansion, an antebellum house, University of Alabama, Tuscaloosa
Bond

ern Alabama in 1540. The city served as the state capital (1826–46) and was partially burned during the American Civil War. It lies at the edge of coal and mineral deposits in a farming region. Its diversified agricultural and industrial economy is augmented by several institutions, including the University of Alabama (founded 1831) and Stillman College (1876). The few antebellum houses in the city include Gorgas House and President's Mansion. Inc. 1819. Pop. (1994 est.) city, 79,797; Tuscaloosa MSA, 157,090.

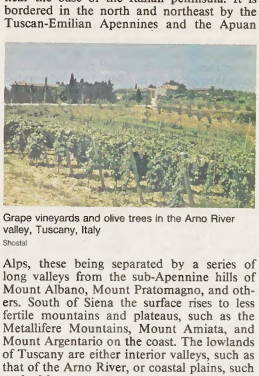
Tuscan order, the simplest of the orders of classical architecture. *See* order.

Tuscania, formerly (until 1911) TOSCANELLA, Latin TUSCANIA, or TUSCANA, town, Viterbo *provincia,* Lazio (Latium) *regione,* central Italy, west of Viterbo. The ancient city was a prosperous Etruscan centre in the 3rd century BC, and Etruscan tombs have been found nearby. Until a disastrous earthquake in 1971, the town contained many relics and treasures of the Etruscan, Roman, and medieval periods. The quake severely damaged the town's two magnificent Romanesque-Lombard churches, San Pietro (8th and 12th centuries), the rose window and parts of the apse and adjacent towers of which collapsed, and Santa Maria Maggiore (7th and 12th centuries), which lost the top of its stone bell tower. Other churches and buildings in the town also sustained heavy damage. By the late 20th century, however, most buildings had been either restored or replaced. Pop. (1993 est.) 7,751.

Consult the INDEX *first*

Tuscany, Italian TOSCANA, *regione,* west-central Italy. It lies along the Tyrrhenian and Ligurian seas and comprises the *provincie* of Massa-Carrara, Lucca, Pistoia, Prato, Firenze, Livorno, Pisa, Arezzo, Siena, and Grosseto, with an area of 8,877 square miles (22,992 square km).

Tuscany is a transitional region occupying much of the former grand duchy of that name near the base of the Italian peninsula. It is bordered in the north and northeast by the Tuscan-Emilian Apennines and the Apuan



Grape vineyards and olive trees in the Arno River valley, Tuscany, Italy
Shostal

Alps, these being separated by a series of long valleys from the sub-Apennine hills of Mount Albano, Mount Pratomagno, and others. South of Siena the surface rises to less fertile mountains and plateaus, such as the Metallifere Mountains, Mount Amiata, and Mount Argentario on the coast. The lowlands of Tuscany are either interior valleys, such as that of the Arno River, or coastal plains, such as the Maremma.

Historical Tuscany. The name Tuscany is derived from an Etruscan tribe that settled there about 1000 BC. Tuscia came into official use under the Roman Empire in the 3rd century AD. Politically united under the barbarian Lombards as a duchy with its seat at

Lucca in the 6th century, Tuscany was next set up as a county by the Franks in 774. In the 11th century the area passed to the Attoni family, who, already holding Canossa, Modena, Reggio, and Mantua, became an important power of central Italy. The most famous representative of this line, Matilda, supported Pope Gregory VII (1073–85) in the Investiture Controversy. After her death in 1115, the cities of Tuscany gradually affirmed their independence, and the area lost its traditional unity. For the next four centuries these cities fought among themselves; supremacy was won first by Pisa and then by Florence, and the area became the greatest centre of Renaissance culture. After the advent of the Medici as rulers of Florence in 1434, with the family's gradual consolidation of power over the area, Tuscany was transformed into a principality.

During the foreign invasions of Italy in the late 15th and early 16th centuries, the Medici were twice expelled (1495–1512 and 1527–30) but were restored by the Holy Roman emperor Charles V in 1530, and the Medici rulers used the title grand duke from 1569. The culture and economy of the area declined beginning in the 16th century.

In 1737, on the death of the last Medici grand duke, Gian Gastone, Tuscany was assigned to Francis of Lorraine, future husband of the Habsburg heiress Maria Theresa, beginning the rule of the Habsburg-Lorraine family. Under Francis and his son the grand duke Leopold I (later the Holy Roman emperor Leopold II), the great period of Tuscan reform took place. Internal trade barriers were removed, ecclesiastical privileges reduced, and the death penalty abolished. With the French domination of the peninsula, during the late 1790s, Ferdinand III was forced to flee from the duchy. In 1801 Napoleon Bonaparte founded the Tuscan kingdom of Etruria for Louis of Bourbon-Parma, nephew of the Spanish queen, but in 1808 annexed it to the French Empire and finally in 1809 gave it to his sister Élisa to rule. With the defeats of Napoleon in 1814, Ferdinand III was restored to Tuscany, but many of the reforms introduced by the French were retained.

Under Ferdinand and his son Leopold II, during the first half of the 19th century, Tuscany was noted among Italian states for its tolerance toward liberals and its progressive government. With the spread of liberal revolutions through Italy in 1848, Leopold granted a constitution, but increasing revolutionary agitation culminated in the proclamation of a republic (Feb. 8, 1849) and forced the Grand Duke to flee. Leopold's return under the protection of the Austrians cost him the support of many Tuscans. When war between Piedmont and Austria (the Second War of Italian Independence) broke out in 1859, Leopold, after refusing both to grant a constitution and to join Piedmont in the fight, was expelled by the Florentines. With a provisional government controlled by the nobleman Bettino Ricasoli working for Italian unification under Piedmont, the Tuscans, in a plebiscite of March 11–12, 1860, voted overwhelmingly for annexation. Tuscany formally became part of the new Italian state with the proclamation of the kingdom on Feb. 18, 1861.

The modern region. Tuscany is one of the most prosperous agricultural regions in Italy, specializing in cereals (especially wheat), olives and olive oil, and wines, notably those of the Chianti district near Siena. Vegetables and fruit are also grown, and cattle, horses, pigs, and poultry are extensively raised. Tuscan agriculture is characterized by the *mezzadria* system, with the landlord, who provides capital and current expenses, sharing the harvest with the tenant, who supplies the labour. There is, however, a growing tendency to the organization of agricultural cooperatives. The storms and floods of 1966 dealt a severe blow to Tuscan agriculture, as well as inundating Florence and Grosseto. Watered chiefly by the Arno and Ombrone rivers, Tuscany has few rivers capable of supporting major hydroelectric projects, but borax deposits at Larderello produce enough underground steam to power a major generating station. Among the mineral resources, easily worked iron ore from the offshore island of Elba is nearing exhaustion, but lead, zinc, antimony, mercury, copper, and iron pyrites are still produced in the region. Lignite (brown coal) is mined around San Giovanni Valdarno, and the marble of Carrara is world famous. Metallurgy, chemicals, and textiles are major industries; and the region is famous for its artisan industries, especially in Florence, the capital. Tourism is important at the coastal resorts and the historical centres of the region. Livorno, the major port, has shipbuilding industries. Other important centres are Piombino, Lucca, Pistoia, Grosseto, Pisa, and Siena. Pop. (1983 est.) 3,581,742.

Tuscarawas River, river rising in Summit County, northeastern Ohio, U.S., near Akron and Barberton (there dammed to form the Portage Lakes). It flows south past Massillon, Dover, and New Philadelphia and then west to join the Walhonding, near Coshocton, after a course of 125 mi (201 km), to form the Muskingum River. Beach City Reservoir is impounded by a flood-control dam on the Tuscarawas north of Dover, and Tappan, Piedmont, Clendening, Leesville, and Atwood reservoirs are on its tributaries. The river's name is derived from the Tuscarora Indian tribe.

Tuscarora, Iroquoian-speaking Indians of North America who occupied what is now North Carolina when first encountered by Europeans in the 17th century. They were noted for their use of Indian hemp for fibre and medicine; their name derives from an Iroquoian term for "hemp gatherers." Though expert hunters, they also depended heavily on cultivating corn (maize). Later they extended their economy by trading rum to neighbouring Indian groups. The typical Tuscarora dwelling at the time of first European contact was a round lodge of poles overlaid with bark. Evidence suggests that they were organized in exogamous clans, with the clans grouped into two moieties in each of the three tribes constituting the Tuscarora nation.

Depredations of Tuscarora women by colonists, who also kidnapped men, women, and children to be sold into slavery and took tribal lands without payment, led to the outbreak of war in 1711, following the failure of peaceful Tuscarora attempts to obtain relief. Over the following 90 years groups of Tuscarora fled or drifted northward, having been admitted into the Iroquois League (*q.v.*) as the sixth nation. During the American Revolution many Tuscarora supported the colonists; those who favoured the British were granted lands on Grand River reservation, Ontario. The highest estimate of Tuscarora population in the early 18th century was about 5,600. By the second half of the 20th century their numbers had dwindled to the hundreds, living in New York state and adjacent parts of Canada.

Tusculum, ancient Italic city (now Frascati) in Latium, 15 miles (24 kilometres) southeast of Rome, a favourite resort of wealthy Romans under the late republic and the empire (1st century BC–4th century AD). Tusculum was a Latin settlement during the early Iron Age (early 1st millennium BC) and was probably under Etruscan influence. According to Roman tradition Octavius Mamilius of Tusculum, son-in-law of the last Roman king, organized a league of 30 Latin cities against Rome in the late 5th century BC, but was defeated and killed in a battle at Lake Regillus in 497, which established Roman supremacy over the Latins. Thereafter, the city usually remained loyal to Rome.

The Roman writer Cicero had a villa at Tusculum in the 1st century BC and composed his philosophical work *Tusculanae disputationes* there. In the early medieval period, Tusculum was an important stronghold, and its counts were influential at Rome. The Romans finally destroyed it during a war in 1191.

The remains of ancient Tusculum include a forum, an amphitheatre of the 2nd century AD, and a complex of buildings wrongly known as the villa of Cicero. The highest point of the city was its citadel, on which are the remains of a medieval castle.

Tuscumbia, city, seat (1867) of Colbert County, northwestern Alabama, U.S., in the Muscle Shoals area on the Tennessee River. It forms with Florence, Sheffield, and the city of Muscle Shoals a four-city metropolitan area. Founded in 1817 as Ococoposa (a Chickasaw–Choctaw word meaning "cold water," referring to a local creek), it was renamed Tuscumbia (1822) after Tash-Ka-Ambi, an Indian chief. It is a farming community with light manufacturing. Tuscumbia was the birthplace (1 June 1880) of Helen Keller, the internationally known blind and deaf lecturer. William Gibson's play *The Miracle Worker* (1959), portraying her childhood efforts under the tutelage of Anne Sullivan to overcome her handicaps, is staged there each summer. Inc. town, 1820; city, 1865. Pop. (1990) 8,413.

Tushino, Thief of: *see in* Dmitry, False.

Ṭūsī, Naṣīr ad-Dīn aṭ- (b. Feb. 18, 1201, Ṭūs, Khorāsān—d. June 26, 1274, Baghdad), outstanding Persian philosopher, scientist, and mathematician.

Ṭūsī became astrologer to the Ismāʿīlī governor Nāṣir ad-Dīn ʿAbd ar-Raḥīm, and later, pretending to be an Ismāʿīlī, lived and studied at the castle of Alamūt, headquarters of the Ismāʿīlī terrorist sect, the Assassins. In 1256 he betrayed the defenses of the fortress to the invading Mongols, whose army he joined; Hülegü Khan took him as a confidential adviser when he attacked and destroyed Baghdad in 1258. Ṭūsī profited by his office as head of the ministry of religious bequests to build a fine observatory at Marāgheh. A man of exceptionally wide erudition, he wrote many books in Arabic and Persian. He improved upon earlier Arabic translations of Euclid, Ptolemy, Autolycus, Theodosius, Apollonius, and others, and made original contributions to mathematics and astronomy; his *Zij-i Ilkhani* is a splendidly accurate table of planetary movements. His *Taḥrīd al-ʿaqāʾid* is a highly esteemed treatise on Shīʿite dogmatics. His most famous and popular work is the *Akhlāq Naṣīrī*, a treatise on ethics in the Greek tradition resting upon the 11th-century *Tahdhīb al-akhlāq* of Ibn Miskawayh, which he drafted while a prisoner of the Assassins and later revised for his Mongol master. This work has been translated into English. Ṭūsī was a Twelver Shīʿite but is credited with a number of distinctively Ismāʿīlī dissertations, notably the *Tasavvurat*. He made important contributions to many branches of Islāmic learning and wrote in excellent philosophical prose.

tusk shell, also called ELEPHANT'S TUSK, ELEPHANT'S TOOTH, or TOOTH SHELL, any of several marine molluscs of the class Scaphopoda. There are four genera of tusk shells (*Dentalium* is typical and most common) and more than 350 species. Most tusk shells live in fairly deep water, sometimes to depths of about 4,000 metres (13,000 feet); many deep-sea species are cosmopolitan in distribution.

Tusk shells are elongated, bilaterally symmetrical (*i.e.*, the external halves are mirror images of one another) animals with a tubular, tusklike shell, open at both ends. The

animals are encased in a tubular mantle and breathe through the body surface. At the anterior (front), larger end of the shell is an extensible foot adapted for digging and an imperfectly developed head with slender tentacles, the captacula, that serve as sensory and food-catching organs. The anterior end is usually buried in the sea bottom. The posterior end admits water for respiration and discharges wastes. Tusk shells feed upon such small organisms as protozoans of the order Forminifera and young bivalves. Sexes are separate, and the eggs develop into free-swimming larvae.

Tuskegee syphilis study, American medical research project that earned notoriety for its unethical experimentation on black patients in the rural South.

The project, which was conducted by the U.S. Public Health Service (PHS) from 1932 to 1972, examined the natural course of untreated syphilis in black American men. The research was intended to test whether syphilis caused cardiovascular damage more often than neurological damage, and to determine if the natural course of syphilis in black men was significantly different from that in whites. In order to recruit participants for its study, the PHS enlisted the support of the prestigious Tuskegee Institute, located in Macon county, Alabama. A group of 412 infected patients and 204 uninfected control patients were recruited for the program. The subjects were all impoverished sharecroppers from Macon county. The original study was scheduled to last only six to nine months.

The subjects were not told that they had syphilis or that the disease could be transmitted through sexual intercourse. Instead, they were told that they suffered from "bad blood," a local term used to refer to a range of ills. Treatment was initially part of the study, and some patients were administered arsenic, bismuth, and mercury. But after the original study failed to produce any useful data, it was decided to follow the subjects until their deaths, and all treatment was halted. Penicillin was denied to the infected men after that drug became available in the mid-1940s, and it was still being withheld from them 25 years later, in direct violation of government legislation that mandated the treatment of venereal disease. It is estimated that more than 100 of the subjects died of tertiary syphilis.

The Tuskegee syphilis study finally came to an end in 1972 when the program and its unethical methods were exposed in the *Washington Star*. A class-action suit against the federal government was settled out of court for $10,000,000 in 1974. That same year the U.S. Congress passed the National Research Act, requiring institutional review boards to approve all studies involving human subjects.

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Tuskegee University, private, coeducational institution of higher education in Tuskegee, Ala., U.S. Its establishment as a school for training black teachers was approved by the Alabama state legislature in 1880, and the school still serves a predominantly black student body.

The black educator Booker T. Washington (*q.v.*) founded the school in 1881 and served as its principal until his death in 1915. The Tuskegee Normal and Industrial Institute inculcated Washington's principles of providing practical training for blacks and helping them develop economic self-reliance through the mastery of manual trades and agricultural skills. In the 1920s Tuskegee shifted from vocational education to academic higher education and became an accredited, degree-granting institute. It was renamed Tuskegee Institute in 1937 and began offering graduate-level instruction in 1943. The institute was renamed Tuskegee University in 1985. The renowned agricultural chemist George Washington Carver, who headed the school's agriculture department, conducted most of his research at Tuskegee from 1896 until his death in 1943. The school's third president, Frederick D. Patterson (served 1935–53), was the founder of the United Negro College Fund (1944).

On the campus is the George Washington Carver Museum, which includes the laboratory used by Carver for his work on the peanut (groundnut) and sweet potato. The university's library contains a notable collection of books pertaining to black Americans. The Booker T. Washington Monument on campus shows the institute's founder lifting a "veil of ignorance" from the head of a freed black. A section of the campus was declared a national historic site in 1974. The university had an enrollment of about 3,300 students in the late 20th century.

Tussaud, Marie, *née* GROSHOLTZ (b. Dec. 1, 1761, Strasbourg, France—d. April 16, 1850, London, Eng.), French-born founder of Madame Tussaud's museum of wax figures, in central London.

Her early life was spent first in Bern and then in Paris, where she learned the art of wax modeling from her uncle, Philippe Curtius, whose two wax museums she inherited upon his death in 1794. From 1780 until the outbreak of the French Revolution in 1789, she served as art tutor at Versailles to Louis XVI's sister, Madame Élisabeth, and she was later imprisoned as a royalist. During the Reign of Terror she had the gruesome responsibility of making death masks from heads—frequently those of her friends—freshly severed by the guillotine.

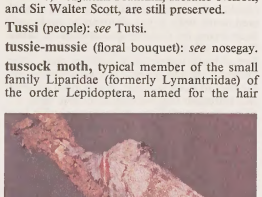
Her marriage in 1795 to François Tussaud, an engineer from Mâcon, was not a success; and in 1802 she took her two sons and her collection of wax models to England. She toured the British Isles for 33 years before finally establishing a permanent home in Baker Street, London, where she worked until eight years before her death. (In 1884 Madame Tussaud's moved to the Marylebone Road, London.)

Madame Tussaud's museum is topical as well as historical and includes both the famous and the infamous. Notorious characters and the relics of famous crimes are segregated in the "Chamber of Horrors," a name coined jokingly by a contributor to *Punch* in 1845. Many of the original models made by Marie Tussaud of her great contemporaries, such as Voltaire, Benjamin Franklin, Horatio Nelson, and Sir Walter Scott, are still preserved.

Tussi (people): *see* Tutsi.

tussie-mussie (floral bouquet): *see* nosegay.

tussock moth, typical member of the small family Liparidae (formerly Lymantriidae) of the order Lepidoptera, named for the hair



Tussock moth (*Dasichyra pudibunda*)
L. Hugh Newman from the Natural History Photographic Agency

tufts, or tussocks, found on most larval forms. The family, which occurs in both Eurasia and the New World, includes several species that are destructive to shade and forest trees: the gypsy moth (*q.v.; Lymantria dispar*), brown-tail moth (*Nygmia phaeorrhoea*), satin moth (*Stilpnotia salicis*), and nun moth (*Lymantria monacha*).

The large larvae are hairy, with many species having stinging hairs. Most feed on foliage of trees and shrubs, sometimes foraging daily from a silken tent or colonial nest of webbed leaves. The larvae of certain species overwinter in these nests; others overwinter as eggs. Pupation occurs aboveground in cocoons attached to tree branches or trunks.

The adults are medium-sized. Females range in colour from white to brown; some, such as the white-marked tussock moth (*Hemerocampa leucostigma*), lack wings.

Tutankhamen, original name TUTANKHATEN (fl. 14th century BC), king of Egypt (reigned 1333–23 BC), known chiefly for his intact tomb discovered in 1922. During his reign, powerful advisers restored the traditional Egyptian religion and art style after the death of Akhenaton, who had led the "Amarna revolution."



Tutankhamen, gold funerary mask found in the King's tomb, 14th century BC; in the Egyptian Museum, Cairo
© Lee Boltin

Medical analysis of his mummy shows that Tutankhaten was probably a brother of Smenkhkare, his immediate predecessor, and son-in-law of King Akhenaton, with whom Smenkhkare was coregent. As suggested by a docket from Tell el-Amarna (Akhenaton's capital Akhetaton) and other circumstantial evidence, young Tutankhaten probably became king after the deaths of Akhenaton and his coregent. Seals from Tell el-Amarna suggest that Tutankhaten resided there during his first year or two. He was married to Akhenaton's third daughter, probably the eldest surviving princess of the royal family, to solidify his claim to the throne. Because at his accession he was still young, his vizier and regent, Ay, who had ties with the royal family, and the general of the armies, Horemheb, became his chief advisers.

Under their tutelage, Tutankhaten moved his residence to Memphis, the administrative capital, near modern Cairo, and restored his father's Theban palace. He also changed his name, at the latest by the fourth year of his reign, to Tutankhamen and issued a decree restoring the temples, images, personnel, and privileges of the old gods and also admitting the errors of Akhenaton's course. In spite of these capitulations to the Amon priesthood, no proscription or persecution of Aten, Akhen-

aton's god, was undertaken. Royal vineyards (up to the king's death) and elements of the army still remained named after the Aten.

During the ninth year of Tutankhamen's reign, perhaps under Horemheb, the Egyptians marched into Syria to assist Egypt's old ally, the Mitannian kingdom of northern Syria, which was embroiled in hostilities with vassals of the Hittites. As reinforcements sent by the Hittite king hastened to aid his vassals, Tutankhamen unexpectedly died, aged about 18 years. Because none of his children survived, Ay succeeded him, perhaps marrying his widow.

Some time after his death, Tutankhamen's tomb in western Thebes (not his original, which Ay had appropriated for himself) was entered twice by plunderers who, however, were caught after doing only minor damage. The burial chamber was not entered and remained intact until it was discovered in 1922 by Howard Carter, the English Egyptologist who excavated the tomb. When in the 19th dynasty the "Amarna kings"—Akhenaton, Smenkhkare, Tutankhamen, and Ay—were stricken from the royal lists and publicly condemned, the location of Tutankhamen's tomb was forgotten, and his relatively few monuments were usurped, primarily by his former general, Horemheb, who subsequently became pharaoh. In the 20th dynasty, when the tomb of Ramses VI was cut immediately above that of Tutankhamen, the stone rubble dumped down the side of the valley covered the young king's tomb with a deep layer of chips. The workers of the 20th dynasty came close to Tutankhamen's tomb and clearly had no knowledge of it. The tomb escaped the great series of robberies at the end of the 20th dynasty and was preserved until a systematic search of the Valley of the Kings revealed its location.

Inside his small tomb, the king's mummy lay within a nest of three coffins, the innermost of solid gold, the two outer ones of gold hammered over wooden frames. On the king's head was a magnificent golden portrait mask, and numerous pieces of jewelry and amulets lay upon the mummy and in its wrappings. The coffins and stone sarcophagus were surrounded by four shrines of hammered gold over wood, covered with texts, which practically filled the burial chamber. The other rooms were crammed with furniture, statuary, clothes, a chariot, weapons, staffs, and numerous other objects. But for his tomb, Tutankhamen had little claim to fame; as it is, he is perhaps better known than any of his longer lived and better documented predecessors and successors.

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Tuthmosis (Egyptian kings): *see* Thutmose.

Tuticorin, town, southern Tamil Nādu state, southern India. The town lies on the Gulf of Mannar, east of Tirunelveli, to which it is connected by road and rail. It developed from a small fishing village into a flourishing Portuguese colony in the 16th century and further expanded during Dutch and British occupancies; the port later declined with the growth of Madras. From the late 1960s the harbour was deepened, warehouse and fishing facilities were improved, and industry was expanded. Most of the town's shipping is handled, nonetheless, at New Tuticorin, about 5 miles (8 km) southeast of the original port. One of the major ports of India, it can receive vessels with drafts of up to 27 feet (8.24 m). It handles a large volume of coal traffic, as well as trade with Sri Lanka. Tuticorin has several colleges affiliated with Madurai-Kamaraj University. Pop. (1991) town, 199,854; metropolitan area, 280,091.

Tutsi, also called BATUSI, TUSSI, WATUSI, or WATUTSI, ethnic group of probable Nilotic stock, whose members live within Rwanda and Burundi. The Tutsi formed the traditional aristocratic minority in both countries, constituting about 9 percent and 14 percent of the population, respectively. (The Tutsis' numbers in Rwanda were greatly reduced by a government-inspired genocidal campaign against them in 1994, however.) The Tutsi originally tended to be taller, smaller boned, and lighter skinned than the Hutu (*q.v.*) majority, though extensive intermarriage between the two groups has blurred these physical characteristics.

The Tutsi first penetrated the area in the 14th or 15th century, entering from the northeast seeking new rangelands. Though they were skilled warriors, they obtained dominance over the resident Hutu through a slow and largely peaceful infiltration. The Tutsi established a feudal relationship with the Hutu based on their possession of cattle and their more advanced knowledge of warfare. At the head of the Tutsis' complex pyramidal political structure was the *mwami* ("king"), who was considered to be of divine origin.

Tutsi expansion continued until the European colonial period of the late 19th century. Until then relations between the Hutu and their Tutsi overlords had been fairly amicable, but the favour shown to the Tutsi by the Belgian colonial administration (1916–61) intensified the animosities between the two peoples. The Tutsi retained their dominant position over the Hutu in Rwanda until 1961, when the monarchy was overthrown. In 1994, in the midst of a military campaign by Tutsi exiles to retake Rwanda, the Hutu-dominated government there instigated genocidal massacres of hundreds of thousands of Tutsi. This did not prevent the Tutsi exiles' army from overruning the country soon afterward and ousting the Hutu regime. In Burundi, by contrast, the Tutsi managed to keep control of the government in the face of periodic Hutu risings. An unsuccessful Hutu revolt in Burundi in 1972 was suppressed by the government at a cost of 100,000 lives, most of them Hutu.

Unlike the agrarian Hutu, the Tutsi considered work with a hoe demeaning and made their living by owning and dealing in cattle. Occasionally an impoverished Tutsi would be forced back to the land, but his clan, when necessary, would generally make arrangements for him to borrow cattle, the symbol of superior status, so that he might not lose face.

The Hutu and Tutsi cultures gradually integrated over the centuries. The Tutsi adopted the mutually intelligible Bantu languages Rwanda and Rundi, which were originally spoken by the Hutu. The kinship and clan system is probably derived from Tutsi culture, and the central importance of cattle certainly is. The Hutu and Tutsi adhere essentially to the same religious beliefs, which include forms of animism and Christianity. The two ethnic groups remain deeply divided over the apportionment of political power in both Rwanda and Burundi, however.

tutu, standard skirt worn by female ballet dancers, consisting of four or five layers of silk or nylon frills; the skirt is attached to a sleek-fitting bodice. (Originally *tutu* designated a short, trouserlike petticoat worn under a dancer's costume.) The prototype of the Romantic tutu, extending to within about 12 inches (30 cm) of the floor, was introduced



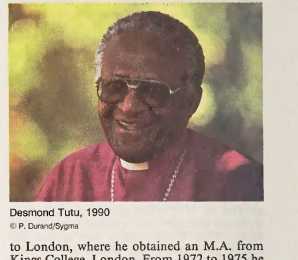
Ballet dancers in Romantic tutus in "Le Foyer de la danse," oil on canvas by Edgar Degas, 1872; in the Louvre, Paris

Giraudon—Art Resource

in the 1830s by Marie Taglioni. The tutu gradually was shortened until, by the 1880s, the whole leg was visible. Both the Romantic and the brief tutu are worn in contemporary ballet.

Tutu, Desmond, in full DESMOND MPILO TUTU (b. Oct. 7, 1931, Klerksdorp, S.Af.), black South African Anglican cleric who in 1984 received the Nobel Prize for Peace for his role in the opposition to apartheid in South Africa.

Tutu was born of Xhosa and Tswana parents and was educated in South African mission schools at which his father taught. Though he wanted a medical career, Tutu was unable to afford training and instead became a schoolteacher in 1954. He resigned his post in 1957. Ordained an Anglican parish priest in 1961, Tutu lectured at a theological seminary in Johannesburg. In the late 1960s he moved



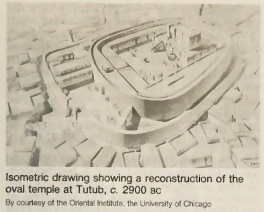
Desmond Tutu, 1990

© P. Durand/Sygma

to London, where he obtained an M.A. from Kings College, London. From 1972 to 1975 he served as an assistant director for the World Council of Churches. He was appointed dean of Johannesburg (1975–76) and was the first black to hold that position.

In 1978 he accepted an appointment as the general secretary of the South African Council of Churches and became a leading spokesman for the rights of black South Africans. He emphasized nonviolent means of protest and encouraged the application of economic pressure by countries dealing with South Africa. *The Divine Intention,* a collection of his lectures, was published in 1982, and *Hope and Suffering,* a collection of his sermons, in 1983. In 1985 he was installed as Johannesburg's first black Anglican bishop, and in 1986 he was elected the first black archbishop of Cape Town, thus becoming the primate of South Africa's 1,600,000-member Anglican church. He retired from the primacy in 1996.

Tutub, modern KHAFĀJĪ, ancient Sumerian city-state located in the Diyālā Valley east of Baghdad, Iraq. Tutub was of greatest significance during the Early Dynastic Period (*c.* 2900–2334 BC), and important remains have been found dating to that period—particularly the temple oval. Tutub was excavated

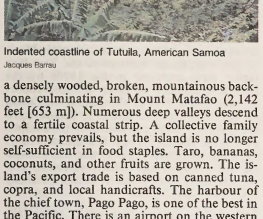


Isometric drawing showing a reconstruction of the oval temple at Tutub, *c.* 2900 BC

By courtesy of the Oriental Institute, the University of Chicago

between 1930 and 1938 by investigators from the Oriental Institute of the University of Chicago.

Tutuila, largest island in American Samoa, south-central Pacific Ocean. It lies about 1,600 miles (2,600 km) northeast of New Zealand. About 18 miles (30 km) long and 6 miles (10 km) across at its widest point, the island has an area of 52 square miles (135 square km). It has



Indented coastline of Tutuila, American Samoa

Jacques Barrau

a densely wooded, broken, mountainous backbone culminating in Mount Matafao (2,142 feet [653 m]). Numerous deep valleys descend to a fertile coastal strip. A collective family economy prevails, but the island is no longer self-sufficient in food staples. Taro, bananas, coconuts, and other fruits are grown. The island's export trade is based on canned tuna, copra, and local handicrafts. The harbour of the chief town, Pago Pago, is one of the best in the Pacific. There is an airport on the western portion of the island. Pop. (1999 est.) 56,600.

Tutuola, Amos (b. 1920, Abeokuta, Nigeria)—d. June 8, 1997, Ibadan), Nigerian author of richly inventive fantasies.

Tutuola incorporated Yoruba myths and legends into loosely constructed prose epics that improvise on traditional themes found in Yoruba folktales. His best-known work is the novel *The Palm-Wine Drinkard and His Dead Palm-Wine Tapster in the Deads' Town* (1952). It was translated into 11 languages and was the first Nigerian book to achieve international fame. *The Palm-Wine Drinkard* is a classic quest tale in which the hero, a lazy boy who likes to spend his days drinking palm wine, gains wisdom, confronts death, and overcomes many perils in the course of his journey.

My Life in the Bush of Ghosts (1954) reiterates the quest motif through the experiences of a boy who, in trying to escape from slave traders, finds himself in the Bush of Ghosts. Another quest is found in *Simbi and the Satyr of the Dark Jungle* (1955), a more compact tale focusing on a beautiful and rich young girl who leaves her home and experiences poverty and starvation. In this and other tales—*The Brave African Huntress* (1958), *The Feather Woman of the Jungle* (1962), *Ajaiyi and His Inherited Poverty* (1967), and *The Witch-Herbalist of the Remote Town* (1981)—Tutuola's rich vision imposes unity upon a series of relatively random events. His later works include *Yoruba Folktales* (1986), *Pauper, Brawler, and Slanderer* (1987), and *The Village Witch Doctor and Other Stories* (1990).

Tutuola had only six years of formal schooling and wrote completely outside the mainstream of Nigerian literature. He was influenced by Daniel Olorunfemi Fagunwa, a Nigerian author who wrote similar folk fantasies earlier in Yoruba. Tutuola was also familiar with *The Thousand and One Nights, Pilgrim's Progress,* and other episodic adventure stories that had been used as textbooks at the Salvation Army primary school that he attended.

His vivid presentation of the world of Yoruba mythology and religion and his grasp of literary form made him a success among a wide British, African, and American audience. Also popular are the theatrical and operatic versions of *The Palm-Wine Drinkard* that have been made by others.

Tuva, also called TYVA, or TANNU-TUVA, republic in south-central Siberia, Russia. Tuva borders northwestern Mongolia and occupies the basin of the upper Yenisey River. Its relief consists of two broad basins, the Tuva and Todzha, drained by two main tributaries of the Yenisey River. High mountain ranges, including the Eastern Sayan and Western Sayan mountains to the north, enclose the basins. A continuous series of ranges also enclose the republic on the west, south, and southeast: the Altai, Tannu-Ola, and Sangilen mountains. The highest point is Mount Munku-Taiga (Mongun-Taiga; 13,044 feet [3,976 m]) in the extreme southwest. The climate is generally of the dry, sharply continental type, with severe winters and warm summers. Vegetation ranges from dry steppe in the basins to dense coniferous forests to alpine meadows that are succeeded by bare rock and snow at the highest elevations.

There are five cities, including Kyzyl (*q.v.*), the capital, and three towns. More than half of the population is rural.

Tannu Tuva was part of the Chinese empire from 1757 until 1911, when tsarist Russia fomented a separatist movement and in 1914 took the country under its protection. In 1921 independence was proclaimed for the Tannu Tuva People's Republic, but in 1944 it was annexed by the Soviet Union and made an autonomous oblast (province) of the Russian S.F.S.R. In 1961 its status was raised to that of an autonomous republic. Tuvans constitute about two-thirds of the population (most of the rest being Russians).

Tuva is an agricultural region, with sheep herding and cattle raising the main occupations. Wool, meat, and animal furs are important products. Industries include food processing, leather making, woodworking, and the manufacture of building materials, but mining, especially of cobalt and asbestos, is the most developed. Area 65,800 square miles (170,500 square km). Pop. (1996 est.) 309,000.

Tuvalu, formerly ELLICE ISLANDS, constitutional monarchy comprising five atolls and four coral islands in the west-central Pacific, 2,500 miles (4,000 km) northeast of Australia. Fongafale, islet of Vaiaku, on Funafuti Atoll, is the capital. Area 9.90 square miles (25.63 square km). Pop. (2000 est.) 10,800.

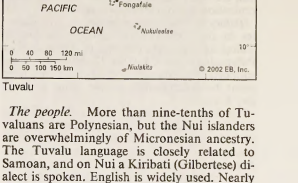
A brief treatment of Tuvalu follows. For full treatment, *see* MACROPAEDIA: Pacific Islands.

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

The land. Tuvalu's islands stretch about 420 miles (676 km) northwestward from Niulakita, the southernmost, and include Nukulaelae, Funafuti, Nukufetau, Vaitupu, Nui, Niutao, Nanumaga (Nanumanga), and Nanumea. They range in size from Vaitupu, 2.16 square miles (5.6 square km), down to Niulakita, 0.16 square mile (0.42 square km). All the islands are low-lying, with maximum elevations of less than 20 feet (6 m).

The climate is warm and humid throughout the year; daytime temperatures range from 80° F to 85° F (27° C to 29° C), but the islands are cooled by prevailing southeast trade winds. Annual rainfall is generally greater than 100 inches (2,500 mm), although severe droughts may affect the islands periodically.

Vegetation is limited to about three dozen plant species, with coconut palms, breadfruit trees, pandanus, casuarina, and grasses predominant. Bird and wildlife variety likewise is limited, but sea fauna abound in the reefs and lagoons. Because of the extremely porous soil, fresh water must be obtained by rainwater catchments, and drinking water is often replaced by coconut milk.



Tuvalu

The people. More than nine-tenths of Tuvaluans are Polynesian, but the Nui islanders are overwhelmingly of Micronesian ancestry. The Tuvalu language is closely related to Samoan, and on Nui a Kiribati (Gilbertese) dialect is spoken. English is widely used. Nearly nine-tenths of Tuvaluans are members of the Church of Tuvalu, which evolved from Congregational missions. Population density is high and about half of the population is urban, mostly concentrated on Fongafale islet of Funafuti Atoll, which is the centre of government and commerce.

The economy. Tuvalu's developing economy is based mainly on subsistence agriculture and fishing. Its gross national product (GNP) per capita is relatively low in comparison with other countries of Oceania. Because of poor soil quality in Tuvalu, the islanders plant taro, bananas, and sugarcane in trenches dug to the water table, 6 to 12 feet (2 to 4 m) below the surface. These crops are planted in hillocks of good soil mulched with leaves within the trenches, which are 10 to 20 feet (3 to 6 m) wide. Breadfruit and pawpaw are grown on embankments between the trenches. Coconut palms and pandanus grow freely on the islands, and copra, which is raised for export, is the main crop. The land is held in small family plots or communally. Pigs, chickens, and ducks are the only livestock.

Fishing, chiefly for castor-oil fish, is conducted for the local market, but several islands harvest and process bêche-de-mer for export.

There is little manufacturing save for the production of copra, coconut oil, and traditional handicrafts woven from pandanus leaves. A modest foreign-exchange earner is postage-stamp production and sales abroad.

About two-thirds of the islands' labour force is employed in subsistence agriculture and small-scale fishing. About one-fifth work in government positions. Many Tuvaluans are employed abroad or on ships, and remittances from these are the principal source of foreign exchange.

Irregular interisland shipping and air service (at Funafuti) are the most important forms of transport, but only Funafuti and Nui have navigable passages into their lagoons. Funafuti

is the main port, and deepening of wharf-side waters was finished in 1980, permitting ocean-going ships to anchor alongside. Tuvalu's imports have generally ranged about tenfold higher than exports in value. Garments and copra are exported.

Government and social conditions. According to its revised constitution of 1986, the British monarch is the head of state in Tuvalu, represented by a Tuvaluan chosen as governor-general by the Tuvaluan prime minister. The unicameral parliament has 12 members elected to four-year terms; the parliament in turn elects the prime minister, who is assisted by a Cabinet of ministers.

Funafuti has a hospital, and each island is served by a dispensary. Health is generally good, but infant mortality has remained fairly high, partly because of erratic fresh water supply. Life expectancy is 62 years for males and 64 years for females.

There are primary schools in each of the eight inhabited islands; education is free and compulsory until the age of 15. Tuvalu has been little affected by European influences, save for Christianization, and local traditions and crafts are still strong, although some modernization has influenced Funafuti.

History. Traditions recorded by missionaries in the 19th century indicate Samoa or Tonga as the original home of Tuvalu's first Polynesian settlers, and the Tuvaluan language supports this. Nui was occupied at some later point by Micronesian people from present-day Kiribati.

The Spanish explorer Alvaro de Mendaña de Neira sighted Nui in 1568 and Niulakita in 1595. The group's former name, Ellice Islands, originated from the owner of the ship *Rebecca*, whose captain, Arent De Peyster, visited Funafuti in 1819. A number of Europeans settled and intermarried with Tuvaluans during the period 1820–70. Peruvian "blackbirders" forcibly abducted from Funafuti and Nukulaelae much of the population, none of whom ever returned. A few years later, in 1865, London Missionary Society pastors established themselves and rapidly converted the islanders to Christianity.

The United States claimed the four southern islands through the congressional Guano Act of 1856. In 1892, Tuvalu joined the British Gilbert Islands Protectorate. The protectorate became the Gilbert and Ellice Islands Colony in 1916. Funafuti Atoll was chosen as administrative centre and became the port of entry.

After the Japanese occupied the Gilberts in 1942, U.S. forces occupied the Ellice Islands and built airstrips on three islands; the Gilberts were liberated in 1943. Many Tuvaluans emigrated to Tarawa in the Gilberts after World War II for employment, and rivalry between them and Kiribatians set the stage for separation of the two. Tuvaluans voted overwhelmingly in 1974 for separation from the Gilberts (now Kiribati), whose people are Micronesian. Tuvalu gained independence on Oct. 1, 1978. Early in 1979 the United States signed a treaty of friendship with Tuvalu and relinquished its claims to the four southern islands. The first postindependence parliamentary elections were held in 1981, and a revised constitution was adopted in 1986. Tuvalu faced land shortages and the prospect of growing unemployment in the late 20th century.

Tuvan, also called TUVINIAN, or TANNU-TUVAN, SOYOT, or URYANKHAI, any member of an ethnolinguistic group inhabiting the autonomous republic of Tuva in south-central Russia; the group also constitutes a small minority in the northwestern part of Mongolia. The Tuvans are a Turkic-speaking people with Mongol influences. They live among the headwaters of the Yenisey River, in an area that has characteristics of both Siberian taiga and Central Asian steppe. Pastoralism and hunting are their traditional occupations, but there is also some sedentary agriculture. The growing of millet and fishing have customarily been a subsidiary part of the economy. Oats, barley, wheat, and vegetables are also grown. The Tuvan traditional dwellings include the felt tents (called *gers,* or yurts) of the steppe peoples and the conical bark tents of Siberia.

Since the 17th century the Tuvans have come under increasing Russian cultural influence. Their traditional social organization is based on a system of clans, and their traditional religion combines shamanism and features of Tibetan Buddhism. They practice a unique musical form called throat singing, in which a singer produces two or three tones simultaneously. In the late 20th century the Tuvans numbered more than 200,000 in Tuva and about 25,000 in Mongolia. There were also several hundred in other areas of Siberia and in China.

Tuve, Merle Antony (b. June 27, 1901, Canton, S.D., U.S.—d. May 20, 1982, Bethesda, Md.), American research physicist and geophysicist who developed the radio-wave exploration method for the ionosphere. The observations he made provided the theoretical foundation for the development of radar.

With the American physicist Gregory Breit, Tuve in 1925 succeeded in measuring the height of the Earth's ionosphere by bouncing short-pulse radio waves off its ionized layer of air and determining the amount of time taken by the echoes to return. In 1926 Tuve investigated long-range seismic refraction (change in the path through the Earth of a disturbance as it passes through material of varying composition). After receiving his doctorate in physics from Johns Hopkins University (1926), he joined the Department of Terrestrial Magnetism of the Carnegie Institution of Washington (Washington, D.C.), where he used high-voltage accelerators to define the structure of the atom. He verified the existence of the neutron, measured the bonding forces in atomic nuclei, produced beta and gamma radiation and high-velocity protons, and researched radioastronomy and artificial radioactivity.

Tuve served as director of the Department of Terrestrial Magnetism at the Carnegie Institution from 1946 to 1966. In 1946 he was awarded the U.S. Presidential Medal of Merit and made a commander in the Order of the British Empire. He was knighted in 1948.

Tuwim, Julian (b. Sept. 13, 1894, Łódź, Pol.—d. Dec. 27, 1953, Zakopane), lyric poet who was leader of the 20th-century group of Polish poets called Skamander (*q.v.*).

Tuwim spent his life in Poland, except for five years of exile in Brazil and the United States during World War II. He began his career in 1915 with the publication of a flamboyant Futurist manifesto that created a scandal and presented a position that he soon abandoned. Tuwim's poetry throughout his life was marked by explosive energy and great emotional tension. Among his works published in the years before World War II are *Czyhanie na Boga* (1918; "Lying in Wait for God"), *Sokrates Tańczący* (1920; "The Dancing Socrates"), and his most important collection, *Słowa we Krwi* (1926; "Words in Blood"). During his exile he wrote a long, discursive autobiographical poem, *Kwiaty polskie* (1949; "Polish Flowers"), and also produced a volume of children's songs.

Tuxpan, in full TUXPAN DE RODRÍGUEZ CANO, city, northern Veracruz *estado* ("state"), east-central Mexico. It lies along the Tuxpan River, 7.5 miles (12 km) from the river's mouth on the Gulf of Mexico. Despite its hot, humid climate, Tuxpan is a commercial, industrial, and transportation centre. The principal source of income is petroleum from the nearby oil fields, much of which is exported. Other exports include corn (maize), bananas, fish, and livestock from the hinterland that are processed in the city. Shipyards are located nearby. Highways and air service link Tuxpan with Mexico City, to the southwest, and with coastal urban centres. Ships can reach Tuxpan via the river or via an inland canal-and-lagoon route through the oil fields from Tampico to the north-northwest. Pop. (1990) 69,224.

Tuxtla, in full TUXTLA GUTIÉRREZ, city, capital of Chiapas *estado* ("state"), southeastern Mexico. It lies at about 1,740 feet (530 m) above sea level, 7.5 miles (12 km) west of the Grijalva River and about 240 miles (390 km) east of Oaxaca. In 1892 Tuxtla replaced San Cristóbal de las Casas as state capital. In addition to its administrative functions, Tuxtla is the major commercial and manufacturing centre in the state. Much of the corn (maize), cotton, cacao, coffee, tobacco, sugarcane, henequen, and other tropical crops cultivated in the region are processed in and distributed from the city. Tuxtla is on that portion of the Pan-American Highway linking Mexico City with Guatemala City, and it has an airfield. The Autonomous University of Chiapas was established at Tuxtla in 1975, and there also are technical institutes. The city has a well-known ZOO, a state archaeological and historical museum, and a botanical garden. The annual fair of Guadalupe held in December attracts a number of tourists. Pop. (1990) 289,626.

Tuy Hoa, city, south-central Vietnam. An agricultural centre and fishing port on the South China Sea coast near the mouth of the Da Rang River, it is the focus of a fertile, densely populated agricultural lowland devoted to sugarcane, cotton, and rice. Many of the Vietnamese farmers of the Tuy Hoa region were recruited in the 1920s by the French to relocate on newly founded rubber and tea plantations in the central highlands. In 1936 the city was linked to Saigon (now Ho Chi Minh City) and Hanoi by the completion of the coastal railway. It is also served by the national coastal highway and has a hospital and a commercial airport. A ruined 4th-century-AD Champa tower is located there. Pop. (1989) 54,081.

Tuz, Lake, Turkish TUZ GÖLÜ, saline lake occupying a depression in the dry central plateau of Turkey, 65 miles (105 km) northeast of Konya. It lies at an elevation of 2,970 feet (905 m). For most of the year this very shallow (3–6 feet [1–2 m]) and saline lake has an area of about 580 square miles (1,500 square km). Normally about 50 miles (80 km) long and 30 miles (50 km) wide, it recedes each summer to leave a desolate expanse of encrusted salt, which is worked. The lake has no outlet, and few surface streams feed into it; rainfall in the surrounding area is as low as 10 inches (250 mm) per year.

Tuzigoot National Monument, national monument in central Arizona, U.S. It is located in the Verde River valley, 5 miles (8 km) northeast of Clarkdale. It was established in 1939 and occupies 43 acres (17 hectares). Its outstanding feature is the ruin, excavated in 1933–34 and partially rebuilt, of a Sinagua Indian pueblo (village) containing 110 rooms that was occupied by three cultural groups between AD 1100 and 1450. A museum displays such artifacts as stone and horn implements, jewelry, matting, and pottery, all recovered from the floors of the pueblo and from graves.

Tuzla, town, northeastern Bosnia and Herzegovina, situated in the Tuzla Basin. Tuzla has long been associated with local deposits of rock salt. In the 10th century it was called Soli (Salts), and its present name is from the Turkish *tuz,* "salt."

From 1510 Tuzla was a Turkish garrison town, until in the 19th century it passed under the Austro-Hungarian Empire; in 1918 it was incorporated into Yugoslavia. Large quantities of lignite are mined in the basin, and there is a mining institute in the town. Its good rail and road connections make Tuzla a collection point for agricultural produce. It is also the site of thermal-power stations. Pop. (1987 est.) 67,300.

TVA: *see* Tennessee Valley Authority.

Tver, in full PRINCIPALITY OF TVER, Russian TVER, OF TVERSKOYE KNYAZHESTVO, medieval principality located in the region northwest of Moscow and centring on the city of Tver and including the towns of Kashin, Mikulin, Kholm, Dorogobuzh, and Staritsa. Descendants of Prince Yaroslav Yaroslavich (brother of Alexander Nevsky and son of Yaroslav Vsevolodovich) founded the principality in 1246. Under their rule Tver rivaled Moscow for supremacy in northeastern Russia during the 14th and 15th centuries. In 1305 Yaroslav's son Michael I was made grand prince of Vladimir (*i.e.,* chief among the Russian princes). Yury of Moscow, however, gained the support of Öz Beg (Uzbek), khan (1313–41) of the Golden Horde, and in 1317 replaced Michael as grand prince. Michael refused to accept his loss and defeated the military force sent by Öz Beg and Yury to dethrone him. He was killed by Öz Beg in 1318.

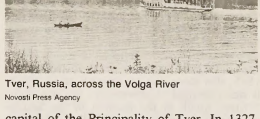
In 1322 the patent conferring the title was again bestowed on a Tver prince, Dmitry Mikhaylovich. But he was executed (1326) by Öz Beg for killing Yury of Moscow. The patent was then passed to his brother Alexander, who held it until the Tver population revolted against Mongol officials (1327). Tver was then plundered by an expedition sent by the Golden Horde; the patent for the grand prince of Vladimir was never again bestowed upon a Tver prince.

Alexander fled to Lithuania, but his brothers, Constantine and Vasily, tried to restore the principality. Although Tver suffered from civil war during Vasily's reign (1346–67), it was strong enough by 1368, under Michael II, son of Alexander, to join Lithuania and challenge Moscow's dominant position. Dmitry Donskoy decisively defeated Michael in 1375 and forced Tver to acknowledge Moscow's suzerainty. Michael and his son Ivan, however, maintained Tver's independence, and under the rule of Boris Aleksandrovich (1425–61) the principality flourished culturally and economically, while maintaining cordial relations with Moscow. Nevertheless, in 1485 Ivan III of Moscow annexed the Principality of Tver, whose last prince, Michael III Borisovich (1461–85), unsuccessfully allied himself with King Casimir IV of Poland and was forced to flee.

Tver, formerly (1931–90) KALININ, *oblast* (province), western Russia. It occupies an area of 32,471 square miles (84,100 square km) and extends from the morainic Valdai Hills in the southwest, across the broad, swampy plain of the upper Volga River, to the shore of the huge Rybinsk Reservoir in the northeast. The Valdai Hills have scores of lakes and many areas of swamp. The chief cities in the oblast are Tver, the administrative centre, Vyshny Volochok, and Rzhev. The oblast is largely forested with spruce, pine, and birch; peat bogs, grass marsh, and floodplain meadows are also extensive, and most of the soils are of low fertility. Oak and other deciduous species occur in the south. The climate is continental, with about 24 inches (600 mm) of precipitation a year. Although only about one-quarter of the land area is plowed, agriculture dominates the economy, consisting chiefly of dairying, livestock, and the growing of flax. Rye, oats, and wheat are the chief grains grown. The oblast's industry is concerned with processing local agricultural and forest products, the manufacture of both linen and cotton textiles, and timber working, with some light engineering. Tver, the capital, has some heavy machinery, including railroad rolling stock. Peat and lignite (brown coal) are exploited locally. Pop. (1990 est.) 1,674,000.

Tver, formerly (1931–90) KALININ, city and administrative centre of Tver *oblast* (province), western Russia. The city lies at the confluence of the upper Volga and Tvertsa rivers.

The first mention of Tver dates from 1134–35, when it was subject to Novgorod. It became part of the Principality of Vladimir-Suzdal in 1209, and in 1246 it became the



Tver, Russia, across the Volga River
Novosti Press Agency

capital of the Principality of Tver. In 1327, with its kremlin large and well fortified, Tver organized an uprising against the Tatars but was defeated. The Principality of Tver was annexed by Moscow in 1485. In the 14th and 15th centuries Tver was well known as an important crafts centre. With the construction of the Vyshny Volochok canal system between the Tvertsa and the Msta rivers in 1703–08, river trade through Tver became important. Although this route is no longer used, Tver remains the major river port of the upper Volga and is linked by the Moscow Canal to the national capital. The city was laid out in a gridiron pattern in the 18th century, and a number of historic buildings survive.

Tver is now the centre of a major flax-growing region and is also an industrial centre, with emphasis on textile manufacturing and other light industries and on the manufacture of railroad rolling stock. It was renamed Kalinin in 1931 after Mikhail Kalinin (1875–1946), a revolutionary and ceremonial head of state of the Soviet Union, but it reverted to its old name in 1990. The city was severely damaged during World War II when it was captured and occupied by the Germans in 1941. Its buildings were subsequently restored. Pop. (1989 prelim.) 451,000.

Tvrtko I, in full TVRTKO KOTROMANIĆ (b. *c.* 1338—d. 1391), probably the greatest ruler of Bosnia, ruling as Bosnian *ban* (provincial lord, subservient to the king of Hungary) from 1353 and king of the Serbs and Bosnia from 1377.

In 1363 Tvrtko commenced war with King Louis I of Hungary, but afterward Louis helped him regain power following a revolution in Bosnia. At Bileča in 1388 Tvrtko's forces halted an Ottoman Turkish invasion. In 1390 he extended his power into Croatia and to the Dalmatian islands in the Adriatic Sea.

Twa, also called BATWA, one of the best-known of the many Pygmy groups scattered across equatorial Africa. Like all other African Pygmies, the Twa, averaging about 5 feet (1.5 m) in height, are a people of mixed ancestry, probably descendants of the original inhabitants of the tropical rain forest. They live in the high mountains and plains around Lake Kivu, in Zaire, Rwanda, and Burundi, and function in economic symbiosis with the pastoral Tutsi, the agricultural Hutu, and other peoples. Many specialize in pottery, which they market; others hunt.

Twachtman, John Henry (b. Aug. 4, 1853, Cincinnati, Ohio, U.S.—d. Aug. 8, 1902, Gloucester, Mass.), painter and etcher, one of the first American Impressionists.

Twachtman went to Munich in 1875 to study painting and adopted the broad brushwork and warmly dark tonal colouring of the Munich school. Later, he studied at the Julian Academy in Paris, where he came into contact with Impressionism and began to paint with broken dabs of colour.

Unsuccessful at first, he supported himself after 1889 by teaching at the Art Students League in New York City. From that year also, his lyrical interpretation of landscape attained its maturity. He preferred painting scenes of nature veiled in cool, shimmering light—*e.g.,*



"Hemlock Pool," oil painting by Twachtman, *c.* 1902; in the Addison Gallery of American Art, Andover, Mass.
By courtesy of the Addison Gallery of American Art, Phillips Academy, Andover, Mass.

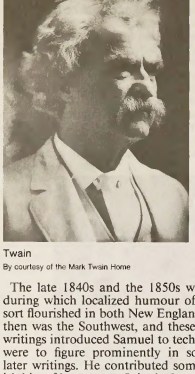
"The White Bridge." Among his best-known works are winter or early spring landscapes with delicate high-keyed colour and strong underlying formal construction—*e.g.,* "Hemlock Pool" (*c.* 1902). Twachtman was also prominent among The Ten, a group of American painters exhibiting independently of the National Academy of Design from 1895 onward.

Twain, Mark, pseudonym of SAMUEL LANGHORNE CLEMENS (b. Nov. 30, 1835, Florida, Mo., U.S.—d. April 21, 1910, Redding, Conn.), American humorist, writer, and lecturer who won a worldwide audience for his stories of youthful adventures, especially *The Adventures of Tom Sawyer* (1876), *Life on the Mississippi* (1883), and *The Adventures of Huckleberry Finn* (1884).

Youth in Hannibal and early travels. Clemens was the sixth child of John Marshall and Jane Lampton Clemens. He was four when the family moved to nearby Hannibal, on the west bank of the Mississippi, where his father kept a dry-goods and grocery store, practiced law, and entered local politics. There Samuel spent his boyhood, enchanted by the romance of river life—the steamboats, keelboats, and giant lumber rafts and also the human flotsam washed up by the river: professional gamblers and confidence men, itinerant stevedores and indigent raftsmen. Hannibal was an ideal place for a boy to grow up, with its woods and hills, its opportunities for fishing, and a nearby island in the river.

Samuel's father died in 1847, when the boy was 11. From that time on, it became necessary for Samuel to contribute to the family's support. He became a delivery boy, grocery clerk, and blacksmith's helper during sum-

mers or after school. At the age of 13 he became a full-time apprentice to a local printer. When his brother Orion, 10 years older than he, established the *Hannibal Journal,* Samuel became a compositor for that paper.



Twain
By courtesy of the Mark Twain Home

The late 1840s and the 1850s were periods during which localized humour of a superior sort flourished in both New England and what then was the Southwest, and these humorous writings introduced Samuel to techniques that were to figure prominently in some of his later writings. He contributed some amateurish bits of humour to Orion's *Journal* and was the "S.L.C." of Hannibal whose sketch "The Dandy Frightening the Squatter" was printed in a Boston humorous paper, *The Carpet-Bag,* in May 1852. This was an anecdote similar to a number then going the rounds, contrasting the strength and forthrightness of a frontiersman with the weakness and foolishness of an Eastern dandy.

Since Orion was as poor a businessman as his father had been, the *Journal* did not do well, and young Clemens became restless. In 1853 he set out as an itinerant printer and worked his way eastward on newspapers in St. Louis, New York City, and Philadelphia. In the summer of 1854 he rejoined Orion, who had now moved to Iowa. Except for a brief period as a printer in St. Louis, he worked at his trade for Orion in Keokuk, Iowa, until the fall of 1856. When in 1856 he began another period of wandering, he had a commission to write some comic travel letters for the Keokuk *Daily Post.* These, signed with the pseudonym "Thomas Jefferson Snodgrass," were characterized by the misspelling, the atrocious grammar, and the weirdly constructed sentences then becoming fashionable among rising humorists. But only five letters appeared, for on the way down the Mississippi toward New Orleans, Clemens met a steamboat pilot named Horace Bixby who agreed to take him on as an apprentice and teach him the mysteries of navigating the tortuous channels of the great and treacherous river. For almost four years Clemens plied the Mississippi; he later remembered these years as the most carefree of his life. He never met a man later anywhere whose kind he had not known on the river. After 1859 he was a licensed pilot in his own right, but two years later the Civil War cut across the river, bringing an end to traffic from north to south.

After probably spending a few weeks during the spring of 1861 in the Confederate militia, Clemens joined his brother Orion in a trip to the Nevada Territory, where the latter had been apointed territorial secretary. In Nevada, after unsuccessful stock speculation in mining and timberlands and equally unsuccessful prospecting for gold and silver, Samuel became a writer for the Virginia City *Territorial Enterprise.* He signed his contributions "Josh" and delighted in perpetrating such journalistic hoaxes as an account of "The Petrified Man" and "The Empire City Massacre," preposterous tall tales told so plausibly that other newspapers reprinted them as true.

It was in Virginia City on Feb. 3, 1863, that "Mark Twain" was born when Clemens, then 27, signed a humorous travel account with that pseudonym. The new name was a riverman's term for water "two fathoms deep" and thus just barely safe for navigation. In the spring of 1864, Twain left Nevada for California. In San Francisco he met and was encouraged by the author Bret Harte and spent convivial evenings with Charles Farrar Browne, who, under the pseudonym Artemus Ward, was then one of the most popular American humorists and platform lecturers and who encouraged him to contribute to a collection of Western sketches that he planned to publish. Twain, however, chose to sojourn in the Tuolumne Hills, where he did pocket mining at Angels Camp. With friends at nearby Jackass Hill, Twain heard the story that he would make famous as "The Celebrated Jumping Frog of Calaveras County." Published in a New York periodical, *The Saturday Press,* in November 1865, this story was an immediate hit when it was reprinted in newspapers far and wide. Written much in the manner of the Southwestern humour of the period of Clemens' youth, this fine tall tale brought not only his first national fame but also the first approval of his work by several discerning critics.

Trips abroad and mature writing. When, in 1866, the Pacific Steamboat Company inaugurated passenger service between San Francisco and Honolulu, Twain took the trip as a correspondent for *The Sacramento Union.* His letters and the lectures that he later gave about the trip were immediately popular. Since he enjoyed going places and talking about them, he set out again as "traveling correspondent" for California's largest paper, the *Alta California;* it was advertised that he would "circle the globe and write letters" as he went. The first leg of the journey was to New York City by way of the Isthmus of Panama, and in June 1867 he took the excursion steamship *Quaker City* for a voyage to Europe and the Holy Land. The letters that he wrote during the next five months, for the *Alta California* and Horace Greeley's *New York Tribune,* caught the public fancy and, when revised for publication in 1869 as *The Innocents Abroad; or, The New Pilgrim's Progress,* established Twain as a popular favourite. In his book Twain sharply satirized tourists who learned what they should see and feel by carefully reading guidebooks. He assumed the role of a keen-eyed, shrewd Westerner who was refreshingly honest and vivid in describing foreign scenes and his reactions to them. It is probable that Americans liked the implication that a common man could judge the Old World as well as the next man. But the chief attraction of the book was its humour, which readers of the time found delightful. The book showed that Mark Twain had found a method of writing about travel which, though seemingly artless, deftly employed changes of pace. Serious passages—history, statistics, description, explanation, argumentation—alternated with laughable ones. The humour itself was varied, sometimes being in the vein of the Southwestern yarn spinners whom he had encountered when a printer's devil, sometimes in that of contemporaneous humorists such as Artemus Ward and Josh Billings, who chiefly used burlesque and parody, anticlimactic sentences, puns, malapropisms, and other verbal devices. Thereafter he was to use the formula successfully in a number of books combining factual materials with humour.

In 1870 Twain resumed his career as a public lecturer who charmed audiences with laconic recitations of incredible comic incidents. Meanwhile, he had met Olivia Langdon of Elmira, N.Y. On Feb. 2, 1870, they were married, and in September 1871 they moved to Hartford, Conn., where Twain built a large and elaborate house in which he and his family would live for the next 20 years—the happiest and most productive period of his life. They soon had three daughters.

In 1872 *Roughing It* appeared, a chronicle of an overland stagecoach journey Twain had taken more than 10 years before and of Twain's adventures among the Pacific islands. Meanwhile, he collaborated with his neighbour Charles Dudley Warner on *The Gilded Age,* a satire on financial and political malfeasance that, when published in 1873, gave a name to the expansive post-Civil War era.

Twain continued to lecture with great success in the United States and, in 1872 and 1873, in England, holding audiences spellbound with his comic-coated social satire, drawling cadences, and outlandish exaggerations. He recorded his experiences as a pilot in "Old Times on the Mississippi" for the *Atlantic Monthly* (1875), expanded eight years later to *Life on the Mississippi,* an authentic and compelling description of a way of life that was, even then, long past. After having written boyhood friends, asking them to send their recollections of old days in Hannibal, he published *The Adventures of Tom Sawyer* in 1876, a narrative of youthful escapades that became an immediate and continuing favourite.

Tom Sawyer is perhaps Twain's best book for a juvenile audience. The setting was a small Mississippi River town, and the characters were the grownups and the children of the town in the 1830s. The book's nostalgic attitude and its wistful re-creation of pre-Civil War life are humorously spiced by its main character, Tom Sawyer. Rather than being the prematurely moral "model boy" of Sunday-school stories, Tom is depicted as "the normal boy," mischievous and irresponsible but goodhearted; and the book's subplots show him winning triumphs again and again. These happy endings endear the book to children, while the lifelike picture of a boy and his friends is enjoyed by both young and old.

In 1878 and 1879 Twain and his family again traveled abroad. A walking tour through the Black Forest provided much of the material for *A Tramp Abroad* (1880). A year later, in *The Prince and the Pauper* (1881), Twain again captured popular fancy as he spoke once more of boyhood adventures, this time through the device of transposed identities in old England, but with an undertone of social criticism that ridiculed the pretensions and achievements of monarchy. Twain's novel *The Adventures of Huckleberry Finn* appeared in 1884.

Huckleberry Finn, by general agreement, is Twain's finest book and an outstanding American novel. Its narrator is Huck, a youngster whose carelessly recorded vernacular speech is admirably adapted to detailed and poetic descriptions of scenes, vivid representations of characters, and narrative renditions that are both broadly comic and subtly ironic. Huck, son of the village drunkard, is uneducated, superstitious, and sometimes credulous; but he also has a native shrewdness, a cheerfulness that is hard to put down, compassionate tolerance, and an instinctive tendency to reach the right decisions about important matters. He runs away from his persecuting father and, with his companion, the runaway slave Jim, makes a long and frequently interrupted voyage floating down the Mississippi River on a raft.

During the journey Huck meets and comes to know members of greatly varied groups, so that the book memorably portrays almost every class living on or along the river. Huck overcomes his initial prejudices and learns to

respect and love Jim. The book's pages are dotted with idyllic descriptions of the great river and the surrounding forests, and Huck's exuberance and unconscious humour permeate the whole. But a thread that runs through adventure after adventure is the theme of man's inhumanity to man—of human cruelty. Children miss this theme, but adults who read the book with care cannot fail to be impressed by an attitude that was to become a reiterated theme of the author during his later years.

Twain turned next to historical fiction. In *A Connecticut Yankee in King Arthur's Court* (1889) he transplants a commonsensical Yankee back in time to Britain during the Dark Ages. Through a series of wary adventures Twain celebrates American homespun ingenuity in contrast to the superstitious ineptitude of a chivalric monarchy.

The popular image of Mark Twain was by now well-established. He was a gruff but knowledgeable, unaffected man who had been places and seen things and was not fooled by pretense. He talked and wrote with contagious humanity and charm in the lafiguage of ordinary people. At the same time, he scornfully berated man; evolution failed, he said, when man appeared, for his was the only evil heart in the entire animal kingdom. Yet Mark Twain was one with those he scorned: what any man sees in the human race, he admitted, "is merely himself in the deep and private honesty of his own heart." Perceptive, comic, but also bitter, Twain seemed to be the mirror of all men.

Financial difficulties and last years. Twain began speculating unsuccessfully again in the late 1880s through his enthusiastic financial support of an inventor named James W. Paige, who was developing a typesetting machine. The device proved worthless, and, in order to economize, Twain closed the large Hartford house and moved with his family to Europe. In 1892 the publishing firm he had established in 1884 published *The American Claimant* and in 1894 *Tom Sawyer Abroad,* neither of which was very successful. The company became more embroiled in financial difficulties, and soon Twain was bankrupt.

He turned over the management of his affairs to a friend, Henry Huttleston Rogers, an executive of the Standard Oil Company, and set about earning enough money to completely pay off his debts. The returns from *The Tragedy of Pudd'nhead Wilson* (1894), *Personal Recollections of Joan of Arc* (1895), a lecture tour around the world, and *Following the Equator* (1897), in which he described the tour, made him solvent again. In England during the lecture tour Twain received news of the death of his eldest daughter, Susy. Though grief-stricken, he and the rest of the family remained abroad for five more years. Jean, the youngest daughter, was discovered to be incurably ill, and Twain's wife, never robust, was failing. *The Man That Corrupted Hadleyburg and Other Stories and Sketches* was issued in 1900.

Late in that year, Twain and his family returned to the United States, where he was widely acclaimed as a man who had refused to bow to bankruptcy but had laboured diligently to pay every creditor every dollar he was owed. The family lived then in New York City, where Twain was greatly in demand as a speaker. He was by now a public hero, lauded and applauded, the friend of great industrial magnates, and the recipient of honorary degrees, but he still spoke out frankly and bitterly on public issues, denouncing imperialism and the baseness of the white man's conduct in subduing the Congo.

In the fall of 1903 Twain and his family settled near Florence, Italy. His wife died six months later, and he expressed his grief, his loneliness, and his pessimism about the human character in several late works. In 1906 Twain began to dictate his autobiography. The rambling, uneven account was uncompleted when he died in April 1910.

MAJOR WORKS. *Novels. The Gilded Age,* with Charles Dudley Warner (1873); *The Adventures of Tom Sawyer* (1876); *The Prince and the Pauper* (1881); *The Adventures of Huckleberry Finn* (1884); *A Connecticut Yankee in King Arthur's Court* (1889); *The American Claimant* (1892); *Tom Sawyer Abroad* (1894); *The Tragedy of Pudd'nhead Wilson* (1894); *Personal Recollections of Joan of Arc* (1895); *Tom Sawyer, Detective* (1896); *The Mysterious Stranger* (1916, posthumously published from the incomplete manuscript; re-edited more accurately, 1969).

Tales and sketches. The Celebrated Jumping Frog of Calaveras County, and Other Sketches (1867); *Mark Twain's Sketches, New and Old* (1875); *The Stolen White Elephant and Other Stories* (1882); *The £1,000,000 Bank-Note and Other New Stories* (1893); *The Man That Corrupted Hadleyburg and Other Stories and Sketches* (1900); *A Double Barrelled Detective Story* (1902); *The $30,000 Bequest, and Other Stories* (1906).

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Reminiscences. Roughing It (872); *Life on the Mississippi* (1883).

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Philosophical dialogue. What Is Man? (1906).

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Twardowski, Samuel (b. *c.* 1600, Lutynia, near Jarocin, Kingdom of Poland—d. 1661, Zalesie Wielkie, near Krotoszyn), Polish poet, diarist, and essayist.

An impoverished Polish nobleman, Twardowski was a hanger-on at various magnates' courts. While traveling as secretary with one of his patrons to Turkey on a diplomatic mission, he wrote a diary of the journey in verse: *Przeważna legacja J.O. Książęcia Krzysztofa Zbaraskiego* (1633; "The Important Mission of His Grace Duke Krzysztof Zbaraski"). He also wrote about many historical events, as in *Wojna domowa z Kozaki i Tatary* (1681; "A Civil War with the Cossacks and Tatars"), an account of the Zaporozhian Cossacks' revolt, under the leadership of Khmelnytsky, against Polish domination in the mid-17th century. Twardowski also wrote Baroque pastoral romances such as *Nadobna Pasqualina* (1655; "Fair Pasqualina") and *Dafnis w drzewo bobkowe przemieniela się* (1638; "Daphne Transformed into a Laurel Tree").

twayblade, any member of either of two genera of orchids, family Orchidaceae: *Liparis* and *Listera. Liparis,* also known as false twayblade, with about 200 species, is distributed worldwide. Each plant has broad, paired leaves, and most have dull-coloured, purplish flowers borne in a terminal spike. The flowers of the large twayblade (*Liparis lilifolia*) of eastern North America have thin, slender side petals and a broad lip. The fen orchid (*Liparis loeselii*) is a similar species found in northern Eurasia.

Listera, with about 30 north-temperate species, also is characterized by broad, paired leaves. Each flower has a large, forked lip. The common twayblade (*Listera ovata*) found throughout Eurasia has small green flowers and broad, egg-shaped leaves. All species of *Listera* have an unusual pollination mechanism by which pollen grains are glued to a visiting insect with an explosive force. The



Large twayblade (*Liparis lilifolia*)
Hugh Spencer

frightened insect then leaves and transfers the pollen to the next flower it visits. A common twayblade usually does not flower until its 10th year but may reproduce vegetatively by means of buds along the roots. The lesser twayblade (*Listera cordata*), also widespread in Eurasia, has heart-shaped leaves.

tweed, any of several fabrics of medium-to-heavy weight, rough in surface texture, and produced in a great variety of colour and weave effects largely determined by the place of manufacture. The descriptions "Scottish," "Welsh," "Cheviot," "Saxony," "Harris," "Yorkshire," "Donegal," and "West of England," for example, cover an extremely wide range of woolen and mixture cloths. Most tweeds are made entirely of wool; but an increasing number consist of blends of wool and cotton, wool and rayon, or wool and man-made fibres, each of which imparts a special property.

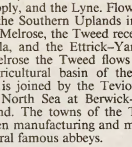
The word tweed was not derived from the River Tweed, although the cloth was manufactured in the Tweed Valley. Tweed is usually made by a variation of the basic twill weave,

and the old Scottish name for twill was tweel. The name tweed is attributed to a mistake on the part of a London clerk who in 1826, when drafting an order or invoice for tweels, accidentally wrote tweeds, a name that quickly established itself.

The wide range of modified twill weaves in use includes herringbones, diamonds, chevrons, cross twills, and checks, along with an even more extensive variety of stripe, marl, fleck, and mingled heather effects in many tones and hues. The counts of the yarns and the twist and colours employed vary greatly, as do the ends and picks in warp and weft, or filling. Most tweeds are colour woven from dyed yarns, but some are piece-dyed. Technical advances in dyeing raw stock, yarns, and fabrics, together with new techniques in finishing, have resulted in a wide variety of stable and hard-wearing apparel cloths made in different weights.

Tweed, River, river in southern Scotland, flowing eastward for 97 miles (156 km) and forming for 17 miles (27 km) the border with England, in which country lie the last 2 miles (3 km) of its course. The river rises at Tweed's Wells and flows northeast in a flat-floored valley; it receives among its tributaries Talla Water, now dammed for Edinburgh's water supply, and the Lyne. Flowing eastward through the Southern Uplands in a gorgelike valley to Melrose, the Tweed receives the Leithen, Gala, and the Ettrick–Yarrow system. From Melrose the Tweed flows through the broad agricultural basin of the Merse and at Kelso is joined by the Teviot. It empties into the North Sea at Berwick-upon-Tweed in England. The towns of the Tweed valley are woolen manufacturing and market towns, with several famous abbeys.

Tweed, William Marcy, byname BOSS TWEED (b. April 3, 1823, New York, N.Y., U.S.—d. April 12, 1878, New York, N.Y.), American politician who, with his "Tweed ring" cronies, systematically plundered New York City of sums estimated at between $30,000,000 and $200,000,000.



Boss Tweed
By courtesy of the Library of Congress, Washington, D.C.

Tweed was a bookkeeper and a volunteer fireman when elected alderman on his second try in 1851, and the following year he was also elected to a term in Congress. He gradually strengthened his position in Tammany Hall (the executive committee of New York City's Democratic Party organization), and in 1856 he was elected to a new, bipartisan city board of supervisors, after which he held other important positions in the city government. Meanwhile he managed to have his cronies named to other key city and county posts, thus establishing what became the Tweed ring. By 1860 he headed Tammany Hall's general committee and thus controlled the Democratic Party's nominations to all city positions. In that same year he opened a law office through which he received large fees from various corporations for his "legal services." He became a state senator in 1868 and also became grand sachem (principal leader) of Tammany Hall that same year. Tweed dominated the Democratic Party in both the city and state and had his candidates elected mayor of New York City, governor, and speaker of the state assembly. In 1870 he forced the passage of a new city charter creating a board of audit by means of which he and his associates could control the city treasury. The Tweed ring then proceeded to milk the city through such devices as faked leases, padded bills, false vouchers, unnecessary repairs, and overpriced goods and services bought from suppliers controlled by the ring. Vote fraud at elections was rampant.

Toppling Tweed became the prime goal of a growing reform movement. Exposed at last by *The New York Times,* the satiric cartoons of Thomas Nast in *Harper's Weekly,* and the efforts of a reform lawyer, Samuel J. Tilden, Tweed was tried on charges of forgery and larceny. He was convicted and sentenced to prison (1873) but was released in 1875. Rearrested on a civil charge, he was convicted and imprisoned, but he escaped to Cuba and then to Spain. Again arrested and extradited to the United States, he was confined again to jail in New York City, where he died.

Tweed River, principal river of the North Coast district, New South Wales, Australia, usually associated with the Clarence and Richmond rivers. Of its three arms, two rise in the McPherson Range and the third in the Tweed Range of the Eastern Highlands. The river flows 50 miles (80 km) east past Murwillumbah and Condong to enter the Pacific Ocean at Tweed Heads. Visited in 1823 by the explorer John Oxley, the river was named after the River Tweed of Scotland. Its valley yields sugarcane, bananas, and dairy products.

Tweeddale, district, Borders (*q.v.*) region, southern Scotland; created by the reorganization of 1975, it constitutes the former county of Peeblesshire (*q.v.*), or Peebles. The district, with an area of 347 square miles (899 square km), lies in the Southern Uplands and is drained by the River Tweed and its tributaries. Sheep are raised on the moors, and the district's limited agricultural land, along the valley floors, grows barley and fodder crops and pastures beef cattle. Peebles, the seat of the district authority, Innerleithen, and Walkerburn produce woolen goods and knitwear. Trout and salmon fishing and moorland scenery attract tourists. Pop. (1987 est.) 14,734.

Tweeddale, John Hay, 2nd Earl and 1st Marquess of, EARL OF GIFFORD, VISCOUNT OF WALDEN, LORD HAY OF YESTER (b. *c.* Aug. 13, 1625, Yester, East Lothian, Scot.—d. Aug. 11, 1697, Edinburgh), British statesman and lord high chancellor of Scotland from 1692 to 1696.

During the English Civil Wars he initially supported Charles I but then joined the Covenanters and fought in the Scottish ranks against the king at Marston Moor (July 1644). He fought with the Royalist section of the Covenanters at Preston (August 1648) and succeeded to his father's earldom in 1653. Nevertheless, he was a member of the Commonwealth Parliaments of 1656 and 1659.

Tweeddale was appointed a member of the Privy Council for Scotland soon after the Restoration of Charles II. While a policy of leniency toward the Covenanters prevailed (1667–74), Tweeddale took a prominent role in Scottish affairs. With the hardening of the official attitude in 1674, he was dismissed. In 1680 he returned to an office in the Treasury, which he held during the reign of James VII (James II of England).

Tweeddale supported William III and became a privy councillor (1689), lord high chancellor of Scotland (1692), and Marquess of Tweeddale (1694). During William's absence abroad, Tweeddale acted as lord high commissioner for Scotland. In this position he formally assented (1695) to the act establishing the Darién Company, which unsuccessfully attempted to establish a colony on the Isthmus of Panama. For this action he was dismissed from office when William returned to England in 1696.

Twelve, The, also called THE TWELVE PROPHETS, OF THE MINOR PROPHETS, book of the Hebrew Bible that contains the books of 12 minor prophets: Hosea, Joel, Amos, Obadiah, Jonah, Micah, Nahum, Habakkuk, Zephaniah, Haggai, Zechariah, and Malachi. In most other versions of the Old Testament, each of these 12 is treated as a separate book (*e.g.,* the Book of Hosea), but in the Hebrew Bible they are consolidated into one book that is the last of eight books in the second division of the Hebrew Bible, known as Nevi'im (*q.v.*), or The Prophets. *See* Old Testament.

Twelve Patriarchs, Testaments of the, pseudepigraphal work (not in any biblical canon) purporting to present the last words of the 12 sons of Jacob—founders of the 12 tribes of Israel. The book is an imitation of the "blessing of Jacob" described in chapter 49 of Genesis, but, unlike its model, this work contains lengthy moral exhortations based on the supposed sin or virtue of each patriarch.

Each essay includes an autobiography of the patriarch, including many elements of folk history (Haggada); an admonitory passage warning against the specific vice of the patriarch; and a prophecy, sometimes with apocalyptic overtones, explaining the fate of the patriarch's sons in the Last Age. In general, the admonitions are based on a belief in resurrection and the Last Judgment, and the tone of the work is decidedly pietistic and ascetic.

In its extant form, the book is a Jewish work, probably of the late 2nd century AD, with Christian interpolations. It was written in Greek, and Semitic originals are known for only two of the testaments, those of Levi and Naphtali. The *Testaments* are connected historically and ideologically with the Essene sect at Qumrān and their Dead Sea Scrolls, among which the fragments of the testaments of Levi (in Aramaic) and Naphtali (in Hebrew) were found. Further, many parallels exist between the *Testaments* and the *Damascus Document* (*q.v.*) produced by the Essenes, though there are also important differences.

The work is extant in several Greek manuscripts and in Armenian and Slavic translations.

Twelve Tables, Law of the, Latin LEX XII TABULARUM, the earliest codification of ancient Roman law, traditionally dated 451–450 BC.

The Twelve Tables were allegedly written at the demand of the plebeians, who at law felt hampered by the fact that court judgments were rendered according to unwritten custom preserved within a narrow group of learned patricians. They managed to have a commission of 10 (decemvirs) appointed to draw up a code. The decemvirs began work in 451, and in 450 the code was posted in the Forum.

The Twelve Tables were in no sense a reform or a liberalizing of old custom. They recognized the prerogatives of the patrician class and of the patriarchal family, the validity of enslavement for unpaid debt, and the interference of religious custom in civil cases. That they reveal a remarkable liberality for their time with respect to testamentary rights and contracts is probably due not to any alteration brought in by the decemvirs but rather to the progress that had been made in commercial customs in Rome in an era of prosperity and vigorous trade.

Only random quotations from the Twelve Tables are extant, so that much knowledge of their contents derives from references in later juridical writings. Romans venerated the Twelve Tables as a prime legal source.

12-tone music, large body of music, written roughly since World War I, that uses the so-called 12-tone method of composition. The Austrian-born composer Arnold Schoenberg is credited with the invention of this technique, although other composers (*e.g.,* the American composer Charles Ives and the Austrian Josef Hauer) anticipated Schoenberg's invention by writing music that in a few respects was similar technically to his 12-tone music.

Between 1912 and 1922 Schoenberg came to realize that he was searching for a new method of composition that would provide a new basis for musical structure to replace the old basis of tonality, which he felt was being stretched and distorted too much to remain a unifying structural principle. Instead of using 1 or 2 tones as main points of focus for an entire composition (as key centres in tonal music), Schoenberg suggested using all 12 tones "related only to one another." In such a system, unlike tonality, no notes would predominate as focal points, nor would any hierarchy of importance be assigned to the individual tones.

The new unifying principle in composition would then arise from the particular order given to a collection of the 12 tones, an order that would be different for each composition. The basic order for any one composition came to be known as its basic set, its 12-tone row, or its 12-tone series, all synonymous terms. The basic set for Schoenberg's *Wind Quintet* (1924) is Eb–G–A–B–C♯–C–Bb–D–E–F♯–Ab–F; for his *String Quartet No. 4* (1936) it is D–C♯–A–Bb–F–Eb–E–C–Ab–G–F♯–B.

The basic set is not a theme, for it has no specific shape, rhythm, or loudness. It is a backbone, a musical idea that permeates the composition in which it is used. Because of the various principles of composing and manipulating the basic set recognized by Schoenberg and others, it is not often possible nor even desirable to hear the basic set when the composition is performed. This situation has led many people to attack Schoenberg's method as unmusical and as mathematical nonsense. Such views seem unjustifiable, because, as Schoenberg pointed out, his method specifies only a tiny fraction of the total nature of a composition—certainly no more than composing with tonality specifies.

Schoenberg's best-known pupils were the Austrian composers Anton von Webern and Alban Berg, each of whom wrote 12-tone music. Neither used the idea of the basic set in the same manner as Schoenberg did, and their music differs greatly in many respects from each other's and from Schoenberg's. Other important composers include the Russian-born Igor Stravinsky, the American Roger Sessions, the Austrian-born Ernst Krenek, the Italian Luigi Dallapiccola, and the German Hans Werner Henze. Many, such as Stravinsky (who had earlier criticized the approach severely) and Sessions, began writing 12-tone music after composing much non-12-tone music.

Some composers also have used some of the notions behind the basic set while simultaneously writing tonal music; among them are Schoenberg himself, the Austrian-born Ernst Toch, the American Walter Piston, and the Russian Dmitry Shostakovich. The American composer Benjamin Johnston combined principles of 12-tone music with microtonality (use of intervals smaller than whole tones or semitones). There are no sufficient analytic techniques used by musicians in understanding 12-tone music, which is partly why it remains not very well understood as a total musical phenomenon by composers, performers, and listeners alike. Twelve-tone music is an example of serialism (*q.v.*) in music.

Twelve Tribes of Israel, in the Old Testament, the Hebrew people who, after the death of Moses, took possession of the Promised Land of Canaan under the leadership of Joshua. Because the tribes were named after sons or grandsons of Jacob (whose name was changed to Israel by God), the Hebrew people became known as Israelites.

Jacob's first wife, Leah, bore him six sons: Reuben, Simeon, Levi, Judah, Issachar, and Zebulun. With the exception of Levi, each was the father of a tribe. Two other tribes, Gad and Asher, were named after sons born to Jacob and Zilpah, Leah's maidservant. Two additional tribes, Dan and Naphtali, were named after sons of Jacob born of Bilhah, the maidservant of Rachel, Jacob's second wife. Rachel bore Jacob two sons, Joseph and Benjamin. Though a tribe was named after Benjamin, none bore the name of Joseph. Two tribes, however, were named after Joseph's sons, Manasseh and Ephraim. The 10 tribes that settled in northern Palestine became known as the Ten Lost Tribes of Israel (*q.v.*).

Twelvers (Islām): *see* Ithnā ʿAsharīyah.

Twentieth Century Fox Film Corporation, major American motion-picture studio formed in 1935 by the merger of Twentieth Century Pictures and the Fox Film Corporation. The latter company was founded in 1915 by William Fox, a New York City exhibitor who had begun distributing films in 1904 and producing them in 1913; he moved his studio to Los Angeles in 1915. The company secured the patents to a German sound-on-film process in 1927, and later that year it introduced the first sound newsreel, Fox-Movietone News. The debt accrued to finance these moves, however, caused Fox to lose control of his studio in 1930. The company then struggled until its merger five years later with Twentieth Century Pictures, which had been founded in 1933 by the former head of production for the Warner Bros. studio, Darryl F. Zanuck, and the former CEO of United Artists, Joseph M. Schenck.

In the late 1930s and early '40s, Twentieth Century Fox produced mainly Westerns, musicals, biographies, and religious epics. Child actress Shirley Temple was the studio's top box-office draw of the 1930s, a role filled in the next decade by Betty Grable. A trend toward serious social drama that began with John Ford's *The Grapes of Wrath* (1940) continued into the late 1940s with films such as *Gentlemen's Agreement* (1947) and *The Snake Pit* (1948). Most of Twentieth Century Fox's films during the next decade were produced using the wide-screen Cinemascope process, which the company introduced in 1953 with the film *The Robe;* other successful Cinemascope productions included the musicals *The King and I* (1956) and *South Pacific* (1958). Among the stars that the studio introduced during the 1950s were Marlon Brando and Marilyn Monroe.

Zanuck, a legendary Hollywood mogul who had personally selected and approved virtually every film made by Twentieth Century Fox, ended his 21-year reign as chief of production in 1956. He was lured back in 1962 when cost overruns for the epic film *Cleopatra* (1963) almost sank the studio. Zanuck served as company president until 1971, during which time the studio's most successful productions included *The Sound of Music* (1965), *Patton* (1970), and *M*A*S*H* (1970). Notable films produced after Zanuck's retirement included *The Towering Inferno* (1974) and the most profitable film in the history of the industry to that time, *Star Wars* (1977).

In 1981 the corporation was bought by Marvin Davis and his family, who in turn sold it to the international publisher Rupert Murdoch in 1985. Murdoch also purchased several independent American television stations at about this time and consolidated them and the film studio to form Fox, Inc. By the turn of the 21st century the company, known as the Fox Entertainment Group, had expanded its holdings to encompass the various Fox television networks (including the FOX Broadcasting Network, FOX News, and several regional sports stations) and the Los Angeles Dodgers baseball team. The company also continued to produce films, using the Twentieth Century Fox banner for large-budget productions and the name Fox Searchlight Pictures for smaller art-house, or "indie," films. Among the best-known productions of the Fox television network are such shows as *The Simpsons* (premiered 1989) and *Beverly Hills 90210* (1990–2000). Successful later films produced by Twentieth Century Fox include *Titanic* (1997), *Cast Away* (2000), and *Moulin Rouge* (2001).

Twentieth Congress of the Communist Party of the Soviet Union (Feb. 14–25, 1956), event notable as the first stage of First Secretary Nikita S. Khrushchev's program to repudiate Stalinism in the Soviet Union.

Highlighting the Twentieth Congress were two addresses given by Khrushchev: the famous secret speech denouncing the late Soviet leader Joseph Stalin (February 24–25), and his Report of the Central Committee to the Congress (February 14). The Report, nearly as important a document as the secret speech, announced a new line in Soviet foreign policy. Rejecting the notion that war between East and West was "fatalistically inevitable," Khrushchev declared that "the Leninist principle of coexistence of states with different social systems" was the basis of the foreign policy of the U.S.S.R. Khrushchev also used the Twentieth Congress to consolidate his leadership by promoting persons loyal to him to high party office. The congress newly elected 40 percent of the full and candidate members of the Central Committee, and five new candidate members were added to the Presidium. Thus, by the end of the congress, Khrushchev had successfully launched his drive to wrest control of the party from the Stalinist old guard and to discredit the excesses of Stalin's rule.

Twenty, The Society of the (art): *see* Vingt, Les.

Twenty-five Articles of Religion, creed that was prepared by John Wesley, founder of Methodism, for the Methodist church in the United States. The creed was accepted at the conference in Baltimore, Md., in 1784, when the Methodist Episcopal Church was formally organized.

The Twenty-five Articles was essentially an abridgment of the Thirty-nine Articles of the Church of England that excluded references to specifically English situations and went beyond the original in excluding the strict Calvinist interpretation of predestination, adopting instead a more general Lutheran view. In general, Wesley simplified and liberalized the Church of England creed. His own Arminian (based on the views of the 17th-century Dutch Reformed theologian Arminius) beliefs (*i.e.,* that man can by his own will accept or reject divine grace) were not explicitly stated in this creed.

21-centimetre radiation, electromagnetic radiation of radio wavelength emitted by cold, neutral, interstellar hydrogen atoms. The hydrogen atom is composed of a positively charged particle, the proton, and a negatively charged particle, the electron. These particles can be considered as spinning around their own axes of rotation. When the spins of the two particles are antiparallel, then the atom is in its lowest energy state. When the spins are parallel, the atom has a tiny amount of extra energy. In the very cold space between the stars, the interstellar hydrogen atoms are at a state of lowest possible energy. Collisions between particles, however, can at times excite some atoms (which makes the spin of the particles parallel), giving them a tiny amount of energy. According to the rules of quantum mechanics, such atoms radiate their acquired

energy in the form of low-energy photons that correspond to a wavelength of 21 centimetres, or a frequency of 1,420 megacycles. This radio radiation was theoretically predicted by the Dutch astronomer H.C. van de Hulst soon after the end of World War II and was experimentally detected by Harold Ewen at Harvard University in 1951. Since that time, 21-centimetre hydrogen emission has come to play a vital role in the study of the Milky Way Galaxy, because it readily penetrates the clouds of interstellar dust particles that obstruct optical observations deep into the galactic centre.

Twenty-one Demands (Jan. 18, 1915), claims made by the Japanese government to special privileges in China during World War I. The major European powers, which already enjoyed similar privileges in China, could not oppose Japan's move because of their involvement in the war. On May 7 Japan delivered an ultimatum, to which the Chinese president, Yüan Shih-k'ai, capitulated by signing a series of Sino-Japanese agreements on May 25.

The demands called for confirmation of Japan's railway and mining claims in Shantung Province; granting of special concessions in Manchuria; Sino-Japanese control of the Han-Yeh-P'ing mining base in central China; access to harbours, bays, and islands along China's coast; and Japanese control, through advisers, of Chinese financial, political, and police affairs. Yüan's forced acceptance of all but the last point greatly increased anti-Japanese feeling in China.

Twenty-six, dice game popular in the United States Midwest from the 1930s through the 1950s, in which a player selects a number from 1 to 6 and then casts 10 dice 13 times, attempting to throw the chosen number 26 times or more, exactly 13, or fewer than 10.

Twenty-six was played mostly in taverns and at store counters, with the house paying off winners in drinks or merchandise. Local and federal antigambling drives largely closed the game down.

26th of July Movement, Spanish MOVIMIENTO 26 DE JULIO, revolutionary movement led by Fidel Castro that overthrew the regime of Fulgencio Batista in Cuba (1959). Its name commemorated an attack on the Santiago army barracks on July 26, 1953. The movement began formally in 1955 when Castro went to Mexico to form a disciplined guerrilla force. The leaders of the movement remaining in Cuba to carry out sabotage and political activities were Frank País, Armando Hart, and Enrique Oltuski. At this time the movement espoused a reform program that included distribution of land to peasants, nationalization of public services, industrialization, and mass education.

In early 1957, with Castro back in Cuba fighting in the Sierra Maestra, "Civic Resistance" groups were organized in the cities, and numerous middle-class and professional persons gravitated toward Castro. In 1958 the movement joined in a "Junta of Unity" with most other groups opposing Batista. After Castro's victory, the 26th of July Movement was integrated into the Organizaciones Revolucionarias Integradas in 1961.

twice-born (Hinduism): *see* dvija.

twilight glow, weak, widespread, and relatively steady glow from the sky that is observed around twilight; it is part of the overall phenomenon called airglow (*q.v.*).

twill, one of the three basic textile weaves, producing a fabric with a diagonal rib, ridge, or wale. In regular twill the diagonal line is repeated regularly, usually running upward from left to right at a 45° angle.

The weave can be varied in many ways, for example, by changing the direction of the twill line (as in herringbone twill) or its angle. The smallest twill is one of the most popular weaves in men's wear.

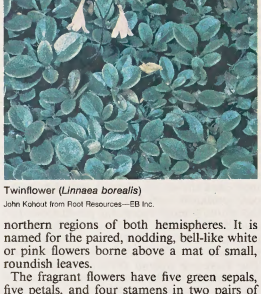
twin, either of two young who are simultaneously born from one mother. Twinning, common in many animals, is of two biological kinds: the one-egg (monozygotic), or identical, type and the two-egg (dizygotic), or fraternal, type. The latter type is more usual and can be thought of simply as a litter of two. In humans, psychological studies of sets of identical twins, since they are genetically identical, have provided much otherwise unobtainable information on the relative effects of genetic endowment and environment. *See also* multiple birth.

Twin Cities (Minnesota, U.S.): *see* Minneapolis; Saint Paul.

Twin Falls, city, seat (1907) of Twin Falls County, south central Idaho, U.S. Located close to Twin Falls (65 ft [20 m] high), Shoshone Falls (212 ft), and Auger Falls (140 ft) of the Snake River, the city is adjacent to a spectacular canyon that bisects the broad, arid river plains. The community, established in 1904, grew up almost overnight with the coming of irrigation and a Union Pacific branch railway. It is primarily an agriculture, trading, and supply centre, but there has been some industrial development, including plastics, hosiery, and farm machinery manufacturing. The (junior) College of Southern Idaho (1964) is located there, as is the headquarters of the Minidoka Division of the Sawtooth National Forest. Inc. village, 1905; city, 1907. Pop. (1990) 27,591.

twin wire process, in papermaking, modification of the Fourdrinier process using two wire mesh belts instead of one to form the pulp into paper. *See* Fourdrinier machine.

twinflower (*Linnaea borealis*), evergreen, creeping shrub of the family Caprifoliaceae, native to moist pinelands or cold bogs in



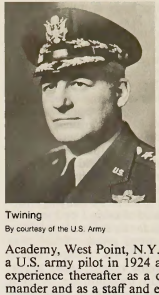
Twinflower (*Linnaea borealis*)
John Kohout from Root Resources—EB Inc.

northern regions of both hemispheres. It is named for the paired, nodding, bell-like white or pink flowers borne above a mat of small, roundish leaves.

The fragrant flowers have five green sepals, five petals, and four stamens in two pairs of different length. The *americana* variety has more tubular flowers, and the *longiflora* variety has larger leaves and corolla.

Twining, Nathan F(arragut) (b. Oct. 11, 1897, Monroe, Wis., U.S.—d. March 29, 1982, Lackland Air Force Base, near San Antonio, Texas), U.S. Air Force officer who played a large part in directing the air war against Japan during World War II.

A 1918 graduate of the U.S. Military



Twining
By courtesy of the U.S. Army

Academy, West Point, N.Y., Twining became a U.S. army pilot in 1924 and gained further experience thereafter as a combat unit commander and as a staff and engineering officer.

As commander of the 13th Air Force in the South Pacific (spring 1943), Twining directed strategic air assaults against stubbornly held Japanese positions in the Solomon Islands (Guadalcanal and Bougainville) and New Guinea. His pilots were so successful in downing enemy planes that they dubbed their combat missions "turkey shoots." Later (1944–45), from Italy he led the 15th Air Force in the strategic bombing campaign against Germany and the Balkans. In the closing months of the war he returned to the Pacific to command the 20th Air Force B-29s that were assaulting Japan from the Mariana Islands.

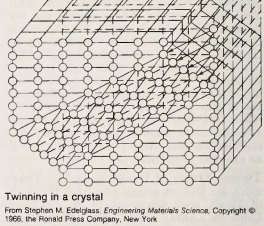
One of the most widely experienced and best qualified of U.S. air commanders, Twining became chief of staff of the U.S. Air Force in 1953, contributing much toward making it an almost all-jet combat force with a high atomic-weapons capability. He served as chairman of the Joint Chiefs of Staff from 1957 to 1960, and played a major role in developing an interventionist U.S. foreign policy.

twinning, in crystallography, regular intergrowth of two or more crystal grains so that each grain is a reflected image of and/or rotated with its neighbour. Other grains added to the twin form crystals that often appear symmetrically joined, sometimes in a starlike or crosslike shape.

Twinning often occurs from the beginning of crystal growth. The individuals that comprise a twin have atomic structures with different orientations, but they must have certain common planes or directions. They must fit simply and must be derived from each other by a simple movement.

There are several kinds of twin crystals. Penetration twins are complete crystals that pass through one another and often share the centre of their axial systems.

Some geometric relations concerning crystal twinning can be set down. Twinning results



Twinning in a crystal
From Stephen M. Edelglass, *Engineering Materials Science*, Copyright © 1966, the Ronald Press Company, New York

in reflected images along a common twinning plane, repetitions rotated about a common twinning axis, or both. Such twinning planes and axes have simple relations to the crystallographic axes of the crystal and are governed by some fundamental laws; *e.g.*, because the resulting twin would be identical to the original crystal, no plane of symmetry in the simple crystal may become a twinning plane, and no axis of 2-, 4-, or 6-fold symmetry may become a twinning axis; also, twinned crystals in classes with a centre of symmetry will have a twinning axis perpendicular to a twinning plane, but, lacking a centre of symmetry, a twinning axis or plane may occur independently.

twist, vigorous dance that developed in the early 1960s in the United States and became internationally popular after its adoption in fashionable circles. The twist's characteristic hip, arm, and leg movements have been described as "drying the buttocks with an imaginary towel while grinding out an imaginary cigarette with one foot." Partners synchronized body positions and gyrations but never touched. Dances that evolved from the twist—for example, the frug and the watusi—were invariably performed by shaking the pelvis. In these dances partners only sometimes coordinated their movements. Among the suggested precursors of the twist are included the shimmy and the black bottom, and a song that was popular before 1910 included the lines "Mama, mama, where is sis? / Down on the levee doin' the double twis'."

twisted moss: *see* screw moss.

twisting, in yarn and rope production, process that binds fibres or yarns together in a continuous strand, accomplished in spinning or playing operations. The direction of the twist may be to the right, described as Z twist, or to the left, described as S twist.

Single yarn is formed by twisting fibres or filaments in one direction. Ply yarn is made by twisting two or more single yarns together, usually by combining singles twisted in one direction with a ply twist in the opposite direction. Twine, cord, or rope can be made with a cable twist, each twist in the opposite direction of the preceding twist (S/Z/S or Z/S/Z), or with a hawser twist, the single yarns and the first ply twist in one direction and the second ply twist in the opposite direction (S/S/Z or Z/Z/S). The number of turns per unit of length in a yarn affects the appearance and durability of fabric made from that yarn. Yarns used for soft-surfaced fabrics have less twist than those used for smooth-surfaced fabrics. Yarns made into crepe fabrics have maximum twist.

two-clawed hunting spider: *see* sac spider.

two-field system, basis of agricultural organization in Europe and the Middle East in early times. Arable land was divided into two fields or groups of fields; one group was planted to wheat, barley, or rye, while the other was allowed to lie fallow until the next planting season to recover its fertility. After cropping the first group of fields was turned to fallow, with the livestock permitted to graze on the stubble and enrich the soil with their droppings. Beginning about the 8th century, between the Loire and the Rhine rivers, the two-field system gave way to the more sophisticated three-field system (*q.v.*).

two-horned sculpin, any fish of the family Icelidae (order Scorpaeniformes). *See* sculpin.

two natures of Christ (theological doctrine): *see* Christ, two natures of.

two-party system, political system in which the electorate gives its votes largely to only two major parties and in which one or the other party can win a majority in the legislature. The United States is the classic example of a nation with a two-party system. The contrasts between two-party and multiparty systems are often exaggerated. Within each major party in the United States, the Republicans and the Democrats, many factions are struggling for power. The presence of divergent interests under a single party canopy masks a process of struggle and compromise that under a multiparty system is out in the open.

Major influences favourable to the two-party system are the use of single-member districts for the election of representatives, the presidential system, and the absence of proportional representation. In Great Britain and the United States members of the national representative assemblies are chosen from single-member districts, and the candidate polling the largest number of votes is the winner. Such an electoral system compels a party to strive for a majority of the votes in a district or other electoral area. Usually only two fairly evenly matched parties may successfully compete for office in a single-member district, and a third party suffers recurring defeat unless it can swallow up one of the other parties. Parties do not thrive under the certainty of defeat. A third party may have a substantial popular following and yet capture few seats in the representative body. With, for instance, 20 percent of the popular vote spread evenly over an entire country, such a party would not win a single seat. (Under full proportional representation, it would be entitled to 20 percent of the seats in a legislative body.) The rise of the Labour Party in Great Britain, for example, virtually deprived the Liberal Party of parliamentary seats even when it had a substantial popular following.

In addition to the single-member-district system, in the United States the presidential system induces parties to seek majority support. No fractional party can elect its presidential candidate, and third parties in national politics have proved to be protest movements more than serious electoral enterprises.

The two-party system is said to promote governmental stability because a single party can win a majority in the parliament and govern. In a multiparty country, on the other hand, the formation of a government depends on the maintenance of a coalition of parties with enough total strength to form a parliamentary majority. The weakness of the ties that bind the coalition may threaten the continuance of a cabinet in power. The stability shown by the government of the United States has not been entirely due to its party system, it has been argued, but has been promoted also by the fixed tenure and strong constitutional position of the president.

The two-party system moderates the animosities of political strife. To appeal for the support of a majority of voters, a party must present a program sympathetic to the desires of most of the politically active elements of the population. In the formulation of such a program an effort must be made to reconcile the conflicting interests of different sectors of the population. This enables the party, if expedient, to resist demands that it commit itself without reservation to the policies urged by any particular extremist element. In effect, the party is a coalition for the purpose of campaigning for office. In Great Britain and Canada differences in program and in composition between the two major parties have been perhaps greater than in the United States. Nevertheless, in all of these countries a broad area of agreement exists among the leading parties. With two major parties of similar views and of approximately equal strength competing for control of a government, it is possible for governmental control to alternate between the parties without shifts in policy so radical as to incite minorities to resistance.

Two Sicilies, Kingdom of the, the state that united the southern part of the Italian peninsula with the island of Sicily between the mid-15th and the mid-19th centuries. (For a brief history of the state and a map, *see* Naples, Kingdom of.) United by the Normans in the 11th century, the two areas were divided in 1282 between the Angevin (French) dynasty on the mainland and the Aragonese (Spanish) dynasty on the island, both of which claimed the title of king of Sicily. In 1443 Alfonso V of Aragon, on reuniting the two portions, took the title of *rex Utriusque Siciliae* (king of the Two Sicilies). This title was sometimes used during the Spanish and Bourbon rule of the two areas, from the 16th to the 19th century; it became official in 1815, when the administration of both areas was combined, and Sicily lost its autonomy.

two-step, ballroom dance appearing in about 1890 in the United States. Its origins are unclear but may include the polka, galop, or waltz. The dance consists of sliding steps to the side in $\frac{2}{4}$ time. It was one source of the fox-trot, which in about 1920 overtook it in popularity, and the term two-step often refers to the fox-trot (*q.v.*).

Two Thousand Guineas, one of the English Classic horse races (with the Derby, the Saint Leger, the One Thousand Guineas, and the Oaks), first run in 1809. Run at Newmarket, Suffolk, the 1-mile event is open to three-year-old colts (carrying 126 pounds) and fillies (121 pounds). For winners since 1949, *see* Sporting Record: *Horse Racing.*

two-tier gold system, arrangement set up to protect international monetary reserves from the pressure of higher gold prices; under a two-tier system, monetary gold used as reserves would sell at a fixed price, and gold used as an ordinary commodity would sell at a freely fluctuating market-determined price.

The system was formulated in an agreement reached by seven members of the London gold pool (Great Britain, West Germany, Switzerland, The Netherlands, Belgium, Italy, and the United States) on March 17, 1968. The monetary authorities agreed not to sell monetary gold on the London market or any other private gold market. The stock of officially held gold was to be maintained at the existing level and only transferred among countries in settling international debts. The governments agreed to cooperate to maintain the existing parities among their currencies and pledged not to sell gold to any country that had sold its official gold in private markets for a profit. Within weeks after the agreement had been formulated, most other countries had adhered to it.

The expectation was that the market price of gold would settle above the monetary price of $35 an ounce, but, in fact, it fluctuated widely both above and below this price. The two-tier system lost its usefulness when the U.S. government terminated official trading in gold in August 1971; in November 1973 the system was terminated by agreement between the seven original adherents.

Tworkov, Jack (b. Aug. 15, 1900, Biała, Pol.—d. Sept. 4, 1982, Provincetown, Mass. U.S.), Polish-born American painter, an exponent of the Abstract Expressionist movement whose style is characterized by gestural brushwork.

Tworkov immigrated to the United States in 1913. After receiving a degree in creative writing from Columbia University (1923), he returned to his earlier interest in painting.

Tworkov's early paintings reflect his profound admiration for the work of Paul Cézanne. While working for the WPA federal arts project in 1935, however, he met the painter Willem de Kooning, and Tworkov subsequently abandoned his figurative style.

After World War II he joined de Kooning and other artists, who together evolved Abstract Expressionism (*q.v.*).



Tworkov, photograph by Arnold Newman, 1960
© Arnold Newman

By 1955 Tworkov revealed his mature style in works that are built up of countless diagonal strokes of paint, creating shimmering atmospheric fields of colour. Later he replaced the multitude of flickering lines with broad strokes; these forceful compositions culminated in the gridlike format of such paintings as "Variables" (1963). In the late 1960s the grid work became literal in the "Crossfield" series (begun 1968); in these, Tworkov superimposed a network of ruled lines onto an overall field of widely spaced strokes "drawn" in paint.

From 1963 to 1969 he was chairman of the department of art at Yale University.

Twysden, Sir Roger (b. Aug. 21, 1597, East Peckham, Kent, Eng.—d. June 27, 1672, East Peckham), English political pamphleteer and constitutional historian who is noted for his work on the development of English law and constitutional government.

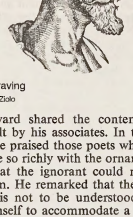
Twysden was educated at Emmanuel College, Cambridge. He was knighted in 1620 and served in Parliament in 1625 and 1626. At the outbreak of the Civil War between Charles I and Parliament in 1642, he participated in the writing of a petition stating grievances against the king, Parliament, and the ecclesiastical authorities. He was imprisoned from July to September of that year for antiparliamentary activities. In June 1643 he attempted to escape to France but was recognized and again imprisoned. During his detention he wrote *The Laws of Henry I* (1645) and began a study of parliamentary history, completed in 1655 as *Certaine Considerations upon the Government of England,* his major work and one of the first treatises dealing with the historical roots of English constitutional law and history. Released after 1647, he continued both his research of ancient records in London and his petitioning of Parliament on various issues throughout the 1650s. After the restoration of the monarchy in 1660, he remained active in public affairs until shortly before his death. In 1652 Twysden also wrote *Historiae Anglicanae Scriptores X,* a compilation of 10 early English chronicles and histories that is a valuable source of medieval material.

Tyagaraja (b. 1767, Tamilnad, India—d. 1847), Indian composer renowned in southern India for his Telugu *kṛtanas* (devotional songs) and ragas. These songs were mostly in praise of Rāma, who, like Krishna, was believed to be an incarnation of the god Vishnu. Tyagaraja became a devotee of Vaiṣṇava at an early age and is regarded as an exponent of *gāna-mārga—i.e.*, salvation through devotional music.

Tyard, Pontus de (b. *c.* 1522, Bissy-sur-Fley, Burgundy, Fr.—d. Sept. 23, 1605, Bragny-sur-Saône), Burgundian poet and member of the literary circle known as La Pléiade who was a forthright theorist and a popularizer of Renaissance learning for the elite.

Tyard was seigneur (lord) of Bissy-sur-Fley and an associate of the Lyonese poets, especially Maurice Scève. In 1551 he translated Leōn Hebreo's *Dialoghi di amore* ("Dialogues of Love"), the breviary of 16th-century philosophic lovers. His poetry collection *Erreurs amoureuses* (1549; "Mistakes in Love"), which includes one of the first French sonnet sequences, also revived the sestina in France. The *Erreurs* was augmented in successive editions, as was his important prose work, *Discours philosophiques* ("Philosophical Discourses"), a Neoplatonic encyclopaedia finally completed in 1587. Its first treatise, the *Solitaire premier* (1552), complements Joachim du Bellay's *Défense et illustration de la langue française* (1549), which expounded the theories on poetic diction and language reform of La Pléiade. In 1578 Tyard was given the bishopric of Chalon-sur-Saône, from which he retired in 1594.

In his enthusiasm for enriching the French language and adapting classical imagery and



Tyard, engraving
Hachette—J.P. Zizlo

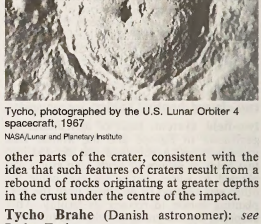
genre, Tyard shared the contempt for the masses felt by his associates. In the *Solitaire premier* he praised those poets who decorated their verse so richly with the ornaments of antiquity that the ignorant could not comprehend them. He remarked that the purpose of the poet is not to be understood by nor to lower himself to accommodate a popular audience still fond of medieval genres. It was this hauteur and this sense of mission without contact beyond the protective society of the court that caused La Pléiade to shine so briefly and to become within a generation as dead as the Greek poets from whom they took their name.

Tybald, Simon: *see* Simon of Sudbury.

Tyburn, small left-bank tributary of the River Thames, England, its course now wholly within London and below ground. Before it was culverted, the river traversed the West End of London from the heights of Hampstead to Westminster. After crossing Regent's Park, its former course was marked by the windings of Marylebone Lane and the dip in Piccadilly. It formerly entered the marshy floodplain of the Thames south of Green Park. One of its branches wandered toward the Thames by what became New Scotland Yard (Metropolitan Police headquarters), and another entered south of the site of the modern Houses of Parliament. Between was the small gravel island of Westminster. From the 13th century the Tyburn supplied water for London through conduits of elm trunks. Its water is now drained off by sewer. The name Tyburn became famous in connection with the Middlesex Gallows, which stood west of the stream near the modern Marble Arch at the junction of Edgware and Bayswater roads in the northeastern corner of Hyde Park. It was a place of execution from as early as 1300 until 1783. Around the gibbet were open galleries for the public.

Tyche, in Greek religion, the goddess of chance, with whom the Roman Fortuna was later identified; a capricious dispenser of good and ill fortune. The Greek poet Hesiod called her the daughter of the Titan Oceanus and his consort Tethys; other writers attributed her fatherhood to Zeus, the supreme god. She was also associated with the more beneficent Agathos Daimon, a good spirit, protective of individuals and families, and with Nemesis, who, as an abstraction, represented punishment of overprosperous man and so was believed to act as a moderating influence. She was often shown winged, wearing a crown, and bearing a sceptre and cornucopia; but she also appeared blindfolded and with various devices signifying uncertainty and risk. Among her monuments was a temple at Argos, where the legendary Palamedes is said to have dedicated to her the first set of dice, which he is supposed to have invented.

Tycho, conspicuous, relatively fresh impact crater lying at the centre of the most extensive system of bright rays on the Moon's near side. The rays, which are light-coloured streaks of material ejected from the impact, dominate the southern highlands and extend for more than 2,600 km (1,600 miles). Located at 43° S, 11° W, Tycho is 85 km (53 miles) across and 4 km (2.5 miles) deep. Analysis of ray material returned in 1972 by Apollo 17 astronauts suggests that the crater was formed about 100 million years ago. Multispectral images from the Clementine spacecraft in 1994 show that Tycho's central peak differs in composition from



Tycho, photographed by the U.S. Lunar Orbiter 4 spacecraft, 1967
NASA/Lunar and Planetary Institute

other parts of the crater, consistent with the idea that such features of craters result from a rebound of rocks originating at greater depths in the crust under the centre of the impact.

Tycho Brahe (Danish astronomer): *see* Brahe, Tycho.

Tychonic system, scheme for the structure of the solar system put forward in 1583 by the Danish astronomer Tycho Brahe. He retained from the ancient Ptolemaic system the idea of Earth as a fixed centre of the universe around which the Sun and Moon revolved, but he held that, as in the newer system of Copernicus, all other planets revolved around the Sun. In both the Tychonic and the Ptolemaic systems, an outer sphere containing the fixed stars was considered to revolve every day around the Earth. The Tychonic theory explained the observed variations of phase of Venus, for which the Ptolemaic system had no explanation.

A system somewhat similar to Tycho's had been proposed in the 4th century BC by the Greek philosopher Heracleides Ponticus, who thought that at least Mercury and Venus (it is uncertain if Heracleides included other planets) went around the Sun.

Tycho's Nova, also called B CASSIOPEIAE, or NOVA CASSIOPEIAE 1572, one of the few recorded supernovae in the Milky Way Galaxy. The Danish astronomer Tycho Brahe first observed the "new star" on Nov. 11, 1572. Other European observers claimed to have noticed it as early as the preceding August, but Tycho's precise measurements showed that it was not some relatively nearby phenomenon, such as a comet, but at the distance of the stars, and that therefore real changes could occur among them.

The supernova (violently exploding star) remained visible to the unaided eye until March 1574. It attained the apparent magnitude of Venus (about −4) and could be seen by day. There is no known stellar remnant but only traces of glowing nebulosity.

Consult the INDEX *first*

Tychy, town, Katowice *województwo* (province), southern Poland. It lies on the Bielsko-Biała rail line on the southern edge of the Upper Silesia industrial district surrounded by the Pszczyna forests. The town was early known for its beer, having opened its first brewery in 1629, and, latterly, for the large Tychy automobile plant. In 1951 the town of Nowe (New) Tychy was begun as part of a socialist public-works project designed to accommodate 130,000 industrial workers and alleviate the housing shortage in the Upper Silesia industrial region. The new town was built to provide wholesome housing for the miners of Upper Silesia; it is completely residential and is built along a cultural avenue, with Lake Paprocańskie at one end and a large park at the other. The new and old towns are under one administration. Pop. (1989 est.) 271,000.

Tyddewi (Wales): *see* Saint David's.

Tydings-McDuffie Act (1934), also called PHILIPPINE COMMONWEALTH AND INDEPENDENCE ACT, the U.S. statute that provided for Philippine independence, to take effect on July 4, 1946, after a 10-year transitional period of Commonwealth government. The bill was signed by President Franklin D. Roosevelt on March 24, 1934, and was sent to the Philippine Senate for approval. Although that body had previously rejected the similar Hare-Hawes-Cutting Act, it approved the Tydings-McDuffie Act on May 1.

Following the terms of the independence act, Filipinos elected delegates for a constitutional convention on July 10, and Roosevelt approved the Philippine constitution on March 23, 1935. The Commonwealth government, under the presidency of Manuel Quezon, was inaugurated in November of that year. For the next 10 years the Philippines remained U.S. territory. Foreign affairs, defense, and monetary matters remained under U.S. jurisdiction, but all other internal matters were in the hands of Filipinos. During the Commonwealth period, duties were to be imposed on a graduated scale, but the trade provisions were subsequently amended in 1939 in favour of the Philippines.

Tye, Christopher (b. *c.* 1500—d. 1573), composer and organist who was an innovator in the style of English cathedral music perfected by Thomas Tallis, William Byrd, and Orlando Gibbons.

Possibly a chorister at King's College, Cambridge, in 1511, Tye took the bachelor of music degree there in 1536 and the doctor of music in 1545. In 1548 he was incorporated as doctor of music at the University of Oxford. From 1541 or 1542 until 1561 he was choirmaster at Ely Cathedral. He was ordained in 1560.

Tye, like Tallis, bridged the mid-16th-century change of musical style and of liturgy (from Roman to Anglican) in England. Much of his Latin church music is incomplete, but two masses survive. Also surviving are 14 English anthems, psalm settings, and music for instrumental ensembles, including 19 works based on the plainsong fragment *In nomine.*

tyee: *see* king salmon.

Tyers, Lake, coastal lake in Gippsland, on the eastern coast of Victoria, Australia, near the northeastern end of Ninety Mile Beach. The lake consists of two main channels; the eastern half curves northeasterly into the interior for about 10 miles (16 km), and the western channel extends northwesterly about 5 miles (8 km). Lake Tyers opens into the Tasman Sea to the south. The lake was named for Charles James Tyers, a surveyor who was appointed commissioner of crown lands in 1842. The nearby township of Lake Tyers, together with 4,000 acres (1,600 hectares), was an Aboriginal reserve until 1971, when Sir Rowan Delacombe, the governor of Victoria, assigned ownership of the property to a trust of 5,000 Aborigines. Tourists visit Lake Tyers for fishing and boating.

Tyler, city, seat (1846) of Smith county, northeastern Texas, U.S. It is located 99 miles (159 km) east-southeast of Dallas. Laid out in 1846 and named for President John Tyler, it was a farming centre until 1930, when the East Texas oil field was discovered. A transportation focus, Tyler became the administrative headquarters for oil companies and now has refineries and commercial and light-industrial developments. It is also known for its flower industry, exemplified by Tyler Rose Park, its annual Texas Rose Festival (October), and Azalea and Spring Flower Trails. The city is the seat of Texas College (1894), Tyler Junior College (1926), and Texas Eastern University (1972). There are many small lakes in the vicinity, including Lake Tyler. Inc. city, 1907. Pop. (1990) city, 75,450; Tyler MSA, 151,309.

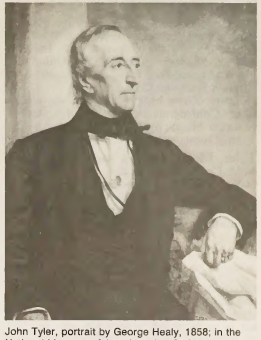
Tyler, Anne (b. Oct. 25, 1941, Minneapolis, Minn., U.S.), American novelist and short-story writer whose comedies of manners are marked by compassionate wit and precise details of domestic life.

The daughter of a chemist, Tyler spent much of her youth in North Carolina and at age 16 entered Duke University (Raleigh, N.C.), from which she graduated three years later in 1961. She then worked as a bibliographer at Duke and as a librarian at McGill University (Montreal, Que.) for several years before settling in Baltimore, Md. in 1967 and turning to writing full-time. In 1963 she married Taghi Modarressi, an Iranian-born child psychiatrist, with whom she had two daughters.

Tyler's first published novel, *If Morning Ever Comes* (1964), was typical of her work in its polished prose and its understated examination of personal isolation and the difficulties of communication between people. Her subsequent novels included *The Clock Winder* (1972), *Celestial Navigation* (1974), *Searching for Caleb* (1975), *Dinner at the Homesick Restaurant* (1982), *The Accidental Tourist* (1985), and *Breathing Lessons* (1988). Several of Tyler's best novels focus on eccentric individuals within chaotic, disunited families living in a middle-class milieu in Baltimore.

Tyler, John (b. March 29, 1790, Charles City county, Va., U.S.—d. Jan. 18, 1862, Richmond), 10th president of the United States (1841–45) who took office upon the death of President William Henry Harrison. A maverick Democrat who refused allegiance to the program of party leader Andrew Jackson, Tyler was rejected in office by both Democrats and Whigs and functioned as a political independent.

Born into a politically active family, young Tyler studied law and began his political career



John Tyler, portrait by George Healy, 1858; in the National Museum of American Art, Smithsonian Institution, Washington, D.C.

National Museum of American Art (formerly National Collection of Fine Arts) Smithsonian Institution, Washington, D.C.

in the Virginia legislature (1811–16, 1823–25, 1839). He was elected a U.S. congressman (1817–21), state governor (1825–27), and U.S. senator (1827–36). His service in Washington was marked by consistent support of states' rights and strict construction of the Constitution. While in the Senate, Tyler—who was a slaveholder—sought to prohibit the slave trade in the District of Columbia but opposed its abolition there without the consent of Maryland and Virginia. He voted against a protective tariff as unconstitutional but also condemned South Carolina's attempt to nullify it.

In an unusual show of independence, Tyler resigned from the Senate in 1836 rather than yield to his state legislature's instructions to reverse his vote on Senate resolutions censuring President Jackson for removal of deposits from the Bank of the United States. This anti-Jackson stand endeared Tyler to the opposition Whig Party, which in 1840 nominated him for the vice presidency in an effort to attract Southern support. Harrison and Tyler won after a campaign that sedulously avoided the issues and stressed innocuous party insignia and the slogan "Tippecanoe and Tyler too!"

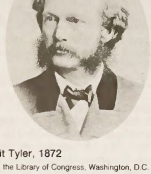
When Tyler was unexpectedly thrust into the presidency, upon President Harrison's death, his opponents proposed to recognize him as acting president only, but Tyler successfully claimed all the rights and privileges of office. When he vetoed a new national bank bill, all but one member of the Cabinet resigned; he promptly appointed new members who shared his states'-rights views.

Tyler was now a president without a party; he had been repudiated by the Whigs, and the Democrats refused to recognize him. Even so, his administration accomplished a great deal. It reorganized the U.S. Navy, established the U.S. Weather Bureau, brought the Second Seminole War (1835–42) in Florida to an end, and quieted Dorr's Rebellion (1842) in Rhode Island.

In 1844 Tyler was renominated for the presidency by an irregular convention but withdrew in favour of the regular Democratic nominee, James K. Polk. He continued to take an active interest in public affairs and remained a strong champion of Southern rights and interests. On the eve of the Civil War he stood firmly against secession, however, and exerted himself to preserve the Union. Early in 1861 he presided over the Washington Peace Conference—an abortive effort to compromise sectional differences. When the Senate rejected the proposed plan, he relinquished all hope of saving the Union and urged an immediate break as a delegate to the Virginia Secession Convention.

Shortly before his death Tyler was elected to the Confederate House of Representatives. A useful biography is O.P. Chitwood's *John Tyler, Champion of the Old South* (1939).

Tyler, Moses Coit (b. Aug. 2, 1835, Griswold, Conn., U.S.—d. Dec. 28, 1900, Ithaca, N.Y.), U.S. literary historian whose use of literary documents in the history of pre-Revolutionary American ideas was a major contribution to U.S. historiography.



Moses Coit Tyler, 1872
By courtesy of the Library of Congress, Washington, D.C.

The descendant of an old New England family, Tyler was taken west in 1837 by his parents, who eventually settled in Detroit in 1842. In 1852 he entered the University of Michigan, Ann Arbor, transferring a year later to Yale University. After graduating, he attended both Yale and Andover Theological seminaries. He served as a pastor in Poughkeepsie, N.Y., from 1860 to 1862, when, in disillusionment, he abandoned the ministry. The following year he travelled to England, where he lectured, wrote, and helped to found the London School of Physical Education. Returning to the United States, he became in 1867 the sole professor of English literature at the University of Michigan, working throughout the next five years to improve teaching methods and curricula for literature courses. In 1873 he left Michigan for New York to become literary editor of *The Christian Union,* a politically liberal and reformist religious weekly. The same year he wrote *Manual of English Literature in England.* Unhappy in the field of journalism, he returned to the University of Michigan in 1874, creating the first course on American literature and working on his projected *History of American Literature, 1607–1765,* 2 vol. (1878). The work was well received by scholars, particularly because of its stress on basically historical and sociopolitical documents.

In 1881 Tyler was given the newly created chair of American history at Cornell University, Ithaca, N.Y. He was active in founding the American Historical Association in 1884 and published a biography of the U.S. patriot and orator Patrick Henry in 1886. After studying the language and university system of Germany in 1888, he began the next year the monumental *Literary History of the American Revolution,* 2 vol. (1897). A trailblazing intellectual history of the period between 1763 and 1783, it concentrated on essayists, pamphleteers, and satirists, thus broadening the scope of historical research. In part influenced by the German school of cultural history, the history was the product of a full and scholarly use of the primary sources of the period. Jessica Tyler Austen's *Moses Coit Tyler* (1911) and Howard M. Jones's *Life of Moses Coit Tyler* (1933) are excellent biographies.

Tyler, Royall, original name WILLIAM CLARK TYLER (b. July 18, 1757, Boston—d. Aug. 26, 1826, Brattleboro, Vt., U.S.), U.S. lawyer, teacher, and dramatist, author of the first American comedy, *The Contrast* (1787).

After graduating from Harvard University, Tyler served in the U.S. Army and later became a lawyer. A meeting with Thomas Wignell, the star comedian of the American Company, in New York City, led him to write *The Contrast,* which premiered in 1787 at the John Street Theatre. A light comedy echoing the English playwrights Oliver Goldsmith and Richard Sheridan (especially *The School for Scandal*), *The Contrast* contains a Yankee character, the predecessor of many such in years to follow, that brought something native to the stage. His other plays, some no longer extant, did not equal *The Contrast.*

Tyler, Wat, byname of WALTER TYLER (d. June 15, 1381, London), leader of the Peasants' Revolt of 1381, the first great popular rebellion in English history; his leadership proved one of the chief factors in the success of protest against the harsh taxation of the poorer classes.

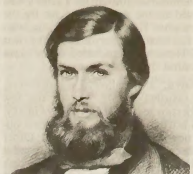
Chosen as captain by the Kentish rebels on June 7, Tyler led them in the capture of Canterbury (June 10); of the Savoy palace belonging to John of Gaunt, the King's uncle (June 13); and of London Bridge and the Tower of London (June 14). Although King Richard II promised concessions on June 14, Tyler's men refused to disarm and disband. They met with Richard on June 15 at Smithfield, where Tyler presented more radical demands, which included the confiscation of all church lands. Fighting broke out in the course of the negotiations, and Tyler was badly wounded. His followers carried him to St. Bartholomew's Hospital, from which he was later dragged away and beheaded by order of the lord mayor of London, William (later Sir William) Walworth. After Tyler's death the government quickly reasserted its authority and ended the rebellion.

tylopod, any of the pad-footed, even-toed, hoofed mammals of the suborder Tylopoda (order Artiodactyla). This group contains three extinct families and one living family, Camelidae, which contains the camels and the lamoids—the llama, alpaca, guanaco, and vicuña.

The chief distinguishing features of the tylopods are found in the structure of the feet, the bone enclosing the middle ear, the neck vertebrae, the number and form of the teeth, and the absence of horns. The living forms are cud chewers and have a rumen.

Tylor, Sir Edward Burnett (b. Oct. 2, 1832, London—d. Jan. 2, 1917, Wellington, Somerset, Eng.), English anthropologist regarded as the founder of cultural anthropology. His most important work, *Primitive Culture* (1871), influenced by Darwin's theory of biological evolution, developed the theory of an evolutionary, progressive relationship between primitive and modern cultures. Tylor was knighted in 1912.

Early life and travels. Tylor was the son of a prosperous Quaker brass founder. He attended a Quaker school until he was 16, when, barred by his faith from entering a university, he became a clerk in the family business. In 1855, at the age of 23, symptoms of tuberculosis led him to travel to America in search of health. He made his way in 1856 to Cuba, where, in Havana, he entered into conversation with a fellow Quaker who turned out to be the archaeologist and ethnologist Henry Christy. Christy was on his way to Mexico to study remnants of the ancient Toltec culture in the Valley of Mexico. The two became friends, and Christy persuaded Tylor to accompany him on his expedition.



Tylor, detail of a chalk drawing by G. Bonavia; in the National Portrait Gallery, London
By courtesy of the National Portrait Gallery, London

Travelling in arduous and sometimes dangerous circumstances, they searched for the Toltec remains, Tylor under Christy's experienced direction gaining practical knowledge of archaeological and anthropological fieldwork. The expedition lasted for six months, and after its conclusion Tylor, now firmly set on the course of his life's work, returned to England. In 1858 he married and spent some time travelling in Europe before publishing the experiences of his Mexican expedition in his first book, *Anahuac; or, Mexico and the Mexicans Ancient and Modern* (1861). Although mainly a well-conceived travelogue, *Anahuac* contains elements that characterize Tylor's later work when he had become a full-fledged anthropologist: a firm grasp on factual data, a sense of cultural differences, and a curious combination of empirical methods with occasional hints of the superiority of a 19th-century Englishman in judging other cultures.

Tylor's concept of progressive development. After *Anahuac,* Tylor published three major works. *Researches into the Early History of Mankind and the Development of Civilization* (1865), which immediately established his reputation as a leading anthropologist, elaborated the thesis that cultures past and present, civilized and primitive, must be studied as parts of a single history of human thought. "The past," he wrote, "is continually needed to explain the present, and the whole to explain the part." Tylor's fame, however, is based chiefly upon the publication of *Primitive Culture.* In it he again traced a progressive development from a savage to a civilized state and pictured primitive man as an early philosopher applying his reason to explain events in the human and natural world that were beyond his control, even though his scientific ignorance produced erroneous explanations. Tylor identified, for example, the earliest form of religious belief as "animism," a belief in spiritual beings, arrived at, he assumed, by primitive attempts to explain the difference between the living body and the corpse and the separation of soul and body in dreams.

Primitive Culture also elaborated upon a theme that became a central concept in his work: the relation of the life of primitive to that of modern populations.

By long experience of the course of human society, the principle of development in culture has

become so ingrained in our philosophy that ethnologists, of whatever school, hardly doubt but that, whether by progress or degradation, savagery and civilization are connected as lower and higher stages of one formation.

Thus, "culture" should be studied not only in the artistic and spiritual achievements of civilizations but in man's technological and moral accomplishments made at all stages of his development. Tylor noted how customs and beliefs from a distant, primitive past seemed to have lived on into the modern world, and he became well-known for his examination of such "survivals," a concept that he introduced. His evolutionary view of human development was endorsed by most of his colleagues and, of course, by Charles Darwin, who had established biological evolution as the key to human development.

Assessment. In the late 19th-century political and theological controversy over the question whether all the races of mankind belonged, physically and mentally to a single species, Tylor was a powerful advocate of the physical and psychological unity of all mankind. On this question, as in all anthropological disputes, he based his position on respect for empirical evidence, which he hoped would bring the standards and procedures of the natural sciences to the study of humanity.

His last book, *Anthropology, an Introduction to the Study of Man and Civilization* (1881), is an excellent summary of what was, late in the 19th century, known and thought in that field. Like all Tylor's work, it conveys a vast quantity of information in a lucid and energetic style.

Tylor was made a fellow of the Royal Society in 1871 and given a doctorate of civil law at the University of Oxford in 1875. Eight years later he returned to Oxford to give lectures and stayed there as keeper of the university's museum, becoming reader in anthropology in 1884 and the first professor of anthropology in 1896. He was also elected the first Gifford lecturer at Aberdeen University in 1888. He retired from active life in 1909 and died in 1917. (B.V.S.)

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tympanic membrane, also called EARDRUM MEMBRANE, membrane in the human ear that receives sound vibrations from the outer air and transmits them to the auditory ossicles, which are tiny bones in the tympanic (middle ear) cavity. It also serves as the lateral wall of the tympanic cavity, separating it from the external auditory canal. The membrane lies across the end of the external canal and looks like a flattened cone with its tip (apex) pointed inward. The edges are attached to a ring of bone, the tympanic annulus.

Accurate diagnosis of middle-ear diseases is dependent on the appearance and mobility of the tympanic membrane, which is normally pearl gray but is sometimes tinged with pink or yellow. The drum membrane has three layers: the outer layer, continuous with the skin on the external canal; the inner layer, continuous with the mucous membrane lining the middle ear; and, between the two, a layer of radial and circular fibres that gives the membrane its tension and stiffness. The membrane is well-supplied with blood vessels, and its sensory nerve fibres make it extremely sensitive to pain.

tympanites (animal disease): *see* bloat.

tympanum, plural TYMPANA, in architecture, an area, triangular or semicircular in shape, that is within an arch above a lintel. In Europe during the 11th and 12th centuries, tympana over church portals were decorated with intricate and stylized relief sculpture.

A particularly popular subject for tympanum decoration was the Last Judgment. Typically, the figure of Christ appears in the centre of the composition, dominant in size and usually enclosed in a mandorla (an oval, nimbus-like form). At his right and left are the four Evangelists, sometimes represented or accompanied by their animal symbols. To the sides, smaller figures of angels and demons weigh sins of the resurrected dead, who are ranked along the lowest and smallest section of the tympanum, directly above the lintel. Fine examples of Romanesque tympana may be seen at the abbey church of Saint-Pierre at Moissac, Fr., and at the cathedral of Saint-Lazare at Autun.

Tynan, Katherine, married name HINKSON (b. Jan. 23, 1861, Dublin—d. April 2, 1931, Wimbledon, Surrey, Eng.), Irish poet and novelist whose works are dominated by the combined influences of Catholicism and Irish patriotism.

Like the poet William Butler Yeats, she developed a deep and abiding interest in Celtic mythology. Her *Collected Poems* were published in 1930. A prodigious writer, she produced five autobiographical volumes: *Twenty-five Years* (1913), *The Middle Years* (1917), *The Years of the Shadow* (1919), *The Wandering Years* (1922), and *Memories* (1924). She also wrote more than 100 romantic novels, the best-known of which is *The House in the Forest* (1928).

Tyndale, James Scott, Baron: *see* Monmouth, James Scott, duke of.

Tyndale, William (b. *c.* 1490–94, Gloucestershire, Eng.—d. Oct. 6, 1536, Vilvorde, Flanders, Neth.), English biblical translator, humanist, and Protestant martyr.

Tyndale was educated at the University of Oxford and became an instructor at the University of Cambridge, where, in 1521, he fell in with a group of humanist scholars meeting at the White Horse Inn. Tyndale became convinced that the Bible alone should determine the practices and doctrines of the church and that every believer should be able to read the Bible in his own language.

After church authorities in England prevented him from translating the Bible there, he went to Germany in 1524, receiving financial support from wealthy London merchants. His New Testament translation was completed in July 1525 and printed at Cologne and, when Catholic authorities suppressed it, at Worms. The first copies reached England in 1526. Tyndale then began work on an Old Testament translation but was captured in Antwerp before it was completed; he was executed at Vilvorde in 1536.

At the time of his death, 50,000 copies of his New Testament had been printed, the first vernacular English text of any part of the Bible to be so published. Tyndale's version became the basis for most subsequent English translations, beginning with the King James Version of 1611.

Tyndall, John (b. Aug. 2, 1820, Leighlin Bridge, County Carlow, Ire.—d. Dec. 4, 1893, Hindhead, Surrey, Eng.), British physicist who demonstrated why the sky is blue.

In 1853 Tyndall was chosen professor of natural philosophy at the Royal Institution, London, where he became a colleague and friend of Michael Faraday. His early work was concerned with the magnetic properties of crystals, but in 1859 he began investigating the ability of various gases to absorb and radiate heat. He established that humid air absorbs heat with little change in temperature, a phenomenon of meteorological importance.

Tyndall studied the diffusion of light by large molecules and dust, known as the Tyndall effect; he also performed experiments demonstrating that the sky's blue colour results from



Tyndall
BBC Hulton Picture Library

the scattering of the Sun's rays by molecules in the atmosphere, a phenomenon which was later explained theoretically by Lord Rayleigh.

In 1881 he delivered the final blow to the long-held idea of spontaneous generation by proving that germ-free air does not lead to food decay. Tyndall's publications, more than 16 books and 145 papers, include *Heat Considered as a Mode of Motion* (1862), *Six Lectures on Light* (1873), and *Forms of Water* (1872).

Tyne River, river in northern England, flowing for 62 miles (100 km) into the North Sea below Newcastle upon Tyne. It is formed by the confluence, near Hexham, of the North Tyne, with its tributary the Rede, and the South Tyne. From Wylam the Tyne functioned as the historic county boundary between Northumberland and Durham. The river crosses a coalfield and for its last 14 miles (23 km) is a tidal waterway. Since about 1850 the Tyne Improvement Commission has carried out dredging on the lower river, dock construction, and improvement of the entrance. The historic crossing is from Gateshead to Newcastle upon Tyne, 10 miles (16 km) from the mouth. The Tyne has shipped coal for at least six centuries, and its estuary is now lined with industry and large urban communities constituting the Tyne and Wear conurbation, but for most of their courses the river and its tributaries flow through unspoiled countryside. Much of the Tyne Basin, including the first section of the Roman Hadrian's Wall, lies within the Northumberland National Park.

Tyne and Wear, area in northeastern England. It covers 208 square miles (540 square km) and is bounded by Northumberland (north and west), Durham (south), and the North Sea (east). It is an urban, industrial region made up of five administrative districts: the city of Newcastle upon Tyne and the boroughs of Gateshead, North Tyneside, South Tyneside, and Sunderland. (From 1974 to 1986 Tyne and Wear had its own administrative metropolitan county council.) It is named for its two main rivers, the Tyne and the Wear.

There is some evidence of prehistoric settlement before the Roman occupation and the associated building of Hadrian's Wall (AD 122), a defensive line extending westward from what is now Wallsend on the Tyne near

Newcastle. Saxon settlement and the eventual establishment of the kingdom of Northumbria followed the Roman withdrawal. In 1080 the Normans built a fortress at Newcastle, dominating the Tyne crossing.

Exploitation of the area's greatest asset, coal, began in the 13th century but was restricted to the exposed coalfield west of Newcastle, near the river for transport. Throughout medieval times coal was exported from Newcastle to London, but it was not until the wood shortage of Elizabethan times that coal became important as domestic fuel and trade increased dramatically. During the 18th century, improvements in mining techniques and the development of the steam engine enabled the exploration of the concealed coalfield east of Newcastle. Long before the Industrial Revolution, coal-dependent industries (glass, pottery, chemicals, and iron) developed along the Tyne. For a time Tyneside was also the country's chief salt-producing area, using coal to evaporate seawater.

The 19th century brought two major advances: the development of heavy transport (railways and, later, iron ships) and the widening market for different types of coal for smelting, gas, and steam production. With the coming of the railways, the mines, no longer limited by accessibility to water transport, were able to penetrate farther east into the concealed coalfield beneath the limestone. Drab mining settlements came into being, often attached to existing agricultural villages—*e.g.,* Easington and Easington Colliery. Later expansion continued eastward to exploit seams beneath the North Sea. Industrial development during the late 19th century concentrated in the Tyneside ports. The old industries—salt, glass, and chemicals—declined and were replaced by expanding shipyards building new iron ships.

Like most British areas greatly dependent upon heavy industry, the region suffered during the depressed years between World Wars I and II, and unemployment remains a problem despite efforts to diversify the industrial structure. The area remains very dependent on heavy industry—shipbuilding, repairing, marine and heavy electrical engineering, and soap and paint manufacturing. Pop. (1985 est.) 1,140,000.

Tynedale, district, county of Northumberland, northern England. It occupies an area of 858 square miles (2,221 square km) in the western part of the county and is bordered on the northwest by Scotland. The district is an area of hills, both rounded and craggy, and bleak moorlands separated by the narrow, fertile valleys of the North Tyne and South Tyne rivers, which merge to form the Tyne River in the southeastern part of the district. The central and northwestern limestone area commonly called the western uplands (elevation 1,000 feet [300 m]) rises on the northeast to an extension of the igneous-based and peat-covered Cheviot Hills (more than 1,500 feet [450 m] high). In the south, below the South Tyne valley, the district extends into the Pennines, which are more than 1,800 feet (550 m) high.

The valleys penetrate into the uplands from the east, and comparative isolation has given each a distinctive character. The principal market and small industrial centres of the district (Prudhoe, Corbridge, Hexham, and Haltwhistle) are located adjacent to the South Tyne and the lower Tyne, where mixed farming is commonplace. Although of low agricultural value, the district's moorlands provide enough pasturage for sheep (especially the locally popular Cheviot and Blackface).

Thick spruce forests, part of an afforestation scheme begun in the 1920s and 1930s, are found in the moorland in the northwest near the headwaters of the North Tyne. The dam at Kielder Reservoir was built on the North Tyne to supplement water flow to industries along the River Tyne and by pipeline to the Wear and Tees rivers; the reservoir is a major recreational resource in the area.

Antiquities of the Anglo-Saxon and Roman periods are gathered at a museum in Corbridge (the site of a Roman camp); and a section of Hadrian's Wall is well-preserved directly north of the South and lower Tyne valleys and extends east–west through the district.

The valleys of the South Tyne and the Tyne River are important avenues for transportation routes between northwestern and northeastern England. Hexham is the district seat. Pop. (1985 est.) 54,900.

Tyo, Kingdom of (African history): *see* Anziku, Kingdom of.

type name, also called TICKET NAME, in dramatic practice, name given to a character to ensure that the personality may be instantly ascertained. In England the allegorical morality plays of the late Middle Ages presented characters personifying, for example, the seven deadly sins—being named Envy, Sloth, Lust, and so forth. Tudor and Elizabethan dramatists were much-influenced by the moralities, and Ben Jonson in particular adopted the habit of christening his characters in such a way that whatever "humour" governed them was pointed up. In his play *The Alchemist* appear Subtle and Face (two confidence tricksters), Sir Epicure Mammon (a voluptuary), Abel Drugger (a naive tobacconist), and Dol Common (a strumpet). Type names were later a feature of Restoration comedy. In Sir John Vanbrugh's comedy *The Relapse,* there appear, among a gallery of familiar characters with type names, Lord Foppington and his brother Young Fashion. Type names continued to be a fixture of English literature in the latter part of the 18th century, as is evident in some of the characters invented by the dramatist Richard Brinsley Sheridan: Joseph Surface and the dramatist Sir Fretful Plagiary. The most prominent and inventive user of type names in 19th-century English literature was the novelist Charles Dickens, though his type names are imaginatively suggestive creations rather than explicit labels of a character's occupation, attitudes, or flaws: Josiah Bounderby, Thomas Gradgrind, Mrs. Sparsit, Tulkinghorn, Dr. Blimber, Mrs. Jellyby, and Captain Cuttle. Anthony Trollope and other Victorian novelists also sometimes used type names, especially for comic or flawed characters.

Type names can be found in most other national literatures, and their use has persisted at a diminished level, usually in comedic works or for comic effect.

types, theory of, in logic, a theory introduced by the British philosopher Bertrand Russell in his *Principia Mathematica* (1910–13) to deal with logical paradoxes arising from the unrestricted use of predicate functions as variables. Arguments of three kinds can be incorporated as variables: (1) In the pure functional calculus of the first order, only individual variables exist. (2) In the second-order calculus, propositional variables are introduced. (3) Higher orders are achieved by allowing predicate functions as variables. The type of a predicate function is determined by the number and type of its arguments. By not allowing predicate functions with arguments of equal or higher type to be used together, contradictions within the system are avoided.

typesetting, the setting of type for use in any of a variety of printing processes. *See* printing.

typesetting machine, basic element in modern letterpress printing. The problem of mechanizing typesetting was solved in the 19th century by devising machines that could cast type from matrices, or molds. The first to be successful was that of Ottmar Mergenthaler, German-born American inventor, which cast thin slugs of a molten, fast-cooling alloy from brass matrices of characters activated by a typewriter-like keyboard; each slug represented a column line of type. The slug could be used either directly for printing or for producing a matrix of a page to be printed; after use it could be melted for reuse. Mergenthaler's Linotype (*q.v.*) machine was patented in 1884; in 1885 another American inventor, Tolbert Lanston, perfected the Monotype (*q.v.*), a machine in which type is cast in individual letters. Both machines were made possible by the development of machine tools, specifically, the mechanical punch cutter. A third process, the Intertype (*q.v.*), developed later, also sets type by the line. Linotype and Intertype are economically advantageous in newspaper and in most book and magazine printing. Monotype is used if tighter or more irregular spacing is needed, as in catalogs; it is also used for some book and magazine work. All modern machines have great flexibility in respect to line widths, type fonts, and type sizes.

All three typesetting machines have been adapted for photocomposition (*q.v.*) and for teletypesetting, by which a perforated tape, encoded by impulses received over a telephone wire, activates the typesetting keys. A significant development of the 1960s was the use of computers to prepare tapes and to drive and control typesetting and photocomposition at very high speeds (*see* computerized typesetting). Another development was the introduction of a family of printing machines that represented a combination of typewriter and composing machine; these could be operated by typists without the technical training required for typesetting machines.

typewriter, any of various machines for writing characters similar to those made by printers' types, especially a machine in which the characters are produced by steel types striking the paper through an inked ribbon with the types being actuated by corresponding keys



The Sholes and Glidden typewriter of *c.* 1873, which, with refinements, became the Remington Model 1
By courtesy of Remington Rand Office Machines Division

on a keyboard and the paper being held by a platen that is automatically moved along with a carriage when a key is struck.

The invention of various kinds of machines was attempted in the 19th century. Most were large and cumbersome, some resembling pianos in size and shape. All were much slower to use than handwriting. Finally, in 1867, the American inventor Christopher Latham Sholes read an article in the journal *Scientific American* describing a new British-invented machine and was inspired to construct what became the first practical typewriter. His second model, patented in 1868, wrote at a speed far exceeding that of a pen. It was a crude machine, but Sholes added many improvements in the next few years, and in 1873 he signed a contract with E. Remington and Sons, gunsmiths, of Ilion, N.Y., for manufac-

ture. The first typewriters were placed on the market in 1874, and the machine was soon renamed the Remington. Among its original features that were still standard in machines built a century later were the cylinder, with its line-spacing and carriage-return mechanism; the escapement, which causes the letter spacing by carriage movement; the arrangement of the typebars so as to strike the paper at a common centre; the actuation of the typebars by means of key levers and connecting wires; printing through an inked ribbon; and the positions of the different characters on the keyboard, which conform almost exactly to the arrangement that is now universal. Mark Twain purchased a Remington and became the first author to submit a typewritten book manuscript.

The typewriter had no shift-key mechanism—it wrote capital letters only. The problem of printing both capitals and small letters without increasing the number of keys was solved by placing two types, a capital and lowercase of the same letter, on each bar, in combination with a cylinder-shifting mechanism. The first shift-key typewriter—the Remington Model 2—appeared on the market in 1878. Soon after appeared the so-called double-keyboard machines, which contained twice the number of keys—one for every character, whether capital or small letter. For many years the double keyboard and the shift-key machines competed for popular favour, but the development of the so-called touch method of typing, for which the compact keyboard of the shift-key machines was far better suited, decided the contest.

Another early issue concerned the relative merits of the typebar and the type wheel, first applied in cylinder models brought out in the 1880s and later. In modern machines of this variety the type faces are mounted on a circle or segment, the operation of the keys brings each type to correct printing position, and the imprint of type on paper is produced by a trigger action. The type-wheel machines offer an advantage in the ease with which the type segments may be changed, thus extending the range and versatility of the machine.

On nearly all typewriters the printing is done through an inked ribbon, which is fitted on spools, travels with the operation of the machine, and reverses automatically when one spool becomes completely unwound. On other machines an inking pad is used, the type contacting the pad prior to printing.

Noiseless typewriters. The noiseless linkage is a variation of the conventional typebar linkage causing the typebar to strike the platen at a lower velocity but with the same momentum. Although it produces less noise than the conventional typewriter, the noiseless typewriter cannot produce as fine an impression or as many carbon copies.

Electric typewriters. A significant advance in the typewriter field was the development of the electric typewriter, basically a mechanical typewriter with the typing stroke powered by an electric-motor drive. The typist initiates the key stroke, the carriage motion, and other controls by touching the proper key. The actuation is performed by the proper linkage clutching to a constantly rotating drive shaft. Advantages of this system include lighter touch, faster and more uniform typing, more legible and numerous carbon copies, and less operator fatigue. Especially valuable as an office machine capable of a high volume of output, electric typewriters are produced by all major typewriter manufacturers.

The first electrically operated typewriter, consisting of a printing wheel, was invented by Thomas A. Edison in 1872 and later developed into the ticker-tape printer. The electric typewriter as an office writing machine was pioneered by James Smathers in 1920.

In 1961 the first commercially successful typewriter based on a spherical type-carrier design was introduced by the International Business Machines Corporation. The sphere-shaped typing element moves across the paper, tilting and rotating as the desired character or symbol is selected. The motion of the element from left to right eliminates the need for a movable paper carriage.

Portable typewriters. The early portables of the late 19th century were slow, awkward, type-wheel machines. In 1909 the first successful portables appeared on the market. By the 1950s practically every typewriter manufacturer produced a portable typewriter; all of them were typebar machines similar in operation to the office machines. Designed with lighter parts than those of standard models, portables are more compact but less sturdy. Electrical operation of portable typewriters was introduced in 1956.

Typewriter composing machines. Special-purpose typewriting machines have been developed for use as composing machines; that is, to prepare originals that look as if they had been set in printer's type (or at least more so than ordinary typewriting does), from which additional copies can be printed. Ordinary typewriting cannot compare in quality, style, and versatility with printing from type produced directly on metal slugs by standard composing machines, but the high cost of skilled typesetting labour prompted the development of composing typewriters that require less operator training. Since the fundamental requirement of a composing typewriter is the ability to supply different styles and sizes of type, the type-wheel machine is far more suitable than the typebar. Other major requirements of a typing machine whose output must resemble print are the proportional spacing of characters in a word (rather than centring every character within the same width, as in ordinary typewriting) and justification, or alignment of the right-hand margin. An electric typebar machine was developed that provided proportional spacing—assigning space for each character in proportion to its width. The other requirement, margin justification, proved more difficult to attain. Most of these machines provided for preliminary typing of a line, determining the necessary compensation for the line length, and retyping to the exact length. A more complicated machine was introduced that would automatically justify a line of type with one keyboarding. This was accomplished by a system in which the operator typed manually into a storage unit, from which a computer first automatically compensated for line length and then operated a second typing mechanism. By mid-20th century the typewriter had begun to be used as a composing machine in spite of its limitations, and it became more popular as improvements were developed.

Automatically controlled machines. One of the most important advances in the field of typewriters and office machines was the development of automatic controls that allow typing from remote electrical signals rather than from manual control. This technique enabled office machine manufacturers to develop an integrated system of business communication utilizing remote control typewriters and computer techniques. With such a system, machines handling all the different office machine functions, such as the typewriter, calculating machine, and printing telegraph, together with mass data processing computers and electronic storage systems, are tied together by the use of a "common language" in the form of coded electrical signals. This coded information, coming into an office via appropriate communication channels, can be automatically recorded and printed. Component machines produced by any manufacturer can be connected to any other without the use of special code converters. Other automatic typewriter devices also have become available. A vacuum-operated system, for example, controls and operates any number of standard typewriters from a perforated roll of paper tape, much like the player piano, making possible rapid production of form letters and other papers.

High-speed printers. The need for high-speed printing machines to convert the output of computers to readable form prompted the introduction of a specialized high-speed form of "typewriter" in 1953. In this class of machines, the paper is fed between a continuously rotating type wheel and a bank of electrically actuated printing hammers. At the instant the proper character on the face of the type wheel is opposite the proper hammer, the hammer strikes the paper and prints the character, while the type wheel continues to rotate. By this means, speeds up to 100,000 characters per minute have been attained, as compared with about 1,000 characters per minute attainable with conventional typebar mechanisms. A number of different models operating on this principle were developed; all of them required elaborate electronic controls to solve the complex synchronization problem. Many other high-speed-output devices for computers were developed. Most of them utilize techniques that are remote from the typewriter field, in some cases using printing mediums other than paper. Speeds of up to 10,000 characters per second were attained by certain nonmechanical systems, which, although not actually typewriters, compete with typewriters as computer-output devices.

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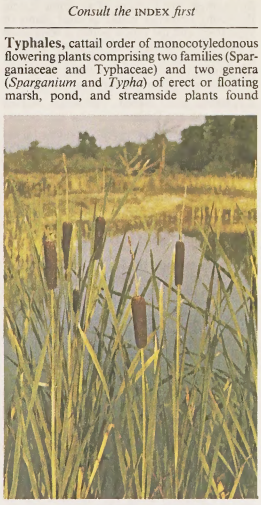
Typhales, cattail order of monocotyledonous flowering plants comprising two families (Sparganiaceae and Typhaceae) and two genera (*Sparganium* and *Typha*) of erect or floating marsh, pond, and streamside plants found



Cattail (*Typha*)
Robert J. Ashworth—The National Audubon Society Collection/Photo Researchers

mainly in temperate and cold regions of the Northern and Southern Hemispheres. The two families are closely related and have similar technical characters, including separate, petalless, wind-pollinated male and female flowers in dense inflorescences (clusters), but the plants differ significantly in appearance.

Members of the burreed family (Sparganiaceae) have spherical flower heads; some species have separate male and female flower heads with the male heads above the female on the same stem, or with the male flowers in the upper part of the same head with the female flowers but being more crowded than the female flowers. The plant stems arise from creeping rootstocks, usually project above the water, and bear long, linear leaves whose lower ends sheath the stem.

The cattail family (Typhaceae), also called bulrushes and reedmaces, have an elongate flowering spike that is divided into two parts: a slender yellow upper portion, bearing the male flowers, and a stout brown lower portion, bearing the female flowers. The plant stems arise from a thick rootstock under the water and rise about 2.5 m (8 feet) above the water, bearing two ranks of flat, linear leaves.

The burreeds (*Sparganium* species) are seldom cultivated, but they are an important source of food and cover for wildlife. The cattails (*Typha* species), also important to wildlife, are often cultivated ornamentally as pond plants and for dried flower arrangements, especially the common cattail (*T. latifolia*) and the smaller narrow-leaf cattail (*T. angustifolia*). Cattail leaves are sometimes used for making mats, baskets, chair seats, and other woven articles, and they are also good for caulking and stopping cracks in barrels and boats because of their ability to swell when wet. Cattails have been called the most useful of all wild plants as sources of emergency food. The rootstocks, for example, are a source of an edible starch; the young stems are edible as salad plants or vegetables; and the yellow pollen is considered a nutritious and agreeably flavoured additive to cookie doughs and pancake batters. Even the immature, still-green flowering spikes can be boiled and eaten like corn on the cob.

Typhaon, also spelled TYPHOEUS (Greek mythology): *see* Typhon.

typhoid, also called TYPHOID FEVER, acute infectious disease of humans caused by the bacterium *Salmonella typhi.* The bacterium usually enters the body through the mouth by the ingestion of contaminated food or water, penetrates the intestinal wall, and multiplies in lymphoid tissue there; it first enters into the bloodstream within 24 to 72 hours, causing septicemia (blood poisoning) and systemic infection.

After an average 10–14 day incubation period, the early symptoms of typhoid appear: headache, lassitude, generalized aching, fever, and restlessness that may interfere with sleep. There may be loss of appetite, nosebleeds, cough, and diarrhea or constipation. Persistent fever develops and gradually rises, usually in a stepwise fashion, reaching a peak of 103° or 104° F (39.4° or 40° C) after 7–10 days and continuing with only slight morning remissions for another 10–14 days. During the first few days of the disease the patient may remain ambulatory.

During about the second week of fever, when typhoid bacilli are present in great numbers in the bloodstream, a rash of small, rose-coloured spots appears on the trunk, lasts four or five days, and then fades away. The lymph follicles (Peyer's patches) along the intestinal wall in which the typhoid bacilli have multiplied become inflamed and necrotic and may slough off, leaving ulcers in the walls of the bowel. The dead fragments of bowel tissue may erode blood vessels, causing a hemorrhage into the bowel, or they may perforate the bowel wall, allowing the bowel's contents to enter the peritoneal cavity (peritonitis). Other complications can include acute inflammation of the gall bladder, heart failure, pneumonia, osteomyelitis, encephalitis, and meningitis. With a continued high fever the symptoms usually increase in intensity, and mental confusion and delirium may appear.

By the end of the third week the patient is prostrated and emaciated, his abdominal symptoms are marked, and mental disturbance is prominent. In favourable cases, during about the beginning of the fourth week, the fever begins to decline, the symptoms begin to abate, and the temperature gradually returns to normal. If untreated, typhoid proves fatal in up to 25 percent of all cases.

Most major epidemics of typhoid have been caused by the pollution of public water supplies. Food and milk may be contaminated, however, by a carrier of the disease who is employed in handling and processing them; by flies; or by the use of polluted water for cleaning purposes. Shellfish, particularly oysters, grown in polluted water and fresh vegetables grown on soil fertilized or contaminated by untreated sewage are dangerous. The prevention of typhoid fever depends mainly on proper sewage treatment, filtration and chlorination of water, and the exclusion of carriers from employment in food industries and restaurants. In the early part of the 20th century, prophylactic vaccination using killed typhoid organisms was introduced, mainly in military forces and institutions, and contributed to a lowering of the incidence of the disease.

The treatment of typhoid formerly was entirely symptomatic and supportive. After 1948 treatment with antibiotics, particularly with chloramphenicol, proved to be effective. Chloramphenicol begins to lower the patient's fever within three or four days after beginning therapy, and there is progressive improvement thereafter. The drug treatment is continued for several weeks in order to prevent relapses. Ampicillin, often in combination with other drugs, is an effective alternate treatment.

About 30 percent of typhoid cases become transient carriers of the disease, excreting the causative bacteria in the stool or urine for weeks or months. About 5 percent remain long-term carriers, harbouring the microorganisms and shedding them for years. In these carriers, who show no apparent ill effects, the bacilli are found mainly in the gallbladder and biliary passages. The bacteria may be excreted continuously or intermittently. One of the most famous instances of carrier-borne disease in medical history was the early 20th-century case of Typhoid Mary (*q.v.*).

Typhoid Mary, byname of MARY MALLON (b. 1870?—d. Nov. 11, 1938, North Brother Island, New York City), famous typhoid carrier in the New York City area in the early 20th century. Fifty-one original cases of typhoid and three deaths were directly attributed to her (countless more were indirectly attributed), although she herself was immune to the typhoid bacillus (*Salmonella typhi*).

Mary's case first arose in 1904, when an epidemic of typhoid spread over Oyster Bay and adjacent towns on Long Island, and the sources were found to be households in which Mary had been a cook. When discovered, she disappeared—to be rediscovered in 1907 as a cook in a Park Avenue home in Manhattan. Again she fled, but authorities led by George Soper, a sanitary engineer in the New York City Department of Health, finally overtook her and had her committed to an isolation centre on North Brother Island, off the Bronx. There she stayed, despite an appeal to the U.S. Supreme Court, until 1910, when the health department released her on condition that she never accept employment that involved the handling of food.

Four years later, Soper began looking for her again when an epidemic broke out at a sanatorium in Newfoundland, N.J., and at Sloane Maternity Hospital in Manhattan; Mary had worked as a cook at both places. She was at last found in a suburban home in Westchester county and returned to North Brother Island, where she remained the rest of her life. A paralytic stroke in 1932 led to her slow death, six years later.

Mary's claim to having been born in the United States was never confirmed, nor was her age ever verified.

Typhon, also spelled TYPHAON, or TYPHOEUS, in Greek mythology, youngest son of Gaea (Earth) and Tartarus (of the nether world). He was described as a grisly monster with a hundred dragons' heads who was conquered and cast into the underworld by Zeus. In other accounts, he was confined in the land of the Arimi in Cilicia or under Mount Etna or in other volcanic regions, where he was the cause of eruptions. Typhon was thus the personification of volcanic forces. Among his children by his wife, Echidna, were Cerberus, the three-headed hound of hell, the multiheaded Lernean Hydra, and the Chimera (*q.v.*). He was also the father of dangerous winds (typhoons), and by later writers he was identified with the Egyptian god Seth.

typhoon, local name in the western North Pacific area for any large, traveling tropical cyclone (*q.v.*).

typhus, acute, infectious series of diseases that are characterized by a sudden onset with headache, chills, fever, and general pains, a rash appearing on the third to fifth day, and toxemia (toxic substances in the blood), and terminating after about two to three weeks. Originally considered a single clinical entity, it is now regarded as a group of closely related diseases caused by different species of rickettsiae (bacteria belonging to the family Rickettsiales) and transmitted to humans by insect carriers under the following general classifications: epidemic (louse-borne) typhus; murine, or endemic (flea-borne), typhus; scrub (mite-borne) typhus, or tsutsugamushi disease; and tick-borne typhus.

Epidemic typhus is caused by *Rickettsia prowazekii* and is conveyed from person to person by the body louse, *Pediculus humanus.* The louse is infected by feeding upon a human who has the disease. The rickettsial bacteria grow in the epithelial cells lining the louse's gut wall and are excreted in the insect's feces. The infection kills the louse after 12 to 18 days. Man is commonly infected by scratching a louse bite, thus rubbing the louse's infected feces into the wound by abrasion. (Rickettsiae may remain viable and retain their virulence for many days in dried louse feces.) After an incubation period of one to two weeks, an infected person experiences headache, loss of appetite, malaise, and a rapid rise in temperature with fever, chills, marked prostration, and nausea. Four to six days after onset a characteristic rash appears over most of the body. The temperature reaches a maximum range by the end of the first week and is sustained until about the 12th day, when it generally falls rather rapidly, becoming normal in an uncomplicated course about the 14th to 16th day. Depression and weakness may be protracted during the recovery, and the patient's convalescence is slow. In fatal cases of the disease, prostration is progressive, and delirium and coma follow; cardiac failure may be the immediate cause of death.

Epidemic typhus has been one of the great disease scourges in human history. It is classically associated with people crowded together in filth, cold, poverty, and hunger; with wars and famine; with refugees; prisons and jails; concentration camps; and ships. Recognizable descriptions of the disease occur in European literature from the Middle Ages on, and devastating epidemics of typhus continued to occur intermittently throughout Europe in the 17th, 18th, and 19th centuries. Prominent outbreaks occurred during the Napoleonic Wars

and during the Irish potato famine of 1846–49. Epidemic typhus was clearly differentiated as a disease entity from typhoid fever in the 19th century, and in the early 20th century typhus decreased and then practically disappeared from western Europe as improvements in living conditions and hygiene occurred. The disease remained intermittently epidemic in eastern Europe, the Middle East, and parts of Africa, however. At the close of World War I the disease caused several million deaths in Russia, Poland, and Romania, and during World War II it again caused epidemics, this time among refugees and displaced persons, particularly in the German concentration camps.

A vaccine for typhus was developed during World War II and is effective in greatly alleviating the course of the disease if contracted. The development of the pesticide DDT in the mid-20th century provided an effective means of preventing outbreaks of epidemic typhus, since this chemical is a powerful and long-lasting lousicide. It is applied directly to the clothing of persons at risk and kills the lice as they hatch on the person's body. Like other types of typhus, epidemic typhus can be quickly and effectively treated by chloramphenicol and by the tetracyclines. Despite techniques using vaccination and delousing, typhus is still an ever-present threat to impoverished and destitute peoples in many parts of the world.

A condition that is closely related to epidemic typhus is Brill-Zinsser disease, or recrudescent typhus, in which mild symptoms of epidemic louse-borne typhus reappear after a latent period, sometimes of many years, in persons who at one time had contracted epidemic typhus. The disease was first noted when cases of typhus occurred in communities that were free of lice. If treated early with chloroamphenicol or a tetracycline drug, most patients with Brill-Zinsser disease recover.

Endemic, or murine, typhus, caused by *Rickettsia typhi* (*mooseri*), has as its principal reservoir of infection the Norway rat; occasionally, the common house mouse and other species of small rodents have also been found to be infected. The tropical rat flea *Xenopsylla cheopis* is the principal carrier of the disease, and transmission to humans occurs through the medium of infected flea feces. The frequency of occurrence of human cases is determined by the amount of contact humans have with domestic rodents. The course of the illness is essentially the same as for louse-borne typhus, but it is milder, complications are less frequent, and the overall fatality rate is less than 5 percent.

Scrub typhus (*q.v.*) is usually classed as a separate disease entity. Tick-borne typhus is also classed as a separate disease called spotted fever (*see* Rocky Mountain spotted fever).

typographic printing: *see* letterpress printing.

typography, the design and selection of letter forms used to make a page of printed text and thus a book or other publication.

A brief treatment of typography follows. For full treatment, *see* MACROPAEDIA: Printing, Typography, and Photoengraving.

The typographer's primary task is to make the letter forms easy to read and secondarily to make them aesthetically pleasing. Perhaps the most basic aspect of typography is, in the Western world, the highly standardized set of characters it inherited from handwriting. Western typefaces resolve into three main kinds—roman, italic, and black letter—all derived from kinds of script. A fourth style, sans serif, which came into vogue in the first half of the 20th century, can be considered a subtype.

The roman capital letters were established in form by the 1st century AD; lower-case forms developed later but still well before the standardized script known as Caroline was imposed by Charlemagne on his empire in the 8th century. A script similar to Caroline, prevalent in Spain and Italy, provided the model for roman typefaces, while a slanted, cursive version, used by chancery scribes for speed, was the source of italic type. In Germany and Britain, however, Caroline gave way to the angular, thick-stroked script known as Old English or Gothic, the model for black letter, which, since printing was invented in Germany, was the first kind of type used. Within 15 years after Johannes Gutenberg had published his Bible (1456), printing had spread through most of Europe. Between 1450 and 1500 most of the conventions of typography were established: the three major types of typefaces, page numbering, the title page, printers' marks, and the colophon (an inscription giving the place and date of publication, the printer-publisher's name, and other information).

In Renaissance Italy a typeface based on a script earlier than Gothic was preferred for classical texts, and a clearer, rounder face, called antiqua, the prototype of roman faces, quickly superseded black letter except in legal and ecclesiastical works. By the early 16th century antiqua was used everywhere in Europe except Germany, where black letter type remained standard until 1940. In the 1490s Aldus Manutius of Venice printed a series of Latin texts in a new cursive typeface, now known as italic and reserved for special functions (such as indicating foreign expressions).

The ascendancy of the roman and italic typefaces was greatly furthered by early 16th-century French typographers, in particular Claude Garamond, the first commercial typefounder, who made his well-designed versions available to all printers and, as a result, so dominated typography that subsequent 16th- and 17th-century developments may be seen as mere refinements to Garamond faces. Garamond's designs were superseded by those of Romain du Roi, which departed from previous practice by being designed not purely in imitation of script but according to mathematically determined proportions.

Among the greatest figures of 18th-century typography were William Caslon, whose typefaces are still in use, and John Baskerville and Giambattista Bodoni, both celebrated as much for their versions of italic and roman type as for their tasteful style of book design.

Printing was mechanized in the 19th century, but type was still cast and composed by hand until the invention in 1884 of punch-cutting machines made feasible the Linotype and Monotype mechanical composition systems. The range of typefaces first used in such systems was small and of poor quality until typography came under the influence of the Arts and Crafts movement and its leader, William Morris, whose private Kelmscott Press set a standard of craftsmanship and design that inspired a generation of printers and typographers.

Early in the 20th century, as more printers installed composing machines, better designed fonts (based on traditional faces like Caslon) began to appear. Perhaps the most influential figure in typography between the wars was the English typographer Stanley Morison, who organized the production of a range of fonts for the composing machine, taken from the best of traditional and contemporary typefaces (and including his own enormously successful Times New Roman). The most important typographic development of the second half of the 20th century has been that of phototypesetting, or filmsetting, in which type is composed optically on film before being transferred to either a lithographic plate or a letterpress block. Although traditional letterpress will probably be used by small businesses for some time, it has been rendered obsolete for most purposes by the combination of offset lithography, phototypesetting, and computerization.

typology, system of groupings (such as "landed gentry" or "rain forests"), usually called types, the members of which are identified by postulating specified attributes that are mutually exclusive and collectively exhaustive—groupings set up to aid demonstration or inquiry by establishing a limited relationship among phenomena. A type may represent one kind of attribute or several and need include only those features that are significant for the problem at hand.

Because a type need deal with only one kind of attribute, typologies can be used for the study of variables and of transitional situations. Classifications, on the other hand, deal with "natural classes"—*i.e.,* with groupings that differ from other groupings in as many particulars as one can discover. For this reason classifications can be only a preliminary step in the study of variables, for they cannot deal elegantly with transitional situations in which variables are to be expected. The more gradual the change, the fewer are the distinctive features upon which to define natural classes and the more difficult it becomes to draw a line between classes. In this situation typologies may be invoked.

When the problem is simply that of ordering unconditioned phenomena, it is difficult to distinguish typologies from classifications. The latter have been considered preliminary to the discovery of sequences or laws. Because typologies invariably use ordering for additional purposes, classifications can be regarded as typologies that are limited to the problem of order. Typologies, subsisting usually on the frontiers of research, are less durable than classifications in that their descriptions are accepted only to the degree that they continue to provide solutions to problems.

A typology elicits a particular order depending on the purposes of the investigator and on the phenomena so arranged, an order that limits the ways in which the data can be explained. There can be different interpretations of the relations of the phenomena. The Linnaean system for setting up divisions in biology is an ordering that was only later found to be in accord with biological evolution. In social and cultural studies, in which the significant distinctions are not of the genus and species kind, this kind of ordering has been less successful.

Typologies are characteristic of the social sciences and have had a great development in archaeology. Arne Furumark, a Swedish archaeologist, regards typologies as applicable to archaeology because of the inertia of the human mind, which usually views the undisturbed development of material culture as taking place gradually. This view has been contrasted with the "Swedish typology" of B.E. Hildebrand and Oscar Montelius, which sees cultural material as produced through a process analogous to that of organic evolution—a view that might be a step toward delineating processes of interaction and development per se, regardless of the sources of the material.

In anthropology and archaeology, typological systems may be based on variations of style or artifacts, paintings, buildings, burial customs, social systems, or ideologies. Christian Jürgensen Thomsen, a Danish antiquary, used a typology of materials to establish his celebrated Stone, Bronze, and Iron ages. Later the Stone Age was subdivided by L.L. Gabriel de Mortillet, a French anthropologist. Subsequently, typologies, combined with careful stratigraphic work, were used to conceptualize elements changing through time, to fill stratigraphic gaps, and to extrapolate strata. A seriation technique, called sequence dating,

based on shared typological features, enabled Sir Flinders Petrie to establish the temporal order of a large number of Egyptian graves.

Some typologies go beyond the problem of order and help to show the importance of particular factors. Comparisons among examples of a single type rely on the postulated constancy of the type in order to focus on variable factors and to suggest explanations of those variations. Two sequences of identical types may show differences in proportions or in rates of change, leading to additional inferences, such as the assumption of a causal relation.

Large-scale typologies may assume that certain factors are of overriding significance. Where ordering is chronological, there are the developmental stages of the social evolutionist Lewis Henry Morgan or the repetitive sequences of the philosophers of history Oswald Spengler and Arnold Toynbee. Where time is of less concern, there are such constructs as the leisure class of the American economist Thorstein Veblen; the inner- and other-directed personality types of David Riesman, a Harvard sociologist and publicist; and the polar cultural types of Sir Henry Maine, Ferdinand Julius Tönnies, and Robert Redfield.

Tyr, Old Norse TÝR, Old English TIW, or TIU, one of the oldest gods of the Germanic peoples and a somewhat enigmatic figure. He was apparently the god concerned with the formalities of war—especially treaties—and also, appropriately, of justice. It is in his character as guarantor of contracts, guardian of oaths, that the most famous myth about him may be understood: as a guarantee of good faith, he placed his hand between the jaws of the monstrous wolf Fenrir while the gods, pretending sport but intending a trap, bound the wolf; when Fenrir realized he had been tricked he bit off Tyr's hand (hence Tyr's identification as the one-handed god). Tyr came to be identified by the Romans with their own Mars, hence *dies Marti* (Mars' Day) came to be rendered Týsdagr (Tuesday).

Tyrannidae, family of flycatcher birds native to the New World. *See* tyrant flycatcher; tyrannulet.

tyrannosaur, any of a related group of carnivorous dinosaurs with a large head, long, serrated teeth, and tiny arms with two-fingered hands. They lived throughout the Cretaceous Period (144 million to 66.4 million years ago), and, although tyrannosaurs were clearly the most fearsome dinosaurs of the time, many aspects of their biology remain in question. *Tyrannosaurus rex* is the best known and largest member of the group; its fossils are found in eastern Asia and western North America, where it lived from 80 million to 66.4 million years ago.

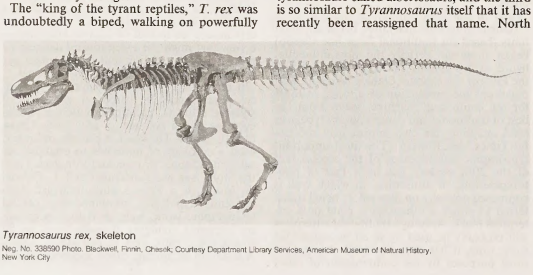
The "king of the tyrant reptiles," *T. rex* was undoubtedly a biped, walking on powerfully developed hind limbs. If the animal had stood upright, it would have been more than 6.5 m (21 feet) tall, but the usual posture was stooped, with the body carried forward and the tail held off the ground as a counterbalance. In this position, a large adult could measure 14 m (46 feet) long. It has been estimated that a living *T. rex* could have weighed eight tons. The huge mouth contained some 60 teeth, which could grow as long as 15 cm (6 inches). The front teeth were D-shaped in cross section, tapering toward the tip. The crowns of the teeth, like those of all animals except mammals, were shed and regrown frequently (every 250 days or so, on the basis of microscopic lines visible within the teeth).

T. rex was probably a rather rare animal, with perhaps only a single individual present for every 260 square km (100 square miles). Its remains are often found in the same deposits as the giant horned dinosaurs (ceratopsians) on which they likely preyed. *T. rex* probably fed opportunistically, scavenging when it could and hunting when it needed to. Arguments against predation point to the useless arms and large olfactory lobes of the brain, perhaps indicating an acute sense of smell used to locate corpses. Wounds in the bones of its prey indicate that *T. rex* ate by using a "puncture and tear" stroke, planting its feet and using the powerful muscles of the neck and legs to anchor itself and pull flesh off bones.

In contrast to the powerful jaws and legs, the forelimbs of tyrannosaurs were very small. Although the arms could have lifted about 180 kg (400 pounds), the hands would not have been able to reach the mouth or grasp prey. The hindlimb bones appear massive but are lightly constructed: the thickness of the bone wall is only about 20 percent of the bones' diameter—a figure approaching that of many birds.

The Latin name was given to the first specimen of *T. rex* by American paleontologist Henry Fairfield Osborn (*q.v.*) in 1905 and was based on partial specimens collected from Garfield county, Montana, by renowned fossil hunter Barnum Brown. Remains found by Brown are on display at the Carnegie Museum of Natural History in Pittsburgh, Pa., the American Museum of Natural History in New York City, and the Natural History Museum in London. Before 1980 only four specimens of *T. rex* were known, and although others have since been discovered, some very complete, there are still only about two dozen *T. rex* skeletons known. Two of the best specimens were both unearthed in 1990; these are on display at the Museum of the Rockies in Bozeman, Mont., and the Field Museum in Chicago, Ill., but replicas can be seen elsewhere.

Other tyrannosaurs include *Alectrosaurus, Daspletosaurus,* and *Tarbosaurus.* The first of these is unusual and different from other tyrannosaurs; the second is of the subgroup of tyrannosaurs called albertosaurs; and the third is so similar to *Tyrannosaurus* itself that it has recently been reassigned that name. North American albertosaurs are represented by *Albertosaurus,* and more derived tyrannosaurs are represented by *Tyrannosaurus* itself and the "dwarf" tyrannosaur, *Nanotyrannus,* estimated at 5 m (16.4 feet) long.



Tyrannosaurus rex, skeleton

Neg. No. 338590 Photo. Blackwell, Finnin, Chesok; Courtesy Department Library Services, American Museum of Natural History, New York City

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tyrant, Greek TYRANNOS, a cruel and oppressive ruler or, in ancient Greece, a ruler who seized power unconstitutionally or inherited such power. In the 10th and 9th centuries BC, monarchy had been the usual form of government in the Greek states; the aristocratic regimes that had replaced monarchy were by the 7th century BC themselves unpopular. Thus the opportunity arose for ambitious men to seize power in the name of the oppressed.

The best-known tyrannies were those founded by Cypselus at Corinth and Orthagoras at Sicyon about 650 BC. There were tyrants also in Asiatic Greece, the most famous of whom was Thrasybulus of Miletus (*c.* 600). The tyrants often sprang from the fringe of the aristocracy; for example, the mother of Cypselus belonged to the ruling clan of the Bacchiads, but his father did not. The nature of the public discontent that provided them with a following may have varied from place to place. At Sicyon, Cleisthenes, who ruled from about 600 to about 570 and was the most successful of the Orthagorids, expressed or exploited the resentment felt by the non-Dorian and underprivileged element in society toward those who claimed descent from the Dorian invaders. Some historians have supposed that the introduction of the hoplite phalanx early in the 7th century led to the development of a class of substantial farmers, who served in the phalanx and supported the tyrants as their champions against the aristocracies. But although the tyrants may have made use of hoplite tactics, substantial farmers were probably a conservative, not a revolutionary, force, and there is no reason to suppose that farmer-hoplites developed class consciousness.

Tyrants eventually came to be considered oppressive, especially by their rivals for political power. Cypselus' son Periander, whose powerful reign at Corinth lasted about 40 years, came to be regarded as a typically bad tyrant. The Corinthian tyranny fell in the late 580s soon after he died.

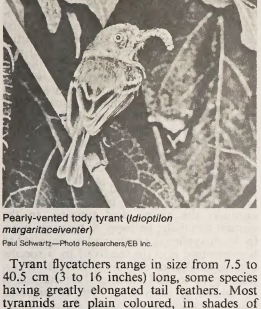
Sparta, which had developed a constitution under which all citizens were soldiers and theoretically equal, avoided tyranny. Peisistratus established a tyranny at Athens in the middle of the 6th century; his son Hippias was expelled by King Cleomenes I of Sparta in 510. This may be taken as the end of the "age of tyrants" but not the end of tyranny. The Persians preferred to keep tyrants in charge of the Greek cities of Anatolia, which they conquered about 540.

In the west, where military autocracy easily took root, the popularity of Gelon of Syracuse rested to a great extent on his defeat of the Carthaginians at Himera in 480; his brother and successor, Hieron, patron of Pindar and others, won a celebrated victory over the Etruscans at Cumae in 474. In 405 Dionysius I of Syracuse, the most powerful of all tyrants, first established his rule during the crisis of another Carthaginian invasion.

In the Hellenistic period some tyrants rested their power on class feeling; others were foreign nominees, like the tyrants supported by the Macedonian kings in the Peloponnese in the 3rd century. The phenomenon continued as long as Greece was free. The great tyrants were notable patrons of the arts and conspicuous builders. They often aided in the transition from narrow aristocracy to more

democratic constitutions, but the Greeks in principle chafed under their illegal autocracy; tyranny thus early acquired a bad name, and tyrannicides such as Harmodius and Aristogiton, who killed Hippias' brother Hipparchus at Athens, received the highest honours.

tyrant flycatcher, also called NEW WORLD FLYCATCHER, any of about 367 species of aggressive, insect-eating New World birds of the family Tyrannidae (order Passeriformes). About one-third of the species are not flycatcher-like in habit and bear names derived from their habitats (*e.g.*, bush tyrant, marsh tyrant) or from their similarity to the songbird groups (tit-tyrant, shrike-tyrant). A few are named for their bill shape (spade bill, flat bill, bent bill). Many have common names not suggestive of their appearance (*e.g.*, phoebe, pewee, kingbird).



Pearly-vented tody tyrant (*Idioptilon margaritaceiventer*)
Paul Schwartz—Photo Researchers/EB Inc.

Tyrant flycatchers range in size from 7.5 to 40.5 cm (3 to 16 inches) long, some species having greatly elongated tail feathers. Most tyrannids are plain coloured, in shades of gray, brown, or olive above and tan, white, or yellow below; a few are strikingly patterned in black and white. Many have a patch of red or yellow on the crown (often concealed, but erectile, nevertheless). In all but a few, the sexes are marked alike. A notable exception is species *Pyrocephalus rubinus*, found from the southwestern United States to Argentina, the male of which is fiery red with dark wings and back.

The more arboreal tyrant flycatchers have weak legs and feet and hold themselves upright when perched. Like the Old World flycatchers of the family Muscicapidae, the flycatching tyrannids dart from a perch to seize insects on the wing. The bills of such forms of flycatcher are broad, flattened, and slightly hooked, with bristles at the base that appear to serve as aids in insect capture. The shrike-tyrants (*Agriornis*) of southern South America take prey as large as mice and small frogs. A number of tyrannids, especially the elaenias, feed extensively on berries and other fruit.

Most tyrant flycatchers have rather simple songs that are often squeaking or grating sounds or monotonous whistles; a few, such as the pewees (*Contopus*), have melodious songs.

Nearly all tyrannids are territorial during the breeding season. Many, especially the kingbird, attack or harass any large bird, such as a crow or hawk, that enters its territory. Exposed nests include open cups, domed structures, and hanging bags; some species nest in holes. There are no brood parasites, but at least one species habitually usurps the nests of other birds, usually those of oropendolas, which build hanging nests.

The family Tyrannidae is best represented in Central and South America, but about 30 species breed in North America. The nearest relatives are the manakins (Pipridae) and cotingas (Cotingidae); the boundaries of the three families are so poorly defined that the family allocations of a number of genera are controversial.

Other members of the tyrant flycatcher group are known by the names attila, elaenia, flatbill, kingbird, kiskadee, pewee, phoebe, spadebill, and tyrannulet. *Compare* flycatcher.

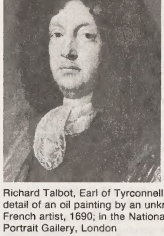
Tyrconnell, EARLS OF, titled Irish nobility of several creations, notably in the families O'Donnell and Talbot, grouped below chronologically and indicated by the symbol •.

• Tyrconnell, Rory O'Donnell, 1st Earl of, BARON OF DONEGALL, also called RODERICK O'DONNELL (b. 1575—d. July 28, 1608, Rome [Italy]), Irish chieftain who rebelled against the English and died in exile.

The second son of Hugh MacManus O'Donnell, he allied with his younger brother Hugh Roe, who transferred his authority as chief to Rory upon leaving for Spain. In 1602 Rory gave his allegiance to the English lord deputy and, in the following summer, went with Hugh O'Neill, 2nd Earl of Tyrone, to London, where he was received with favour by James I, who created him Earl of Tyrconnell. In 1605 he was invested with authority as lieutenant of the king in Donegal. But the arrangement between Rory and Niall Garve O'Donnell insisted upon by the government was displeasing to both O'Donnells, and Rory, like Hugh Roe before him, entered into negotiations with Spain. His country had been reduced to a desert by famine and war, and his own reckless extravagance had plunged him deeply in debt. These circumstances as much as the fear that his designs were known to the government may have persuaded him to leave Ireland. In September 1607 "the flight of the earls" took place; in April 1608 Tyrconnell and Tyrone reached Rome, where Tyrconnell died the following July.

Rory O'Donnell was attainted by the Irish parliament in 1614, but his son Hugh, who lived at the Spanish court, assumed the title of earl; and the last titular earl of Tyrconnell was this Hugh's son Hugh Albert, who died without heirs in 1642.

• Tyrconnell, Richard Talbot, Earl of, VISCOUNT BALTINGLASS, BARON OF TALBOTSTOWN (b. 1630—d. Aug. 14, 1691, County Limerick, Ire.), Irish Jacobite, a leader in the war (1689–91) waged by Irish Roman Catholics against the Protestant king William III of England.



Richard Talbot, Earl of Tyrconnell, detail of an oil painting by an unknown French artist, 1690; in the National Portrait Gallery, London
By courtesy of the National Portrait Gallery, London

The son of Sir William Talbot, a Roman Catholic lawyer and politician, Richard fought with the Royalist forces in Ireland during the English Civil Wars between the Royalists and Parliamentarians. In November 1655 he was arrested in London for plotting to overthrow Oliver Cromwell's Protectorate, but he soon escaped to Flanders. During the reign of Charles II (1660–85), Talbot became a close associate of the king's Catholic brother James, Duke of York, and, when York ascended the throne as James II in 1685, Talbot was created Earl of Tyrconnell and appointed to the Privy Council in England. In March 1686 James made him lieutenant general of the Irish army and in February 1687 lord deputy of Ireland, in which capacity he pursued a strongly pro-Catholic policy.

Although James II was deposed by William of Orange (later King William III) in 1688, Tyrconnell continued to rule Ireland in James's name. He commanded troops against William, but the Jacobite cause in Ireland was doomed by the time Tyrconnell died. James had made him Marquess and Duke of Tyrconnell in March 1689, but the title was recognized only by the Jacobites.

Tyrdt (Parthian rulers): *see under* Tiridates.

Tyre, modern ṢŪR, coastal town, southern Lebanon. It was a major Phoenician seaport from about 2000 BC onwards through the Roman period.

Tyre, built on an island and the neighbouring mainland, was probably originally founded as a colony of Sidon (modern Ṣaydā) to the north and was mentioned in Egyptian records of the 14th century BC as being subject to Egypt. It became independent when Egyptian influence in Phoenicia declined and soon surpassed Sidon as a trade centre, developing commercial relations with all parts of the Mediterranean world. In the 9th century BC colonists from Tyre founded in northern Africa the city of Carthage, which later became Rome's principal rival in the West. The town is frequently mentioned in the Bible as having had close ties with Israel. Hiram, king of Tyre, furnished building materials for Solomon's Temple in Jerusalem (10th century), and the notorious Jezebel, wife of King Ahab, was the daughter of Ethbaal "king of Tyre and Sidon." In the 10th and 9th centuries Tyre probably enjoyed some primacy over the other cities of Phoenicia and was ruled by kings whose power was limited by a merchant oligarchy.

For much of the 8th and 7th centuries the town was subject to Assyria, and in 585–573 it successfully withstood a prolonged siege by the Babylonian king Nebuchadrezzar II. Between 538 and 332 it was ruled by the Achaemenian kings of Persia. In this period it lost its hegemony in Phoenicia but continued to flourish. Probably the most famous episode in the history of Tyre was its resistance to the army of the Macedonian conqueror Alexander the Great, who took it after a seven-month siege in 332, using floating batteries and building a causeway to gain access to the island. After its capture, 10,000 of the inhabitants were put to death, and 30,000 were sold into slavery. Alexander's causeway, which was never removed, converted the island into a peninsula.

Tyre was subsequently under the influence of Ptolemaic Egypt and in 200 became part of the Hellenistic Seleucid kingdom; it finally came under Roman rule in 68 BC. It was often mentioned in the New Testament and was famous in Roman times for its silk products and for a purple dye extracted from snails of the genus *Murex*. By the 2nd century AD it had a sizable Christian community, and the Christian scholar Origen was buried there (*c.* 254). Under Muslim rule from 638 to 1124, Tyre grew prosperous as part of the kingdom of Jerusalem, a crusader state in the 12th and 13th centuries. The Holy Roman emperor Frederick I Barbarossa, who died on the Third Crusade, was buried in its cathedral (1190). Captured and destroyed by the Muslim Mam-

lūks in 1291, the town never recovered its former importance.

The silted up harbour on the south side of the peninsula has been excavated by the French Institute for Archaeology in the Near East, but most of the remains of the Phoenician period still lie beneath the present town. Pop. (1982 est.) 23,000.

tyre: *see* tire.

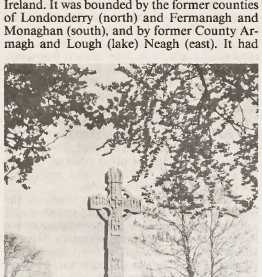
Tyri, Lake, lake, Buskerud *fylke* (county), southeastern Norway, in the Ringerike (*q.v.*) region. Irregular in shape, it ranges up to 20 miles (32 km) in length and 10 miles in width, attains a maximum depth of 922 feet (281 m), and has an area of 52 square miles (134 square km). The Begna (river) flows southward into the lake, which is then drained by the Dramselva (river), which empties into Drams Fjord, a branch of Oslo Fjord. Three large bays give the lake its distinctive shape, while several islands lie in the eastern part. The main town along the lake is Vikersund, but the most important town of the region is Hønefoss, situated just to the north of the lake on the Begna. The lake is completely bordered by highways, and a rail line parallels its western shore.

Tyrian purple, naturally occurring dye highly valued in antiquity. It is closely related to indigo (*q.v.*).

Tyrnau (Slovakia): *see* Trnava.

Tyrol (Austria): *see* Tirol.

Tyrone, former (until 1973) county, Northern Ireland. It was bounded by the former counties of Londonderry (north) and Fermanagh and Monaghan (south), and by former County Armagh and Lough (lake) Neagh (east). It had



Celtic highcross at Arboe, Cookstown district, Northern Ireland
Tiers—Monkmeyer

an area of 1,260 square miles (3,263 square km). In the north, the Sperrin Mountains rise to 2,224 feet (678 m), the highest peaks being Sawel and Mullaghcloga. To the southwest, Bessy Bell (1,387 feet) and Mary Gray (803 feet) straddle the River Mourne. Sandstones and limestones are most common in the south and west of former Tyrone County. The moorlands of the mountainous regions are unproductive, but the river valleys are extremely fertile. Lough Neagh, the largest lake in the British Isles, is on what was the eastern boundary. The climate is temperate, with an average annual rainfall of more than 55 inches (1,400 mm) in the mountainous north.

The former county derived its name from Tir Eoghain (land of Eoghan, son of Niall of the Nine Hostages). From the 5th to the 16th century AD, the O'Nialls (or O'Neills) were rulers of this territory, and successive chiefs were installed at Tullaghoge near Dungannon. After the flight (1607) of Hugh O'Neill, 2nd Earl of Tyrone, from the English, ownership of his vast estates lapsed and passed to the crown; the lands were subsequently divided and granted by the king under the scheme for the Plantation of Ulster. Royalist forces under Lord Mountjoy established fortifications at strategic points; and Tyrone became colonized. In 1688–89 troops of James II occupied part of Tyrone, and Omagh was severely damaged.

In the 1973 administrative reorganization of Northern Ireland, the county was divided into the districts of Strabane, Omagh, and Dungannon and a portion of Cookstown district.

Tyrone, Conn O'Neill, 1st Earl of, byname CONN THE LAME, Irish CONN BACACH, Conn also spelled CON (b. *c.* 1480—d. 1559), the first of the O'Neills to emerge as leaders of the native Irish as a result of England's attempts to subjugate the country in the 16th century.

Conn, who was related through his mother to the Earl of Kildare (Fitzgerald), became chief of the Tyrone branch of the O'Neills (Cinel Eoghain) about 1520. When Kildare became viceroy in 1524, O'Neill consented to act as his swordbearer in ceremonies of state; but his allegiance was not to be reckoned upon. However, the territory of Tyrone having been invaded in 1541 by Sir Anthony St. Leger, the English lord deputy, Conn delivered up his son as a hostage, attended a parliament held at Trim, and, crossing to England, made his submission at Greenwich to Henry VIII, who created him Earl of Tyrone for life. He was also made a privy councillor in Ireland and received a grant of lands. This event created a deep impression in Ireland, where O'Neill's submission to the English king and his acceptance of an English title were resented by his clansmen and dependents.

The resulting feud was aggravated by the nomination of Conn's illegitimate son Matthew as his heir, with the title of Baron of Dungannon. Matthew's parentage was actually in doubt, and in addition this nomination by the king was contrary to the Irish law or custom of tanistry. Matthew was murdered by followers of Conn's son Shane in 1558, and Conn died the following year. Elizabeth I settled the chieftainship on Shane but gave the earldom to Matthew's son Hugh.

Tyrone, Hugh O'Neill, 2nd Earl of, byname THE GREAT EARL (*c.* 1540—d. July 20, 1616, Rome, Papal States [Italy]), Irish rebel who, from 1595 to 1603, led an unsuccessful Roman Catholic uprising against English rule in Ireland. The defeat of O'Neill and the conquest of his province of Ulster was the final step in the subjugation of Ireland by the English.

Although born into the powerful O'Neill family of Ulster, Hugh grew up in London. In 1568 he returned to Ireland and assumed his grandfather's title of Earl of Tyrone. By cooperating with the government of Queen Elizabeth I, he established his base of power, and in 1593 he replaced Turlough Luineach O'Neill as chieftain of the O'Neills. Skirmishes between Tyrone's forces and the English in 1595 were followed by three years of fruitless negotiations between the two sides.

In 1598 Tyrone reopened hostilities. His victory (August 14) over the English in the Battle of the Yellow Ford on the Blackwater River, Ulster—the most serious defeat sustained by the English in the Irish wars—sparked a general revolt throughout the country. Pope Clement VIII lent moral support to Tyrone's cause, and, in September 1601, 4,000 Spanish troops arrived at Kinsale, Munster, to assist the insurrection. But these reinforcements were quickly surrounded at Kinsale, and Tyrone suffered a staggering defeat (December 1601) while attempting to break the siege. He continued to resist until forced to surrender on March 30, 1603, six days after the death of Queen Elizabeth.

Elizabeth's successor, King James I, allowed Tyrone to keep most of his lands, but the chieftain soon found that he could not bear the loss of his former independence and prestige. In September 1607 Tyrone, with Rory O'Donnell, Earl of Tyrconnell, and about 100 northern chieftains, secretly embarked on a ship bound for Spain. The vessel was blown off course and landed in the Netherlands. From there the refugees made their way to Rome, where they were acclaimed by Pope Paul V. This "flight of the earls" signaled the end of Gaelic Ulster; thereafter the province was rapidly Anglicized. Outlawed by the English, O'Neill lived in Rome the rest of his life.

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tyrosine, an amino acid comprising about 1 to 6 percent by weight of the mixture obtained by hydrolysis of most proteins. First isolated from casein (1849), tyrosine is particularly abundant in insulin (a hormone) and papain (an enzyme found in fruit of the papaya), which contain 13 percent by weight. Tyrosine is one of several so-called essential amino acids for certain animals; *i.e.,* they cannot synthesize it and require dietary sources. Other species can, however, convert phenylalanine, also an essential amino acid for fowl and mammals, to tyrosine whenever necessary for protein synthesis.

tyrosinemia, also called TYROSINOSIS, inherited inability of the body to metabolize normally the amino acid tyrosine. In the normal metabolic pathway of tyrosine, *para*-(*p*-)hydroxyphenylpyruvic acid is converted to homogentisic acid (in the liver) by a specific organic catalyst or enzyme, called *p*-hydroxyphenylpyruvic acid oxidase. This enzyme is not active in individuals with tyrosinemia. Clinical features of the disease include an increase in concentration of tyrosine in the blood and urine, defects in kidney function, and replacement of liver cells with fibrous tissue. There may also be fewer circulating platelets in the blood than normal and an increased pigmentation of the skin. Affected children may develop a form of rickets that does not improve with administration of vitamin D. A diet low in tyrosine and phenylalanine, an amino acid that the body converts to tyrosine, helps keep tyrosinemia under control. This disorder is extremely rare; it is transmitted through a recessive gene.

Tyrrell, George (b. Feb. 6, 1861, Dublin, Ire.—d. July 15, 1909, Storrington, Sussex, Eng.), Irish-born British Jesuit priest and philosopher, a prominent member of the Modernist movement, which sought to reinterpret traditional Roman Catholic teaching in the light of contemporary knowledge.

Tyrrell was raised in the Anglican church but converted to Roman Catholicism in 1879 and joined the Society of Jesus the following year. After his ordination in 1891, he was assigned to teach philosophy in a Jesuit college, Stonyhurst College, in Lancashire.

Considering himself within the liberal Catholic tradition exemplified by John Henry Cardinal Newman, Tyrrell argued that each age had the right to adjust the expression of Christianity to current knowledge. His own early liberal views were characterized by an optimism about the ability of Catholic theology to incorporate scientific findings. His commitment to the application of historical and critical methods to theological issues brought him into conflict with popes Leo XIII and Pius X, both of whom endorsed conservative interpretations of the Bible and of church dogma. By

1901 Tyrrell was in open conflict with his Jesuit superiors. His theology grew increasingly liberal, eventually leading him to repudiate Newman and associate himself with the Baron Friedrich von Hügel, an Italian-born philosopher and theologian who introduced Tyrrell to the works of the Continental Modernists.

Books such as *Religion as a Factor of Life* (1902) and *The Church and the Future* (1903)—in which Tyrrell, under various pseudonyms, attacked religious authoritarianism—accelerated his fall from favour. In 1906 he was expelled from the Jesuit order. The following year, Pius X issued his crucial encyclical *Pascendi Dominici Gregis* ("Feeding the Lord's Flock"), in which he condemned Modernism and declared its teachings to be the very essence of heresy. Rather than submit to papal authority, Tyrrell published a letter denouncing the encyclical and was subsequently excommunicated. He settled at Storrington, despondent but determined to remain a Catholic; he refused, however, to retract what he had written and, indeed, continued to write and publish on theological issues. H. Egerton's *Father Tyrrell's Modernism* appeared in 1908. In 1912 M.D. Petre published *Autobiography and Life of George Tyrrell* (2 vol.) and in 1920, *Letters.*

Tyrrell, Sir James (d. 1502, London), English soldier and royal official alleged by the 16th-century Humanist Sir Thomas More to have murdered the 12-year-old king Edward V and his younger brother Richard in the Tower of London in August 1483. Modern research has shown that there is little evidence for More's allegation.

Tyrrell fought on the Yorkist side in their victory over the Lancastrians at Tewkesbury in 1471, and he was knighted after the battle. Sometime during the next decade he became a servant of Richard of Gloucester. In 1482 he was made a knight banneret for his service in Richard's wars in Scotland, and after Richard became King Richard III, he was master of the royal henchmen. Thus More, in his *History of King Richard III*, was misinformed in claiming that Richard was not well acquainted with Tyrrell before supposedly commissioning him to perform the murders; it also seems incorrect to assert, as More does, that Tyrrell was knighted as his reward for committing the crimes.

Richard III's successor, King Henry VII, made Tyrrell governor of Guisnes Castle, which guarded the English-held port of Calais, Fr., but in 1502 the King had Tyrrell executed for harbouring a traitor. More claims that, shortly before his death, Tyrrell confessed to the murder of the princes, but this confession is mentioned in no other source. It has never been proved conclusively that Richard III ordered the princes killed, and Tyrrell's involvement in the crime is even more doubtful.

Tyrrell, Lake, shallow, salt-crusted depression of 70 sq mi (180 sq km), in the Mallee district, northwestern Victoria, Australia, 195 mi (314 km) northwest of Melbourne. Usually dry, it is occasionally fed by Tyrrell Creek. An extraction plant at Sea Lake, a town on the lake's south shore, harvests the salt deposits. The lake was visited (1838) by Edward Eyre, who was seeking new grazing lands, and was named after an early settler in the Port Phillip area of South Australia.

Tyrrhenian Sea, Latin MARE TYRRHENUM, Italian MARE TIRRENO, arm of the Mediterranean Sea, between the western coast of Italy and the islands of Corsica, Sardinia, and Sicily. It is connected with the Ligurian Sea (northwest) through the Tuscan Archipelago and with the Ionian Sea (southeast) through the Strait of Messina. Chief inlets of the sea include the Bay of Naples and the gulfs of Gaeta, Salerno, Policastro, and Sant'Eufemia. Islands within the sea are located in the north (Tuscan Archipelago, including Elba), east, and southeast (Eolie Islands). Ports include Civitavecchia, Pozzuoli, Naples, Salerno, and Palermo (in Sicily).

Tyrrhenian Stage, major division of Pleistocene deposits and time in Mediterranean Europe (the Pleistocene Epoch began about 2,500,000 years ago and ended about 10,000 years ago). The Tyrrhenian Stage precedes the Flandrian Stage, which is partly Pleistocene and partly Holocene (younger than 10,000 years old) in age. The Tyrrhenian is characterized by a faunal assemblage in which warm-water forms predominate.

Tyrtaeus (fl. *c.* 650 BC, Sparta), Greek elegiac poet, author of stirring poetry on military themes supposedly composed to help Sparta win the Second Messenian War.

Greek tradition after Tyrtaeus' time claimed that he was an Athenian or Milesian schoolmaster, sent to Sparta in reluctant compliance with an oracle, to strengthen Spartan morale. It is probable, however, that stories of his non-Laconian origin were invented after the 6th-century revolution at Sparta, when other Greeks could no longer imagine that Sparta had ever been able to produce its own poets.

Only fragments of Tyrtaeus' poems survive; these combine exhortations to courage and self-discipline with reminders of past victories and assurances of future successes.

Tyrwhitt, Thomas (b. March 27, 1730, London—d. Aug. 15, 1786, London), English scholar especially notable for his work on the medieval English poet Geoffrey Chaucer. In classical and English scholarship alike, Tyrwhitt showed the same qualities of balance,



Tyrwhitt, engraving
BBC Hulton Picture Library

wide knowledge, and critical acumen. (He was the one man able, on linguistic grounds alone, to denounce as a forgery the poems by Thomas Chatterton purporting to be by one "Thomas Rowley.")

After leaving Oxford University, he was called to the bar but never practiced. Deputy secretary of war (1756), then clerk of the House of Commons (1762), he retired in 1768. He edited Aristotle's *Poetics* (1794), but his fame rests chiefly upon an edition of Chaucer's *Canterbury Tales*, 5 vol. (1775–78). Chaucer's reputation had suffered because the principles on which his verse depends were no longer understood; it was Tyrwhitt who pointed out that final *e*'s (by his time mute) ought to be pronounced as separate syllables and that the accent of a word was often placed in the French manner (*e.g.*, virtúe, not vírtue). Tyrwhitt's scholarship is still held in great respect.

Tyson, Edward (b. 1650, Clevedon, Somerset, Eng.—d. Aug. 1, 1708), English physician and pioneer of comparative anatomy whose delineation of the similarities and differences between men and apes provided an empirical basis for the study of man and not only suggested a continuity of animality and humanity, but also indicated the existence of definite relationships between humans and other primates.

Tyson's comparisons, set forth in his landmark treatise (1699) of anthropology and comparative anatomy, remarkable for its empirical approach, proved so accurate that they served as an aid to naturalists 150 years later. He thought, however, that the chimpanzees from which he made his observations were pygmies and believed them to be the "missing link."

Tytler, James (b. *c.* 1747, Fearn, Ross and Cromarty, Scot.—d. Jan. 11, 1804, Salem, Mass., U.S.), Scottish editor of *Encyclopædia Britannica*'s second edition, who was sometimes called "Balloon Tytler" because of his experiments in aeronautics.

Known in Edinburgh as a debt-ridden eccentric, between 1776 and 1784 Tytler almost single-handedly revised the original edition of *Encyclopædia Britannica*, enlarging it from three to ten volumes, including historical and biographical material for the first time. He was one of the first men in Britain to attempt a balloon ascension (August 1784). A political radical, he was forced to emigrate in 1792 because a handbill he had printed was deemed seditious. Tytler ended his days as a newspaper publisher in the United States.

Tyumen, also spelled TIUMEN, or T'UMEN', *oblast* (province), central Russia, occupying an area of 554,100 square miles (1,435,200 square km) in the Ob-Irtysh Basin. In the extreme west the Ural Mountains attain 6,214 ft (1,894 m) in Mount Narodnaya, but the remainder of the *oblast*'s huge area is a low, exceptionally flat plain, with innumerable lakes and very extensive swamps. The *oblast* stretches from tundra in the north, with its scanty vegetation of mosses and lichens and poor soils, through dense swamp forests, or taiga, of spruce, fir, pine, larch, and birch, to forest-steppe with birch in the south. More than 80 percent of the area is occupied by the Khanty-Mansi and Yamalo-Nenets autonomous *okruga* (*qq.v.*). Tyumen city is the administrative centre of the *oblast*.

Until the 1960s economic activity was confined to timber working, fur trapping, and reindeer herding, and communications were extremely sparse; only in the forest-steppe south was agriculture important. Major oil deposits were opened in the 1960s along the Ob, with Surgut and Nadym as the main centres. Towns and communications have developed as a result of increasing production. Pop. (1991 est.) 3,155,700.

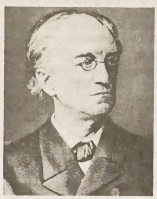
Tyumen, also spelled TIUMEN, or T'UMEN', city and administrative centre of Tyumen *oblast* (province), central Russia. The city lies in the southwestern part of the West Siberian Plain. It is situated on both banks of the Tura River at its crossing by the Trans-Siberian Railroad. Founded in 1586, it is the oldest Russian city in Siberia, located on the site of a Tatar town, Chingi-Tura, founded in the 14th century. A river port, it functions as a transshipment point. Its main industries are metalworking, engineering, shipbuilding, timber products, and chemicals. The city grew rapidly after the discovery of oil and gas farther to the north in Western Siberia. Pop. (1991 est.) 494,200.

Tyus, Wyomia (b. Aug. 29, 1945, Griffin, Ga., U.S.), U.S. sprinter who held the world record for the 100-metre race (1964–65, 1968–72) and was the first person to win the Olympic Games gold medal in the event twice.

Tyus began running in high school and continued at Tennessee State University (Nashville), from which she was graduated in 1967. In the 1964 Olympic Games at Tokyo,

she won the gold medal with a time of 11.4 seconds. In the same year, she won the 100-metre race in the Amateur Athletic Union (AAU) meet, and she won the 100-yard dash in the 1965 and 1966 AAU meets. In 1966 Tyus also won the 220-yard dash and was the AAU champion in the 60-yard dash (1965–67). In 1965 she tied the world record for the 100-yard dash, and then in 1968 she set a world record for the 100 metres in the Olympic Games at Mexico City with a time of 11.08 seconds. In those games she also placed sixth in the 200-metre race and was a member of the 4 × 100-metre relay team that won the gold medal. In 1973 Tyus entered professional track competitions, and later she frequently served as a television sports commentator.

Tyutchev, Fyodor Ivanovich, Tyutchev also spelled TIUTCHEV (b. Dec. 5 [Nov. 23, Old Style], 1803, Ovstug, Russia—d. July 27 [July 15], 1873, St. Petersburg), Russian writer who was remarkable both as a highly original philosophic poet and as a militant Slavophile,



Tyutchev
Novosti Press Agency

and whose whole literary output constitutes a struggle to fuse political passion with poetic imagination.

The son of a wealthy landowner, educated at home and at Moscow University, Tyutchev served his country as a diplomat in Munich and Turin. In Germany he developed a friendship with the poet Heinrich Heine and met frequently with the idealist philosopher Friedrich W.J. von Schelling. His protracted expatriate life, however, only made Tyutchev more Russian at heart. Though the bare and poverty-stricken Russian countryside depressed him, he voiced a proud, intimate, and tragic vision of the motherland in his poetry. He also wrote political articles and political verses, both of which reflect his reactionary nationalist and Pan-Slavist views, as well as his deep love of Russia. He once wrote, "I love poetry and my country above all else in the world."

Tyutchev's love poems, most of them inspired by his liaison with his daughter's governess, are among the most passionate and poignant in the Russian language. He is regarded as one of the three greatest Russian poets of the 19th century, making a trinity with Aleksandr Pushkin and Mikhail Lermontov.

tyuyamunite, radioactive, yellow, soft, and waxy uranium and vanadium oxide mineral, $Ca(UO_2)_4(VO_4)_2 \cdot nH_2O$. It is considered to be the calcium analogue of carnotite, from which it can be made artificially and reversibly by cation exchange (calcium exchanges places with potassium in carnotite's molecular structure). Tyuyamunite occurs widely with carnotite in the southwestern United States and in Central Asia. For detailed physical properties, *see* vanadate mineral (table).

Tyva (Russia): *see* Tuva.

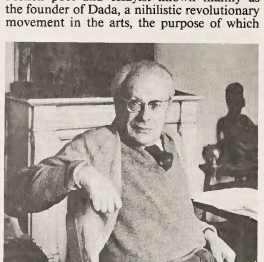
tzaddiq, also spelled TSADDIK, or ZADDIK (Hebrew: "righteous man"), plural TZADDIQIM, TSADDIKIM, or ZADDIKIM, one who embodies the religious ideals of Judaism. In the Bible, a *tzaddiq* is a just or righteous man (Genesis 6:9), who, if a ruler, rules justly or righteously (II Samuel 23:3) and who takes joy in justice (Proverbs 21:15). The Talmud (compendium of Jewish law, lore, and commentary) asserts that the continued existence of the world is due to the merits of 36 individuals, each of whom is *gamur tzaddiq* ("completely righteous"). While recognizing that *tzaddiqim* have special privileges, the Talmud also notes their special obligations. They are at least partially responsible for the sins of their generation.

In the 18th-century Pietistic movement known as Ḥasidism, the Jewish religious leader (*tzaddiq*) was viewed as a mediator between man and God. Because the *tzaddiq*'s life was expected to be a living expression of the Torah, his behaviour was even more important than his doctrine. Rabbi Leib, a disciple of Dov Baer of Mezhirich, thus was said to have visited his master not to hear explanations of the Torah but to see how Dov Baer laced and unlaced his shoes.

In early Ḥasidism, the *tzaddiq* traveled widely and often seemed to engage in such secular matters as idle talk and the consumption of wine. The Ḥasidic formula for such conduct was "descent on behalf of ascent" (*'aliyya tzrikha yerida*)—a calculated risk to strengthen the spiritual life of the Jewish community. Whereas some *tzaddiqim* lived simple and humble lives, others sought wealth and luxury. Toward the end of the 18th century the *tzaddiqim* ceased to travel. Thereafter, they were available at home for those who sought advice and instructions. This change gave rise to "practical tzaddiqism," a development that included, among other things, the writing of a *quittel* ("prayer note") to guarantee the success of petitions made by visitors who offered money for the service. Such developments contributed to the gradual deterioration of an institution that had earlier been a vital spiritual force within Jewish communities.

tzar, feminine TZARINA: *see* tsar.

Tzara, Tristan (b. 1896, Moineşti, Rom.—d. December 1963, Paris), Romanian-born French poet and essayist known mainly as the founder of Dada, a nihilistic revolutionary movement in the arts, the purpose of which



Tzara
Maywald

was the demolition of all the values of modern civilization.

The Dadaist movement originated in Zürich during World War I, with the participation of the artists Jean Arp, Francis Picabia, and Marcel Duchamp. Tzara wrote the first Dada texts—*La Première Aventure céleste de Monsieur Antipyrine* (1916; "The First Heavenly Adventure of Mr. Antipyrine") and *Vingtcinq poèmes* (1918; "Twenty-Five Poems")—and the movement's manifestos, *Sept Manifestes Dada* (1924; "Seven Dada Manifestos"). In Paris he engaged in tumultuous activities with André Breton, Philippe Soupault, and Louis Aragon to shock the public and to disintegrate the structures of language. In about 1930, weary of nihilism and destruction, he joined his friends in the more constructive activities of Surrealism. He devoted much time to the reconciliation of Surrealism and Marxism and joined the Communist Party in 1936 and the French Resistance movement during World War II. These political commitments brought him closer to his fellowmen, and he gradually matured into a lyrical poet. His poems revealed the anguish of his soul, caught between revolt and wonderment at the daily tragedy of the human condition. His mature works started with *L'Homme approximatif* (1931; "The Approximate Man") and continued with *Parler seul* (1950; "Speaking Alone") and *La Face intérieure* (1953; "The Inner Face"). In these, the anarchically scrambled words of Dada were replaced with a difficult but humanized language.

Tzedoq (sect): *see* Sadducee.

Tzeltal, Mayan Indians of central Chiapas in southeastern Mexico, most closely related culturally and linguistically to their neighbours to the west, the Tzotzil (*q.v.*). The habitat of the Tzeltal varies from plains and gentle hills to high peaks; climate and vegetation vary with



Tzeltal Indian woman
Donald Cordry

altitude. The Indians are agricultural, growing corn (maize), beans of several varieties, and chilies as staples. Squash, manioc, and peanuts (groundnuts) are also planted. Cultivation is with the digging stick and the hoe. Settlement is in villages and surrounding hamlets; in many communities, however, only non-Indians live in the villages proper. Houses are of logs or wattle and daub, with thatched roofs. Ceramics, spinning, weaving, mat making, and basketmaking are the major crafts. Each community has its own clothing styles, generally traditional. Basically, men's clothing consists of short pants and a knee-length shirt, hat, sandals, and a red sash; women's clothing is a long wraparound skirt of wool, a sash, a cotton blouse or tunic, and a rebozo, or shawl. Women always go barefoot.

The ritual kinship institution (*compadrazgo*) occurs but is strongest in communities with influential mixed (*ladino*) or non-Indian populations. In more traditional locales, godparents (*compadres*) are chosen only at baptism, and the ties invoked are often informal. Religion is Roman Catholic, with a degree of pagan syncretism. The laymen's religious society (*cofradía*) elects officers in charge of organizing and financing the fiesta of the local patron saint and caring for the saint's image. A number of non-Christian rituals are also common.

Tzetzes, John (fl. 12th century AD, Constantinople), Byzantine didactic poet and scholar

who preserved much valuable information from ancient Greek literature and scholarship, in which he was widely read.

Tzetzes was for a time secretary to a provincial governor, then earned a meagre living by teaching and writing. He has been described as the perfect specimen of the Byzantine pedant. His literary and scholarly output was enormous, although it contained many inaccuracies—mostly because he was quoting from memory, lacking books, which he said his poverty forced him to do without.

Of his numerous and varied works the most important is the *Chiliades* ("Thousands"). Also known as the *Book of Histories*, the work is a long poem (more than 12,000 lines of 15 syllables) containing literary, historical, antiquarian, and mythological miscellanies, intended to serve as a commentary on Tzetzes' own letters, which are addressed to friends and famous contemporaries as well as to fictitious persons. Though the whole work suffers from an unnecessary display of learning, the total number of authors quoted being more than 400, it contains much information unavailable elsewhere. Another work is *Allegoriai* on the *Iliad* and the *Odyssey,* two long didactic poems containing interpretations of Homeric theology.

Tzevi, Shabbetai (Jewish false messiah): *see* Shabbetai Tzevi.

Tziá (Greece): *see* Kéa.

Tzotzil, Mayan Indians of central Chiapas in southeastern Mexico. Linguistically and culturally the Tzotzil are most closely related to the neighbouring Tzeltal (*q.v.*). The habitat of the Tzotzil is highland, with mountains, volcanic outcroppings, and valley lowlands. The climate at high altitudes is cool to cold, and summers are very wet. The native Tzotzil live mainly in the higher reaches. They are agricultural, growing chiefly corn (maize), beans, and squash. Fields are burned to clear them and planted and cultivated with the hoe and digging stick. Vegetables and cash crops such as peaches are also raised. Sheep are kept, primarily for their wool, and there are occasional chickens, turkeys, and pigs. There is also some hunting and fishing. Pottery is made in some areas, and weaving is universal. Baskets, nets, hammocks, hats, and rope are made of fibre products as well. Carpentry, stonework, and leatherwork are skills of the Bohom (Chamula) region.

Houses are built of a variety of materials, including wattle and daub, poles, and lumber. Thatched roofs are usual. Households are generally congregated loosely around a central village. Clothing styles vary a good deal from community to community, but basically they consist of shirt, short pants, neckerchief, hat, and, for warmth, a wool poncho for men; women wear a blouse or *huipil* (long overblouse or tunic), long skirt, sash, and shawl. Colours, styles, materials and decorative elements of clothing vary considerably.



Tzotzil Indian musicians playing in Tuxtla Gutiérrez, Mex.
Donald Cordry

Ritual kinship (*compadrazgo*) is frequent, the extent of the institution depending on the extent of observance of Roman Catholic sacraments, because such sacraments are considered the proper occasion for establishment of ritual ties. In some communities organized Catholicism is weak, but Christian mythology is intertwined with native beliefs in all areas.

tz'u, in Chinese poetry, song form characterized by lines of unequal length, with prescribed rhyme schemes and tonal patterns, each bearing the name of a musical air. The varying line lengths are comparable to the natural rhythm of speech and therefore easily understood when sung. First sung by ordinary folk, they were popularized by professional women singers and poets during the T'ang dynasty (618–907). The *tz'u* served as a major vehicle for Sung dynasty (960–1279) verse.

Tzu-ang (painter): *see* Chao Meng-fu.

Tz'u-chou ware, Pinyin CIZHOU, stoneware produced in Chihli Province, northern China, during the Sung (960–1279), Yuan (1279–1368), and Ming (1368–1644) dynasties. Vases, bottles, and other vessels are decorated with simple but marvellously assured brushwork in brown, black, or gray on a white, cream, buff, or, occasionally, turquoise background; the pale background is achieved by applying a coating of slip (semi-liquid clay) to the body of the vessel before firing. Bold strokes, curves, seemingly haphazard splotches, freehand concentric bands around the vessel, and sketchy animals and birds are typical decorative motifs. Another type of ornamentation consists of incisions in the slip coating that reveal the contrasting colour of the body beneath.



Tz'u-chou stoneware jug, Sung dynasty (AD 960–1279); in the Museum of Fine Arts, Boston
By courtesy of the Museum of Fine Arts, Boston, Hoyt Collection

Tz'u-hsi, Pinyin CIXI, also called (Wade–Giles romanization) HSIAO-CH'IN, or HSIEN HUANG-HOU, byname EMPRESS DOWAGER (b. Nov. 29, 1835, Peking—d. Nov. 15, 1908, Peking), consort of the Hsien-feng emperor (reigned 1850–61), mother of the T'ung-chih emperor (reigned 1861–75), and adoptive mother of the Kuang-hsü emperor (reigned 1875–1908), who dominated the Chinese empire for almost half a century. Ruling through a clique of conservative, corrupt officials, she maintained an iron grip over the Manchu Imperial house (Ch'ing dynasty, 1644–1911/12), becoming one of the most powerful women in the history of China.

A low-ranking concubine to the Hsien-feng emperor, Tz'u-hsi bore his only son in 1856. On Hsien-feng's death, the six-year-old boy became the T'ung-chih emperor; state business was put in the hands of a regency council of eight elder officials. The regency was transferred to Tz'u-hsi and Hsien-feng's former senior consort, Tz'u-an, a few months later as a result of their clever plotting. The two empress dowagers were aided in their intriguing by Prince Kung, the former emperor's brother, who then became the prince counsellor.

Under this triumviral rule, the government entered a temporary period of revitalization; the great Taiping Rebellion (1850–64), which had devastated South China, was quelled, as was the Nien Rebellion (1853–68) in the northern provinces. Schools were created for the study of foreign languages, a modern customs service was instituted, Western-style arsenals were constructed, and the first Chinese foreign service office was installed. Internally, an effort was made to end governmental corruption and to recruit men of talent.

Although the regency was terminated in 1873 after the T'ung-chih emperor attained maturity, Tz'u-hsi's control over state affairs continued. It was even rumoured that she hastened the demise of the young emperor by leading him into excesses and disrupting his personal life. Following T'ung-chih's death, Tz'u-hsi, with the support of the army, flagrantly violated the succession laws and had her three-year-old nephew, whom she adopted, named as the new heir. The two empress dowagers thus continued to act as regents, but after Tz'u-an's sudden death in 1881, Tz'u-hsi became the sole holder of the office. Three years later, she displaced Prince Kung, having long since sabotaged most of his reform programs.

In 1889 Tz'u-hsi nominally relinquished control over the government to retire to the magnificent summer palace she had rebuilt northwest of Peking. But in 1898, a few years after the shocking defeat of the Chinese forces in the Sino-Japanese War (1894–95), the young Kuang-hsü emperor, under the influence of a group of reformers, put through a number of radical proposals designed to renovate and modernize the Chinese government and to eliminate corruption. But conservative officials collected around Tz'u-hsi, who again used the military to institute a coup. The new reforms were reversed, the Emperor was confined to his palace, and Tz'u-hsi resumed the regency. Most historians believe that China's last chance for peaceful change thus ended.

The following year Tz'u-hsi began to back



Tz'u-hsi, *c.* 1904
By courtesy of the Smithsonian Institution, Freer Gallery of Art, Washington, D.C.

those officials who were encouraging the anti-foreign Boxer rebels. In 1900 the Boxer Rebellion reached its peak; some 100 foreigners were killed, and the foreign legations in Peking were surrounded. But a coalition of foreign troops soon captured the capital, and Tz'u-hsi was forced to flee the city and accept the humiliating peace terms. Returning to Peking in 1902, she finally began to implement many of the innovations she had reversed in 1898, although the Kuang-hsü emperor was not allowed to participate in the government. The day before Tz'u-hsi died, Kuang-hsü's death was announced, presumably from poison, in accordance with her deathbed command.

tzu-jan (Chinese: "naturalness"), in Chinese Taoism, an ideal state of human existence that results from living in complete harmony with the forces of nature. Taoists, observing that everything in the world has its natural state, strive to attain a state of complete spontaneity in order to become what nature intended them to be. As a consequence, life becomes exceedingly simple; and such things as life and death, good health and illness are accepted as part of the irresistible cycle of nature, which ceaselessly makes and unmakes the world. Unlike the rest of the universe, however, man must resolve to bring his existence into conformity with the forces of nature. He can do this best by first observing the ever-changing world about him and then "fatalistically" abstaining from struggle against powers beyond his control.

Tzu-kung, Pinyin ZIGONG, city in central Szechwan Province (*sheng*), China. Tzu-kung is a prefecture-level municipality (*shih*), which was formed in 1939 by the merger of Kung-ching—a great salt-producing district with a history dating to the 7th century AD—and the rapidly developing town of Tzu-liu-ching. The city is situated on the Ching Ho (river), a tributary of the T'o Chiang (river), and the area is connected by rail to Nei-chiang and by highway to such surrounding cities as Le-shan and Lu-chou. Tzu-kung's prosperity was long dependent on its salt industry; deep drilling for brine has been an established practice in the area since the 9th century. In recent times important deposits of oil and natural gas have also been discovered and exploited. Natural gas had already been in use since early times as a fuel to evaporate the brine. On the basis of its salt production, Tzu-kung has built up a large and varied chemical industry, producing potassium chloride, bromine, iodine, barium salts, and other products. Fertilizers are another important by-product, and Tzu-kung salt is used extensively by the chemical works at nearby Le-shan. Tzu-kung also has engineering works, and there is a power generating plant using coal from Le-shan and from Huang-chin-k'ou further north. Pop. (1998 est.) 464,500.

Tzu-po, also called CHANG-TIEN, Pinyin ZIBO, or ZHANGDIAN, industrial city and municipality (*shih*), central Shantung Province (*sheng*), China. The core of the present 1,135-sq-mi (2,935-sq km) autonomous subprovincial-level municipality was formed under the People's Republic by amalgamating the two counties (*hsien*) of Tzu-ch'eng (Tzu-ch'uan) and Po-shan, which together form the richest coal field and mining area in the province. Tzu-ch'eng was an old-established city and administrative centre. Pan-yang County (*hsien*) was established there in the 2nd century BC; it subsequently fell into abeyance in the 3rd century AD but was revived in the 6th century under the name Pei-ch'iu County. In 596 it became the seat of a prefecture, Tzu-chou, and in 598 received the name Tzu-ch'uan, by which it was long known. It remained an important administrative centre and was also a focus of routes, being situated on the route skirting the northern edge of the T'ai Shan (mountains), at the mouth of the valley leading up to Po-shan and to a pass over the mountains. Po-shan itself was a later development, originally comprising two towns—Po-shan proper, which was first walled in 1558, and Yen-chen-chen. The centre of an important ceramic and glass industry, in the 16th century it was rich enough to warrant having its own tax bureau. In 1734 the city had developed enough to become an independent county.

Its 20th-century development into a major industrial complex began with the completion in 1904 of the railway linking Tsingtao to Chi-nan, passing to the north of Tzu-ch'eng town, through the important market towns of Chang-tien (now the seat of Tzu-po municipality) and Chou-ts'un. A branch line was built by the Germans from Chang-tien to Po-shan, however, after they acquired coal-mining rights in a zone along the railway and began mining in the area around Tzu-ch'eng. During World War I the Japanese controlled both the railway and the mines; in 1921 the mines came under the control of a Sino-Japanese company, the Lu-ta Colliery Company. The Po-shan mines, which were developed later, in 1924, also passed into the control of a Sino-Japanese firm, the Po-tung Company.

By the time of the Japanese invasion in 1937, Po-shan had outstripped Tzu-ch'eng in production, producing 1,000,000 tons annually to Tzu-ch'eng's 600,000 tons. The local iron industry was also established before World War II. In 1919 the Japanese had founded the Chin-ling-chen Ironworks on the main railway line a few miles east of Chang-tien, using supplies of local iron ore and coking coal from Tzu-ch'eng.

After 1949, when the whole area was merged into a single municipality, it was developed into a major industrial base. During the 1950s and 1960s, when Po-shan was the seat of the municipality, it took the administrative name of the municipality, Tzu-po; subsequently, when the seat was removed to Chang-tien, it took the name of Tzu-po, and Po-shan resumed its former name. By 1963 the city of Tzu-po (Po-shan) had outstripped Tsingtao as Shantung's greatest industrial city. Between 1953 and 1958 the municipality's population rose from 259,000 to 875,000. Within the enlarged municipality, growth was concentrated at Po-shan and Tzu-po (the former Chang-tien), each of which in the early 1970s was considerably bigger than Tzu-ch'eng; the municipality then had a total population of more than 1,200,000.

Mining and heavy industry, machine building, and the manufacture of electrical equipment and batteries were all major enterprises. In addition to the traditional ceramic and glass industries, firebrick, refractory materials, and industrial ceramics are also manufactured. There is also an important chemical industry. While heavy industry is concentrated in Tzu-ch'eng and Po-shan, Tzu-po (Chang-tien) and Chou-t'un—in addition to their growing roles as transportation centres—have developed as centres of textile manufacturing and food processing. Pop. (1998 est.) mun. 1,458,100.

Tzu Ssu, Pinyin ZI SI, also called (Wade–Giles romanization) K'UNG CHI (b. 483—d. 402 BC), Chinese philosopher, grandson of Confucius, native of the ancient state of Lu (present Shantung province), and according to tradition, the author of the *Doctrine of the Mean.* This classic, now part of the *Li Chi* ("Record of Rites") and classified as one of the Four Books, reaffirms Confucius' interpretation of the mean as the state of equilibrium (*chung yung*) of the exemplary man. The work also broadens the concept of mean through its discussion of the "timely mean" (*shih chung*) that is relative and varies according to situation.

Tzutujil, also spelled ZUTUHIL, or TZUTUHIL, Mayan Indians of the midwestern highlands of Guatemala. The Tzutujil language is closely related to those of the neighbouring Cakchiquel and Quiché (*qq.v.*). The Tzutujil, like the neighbouring Mayan peoples, are agricultural, growing the Indian staple crops—corn (maize), beans, and squash. They also keep a few domestic animals such as sheep, pigs, and chickens. The people live in *municipios,* districts or communities oriented around central villages; the villages themselves are not usually permanently inhabited in this region. The Indians consider themselves members of the *municipio* rather than Tzutujil or Guatemalan. The basic cultural pattern is very similar to that of the Quiché or the Cakchiquel; custom and dress vary to some extent from one *municipio* to the next. *See also* Maya.

U (Burmese title): *see under* proper name (*e.g.*, Nu, U).

U-2, single-seat, U.S. high-altitude jet reconnaissance and research aircraft. A prototype flew in 1955. On May 1, 1960, a U-2 was shot down over the Soviet Union (*see* U-2 Affair), and in 1962 a U-2 took photographs that confirmed the presence of Soviet missiles in Cuba. The U-2 had a top speed of 494 miles (795 km) per hour and a service ceiling of approximately 70,000 feet (21,000 m).

The U-2 was replaced in U.S. service in the mid-1960s by the SR-71 Blackbird, a two-jet aircraft constructed mainly of titanium, capable of flying at even higher altitudes than the U-2 and at speeds exceeding 2,000 miles per hour (3,200 kilometres per hour). It could survey 100,000 square miles (260,000 square km) of the Earth's surface in one hour. Artificial satellites now accomplish most observations formerly undertaken by the U-2 and SR-71.

U-2 Affair (1960), confrontation between the United States and the Soviet Union that began with the shooting down of a U.S. U-2 reconnaissance plane over the Soviet Union and that caused the collapse of a summit conference in Paris between the United States, the Soviet Union, Great Britain, and France.

On May 5 the Soviet premier Nikita S. Khrushchev told the Supreme Soviet of the U.S.S.R. that an American spy plane had been shot down on May 1 over Sverdlovsk, referring to the flight as an "aggressive act" by the United States.

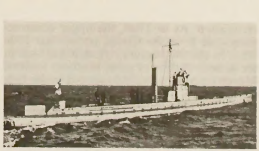
On May 7 he revealed that the pilot of the plane, Francis Gary Powers, had parachuted to safety, was alive and well in Moscow, and had testified that he had taken off from Peshāwar, in Pakistan, with the mission of flying across the Soviet Union over the Aral Sea and via Sverdlovsk, Kirov, Arkhangelsk, and Murmansk to Bodō military airfield in Norway, collecting intelligence information en route. Powers admitted working for the U.S. Central Intelligence Agency.

On May 7 the United States stated that there had been no authorization for any such flight as Khrushchev had described, although a U-2 probably had flown over Soviet territory. The Soviet Union refused to accept that the U.S. government had had no knowledge of the flights and on May 13 sent protest notes to Turkey, Pakistan, and Norway, which in turn protested to the United States, seeking assurances that no U.S. aircraft would be allowed to use their territories for unauthorized purposes. On May 16 in Paris Khrushchev declared that the Soviet Union could not take part in the summit talks unless the U.S. government immediately stopped flights over Soviet territory, apologized for those already made, and punished the persons responsible. The response of President Dwight D. Eisenhower, promising to suspend all such flights during the remainder of his presidency, did not satisfy the Soviet Union, and the conference was adjourned on May 17.

Francis Gary Powers was tried (August 17–19) and sentenced to 10 years' confinement, but he was exchanged for the Soviet spy Rudolf Abel on Feb. 10, 1962.

U-boat, German U-BOOT, abbreviation of UNTERSEEBOOT ("undersea boat"), a German submarine. The destruction of enemy shipping by German U-boats was a spectacular feature of both World Wars I and II.

World War I. Germany was the first country to employ submarines in war as substitutes for surface commerce raiders. At the outset of World War I, German U-boats, though numbering only 38, achieved notable successes against British warships; but because of the reactions of neutral powers (especially the United States) Germany hesitated before adopting unrestricted U-boat warfare against merchant ships. The decision to do so in



U-boat of World War II

By courtesy of the Bundesarchiv, Freiburg im Breisgau

February 1917 was largely responsible for the entry of the United States into the war. The U-boat campaign then became a race between German sinkings of merchant ships and the building of ships, mainly in the United States, to replace them. In April 1917, 430 Allied and neutral ships totaling 852,000 tons were sunk, and it seemed likely that the German gamble would succeed. However, the introduction of convoys, the arrival of numerous U.S. destroyers, and the vast output of American shipyards turned the tables. By the end of the war Germany had built 334 U-boats and had 226 under construction. The peak U-boat strength of 140 was reached in October 1917, but there were never more than about 60 at sea at one time. In 1914–18 the destruction—more than 10,000,000 tons—caused by the U-boats was especially remarkable in view of the small size (less than 1,000 tons), frailty, and vulnerability of the craft.

World War II. The Armistice terms of 1918 required Germany to surrender all its U-boats, and the Treaty of Versailles forbade it to possess them in the future. In 1935, however, Adolf Hitler's Germany repudiated the treaty and forcefully negotiated the right to build U-boats. Britain was ill-prepared in 1939 for a resumption of unrestricted submarine warfare, and during the early months of World War II the U-boats, which at that time numbered only 57, again achieved great successes. The first phase, during which the U-boats generally operated singly, ended in March 1941, by which time many merchant ships were sailing in convoy, trained escort groups were becoming available, and aircraft were proving their effectiveness as anti-U-boat weapons. In the next phase the Germans, having acquired air and U-boat bases in Norway and western France, were able to reach much farther out into the Atlantic, and their U-boats began to operate in groups (called wolf packs by the British). One U-boat would shadow a convoy and summon others by radio, and then the group would attack, generally on the surface at night. These tactics succeeded until radar came to the aid of the escorts and until convoys could be given continuous sea and air escort all the way across the Atlantic in both directions. In March 1943, as in April 1917, the Germans nearly succeeded in cutting Britain's Atlantic lifeline, but by May escort carriers and very-long-range reconnaissance bombers became available. After the U-boats lost 41 of their number during that month, they withdrew temporarily from the Atlantic.

In the next phase, U-boats were sent to remote waters where unescorted targets could still be found. Although at first they achieved considerable successes, especially in the Indian Ocean, the Allied strategy of striking at the U-boats' supply vessels and putting all possible shipping into convoys again proved successful. In the final phase the U-boats—then fitted with the snorkel (*schnorkel*) ventilating tube, which permitted extended underwater travel and greatly reduced the effectiveness of radar—returned to the coastal waters around the British Isles, but they sank few ships and themselves suffered heavy losses.

In World War II Germany built 1,162 U-boats, of which 785 were destroyed and the remainder surrendered (or were scuttled to avoid surrender) at the capitulation. Of the 632 U-boats sunk at sea, Allied surface ships and shore-based aircraft accounted for the great majority (246 and 245 respectively).

U Geminorum star, any of a class of irregular variable stars that display sudden increases in brightness so great that they are sometimes called dwarf novae. Some have been observed to brighten by as much as 5 magnitudes (100 times) in a period of hours. The prototype star, U Geminorum, brightens by as much as 4 magnitudes (about 40 times) in a few days, declining again to normal brightness in two or three weeks. U Geminorum was the first of the class to be discovered, in 1855, by the English astronomer John Russell Hind. Fewer than 200 U Geminorum stars are known; sometimes they are called SS Cygni stars, after the brightest known member of the class.

U Thong style, one of the canonical styles for Buddha icons developed in Thailand (Siam) in the southern capital of Ayutthaya, beginning in the 14th century. To retain the greatest spiritual potency, Buddha icons in Thai temples had to resemble as closely as possible an original prototype that tradition erroneously believed had been made during the lifetime



Buddha, bronze, U Thong style, 13th–14th century; in the Musée Guimet, Paris

Cliché Musees Nationaux, Paris

of the Buddha. Of the three major efforts by Thai kings to establish an "authentic" canon for the icons, the Sukhothai style (*q.v.*) was the first, followed by the U Thong and the lion types.

The populace of southern Thailand, which captured Sukhothai in approximately 1350, was in the 14th century still largely Mon, and the fusion of styles resulted in the more solid, corporeal, and squared-off U Thong image. Although the resulting changes may be seen most readily in the shape of the head, now more square than oval, and the broader, more sober features, there is also an increased heaviness of the body, no longer weightless but firmly seated on the ground. While the Sukhothai style is characterized by linear emphasis, the U Thong style again shows concern for solidity and modeling. At the same time, the U Thong images are rather stolid and lack the linear excitement and uniquely Thai character of Sukhothai art. U Thong style, like Sukhothai style, is still copied in Thailand.

Uaimh, An (Ireland): *see* Navan.

uakari (*Cacajao*), any of several diurnal monkeys, belonging to the Cebidae, the only fam-

ily of short-tailed American monkeys. Uakaris are about 35–50 cm (14–20 inches) long, excluding their 15–20-centimetre (6–8-inch) tails. They have bare faces, which become



Red uakari (*Cacajao rubicundus*)
Tierbilder Okapia, Frankfurt am Main

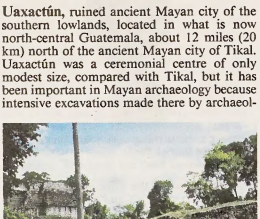
flushed in excitement, and long, shaggy fur. Colour in the three species is grayish with a pink face, reddish with a bright scarlet face, and brownish with a black face.

Uakaris are rare and are confined to certain forest ranges along the Amazon River. They are said to live in small groups and are found among the higher branches. They are quadrupedal and feed on nuts, fruit, and vegetation. Uakaris are captured by the Amazonian Indians; the young are kept as pets, the adults eaten. In general, uakaris do not do well in captivity. All species are listed as vulnerable or endangered in the *Red Data Book*.

U.A.R.: *see* United Arab Republic.

UAW: *see* United Automobile, Aerospace and Agricultural Implement Workers of America: International Union.

Uaxactún, ruined ancient Mayan city of the southern lowlands, located in what is now north-central Guatemala, about 12 miles (20 km) north of the ancient Mayan city of Tikal. Uaxactún was a ceremonial centre of only modest size, compared with Tikal, but it has been important in Mayan archaeology because intensive excavations made there by archaeol-



North Court of Group E, Classic period, Uaxactún, Guatemala
James D. Nations—D. Donne Bryant Stock

ogists of the Carnegie Institution of Washington established the first long, Formative-to-Classic ceramic sequences for the Mayan area.

Occupation of the Uaxactún site began in the Middle Formative period of Mayan culture (900–300 BC), and before the close of the Late Formative period (300 BC–AD 100) a number of ceremonial buildings had been erected, including a temple with giant stucco masks reminiscent of the more ancient Olmec civilization. As in Tikal, the major constructions date from the Classic period (AD 100–900). In the 9th century, Uaxactún shared in the general decline of other southern lowland Mayan centres and was abandoned in the 10th century.

Ubaid, Tell el-: *see* 'Ubayd, Tall al-.

Ubangi River, also spelled OUBANGUI, largest right-bank tributary of the Congo River, marking the border between Zaire and the People's Republic of the Congo. The Ubangi is formed by the union (near Yakoma on the border between the Central African Republic and Zaire) of the Bomu and Uele (Welle) rivers, and it then flows west for about 350 miles (560 km). It bends northeast of Bangui and flows a somewhat longer distance southwest. The total length of the Ubangi, with the Uele, is approximately 1,400 miles (2,250 km). Its mean discharge at Bangui is estimated at 151,147 cubic feet (4,280 cubic m) per second; from May to December, when in flood, the discharge may exceed 494,000 cubic feet (14,000 cubic m), while during low water (February–April) it drops to 35,300 cubic feet (1,000 cubic m).

In its upper reaches the Ubangi divides into arms separated by elongated islands, while elsewhere confining rocks cause rapids, such as those of Bangui. The Ubangi changes on entering the Congo Basin, its wide course being split by sandy shoals. Some of its tributaries are still impeded by rapids. The area between longitude 16° E and the Ubangi consists of flat, swampy valleys and low divides descending east and southeast from the western hills to the Congo River. Much of the region is covered with dense equatorial rain forest, and large portions of the region that lie northeast and southwest of the Sangha River are permanently inundated. The Ubangi River joins the Congo at the village of Irebu, at the mouth of the Irebu Channel. Low-lying, swampy Lake Tumba drains through this channel into the Congo River. The Congo waters during late April to late June push back those of the Ubangi. Some clearance for navigation has taken place, and barges of 600 tons can reach Bangui.

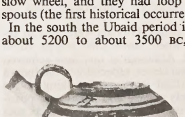
The Uele was visited from the north in 1870 by Georg Schweinfurth, and Wilhelm Junker in 1882–83 established it as part of the Congo River system.

Ubani (Nigeria): *see* Bonny.

Ubasti (Egyptian goddess): *see* Bast.

'Ubayd, Tall al-, also spelled TELL EL-UBAID, ancient site that gave its name to a prehistoric cultural period, the Ubaid, in Mesopotamia; it is located near the ruins of ancient Ur in present-day southeastern Iraq. Excavations have uncovered Ubaidian remains throughout southern Mesopotamia. The hallmark of the period was a painted pottery decorated with geometric and sometimes floral and animal designs in dark paint on a buff or drab clay. Many vessels seem to have been made on a slow wheel, and they had loop handles and spouts (the first historical occurrence of these).

In the south the Ubaid period is dated from about 5200 to about 3500 BC, but in the north Ubaidian characteristics do not seem to appear until about 4300. Some scholars believe the characteristics of the northern Ubaid period may have been outgrowths of the preceding Halaf period rather than the result of cultural influences received directly from the south, but the overall picture is one of great homogeneity throughout the entire area from the Persian Gulf to the Mediterranean Sea.



Painted Ubaid ware from Ur, first half of the 4th millennium BC; in the British Museum
By courtesy of the trustees of the British Museum

Ubayyiḍ, al-, also spelled EL-OBEID, town, central Sudan. It lies on a sandy, scrub-covered plateau at an elevation of 1,869 feet (570 m). Founded by the Egyptians in 1821, the town was captured and largely destroyed by the Mahdist forces in 1882, but it was rebuilt after Kurdufān was federated with the Anglo-Egyptian Sudan in 1899. Al-Ubayyiḍ is encircled by a forest reserve that tends to alleviate dust storms. Located on a spur of the Khartoum–Nyala railroad, the town is a commercial and communications centre, trading in gum arabic (the area's main product), millet, oilseeds, and livestock. It also has an airport. Pop. (1983) 140,000.

Ube, city, Yamaguchi *ken* (prefecture), Honshu, Japan, on the Inland Sea. Coal was mined in the area in the late 17th century, but Ube remained a small village until undersea mining operations began in the Meiji period (1868–1912). It then developed into a large mining and industrial city, manufacturing chemicals from coal. Because of the gradual decline of coal mining in Japan after World War II, many of the mines were closed. The city's products now include ammonium sulfate, cement, and soda. Ube also has a well-equipped harbour. Pop. (1987 est.) 175,404.

Úbeda, city, Jaén province, in the *comunidad autónoma* ("autonomous community") of Andalusia, southern Spain. Úbeda lies northeast of the city of Jaén, on the Úbeda Hills in the Guadalimar Valley. Originally an Iberian settlement, the city was occupied by the Arabs in 711 and was reconquered by Ferdinand III of Castile in 1234. It is renowned for its architecture, particularly of the Renaissance period, which is reflected by the Sacra Capilla del Salvador (completed 1556 with a Classic facade), the Hospital de Santiago (begun in 1567 by Andrés de Vandelvira), and the Palacio del Condestable Dávalos (now a government hotel). Most of the city has been declared a national monument.

Situated in a well-watered olive-growing region, Úbeda produces olive oil and olive-pressing equipment. Manufactures include plastics, pottery, esparto-grass mats, and forged metal products. St. John of the Cross died in the city. Pop. (1981) 28,717.

Uber Cup, trophy representing the women's world championship in the sport of badminton. The cup was contributed by Mrs. H.S. Uber, former English champion, in 1956 for a series of women's international team competitions to be held every three years. For winning teams, *see* Sporting Record: *Badminton.*

Uberaba, city, western Minas Gerais *estado* ("state"), Brazil, in the highlands at 2,575 feet (785 m) above sea level, on the Uberaba River. It was given city status in 1856. Uberaba is the trade centre of an important agricultural area, yielding cattle (the largest source of income), rice, oranges, corn (maize), beans, coffee, sugarcane, and bananas. A well-known cattle and agricultural exhibition is held there each May. The city's well-developed industry includes cement and lime plants, shoe factories, and sugar mills. Freight is transported by rail and road to Belo Horizonte, the state capital (262 miles [422 km] east), and to neighbouring communities in Minas Gerais and São Paulo states. Uberaba is an archdiocese, the seat of the stock-raising district, called the Triangulo Mineiro (Minas Triangle), and also the seat of the Regional Centre for Economic



Rui Barbosa Square and the cathedral at Uberaba, Braz.
Piessner International

and Social Research on Latin America. Pop. (2000) 243,406.

Uberlândia, city, western Minas Gerais *estado* ("state"), Brazil. It lies along the Bom Jardim River, which is a tributary of the Araguari River (also known as the Velhas River), at 2,802 feet (854 m) above sea level. It was given city status in 1892. Uberlândia is a trade centre for a primarily agricultural and pastoral hinterland whose chief crops include cotton, corn (maize), rice, and *feijão* (beans). The city processes cattle and hog products (including *xarque* [jerked beef] and dairy foods) and manufactures plastics and chemicals. The Federal University of Uberlândia (1969) is located there. Uberlândia is on the main highway and railroad between São Paulo and Brasília (220 miles [350 km] north). Pop. (2000) 487,887.

Uberti, Farinata degli (d. Nov. 11, 1264), Florentine nobleman who became the leader of the Florentine Ghibellines, the proimperial party. According to Dante (*Inferno,* canto X), Uberti alone dissuaded the members of the Ghibelline coalition from razing the city of Florence, which they had just captured.

Uberti became chief of the Ghibellines in 1239, but he was exiled from Florence along with his party after the death of the Holy Roman emperor Frederick II in 1250. He allied himself with Frederick's natural son, Manfred, the Ghibelline claimant to the throne of Sicily (1258). In September 1260, despite lack of support from his allies in Naples and Siena and thanks to his own superior tactical skill, Uberti led the Ghibelline forces to victory over the rival propapalist Guelf party at Montaperti. He followed up this victory by capturing Florence. Uberti was condemned posthumously as a heretic by the Inquisition (1283).

Consult the INDEX *first*

Ubico (Castañeda), Jorge, byname TATA (Spanish: "Daddy") (b. Nov. 10, 1878, Guatemala City, Guat.—d. June 14, 1946, New Orleans, La., U.S.), soldier and dictator who ruled Guatemala for 13 years (1931–44).

Ubico received a commission in the Guatemalan army in 1897, distinguished himself in several campaigns, and rose to the rank of colonel. In 1907 he was appointed governor of Alta Verapaz and in 1911 governor of Retalhuleu, where he served with efficiency and honesty. In the following years he was made a brigadier general, a member of the National Assembly, and minister of war (1922–26) under President José María Orellana. In 1931, backed by the Liberals and the Progressives, he was elected president of Guatemala, an office he held until 1944.

Ubico restored Guatemala's international credit, built roads and public works, improved public health, ended the peonage of Indians, and eliminated wholesale corruption. He cultivated the friendship of the United States and was rewarded with tariff reductions and armaments. At the same time, he also eliminated all political opposition and democratic activity in Guatemala. Unrest developed, and when Ubico suspended freedom of speech and the press on June 22, 1944, the response was a general strike the next day. Forced to resign on July 1, he fled the country and made his home in New Orleans.

ubiquinone, also called COENZYME Q, any of several members of a series of organic compounds belonging to a class called quinones. Widely distributed in plants, animals, and microorganisms, ubiquinones function in conjunction with enzymes in cellular respiration (*i.e.*, oxidation-reduction processes). The naturally occurring ubiquinones differ from each other only slightly in chemical structure, depending on the source, the structures resembling those of the fat-soluble vitamin K and certain derivatives of vitamin E.

Ubon Ratchathani, town, eastern Thailand, on the Khorat Plateau. Ubon Ratchathani



Wat ("temple") Supat Wanaram, Ubon Ratchathani, Thailand
Jules Bucher—Photo Researchers/EB Inc.

lies near the confluence of the Mun and Chi Rivers. It is a major trading centre for rice, cattle, and tobacco. A road leads east to Pakxe (Laos) on the Mekong River.

The area in which Ubon Ratchathani is situated produces rice, freshwater fish, cattle, pigs, sugarcane, timber, and cotton. There are large numbers of Lao (Laotian) and Khmer (Cambodian) peoples in the area. Apart from Ubon Ratchathani, the main towns in the region include Warin Chamrap (which is the eastern terminus of the railway from Bangkok) and Phibun Mangsahan. Pop. (2000 est.) town, 116,300.

UBV system, system of classifying stars by spectral type, based on photometric measurements of the ultraviolet (U), blue (B), and visual (V [yellow]) magnitudes. It was introduced in the early 1950s by the American astronomers Harold Lester Johnson and William Wilson Morgan and has largely superseded the less accurate system using the north polar sequence.

Ucayali, *departamento* of eastern Peru (until 1980 part of Loreto department) spanning the upper and middle sections of the meandering Ucayali River, a principal tributary of the Amazon. Formerly a very isolated area of Peru, Ucayali department experienced rapid population growth (particularly at Pucallpa [*q.v.*], the departmental capital) after 1945 with the completion of a road system from Lima. With an area of 38,931 square miles (100,831 square km), most of Ucayali is a humid, lowlying region with tropical rain forest, although in the far south it is more savanna-like as a result of a more distinct dry season. Frontier communities and villages, including Pucallpa, are located mostly along the sandy and eroded banks of the Ucayali River. Agricultural cooperatives adjacent to these settlements are tilled by mestizo colonists who raise bananas, cassava, corn (maize), and rice, as well as pigs and cattle; rosewood felled in the rain forest is trucked to Callao (the port of Lima) for export. The often-proselytized Shipibo Indians live in remote areas. Transportation in Ucayali is almost entirely riverine except for the road to Lima, the airport at Pucallpa, and occasional trails and landing strips. Minor ports along the Ucayali River are Puerto Oriente in the north and Atalaya, the terminus for navigation in the uppermost section of the river, in the south. Pop. (2000 est.) 424,410.

Ucayali River, Spanish RÍO UCAYALI, headwater of the Amazon, formed by the junction of the Apurímac and Urubamba rivers in east-central Peru. The Ucayali meanders northward from this junction for about 910 miles (1,465 km) through a densely forested floodplain east of the Andes to its junction with the Marañón River, 55 miles (90 km) south-southwest of Iquitos. This confluence is considered to mark the head of the Amazon. The total length of the Ucayali and its longest tributary, the Apurímac, is 1,701 miles (2,738 km).



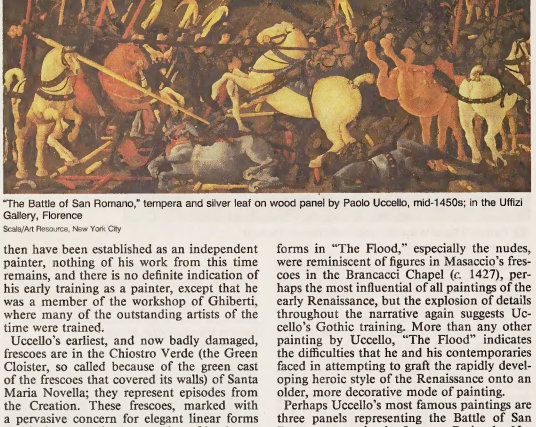
Pucallpa, on the Ucayali River in Peru
Redapo—EB Inc.

Shallow-draft vessels ply the river as far south as its junction with the Pachitea River, 675 miles (1,085 km) upstream from Iquitos. Along the Ucayali are small river ports, notably Pucallpa, Contamana, and Requena.

Uccello, Paolo, original name PAOLO DI DONO (b. 1397, Pratovecchio, near Florence—d. Dec. 10, 1475, Florence), Florentine painter whose work attempted uniquely to reconcile two distinct artistic styles—the essentially decorative late Gothic and the new heroic style of the early Renaissance. Probably his most

famous paintings are three panels representing "The Battle of San Romano" (*c.* 1456). His careful and sophisticated perspective studies are clearly evident in "The Flood" (1447–48).

Apprenticeship and early work. By the time Paolo was 10 years old he was already an apprentice in the workshop of the sculptor Lorenzo Ghiberti, who was then at work on what became one of the masterpieces of Renaissance art—the bronze doors for the Baptistery of the Florence cathedral, which consist of 28 panels illustrating New Testament scenes of the life of Christ. In 1414 Uccello joined the confraternity of painters (Compagnia di San Luca), and in the following year he became a member of the Arte dei Medici e degli Speziali, the official guild in Florence to which painters belonged. Though Uccello must by



"The Battle of San Romano," tempera and silver leaf on wood panel by Paolo Uccello, mid-1450s; in the Uffizi Gallery, Florence

Scala/Art Resource, New York City

then have been established as an independent painter, nothing of his work from this time remains, and there is no definite indication of his early training as a painter, except that he was a member of the workshop of Ghiberti, where many of the outstanding artists of the time were trained.

Uccello's earliest, and now badly damaged, frescoes are in the Chiostro Verde (the Green Cloister, so called because of the green cast of the frescoes that covered its walls) of Santa Maria Novella; they represent episodes from the Creation. These frescoes, marked with a pervasive concern for elegant linear forms and insistent, stylized patterning of landscape features, are consistent with the late Gothic tradition that was still predominant at the beginning of the 15th century in Florentine studios.

From 1425 to 1431, Uccello worked in Venice as a master mosaicist. All his work in Venice has been lost, however. Uccello may have been induced to return to Florence by the commission for a series of frescoes in the cloister of San Miniato al Monte depicting scenes from monastic legends. While the figural formulations of these ruinous frescoes still closely approximate those of the Santa Maria Novella cycle, there is also a fascination with the novel perspective schemes that had appeared in Florence during Uccello's Venetian sojourn and with a simplified and more monumental treatment of forms deriving from the recent sculpture of Donatello and Nanni di Banco.

Later years. In 1436 in the Florence cathedral, Uccello completed a monochrome fresco of an equestrian monument to Sir John Hawkwood, an English mercenary who had commanded Florentine troops at the end of the 14th century. In the Hawkwood fresco, a single-point perspective scheme, a fully sculptural treatment of the horse and rider, and a sense of controlled potential energy within the figure all indicate Uccello's desire to assimilate the new style of the Renaissance that had blossomed in Florence since his birth. Following the Hawkwood monument, in 1443 Uccello completed four heads of prophets around a colossal clock on the interior of the west facade of the cathedral; between 1443 and 1445 he contributed the designs for two stained-glass windows in the cupola.

After a brief trip to Padua in 1447, Uccello returned to the Chiostro Verde of Santa Maria Novella. In a fresco illustrating the Flood and the recession, Uccello presented two separate scenes united by a rapidly receding perspective scheme that reflected the influence of Donatello's contemporary reliefs in Padua. Human forms in "The Flood," especially the nudes, were reminiscent of figures in Masaccio's frescoes in the Brancacci Chapel (*c.* 1427), perhaps the most influential of all paintings of the early Renaissance, but the explosion of details throughout the narrative again suggests Uccello's Gothic training. More than any other painting by Uccello, "The Flood" indicates the difficulties that he and his contemporaries faced in attempting to graft the rapidly developing heroic style of the Renaissance onto an older, more decorative mode of painting.

Perhaps Uccello's most famous paintings are three panels representing the Battle of San Romano, now in the Louvre, Paris; the National Gallery, London; and the Uffizi, Florence. These panels represent the victory in 1432 of Florentine forces under Niccolò da Tolentino over the troops of their archrival, Siena. There are Renaissance elements, such as a sculpturesque treatment of forms and fragments of a broken perspective scheme in this work, but the bright handling of colour and the elaborate decorative patterns of the figures and landscape are indebted to the Gothic style. The older style continued to be used through the 15th century in Florence to enrich the environments of the new princes of the day, such as the Medici, who acquired all three of the panels representing the Battle of San Romano.

Uccello is justly famous for his careful and sophisticated perspective studies, most clearly visible in "The Flood," in the underdrawing (sinopia) for his last fresco, "The Nativity," formerly in San Martino della Scala in Florence, and in three drawings universally attributed to him that are now in the Uffizi. These drawings indicate a meticulous, analytic mind, keenly interested in the application of scientific laws to the reconstruction of objects in a three-dimensional space. In these studies he was probably assisted by a noted mathematician, Paolo Toscanelli. Uccello's perspective studies were to influence the Renaissance art treatises of artists such as Piero della Francesca, Leonardo da Vinci, and Albrecht Dürer. Uccello apparently led an increasingly reclusive existence during his last years.

Assessment. Uccello was long thought to be significant primarily for his role in establishing new means of rendering perspective that became a major component of the Renaissance style. The 16th-century biographer Giorgio Vasari said that Uccello was "intoxicated" by perspective. Later historians found the unique charm and decorative genius evinced by his compositions to be an even more important contribution. Though in ruinous condition, they indicate the immense difficulties faced by artists of his time in taking advantage of new developments without giving up the best in traditional art. (J.T.Pa.)

BIBLIOGRAPHY. The standard and most readable and complete work on Uccello (and his followers) in English is John Pope-Hennessy, *Paolo Uccello,* 2nd ed. (1969). Eve Borsook discusses Uccello's Florentine frescoes in *The Mural Painters of Tuscany, from Cimabue to Andrea del Sarto* (1960). Uccello's role in the investigation of perspective is mentioned by John White in *The Birth and Rebirth of Pictorial Space,* 2nd ed. (1967); and this subject is treated more fully by Alessandro Parronchi in *Studi su la dolce prospettiva* (1964).

Ucciali, Treaty of, Ucciali also spelled WICHALE (May 2, 1889), pact signed at Wichale (Ucciali), Eth., by the Italians and Menilek II of Ethiopia, whereby Italy was granted the northern Ethiopian territories of Bogos, Hamasen, and Akale-Guzai (modern Eritrea and northern Tigray) in exchange for money and the provision of 30,000 muskets and 28 cannons.

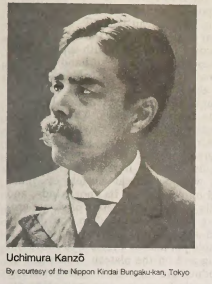
Article XVII of the Treaty of Ucciali stated that the emperor of Ethiopia "could" have recourse to the good offices of the Italian government in his dealings with other foreign powers; but the Italian text of the treaty had the word "must." Based on their own text, the Italians proclaimed a protectorate over Ethiopia. In September 1890, Menilek II repudiated their claim, and in 1893 he officially denounced the entire treaty. An attempt by the Italians to impose a protectorate over Ethiopia by force was finally confounded by their defeat at the Battle of Adowa (Adwa) on March 1, 1896. By the Treaty of Addis Ababa (Oct. 26, 1896), the country south of the Mareb and Muna rivers was restored to Ethiopia, and Italy acknowledged the absolute independence of Ethiopia.

Uccle, Flemish UKKEL, municipality, Brussels region, central Belgium. It lies just south of Brussels and is one of the 19 communes that make up Greater Brussels. Formerly a separate town dating back to the 12th century, it is now a primarily residential suburb with some light manufacturing. It is the site of the Royal Observatory and has several châteaus (Errera, Uccle, and Ithier). The Russian Orthodox Cathedral, surrounded by birch trees, is modeled on a church in Novgorod. The Auberge du Cornet, an inn dating from 1570, lies near the wooded Wolvendael Park, a remnant of the Soigne Forest. The main body of the forest extends into eastern Uccle. Pop. (1992 est.) mun., 73,826.

Uchimura Kanzō (b. May 2, 1861, Edo [now Tokyo], Japan—d. March 28, 1930, Tokyo), Japanese Christian who was an important formative influence on many writers and intellectual leaders of modern Japan.

Uchimura came from a samurai (warrior) family and studied (1878–81) at the Sapporo Agricultural School (now Hokkaido University), where he was converted to Christianity.

After several years' service in the government as a scientist, he continued his studies in the United States (1884–88), where he determined to spend his life propagating Christianity in Japan. Upon his return to Japan, Uchimura's



Uchimura Kanzō
By courtesy of the Nippon Kindai Bungaku-kan, Tokyo

adherence to his beliefs brought him into conflict with most segments of society. In 1890 he became an instructor in a government school, but the following year he caused an uproar when he questioned the divinity of the emperor by refusing to bow when presented with the Imperial Rescript on Education. The resulting nationwide controversy over the loyalty of Christians led to his resignation of his post.

In 1900 Uchimura founded the magazine *Seisho no kenkyū* ("Biblical Studies"), which he continued to publish until his death in 1930. His best-known writings, however, are his three autobiographies: *Kirisuto-shintō no nagusame* (1893; "Consolations of a Christian"), *Kyūanroku* (1893; "Seeking Peace of Mind"), and *How I Became A Christian* (1895). He also wrote essays on Christianity and pacifism and lectured extensively in Japan on the Bible. Uchimura's interpretation of Christianity emphasized the central importance of the Bible and the individual conscience and denied the need for a church or sacraments, a tradition still known in Japan by the word he coined for it, *mukyōkai* ("nonchurch movement"). His religious freethinking drew around him groups of young men, among them the writers Masamune Hakuchō, Mushanokōji Saneatsu, and Arishima Takeo, who in 1910 founded the influential *Shirakaba* ("White Birch"), a journal that served as a vehicle for their humanitarian ideals. Uchimura's *Complete Works* were translated and published in seven volumes (1971–73).

Uchta (Russia): *see* Ukhta.

Ucicky, Gustav, original name GUSTAV KLIMT (b. July 6, 1899, Vienna, Austria—d. April 26, 1961, Hamburg, W.Ger.), Austrian film director known for historical and nationalistic German films done during Adolf Hitler's rise to power.

Ucicky began his career as a cameraman with Michael Curtiz but moved to Germany in 1928, becoming involved in the state-subsidized studio Ufa. His early movies, such as *Hocuspocus* (1929) and *Der unsterbliche Lump* (1930; *Immortal Vagabond*), were light and well-directed entertainments that were praised for artistic photography.

Ucicky's first nationalistic film, *Yorck* (1931), was panned in the United States as being no more than an over-glorified episode of German history. Though similarly criticized in Austria, the movie launched a string of films that were approved for the German public by Joseph Goebbels, Nazi minister of public enlightenment. *Morgenrot* (1932; *Dawn*), which gained some recognition both in Europe and the United States, was a realistic story of U-boat warfare and depicts the dangerous and tenuous life in a submarine. *Flüchtlinge* (1933; "Refugees") was crudely anti-Soviet, however, and was followed by several other propaganda films. After the war, Ucicky resumed directing, producing several largely entertaining films between 1949 and 1960.

ʿūd, also spelled OUD, stringed musical instrument prominent in medieval and modern Islāmic music. It was the parent of the European lute. The *ʿūd* has a deep, pear-shaped body; a fretless fingerboard; and a relatively shorter neck and somewhat less acutely bent-back pegbox than the European lute. The tuning pegs are set in the sides of the pegbox. The gut strings, plucked with a plectrum, are fastened to a tension (guitar-type) bridge on the instrument's belly.

The *ʿūd* is not completely standardized in size or number of strings. Four pairs of strings (the classical number) are common, although five and six pairs are also found. Tunings vary; the pitch range is similar to that of a lute or guitar. The *ʿūd* is known in Turkey as the *lauta* and in the Balkans as the oud or *uti*. The *kuwītra,* a longer necked, narrower variety, is common in North Africa.

The *ʿūd* appeared in medieval Persia as the *barbaṭ* in the 7th century AD. Its name, *ʿūd* (Arabic: "wood"), refers to its aloe wood belly, in contrast to the skin bellies of earlier lutes. Originally, it had a tapered body of one piece with a neck and two crescent-shaped sound holes, much like some East Asian lutes, suggesting a common West Asian origin. In Andalusia during the Muslim occupation of Spain (711–1492) the present form probably emerged, with a separate neck and round sound hole with a wooden rose (three sound holes are now common).

Some medieval theorists mention the frets of the *ʿūd* when discussing the proper note intervals of the *maqāmāt,* or melodic modes. Surviving pictures of the *ʿūd* show no frets, but it is possible that both fretted and unfretted types were used.

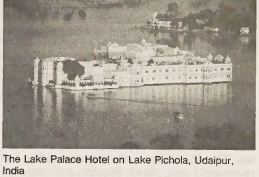
Uda, in full UDA TENNŌ, personal name SADAMI (b. June 10, 867, Kyōto, Japan—d. Sept. 3, 931, Kyōto), 59th emperor of Japan, from 887 to 897.

The son of the emperor Kōkō, Uda was one of the few rulers during this period whose mother was not a member of the Fujiwara family, which, partly through intermarriage with the imperial line, dominated Japan from 859 to 1160. During the first part of Uda's reign, Mototsune, the head of the Fujiwara house, occupied the post of *kampaku,* or chief councillor, through which he could issue commands on behalf of the emperor. After Mototsune's death in 891, Uda kept the post vacant, selecting his advisers from members of minor Japanese noble families.

In 897 Uda abdicated in favour of his eldest son, who became the emperor Daigo, although Uda continued to exercise power as the retired emperor (*in no chō*). In 899 Uda succeeded in getting his favourite, the renowned scholar Sugawara Michizane, appointed to the important post of minister of the right (*udaijin*). But he was forced to concede the more important post of minister of the left (*sadaijin*) to Fujiwara Tokihira, the head of the Fujiwara house. In 901 Tokihira forced his rival into exile, where Sugawara is said to have died of a broken heart. Fujiwara clansmen then surged back into powerful positions, from which they were able to dominate the government for three centuries.

Together, Uda and Fujiwara Tokihira introduced a series of measures designed to prevent the further avoidance of taxes by large rural landholders. Although their effort was largely unsuccessful, in 927 it did result in the *Engi shiki* ("Procedures of the Engi Era"), a compilation of the existing administrative regulations of the period, which now is of great historical interest.

Udaipur, also spelled UDAYPUR, city, southern Rājasthān state, northwestern India. It lies in the hills of the Arāvali Range. Udaipur ("City of Sunrise") was made the capital of the princely state of Udaipur in 1568 by Mahārāṇā Udai Singh after the sack of Chittaurgarh. A walled city, it stands on a ridge crowned by the Mahārāṇā's palace, which was begun in 1570. To the west lies Lake Pichola with its two small islands and marble palaces, one of which served as a refuge for the Mughal emperor Shāh Jahān (reigned 1628–58) when, before his accession, he revolted against his father, Jahāngīr. A major road and rail junction, Udaipur is an agricultural distributing centre. Its factories produce chemicals, asbestos, and



The Lake Palace Hotel on Lake Pichola, Udaipur, India
© Nicholas DeVore/Tony Stone Images

clay. Cloth, embroidery, ivory, and lacquerware handicrafts are also manufactured there. Udaipur has several hospitals, a museum, and Mohanlal Sukhadia University (established in 1962).

Udaipur (Mewār) princely state was established in the 8th century by Sīsōdia Rājputs (warrior rulers of the historic region of Rājputāna). The dynasty later made a long resistance to the Muslim invasions. In the 18th century the state suffered from internal dissension and incursions by the Marāthās and came under British paramountcy in 1818. In 1948 it merged with the union of Rājasthān. Pop. (1991) 308,571.

Udall, Nicholas (b. December 1505?, Southampton, Hampshire, Eng.—d. December 1556, Westminster), English playwright, translator, and schoolmaster who wrote the first known English comedy, *Ralph Roister Doister.*

Udall was educated at the University of Oxford, where he became a lecturer and fellow. He became a schoolmaster in 1529 and was teaching in London in 1533 when he wrote "ditties and interludes" for Anne Boleyn's coronation. In 1534 he published *Floures for Latine Spekynge Selected and Gathered out of Terence . . . Translated into Englyshe* (dated 1533). The same year he became headmaster of Eton College.

From 1542 to 1545 Udall seems to have been in London, engaged in work as a translator. In 1542 he published a version of Erasmus' *Apoplhegmes;* and he was employed by Catherine Parr, who shared his enthusiasm for the Reformation, to take charge of a translation of Erasmus' paraphrase of the New Testament. The first volume, containing the Gospels and Acts, was published in 1548; the Gospel According to Luke was translated by Udall, and the Gospel According to John was translated by Princess Mary (later Queen Mary I).

In 1549 Udall became tutor to the young Edward Courtenay; in 1551 he obtained a prebend at Windsor, and in 1553 he was given a living in the Isle of Wight. Meanwhile he

had become famous as a playwright and translator. Even under Queen Mary, his Protestant sympathies did not cause him to fall into disfavour at court; various documents refer to his connection with plays presented before the queen. He became a tutor in the household of Stephen Gardiner, bishop of Winchester, and in December 1555 was appointed headmaster of Westminster.

Although Udall is credited in John Bale's catalog of English writers with "many comedies," the only play extant that can certainly be assigned to him is *Ralph Roister Doister*. This must have been written, and probably was performed, about 1553. The play marks the emergence of English comedy from the medieval morality plays, interludes, and farces. It is modeled on Terence and Plautus: its central idea—of a braggart soldier-hero, with an impecunious parasite to flatter him, who thinks every woman he sees falls in love with him and is finally shown to be an arrant coward—is derived from Plautus' *Miles Gloriosus.* The incidents, characters, and colloquial idiom, however, are English. It was probably written as a Christmas entertainment to be performed by Udall's pupils in London.

To make the best use of the Britannica, consult the INDEX *first*

Udāsī, sect within Sikhism, a religion of India. The Udāsī (from the Sanskrit *udās,* "to renounce") sect, which requires celibacy and asceticism of its members, originated with the followers of Sirī Chānd, the son of the first Sikh gurū (religious teacher and leader of the Sikh community), Nānak. Under the leadership of Bābā Gurditā, the eldest son of the sixth gurū, Hargobind, they served as missionaries, particularly north and east of the Punjab, the Sikh homeland. They did not adopt the five K's (unshorn hair, comb, sword, military shorts, and steel bracelet), emblems of the Khālsā order. Udāsīs may cut their hair and shave; they wear reddish garments and use caste marks, sacred threads, and prayer books more generally associated with Hindu ascetics. The Udāsīs maintain a temple adjacent to the Harimandir, the main Sikh temple in Amritsar, Punjab.

Udayagirī, village and archaeological site, south-central Orissa state, eastern India. In the village are located several Jaina and Buddhist rock-cut caves. One of these is a double-storied cave with ranges of cells cut into three sides of an open courtyard. Inscriptions in the caves date from the 2nd century BC to the 10th century AD.

Udayanācārya (fl. 10th century, near Darbhanga, modern Bihār state, India), Hindu logician who attempted to reconcile the views held by the two major schools of logic out of which developed the Navya Nyāya ("New Nyāya") school of "right" reasoning, which is still recognized and followed in some regions of India.

Of the two schools, the old Nyāya system was concerned with the critical examination of the objects of knowledge by means of logical proof, while the earlier Vaiśeṣika system dealt with particulars—objects that can be thought of and named. Udayanācārya assumed, with the Vaiśeṣika, that the world was formed by atoms, from which physical bodies also derived. But he was equally concerned with the mind and its right apprehension of objects in nature. His vigorous thinking was set forth in the *Kusumāñjali* and the *Bauddhadhikkāra,* the latter an attack on the atheistic thesis of Buddhism. Living in a period of lively controversy with the Buddhists, Udayanācārya defended his belief in a personal God by resorting to the two natures of the world: cause and effect. The presence of the world is an effect that cannot be explained by the activity of atoms alone. A supreme being had to cause the effect and regulate the activity of the atoms; hence, according to Udayanācārya, God exists.

Udaypur (India): *see* Udaipur.

UDC: *see* United Daughters of the Confederacy.

Uḍḍandapura (India): *see* Odantapurī.

Uddevalla, town, in the *län* (county) of Göteborg och Bohus, southwestern Sweden. It lies along the Bäve River, at the head of By Fjord, (an inlet of the Skagerrak), north of Göteborg. The site has been identified with Odensvold, a pagan place of sacrifice. The town was incorporated in 1498. On several occasions during the Danish-Swedish wars, large parts of it were destroyed and ravaged by fire. Uddevalla was once dependent on the grain trade, fishing, and stone quarrying, but it has developed into an industrial town with large shipyards and dock installations. Its coastal position also makes it a popular summer resort. Pop. (1995 est.) mun., 48,859.

Udhampur, town in Indian-administered Jammu and Kashmir state, situated at an elevation of 2,500 feet (760 m). It is named for Udham Singh, eldest son of Gulab Singh, the founder and ruler of the Jammu and Kashmir state. Situated on the Pathānkot-Urī national highway connecting Srīnagar via Udhampur to the rest of India, Udhampur town is an important military cantonment in northern India. Krimchi, a group of four Śiva temples (11th century AD), is situated 6 miles (10 km) north of the town. The Chenāni hydroelectric project and an old fort are other places of interest. Pop. (1981) town, 22,509.

Udi-Nsukka Plateau, pair of plateaus in south-central Nigeria that form a nearly continuous elevated area. The Nsukka Plateau, which forms the main eastward-facing escarpment, extends about 80 miles (130 km) from Nsukka in the north to Enugu in the south. The Udi Plateau continues southward for about 100 miles (160 km) to a point near Okigwi. The average elevation is slightly more than 1,000 feet (300 m), and the highest point (1,897 feet) is found 15 miles (24 km) northnorthwest of Enugu.

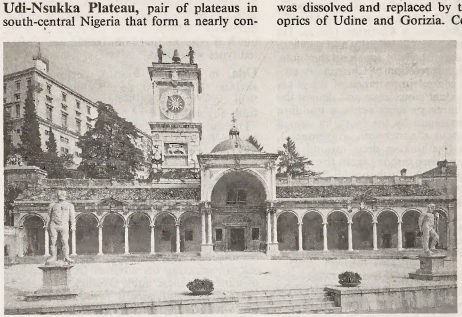
The steep escarpments of the east and north (the latter trending east-west and sometimes called the Igala Plateau) form spectacular landscapes. Numerous tributaries of the Cross River cascade over the eastern escarpment onto the Cross River Plains. The headwaters of the Anambra, Adada, and Mamu rivers rise in the western part of the plateau and flow through the Anambra Lowlands before emptying into the Niger River. In addition, a number of small streams flow north to feed the Benue River. The scarp at the southern end, called the Awgu-Okigwi Cuesta, is the source of the Imo River.

Coal deposits were discovered in the southern part of the plateau in 1909, and mining began near Enugu in 1915; the railway from Port Harcourt (151 miles south-southwest of Enugu) was originally built to handle the export of coal from the Enugu fields. Although coal was also known to exist in the north, it was not until 1968 that exploitation began in the Okaba field near Ankpa. These deposits made Nigeria the first coal-producing nation in West Africa.

The plateau is marked by small, round-topped hills. Most of it is covered by open grassland with occasional clusters of woodlands and oil palm trees. Its poor, sandy, and acidic soils (with many regions of severe erosion) have been overworked in the densely populated areas in the south, and there is considerable population pressure to move out of farming and off the plateau. Yams and oil palm produce are the most important crops; but corn (maize), cassava, taro, pumpkins, avocados, and fruit are also cultivated. Cashew trees were introduced in the 1950s.

Igbo (Ibo) people are the principal inhabitants in the south, and Igala predominate in the north. Enugu is at the foot of an eastern escarpment, and Nsukka, Enugu Ezike, and Ankpa are major towns on the plateau.

Udine, city, capital of Udine *provincia,* Friuli-Venezia Giulia *regione,* northeastern Italy. It lies northwest of Trieste, near the border with Slovenia. Possibly the site of a Roman frontier station called Utina, the city was the seat of the Roman Catholic patriarchate of Aquileia from 1238 until 1751, when the patriarchate was dissolved and replaced by the archbishoprics of Udine and Gorizia. Conquered by the Venetians in 1420 and ceded to Austria by the Treaty of Campo Formio in 1797, Udine was united with Italy in 1866. It was the headquarters of the Italian army in 1915–17 during World War I and suffered heavy bomb damage in World War II. The city is dominated by a castle (rebuilt 1517) that was originally the seat of the patriarchs and of the Venetian governors and now houses a museum and art gallery with works by Giovanni Battista Tiepolo and other artists of the Venetian school. Other notable buildings are the Palazzo del Comune (1448–56); the elegant Loggia del San Giovanni (1533–39), by Bernardino da Morcote, with a notable clock tower by Giovanni da Udine, a native of the city; and the 16th-century archiepiscopal palace. Udine was relatively undamaged in the



Portico of San Giovanni and clock tower, Udine

SCALA/Art Resource, New York City

severe earthquake that shook Friuli-Venezia Giulia in May 1976. It is a thriving trade and industrial centre with ironworks, cotton mills, tanneries, and machine and food industries. Pop. (1990 est.) mun., 98,872.

Udmurtiya, republic in west-central Russia. It lies partly in the basin of the middle Kama River, which flows along part of its southeastern boundary. The larger part of Udmurtiya lies in the drainage area of the Cheptsa and Kilmez rivers, which are tributaries of the Vyatka River. Its capital is Izhevsk.

From the republic's highest point, a low (1,080 feet [330 m]) outlier of the Ural Mountains on the northeastern edge, the land slopes gently to the west and south. Udmurtiya's markedly continental climate, with long winters, has an average January temperature of 5° F (−15° C) and an average July temperature of 64° F (18° C). Rainfall, with a summer maximum, is about 16–20 inches (400–500 mm) annually. A large zone of boreal forest, or taiga, is dominated by spruce, pine, and birch and covers about two-fifths of the republic's surface; some deciduous trees, mainly oak and linden, appear in the extreme south. The soil in the west and north is alluvial and often marshy, while in the east it is of a humus-carbonate type. Along the rivers are broad floodplain meadows, which make good pastures. Natural resources include peat, limestone, manganese, quartz sand, petroleum, and oil shales.

The Udmurt are a Finno-Ugric people related to the Mari to the west and the Komi farther north. Settled by the Udmurt, the area came under the control of the khanate of Kazan in the 14th and 15th centuries and passed into Russian control in 1552 during the reign of Ivan IV the Terrible. Established as the Votskaya autonomous *oblast* (province) in 1920, it was renamed the Udmurt autonomous *oblast* in 1932 and raised to the status of an autonomous republic in 1934. It became a republic in the early 1990s. Of the population—Russians, Udmurts, Tatars, Mari, and Ukrainians—almost three-fourths is urban. Major cities include Sarapul, Votkinsk, Glazov, and Izhevsk (*q.v.*; formerly Ustinov).

Udmurtiya is a part of the Urals economic region and is heavily industrialized. Major industries include metallurgy, machine and tool manufacturing, lumbering, leatherworking, flax processing, brick and cement making, and food processing. High-grade steel, rifles, furniture, motorcycles, electric motors, and handling, transport, and construction equipment are manufactured at Izhevsk; locomotives and conveyor belts at Votkinsk; oil-drilling machinery and radios at Sarapul; rolling stock and timber-working equipment at Kambarka; and glass at Mozhga. Elsewhere timber cutting and sawmilling are the chief occupations. Electric power is generated at thermoelectric plants at Izhevsk, Votkinsk, and Sarapul.

Arable land occupies about half of the republic, the greater part in the southern section. Rye and oats are the chief crops, and wheat, corn (maize), flax, and hemp are also grown. Market (or truck) gardening, dairying, beekeeping, and stock raising (cattle, sheep, goats, and pigs) are also practiced.

Railways, motor roads, and airlines intersect at Izhevsk. A north-south railroad passes through Izhevsk to connect two east-west lines that cut through the northern and southern parts of the republic. The Perm-Kazan highway also crosses the republic. Air connections to Moscow and other regional centres are available at Izhevsk. Area 16,250 square miles (42,100 square km). Pop. (1990 est.) 1,619,000.

Udon Thani, town, northeastern Thailand, near the northern (Laotian) border. Udon Thani is the major town of the northern Khorat Plateau and is served by road, rail, and air. The surrounding area produces rice, livestock, timber, and freshwater fish. Pop. (1986 est.) 82,706.

Uea Island (New Caledonia): *see* Ouvéa Island.

Uebi Scebeli (eastern Africa): *see* Shebeli River.

Ueda, city, Nagano *ken* (prefecture), Honshu, Japan. It lies along the Chikuma River. Ueda was a castle town during the Tokugawa period (1603–1867) and later became a centre of silk manufacturing and the site of the Sericultural Professional School. The city's silk industry



Buddhist pagoda at Ueda, Japan
Photos Pack

declined during the mid-20th century, and synthetic textiles, processed foods, and electrical appliances are now produced. Served by a railway and highway, Ueda is a gateway to such tourist areas as the hot springs of Bessho and the skiing resort of Sugadaira. The castle remains contain a museum, and Ueda houses the Buddhist Shinano-Kokubun Shrine. Pop. (1990) 119,435.

Ueda Akinari, pseudonym of UEDA SENJIRO (b. July 25, 1734, Ōsaka, Japan—d. Aug. 8, 1809, Kyōto), preeminent writer and poet of late 18th-century Japan, best known for his tales of the supernatural.

Ueda was adopted into the family of an oil and paper merchant and brought up with great kindness. A childhood attack of smallpox left him with some paralysis in his hands, and it may have caused his blindness late in life. Ueda became interested in classical Japanese and Chinese literature around the age of 25. He had started to write *ukiyo-zōshi,* "tales of the floating world," the popular fiction of the day, when in 1771 the business he had managed since his stepfather's death (1761) burned down. He took that as his opportunity to devote his full time to writing. In 1776, after eight years of work, he produced *Ugetsu monogatari* (*Tales of Moonlight and Rain*). These ghost tales showed a concern for literary style not present in most popular fiction of the time, in which the text was usually simply an accompaniment for the illustrations that formed the main part of the books.

A student of history and philology, Ueda called for a revival of classical literature and language reform. His late years were spent in poverty-stricken wandering. His *Harusame monogatari* (1808; *Tales of the Spring Rain*) is another fine story collection. *Ugetsu monogatari* was the basis for the film *Ugetsu* (1953), directed by Mizoguchi Kenji.

Ueno, city, Mie *ken* (prefecture), Honshu, Japan. It lies in an intermontane basin at the head of the Kii Peninsula. The city developed around a castle built in 1611 and still retains some of its early character. Hakuho Park is on the site of the old castle, which was rebuilt in 1953. The Aizen Temple in Ueno is dedicated to the god of love. The industry of the city includes the traditional manufacture of sake (rice wine), textiles, stoneware, and umbrellas. Ueno is connected by railway to Nara (west) and Nagoya (east). Pop. (1990) 60,239.

Ueno Zoological Garden, Japanese UENO DŌBUTSUEN, oldest and most famous zoological garden in Japan. It was founded in 1882, and its administration was transferred to the Tokyo city government in 1924. Occupying a 32-acre (13-hectare) site in the Ueno district of Tokyo, it is landscaped in traditional Japanese style. The zoo saw much damage in World War II but was rebuilt within 10 years, mainly along prewar lines. A modernization program was pursued in the late 20th century. Among the renovated buildings are an elephant house (1968), a big-cat house (1974), and an aquarium (1964), which has special exhibits of goldfish and jellyfish and also houses reptiles. The Ueno Zoological Garden has about 8,860 specimens representing some 960 species, including the rare giant salamander and breeding groups of several rare pheasants and wallabies. The zoo emphasizes public education and sponsors active research on zoo animal husbandry and reproduction.

In 1958 the Ueno Zoological Garden opened a sister facility, the 125-acre (50-hectare) Tama Zoological Park, in the outlying district of Hodokubo, enabling it to expand its collection. A unique exhibit at Tama Park is a 4-acre (1.6-hectare) insectarium, where 15,000 native insects are bred and displayed. The park's collection is organized by zoogeographic area (*i.e.,* all animals native to a particular region are grouped together), with emphasis on Asian and African faunas. Tama Park has a good breeding herd of scimitar-horned oryx and also keeps Indian rhinoceroses. In addition, it serves as the repository of the international studbooks for the Japanese serow and the Manchurian crane.

Uesugi FAMILY, one of the most important warrior clans in Japan from early in the 15th century until the last half of the 19th.

The Uesugi were already dominant in the Kantō region of Honshu when the appointment of the head of the family to the hereditary post of governor-general of Kantō in 1439 made them the second most powerful clan in Japan and the dominant power in the western part of the country.

By the middle of the 16th century, however, the family had been replaced in the Kantō region by the newly ascendant feudal power of the Hōjō family. With the aid of Uesugi Kenshin (1530–78), a warrior who had been adopted into the family, the clan was able to recoup some of its losses, and by the late 16th century it was relocated in the northern tip of the north Honshu plain in central Japan.

Uesugi Kagekatsu (1555–1623), who succeeded Kenshin as head of the clan, became one of the early allies in the campaign of Toyotomi Hideyoshi to reunify Japan. Before Hideyoshi died, he appointed Kagekatsu to serve as one of the five regents for his infant son Hideyori.

In 1600 Kagekatsu attempted to challenge the power of Tokugawa Ieyasu, the head of the regency council. Kagekatsu's defeat marked the ascendancy of the Tokugawa family as

the preeminent power in Japan. But Ieyasu, who in 1603 had himself appointed shogun, or hereditary military dictator of Japan, permitted the Uesugi family to retain part of its former domain. Under the Tokugawa system, the Uesugi became the daimyos, or lords, of Yonezawa in northern Honshu. The Uesugi continued to rule that territory until the Meiji Restoration (1868), when the Tokugawa house was overthrown and the feudal structure of Japan abolished. Under the new government Yonezawa was incorporated into the newly created Yamagata prefecture.

Uesugi Kenshin, also called UESUGI TERUTORA, original name NAGAO TORACHIYO (b. Feb. 18, 1530, Takada, Echigo province, Japan—d. April 19, 1578, Takada), one of the most powerful military figures in 16th-century Japan.

Nagao Torachiyo was the third son of the head of Echigo province in northeastern Japan. With the death of his father in 1543, the family's control of the area began to disintegrate. Torachiyo not only restored order to the area but also gained control of neighbouring provinces, becoming one of the most powerful warriors on the Kantō Plain in central Honshu.

In 1552 Uesugi Norimasa, who had inherited the position of *kanrei,* or governor-general, of Kantō and whose family had long been the most powerful in the area, was defeated by the Hōjō clan and took shelter with Torachiyo, whom he adopted as his son. Torachiyo then changed his surname to Uesugi. He received many of the hereditary vassals of the Uesugi family, and he also became involved in a series of battles with the eastern warlords of the Hōjō and Takeda families for control of the Kantō region. Uesugi's battles with the noted general Takeda Shingen resulted in no permanent gain for either side, however.

Meanwhile, Oda Nobunaga had become the strongest military leader in Japan, and in 1573 he overthrew the shogunate and began to consolidate his control over the capital. The only warrior strong enough to challenge Oda was Uesugi, and in 1577 he agreed to undertake an expedition to restore the shogunate. He died, however, before the expedition could get under way.

Ufa, city and capital, Bashkortostan republic, western Russia. It lies along the Belaya (White) River just below its confluence with the Ufa River. A defensive site in a loop formed by the two rivers led to the foundation there of a fortress in 1574 to protect the trade route across the Ural Mountains from Kazan to Tyumen. It became a town in 1586 and derived importance from this trade route. Ufa grew rapidly in the 20th century as a major manufacturing centre, stimulated by the development of the Volga-Urals oil field. In 1956 its satellite town of Chernikovsk, a few miles to the northeast, with oil refineries and petrochemical industries, was united with Ufa. Synthetic rubber, polyethylene, herbicides, and other products are made there.

Ufa itself has large engineering industries making power and mining machinery, electrical apparatus, telephones, and typewriters. There are also timber-processing industries—making furniture, veneer, prefabricated houses, and matches—and various food industries. Ufa is a major focus of rail and road lines and oil and gas pipelines at the head of navigation on the Belaya. The city is strung out for almost 25 miles (40 km) along the river on the high right bank, but it has extended onto the lower river terrace and across to the low left bank. It is an important cultural centre, with a university, several technical institutes, and numerous scientific-research establishments. Pop. (1991 est.) 1,097,000.

Ufa, in full UNIVERSUM FILM-AKTIENGESELLSCHAFT, German motion-picture production company that made artistically outstanding and technically competent films during the silent era. Located in Berlin, its studios were the best equipped and most modern in the world. It encouraged experimentation and imaginative camera work and employed such directors as Ernst Lubitsch, famous for directing sophisticated comedies, and G.W. Pabst, a pioneer in the expressive use of camera position and editing techniques.

Ufa was established in 1917 when the German government consolidated most of the nation's leading studios. In the post-World War I era, Ufa's films of the macabre—*e.g., The Cabinet of Dr. Caligari* (1919) by Robert Wiene and *Metropolis* (1927) by Fritz Lang; its realistic films based on the life of the common man—*e.g., The Last Laugh* (1924) by F.W. Murnau; and its dramas based on traditional German legends were especially popular.

From 1925 to 1930 many German directors and actors went to the United States to work in Hollywood, and, despite loans and cooperation from American companies, the studio's financial stability weakened. In 1927 controlling stock was purchased by Alfred Hugenberg, a conservative newspaper owner and future supporter of the dictator Adolf Hitler. By 1938 the Nazi government had complete control of the German film industry, and it used Ufa as a propaganda tool until the end of World War II, when the government fell and the company ceased to exist. The studio itself, however, located in Berlin, remains a production centre to this day.

Ufa Plateau, Russian UFIMSKOYE PLATO, plateau lying immediately to the west of the central Ural Mountains in Bashkortostan and in Yekaterinburg *oblast* (province), west-central Russia. The plateau embraces parts of the basins of the Ufa, Yuryuzan, and Ay rivers. It has a total north-south length of 95 miles (150 km). The plateau varies in elevation from 1,300 to 1,650 feet (400 to 500 m), reaching its highest point at 2,270 feet. It is a gentle anticline of limestones, and its surface is characterized by extensive eroded limestones, or karst, phenomena. It is also underlain by extensive oil deposits.

Ufer, Walter (b. July 22, 1876, Louisville, Ky., U.S.—d. Aug. 2, 1936, Santa Fe, N.M.), American painter who was a member of the Taos Society of Artists and who specialized in portraits of Indians and landscapes of the southwestern United States.

Ufer studied at the Royal Academy in Dresden, Ger., and at the Art Institute of Chicago. In 1911 he abandoned a career in advertising to study painting in Munich and to travel across Europe and North Africa. Soon after his return to the United States, he moved to Taos, N.M., where a small art colony had been established in 1898. This was the first such colony devoted to the art of the American West, and in 1914 they formed the Taos Society of Artists, which exhibited throughout the United States and Europe.

Uffizi Gallery, Italian GALLERIA DEGLI UFFIZI, art museum in Florence that has the world's finest collection of Italian Renaissance painting, particularly of the Florentine school. It also has antiques, sculpture, and more than 100,000 drawings and prints. In 1559 the grand duke of Tuscany, Cosimo I de' Medici, engaged the painter-architect Giorgio Vasari to plan a building for the offices (*uffizi*) of the government judiciary. The Uffizi Palace (1560–80), one of the most important examples of Italian Mannerist architecture, has been subsequently enlarged and remodeled, but always in keeping with Vasari's original design. After Cosimo I died in 1574, the new grand duke, Francis I, commissioned Bernardo Buontalenti to convert the top floor of the Uffizi into a repository for the art treasures amassed by the Medici family from the time of Cosimo the Elder (1389–1464) on. These galleries were expanded in the 17th century by the grand duke Ferdinand II and his brother, Cardinal Leopoldo, who collected the artist self-portraits later exhibited in the Vasari corridor connecting the Uffizi and the Pitti Palace. In the 18th century the Medici's personal property was bequeathed to the Lorraine



East (at right) and (left) west wings of the Uffizi Gallery, Florence, with the Palazzo Vecchio in the background

The J. Allan Cash Photolibrary, London

family with a pact providing that the works of art should always remain in Florence. It was the grand duke Leopold I who gave the Uffizi its status as a museum in the 18th century. He had its collections reorganized, appointed its first director (1769), and opened it to the public.

The Uffizi Gallery has a comprehensive and voluminous collection of Florentine paintings from the Late Gothic through the Renaissance and Mannerist periods. Its holdings of works by Sandro Botticelli are quite extraordinary. Parts of the Uffizi were seriously damaged by a car bomb explosion in 1993, though few of its masterworks were harmed.

Ufford, Robert de: *see* Suffolk, Robert de Ufford, 1st Earl of.

Ugaki Kazushige (b. June 1868, Okayama prefecture, Japan—d. April 30, 1956, Tokyo), Japanese soldier-statesman, who in the years before World War II headed the so-called Control Faction of the Japanese army, a group that stressed the development of new weapons and opposed the rightist "Imperial Way" faction, which emphasized increased indoctrination of troops with ultranationalist ideology. Ugaki's faction was in control of the military most of the time between 1920 and 1945.

A graduate of the Imperial Military Academy and the War College (1900), Ugaki became a staff officer at army headquarters and, in 1919, president of the War College. In 1924 he became a full general and took the post of minister of the army, in which, despite strong opposition from the armed forces, he began to implement the arms-reduction program that Japan had agreed upon at the 1922 Washington Conference. He resigned from the cabinet in 1927 but resumed his post two years later and again met strong opposition to his acceptance of the warships' limitations imposed by the 1930 London Naval Conference; the opposition increased when he formed a committee to reorganize the army as part of a general retrenchment brought on by the Great Depression.

In March 1931 a group of young officers, under the illusion that Ugaki's policies were dictated by civilians, attempted a coup to install Ugaki as premier. Although Ugaki did not cooperate with the plotters, he nevertheless resigned his post, assuming responsibility for

the attempt. Ugaki was then appointed governor-general of Korea, where he attempted to develop war-related industries. Later he was proposed as prime minister, but army objections blocked his forming of a cabinet. In 1938, however, he became minister of foreign affairs and minister of overseas affairs in the new government of Konoe Fumimaro.

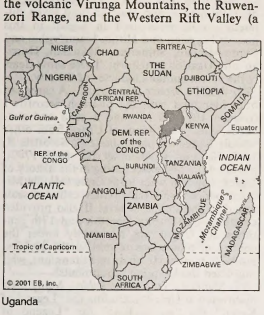
Late in World War II, Ugaki entered into negotiations with the Republic of China in an attempt to end the conflict with that country, but again army opposition forced him to resign from the government. After the war Ugaki reentered politics and in 1953 won election to the upper house of the Japanese Diet (parliament).

Uganda, officially REPUBLIC OF UGANDA, Swahili JAMHURI YA UGANDA, landlocked eastern African country lying on the Equator. Facing Lake Victoria to the southeast, Uganda is bordered by Tanzania and Rwanda to the southwest, Congo (Kinshasa) to the west, The Sudan to the north, and Kenya to the east. The capital is Kampala. Area 93,065 square miles (241,040 square km). Pop. (2000 est.) 23,318,000.

A brief treatment of Uganda follows. For full treatment, *see* MACROPAEDIA: Eastern Africa.

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

The land. Uganda is largely situated on a section of the Central African Plateau. The country's western boundary is composed of the volcanic Virunga Mountains, the Ruwenzori Range, and the Western Rift Valley (a



Uganda

branch of the East African Rift System), which includes Lake Albert and the valley of the Albert Nile River. The Virungas rise to 13,540 feet (4,127 m) at Mount Muhavura, and the Ruwenzoris rise to 16,795 feet (5,119 m) at Margherita Peak on Mount Stanley, Uganda's highest point. The country's eastern border is defined by a string of volcanic mountains; Mount Elgon is the highest of the chain, reaching 14,178 feet (4,321 m) east of Mbale. The country's drainage system is dominated by major lakes, including Lakes Albert, Kyoga, Edward, Georgia, Bisina, and Victoria. The portion of Lake Victoria within Uganda occupies virtually all of the southeastern corner of the country. The Victoria Nile River flows northwest from Lake Victoria, passes through Lake Kyoga, and continues to Lake Albert, which is drained in turn by the Albert Nile River.

Uganda is on the Equator, but has a modified tropical climate. Temperatures are ameliorated by the region's high elevation and—locally—by the presence of large lakes. Average daily maximum temperatures at Kampala are 83° F (28° C) in January and 77° F (25° C) in July. Temperatures are somewhat higher in the north. In the Lake Victoria region, the annual rainfall of 60 inches (1,500 mm) is distributed throughout the year fairly evenly, while along some sections of the northeast border, rainfall averages less than 20 inches (500 mm) and is distributed much more seasonally. Wooded savanna is typical of central and northern Uganda. In the south, natural vegetation has been largely replaced by cultivated plots, with scattered patches of forest or of elephant grass. Thousands of square miles are devoted to national parks and game reserves; the largest park, Kabarega (Murchison) Falls National Park, occupies nearly 1,500 square miles (3,900 square km). The country's fauna includes lions, rhinoceroses, leopards, elephants, hippopotamuses, buffaloes, Uganda kobs and topis (antelopes), and a number of species of monkeys. About one-third of Uganda's land area is arable; nearly one-tenth of the land is used as pasture.

The people. The dozens of ethnic groups in Uganda speak languages classified in either of two language families: Niger-Congo and Nilo-Saharan. Bantu speakers (part of the Niger-Congo family) are concentrated in the south and account for more than two-thirds of the population. The Bantu-speaking Ganda alone constitute almost one-fifth of the total population. Other Bantu languages with more than a million speakers are Nkole, Chiga (Kiga), Soga, and Rwanda. The major Nilo-Saharan languages spoken in Uganda are Teso, Lango, and Acholi (in the Nilotic branch) and Lugbara (in the Central Sudanic branch). More than 8,000,000 people speak Swahili, the lingua franca, and English, the official language of Uganda, is spoken as a second language by 2,500,000.

About one-third of the population is nominally Roman Catholic, an equal number Protestant, and a small minority Muslim. However, most Ugandans have retained indigenous religious beliefs or have integrated such beliefs with Christianity or Islām.

Uganda's annual rate of population growth is above average for sub-Saharan Africa, primarily because of the country's high birth rate. More than half of the population is under 15 years of age. The most densely settled areas are in the fertile south and east, mainly along Lake Victoria. Kampala is the largest city. Other major cities are Jinja, Masaka, and Mbale. The urban population, though only about one-eighth of the total, is growing steadily.

The economy. Uganda has a developing, market economy based largely on agriculture. The gross national product (GNP) per capita is among the lowest in the world. Both agricultural and industrial production were severely curtailed from the 1970s and in the mid-1980s due to political instability and civil war. By the mid-1990s the government had begun to encourage foreign investment, strengthen export industries, and establish relationships with such organizations as the International Monetary Fund. In addition, some lands and properties were restored to Asians and others who had been expelled or had fled during the rule of Idi Amin (1971–79).

Agriculture accounts for roughly two-fifths of the gross domestic product (GDP) and employs more than four-fifths of the workforce. More than half of production is accounted for by subsistence farmers. The main food crops are cassava, sweet potatoes, millet, plantains, and corn (maize). Coffee is the principal export crop, followed by tea, cotton, and sugar.

Less than one percent of the GDP comes from mining. The output of copper fell sharply during the 1970s, and both the copper mine at Kilembe and the Jinja smelter ceased production. Uganda exploits apatite at Tororo and mines tungsten and tin on a small scale. There are also unexploited deposits of high-grade iron ore at Kigezi.

Manufacturing accounts for less than one-twelfth of the GDP and employs a smaller percentage of the workforce. Output has fallen drastically since the early 1970s. The main industries include food processing, textiles, automobiles, and metal products.

Firewood and charcoal remain important sources of energy, despite the depletion of forests. Nearly all of Uganda's power is produced by hydroelectric generation, with the Owen Falls Dam on the Victoria Nile providing the bulk of the capacity.

The value of imports exceeds that of exports. Imports include machinery and transport equipment, minerals, fuels, chemicals, food and food products, and live animals. The main exports are unroasted coffee (which accounts for more than half of the total value of exports), tea, and fish. Principal trading partners include Kenya, the United Kingdom, Japan, Spain, and Germany.

Government and social conditions. Uganda is a sovereign republic. The constitution of 1995 vests executive power in a popularly elected president who can serve no more than two five-year terms. The president is assisted by a cabinet of ministers. Legislative power is exercised by a unicameral Parliament whose members are elected to five-year terms and represent constituent districts. The judicial branch, headed by the Supreme Court, includes the Court of Appeal, the High Court, and various lower courts. Justices are appointed by the president with the approval of the legislature. From 1986 until the installation of elected officials as prescribed by the new constitution, Uganda was governed by a nonelected president and by an indirectly elected body called the National Resistance Council.

Health and welfare services deteriorated in the 1970s, improved in the '80s and early '90s, but then declined in the face of severe health crises, notably an AIDS epidemic that by the year 2000 infected nearly one-tenth of the adult population. Other common diseases include tuberculosis, various sexually transmitted diseases, measles, malaria, sleeping sickness, dysentery, whooping cough, hookworm, typhoid, and leprosy.

The government has overall responsibility for educational services, which have suffered from a lack of funding and trained personnel and from the country's political instability. Makerere University in Kampala has faculties of arts, social services, science, law, engineering, veterinary science, agriculture, and education. Radio stations have proliferated since 1990, and in addition to the government-run Radio Uganda there are a number of privately owned stations. Television is transmitted over a radius of 50 miles (80 km) from Kampala, with relay stations around the country. A fluctuating number of daily newspapers is published in Uganda, and daily papers published in Kenya are available. The degree of government control and censorship of the press has varied under different regimes. Since the early 1990s, however, there has been considerable freedom of expression in the country.

Cultural life. Indigenous music and dances are highly popular in rural villages and among the various ethnic groups in urban areas. Cultural institutions include the National Theatre and the Uganda Museum in Kampala, the Entebbe Botanical Gardens, and museums at the national parks.

History. Bantu-speaking peoples were probably among the earliest inhabitants of the area. Toward the end of the 17th century, Nilo-Hamitic groups began to move into northern Uganda and a century later into the south. Arabs reached the country in the 1840s trading in ivory and slaves. In 1862 the kabaka (ruler) Mutesa I admitted to the Buganda kingdom the Englishman John Hanning Speke and the Scotsman James Augustus Grant, the first European explorers to reach the area. The first missionaries of the British Church Missionary Society entered Mutesa's

kingdom in 1877, and other missionaries followed. When Mutesa died in 1884, he was succeeded by his son Mwanga, who persecuted the Christians and tried to expel them. Muslim Arabs, however, expelled both Mwanga and the Christian missionaries from Buganda and seized control of the kingdoms. With the assistance of Christians of the Ganda group, Mwanga's kingdom was restored, but it soon came under European domination.

The German Carl Peters made a treaty of protection with Mwanga in 1889, but this was revoked when the Anglo-German agreement of 1890 declared all of the country north of latitude 1° S to be a British sphere of influence. That same year the British East Africa Company agreed to administer the region on behalf of the British government, and the company's agent, F.D. Lugard, made a treaty with Mwanga, placing Buganda under the company's protection. Lugard also made treaties of protection with the rulers of the western states of Ankole and Toro. In 1894 Buganda was formally proclaimed a British protectorate. Bunyoro, Toro, Ankole, and Busoga were included in the protectorate in 1896, and in the later 1890s treaties were also made with chiefs to the north of the Victoria Nile River.

The conditions of World War II required Uganda to become as economically self-sufficient as possible. In 1945 the first Africans were nominated to the Legislative Council, and in 1955 a ministerial system was implemented, but the protectorate government faced alternating support and opposition from the influential Ganda rulers of Buganda.

Uganda gained its independence in 1962, and Milton Obote, a leader of the Lango people, became prime minister. A year later Mutesa II, the kabaka of Buganda, was appointed the first president, but conflicts grew between representatives of the various ethnic groups and between the president and the prime minister. Obote ousted Mutesa in 1966, took over as president, and proclaimed a new constitution a year later. In 1971 a military coup replaced Obote with Major General Idi Amin, whose reign was notorious for its brutality. Amin expelled Asians from Uganda in 1972, persecuted the Acholi, Lango, and other peoples, and presided over a general economic collapse. Late in 1978 Amin invaded Tanzania. In retaliation, Tanzanian forces invaded Uganda a year later and deposed Amin. Amid considerable controversy, Obote was elected to the office of president in 1980, but he was deposed once again by a military coup in 1985. The new military rulers themselves were pushed out the following year by the armed National Resistance Movement, led by Yoweri Museveni. A new constitution was promulgated in 1995, and in presidential elections held in 1996 Museveni easily won reelection. Despite an improved economy and a better record on human rights, inflation and unemployment continued to be problems, and Uganda faced continued criticism in the beginning of the 21st century for its support of rebel factions in Congo (Kinshasa).

Uganda, Martyrs of, a group of 22 African Roman Catholics who were executed during the persecution of Christians under Mwanga, kabaka (ruler) of Buganda (now part of Uganda) from 1885 to 1887.

The first Roman Catholic missions to Bantu-speaking Africa were established by the White Fathers Mission in 1879. Christians were tolerated by the kabaka Mutesa I, but his successor, Mwanga, launched a campaign against them. Mwanga massacred the Anglican missionary bishop James Hannington and his colleagues in October 1885. St. Joseph Mukasa, an important member of the royal household, reproached the kabaka for the massacre and on November 15 of that year, Mwanga had Joseph beheaded.

The Christian pages under Joseph's guidance became the next victims. Mwanga, having learned that they had received religious instruction from the page St. Denis Ssebuggwawo, ordered that all the youths be arrested. St. Charles Lwanga, Mukasa's successor, then secretly baptized those boys who had only been catechumens. The following day they were herded away to the village of Namugongo. Three of them were murdered en route (St. Pontian Ngondwe, a soldier, and the royal servants Athanasius Bazzekuketta and Gonzaga Gonza). All the survivors, as recorded by Father Lourdel, superior of the Roman Catholic mission to Uganda, were imprisoned for a week. With the exception of St. Mbaga-Tuzinde, who was bludgeoned by his own father, the following pages were burned alive on June 3, 1886: Saints Ambrose Kibuka, Anatole Kiriggwajjo, Achilles Kiwanuka, Mugagga, Mukasa Kiriwawanvu, Adolphus Mukasa Ludigo, Gyavira, and Kizito. The soldiers and officials Saints Bruno Serunkuma, James Buzabaliawo, and Luke Banabakintu were martyred with them.

Mwanga continued to destroy both Protestant and Roman Catholic missionaries. Subsequent victims included Saints Matthias Mulumba, assistant judge to a provincial chief; Andrew Kaggwa, chief of Kigowa; and Noe Mawaggali, a Roman Catholic leader. The page St. Jean Marie Muzeyi was beheaded on Jan. 27, 1887. Collectively, the martyrs were solemnly beatified by Pope Benedict XV in 1920 and canonized by Pope Paul VI on Oct. 18, 1964. Their feast day is June 3.

BIBLIOGRAPHY. Accounts of the martyrs are found in J.P. Thoonen, *Black Martyrs* (1941); and J.F. Faupel, *African Holocaust,* 2nd rev. ed. (1965).

Ugarit, ancient city lying in a large artificial mound called Ras Shamra (Ra's Shamrah), 6 miles (10 km) north of Al-Lādhiqīyah (Latakia) on the Mediterranean coast of northern Syria. Its ruins, about half a mile from the shore, were first uncovered by the plow of a peasant at Al-Bayḍā Bay. Excavations were begun in 1929 by a French archaeological mission under the direction of Claude F.A. Scheffer.

The golden age of Ugarit. The most prosperous and the best-documented age in Ugarit's history, dated from about 1450 to about 1200 BC, produced great royal palaces and temples and shrines, with a high priests' library and other libraries on the acropolis. Some of the family vaults built under the stone houses show strong Mycenaean influence. Mycenaean and Cypriot pottery in great amounts has also been found.

After the discovery of the temple library, which revealed a hitherto unknown cuneiform alphabetic script as well as an entirely new mythological and religious literature, several other palatial as well as private libraries were found, along with archives dealing with all aspects of the city's political, social, economic, and cultural life.

The art of Ugarit in its golden age is best illustrated by a golden cup and patera (bowl) ornamented with incised Ugaritic scenes; by carved stone stelae and bronze statuettes and ceremonial axes; by carved ivory panels depicting royal activities; and by other fine-carved ivories. Despite Egyptian influence, Ugaritic art exhibits a Syrian style of its own.

Soon after 1200 BC, Ugarit came to an end. Its fall coincided with the invasion of the Northern and Sea Peoples and certainly with earthquakes and famines. In the Iron Age and during the 6th–4th century BC, there were small settlements on the site (Leukos Limen).

The excavators of the site were fortunate in the number and variety of finds of ancient records in cuneiform script. The excavations continue, and each season throws some new and often unexpected light on the ancient north Canaanite civilization. The texts are written on clay tablets either in the Babylonian cuneiform script or in the special alphabetic cuneiform script invented in Ugarit.



Golden bowl from Ugarit, 14th century BC; in the National Museum, Aleppo, Syria
Hirmer Fotoarchiv, München

Several copies of this alphabet, with its 30 signs, were found in 1949 and later. A shorter alphabet, with 25, or even 22, signs, seems to have been used by 13th-century traders.

Scribes used four languages: Ugaritic, Akkadian, Sumerian, and Hurrian, and seven different scripts were used in Ugarit in this period: Egyptian and Hittite hieroglyphic and Cypro-Minoan, Sumerian, Akkadian, Hurrian, and Ugaritic cuneiform. These show clearly the cosmopolitan character of the city.

The Middle Bronze Age period. A carnelian bead identified with the pharaoh Sesostris I (reigned 1971–28 BC) and a stela and statuettes, gifts to the kings of Ugarit from other Middle Kingdom pharaohs (*e.g.,* Sesostris II, 1897–78, and Amenemhet III, 1842–1797), provided the first exact dating in the history of Ugarit. Eggshell ware from Crete (Middle Minoan period) and Babylonian cylinder seals found in the tombs of level II also provided cross datings. During the 18th and 17th centuries BC, Ugarit was apparently under the control of new tribes related to the Hyksos, probably mainly Hurrians or Mitannians, who mutilated the Egyptian monuments.

Ras Shamra texts and the Bible. Many texts discovered at Ugarit, including the "Legend of Keret," the "Aghat Epic" (or "Legend of Danel"), the "Myth of Baal-Aliyan," and the "Death of Baal," reveal an Old Canaanite mythology. A tablet names the Ugaritic pantheon with Babylonian equivalents; El, Asherah of the Sea, and Baal were the main deities. These texts not only constitute a literature of high standing and great originality but also have an important bearing on Old Testament studies. It is now evident that the patriarchal stories in the Old Testament were not merely transmitted orally but were based on written documents of Canaanite origin, the discovery of which at Ugarit has led to a new appraisal of the Old Testament.

The Ras Shamra mound. Soundings made through the Ras Shamra mound revealed a reliable stratigraphic sequence of settlements from the beginning of the Neolithic period. Above the ground level, five main upper levels (levels V to I) were identified. The three lowest levels have been subdivided into smaller layers. The earliest settlement on level V—already a small fortified town in the 7th millennium BC—shows a prepottery stage with flint industries. Also on level V, but in a later layer, light, sun-dried pottery appears. Level IV and part of level III date back to the Chalcolithic, or Copper-Stone, Age, when

new ethnic groups arrived from the northeast and the east. This stage shows Mediterranean as well as strong Mesopotamian influence. During the Early Chalcolithic Age, painted pottery of the Hassunan and Halafian cultures of northern Iraq is very common. The Late Chalcolithic shows fresh Mesopotamian influence with its monochromatic, Ubaidian, geometric painted pottery. The flint industry was then in competition with the first metal tools, made of copper. The Early Bronze Age (3rd millennium) layers, immediately above, in level III, yielded no more painted ware but various monochromatic burnished wares and some red polished ware of Anatolian origin. With Early Bronze Age III, metallurgy quickly developed. In the Middle Bronze Age, newcomers, so-called Torque-Bearers, expert in bronze metallurgy, arrived (*c.* 2000–1900 BC). Levels II and I correspond to historical periods within the 2nd millennium BC.

(C.F.A.S.)

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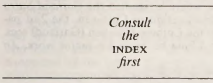
Ugaritic alphabet, cuneiform writing system used on the Syrian coast from the 15th to 13th century BC. It is believed that it was invented independent of other cuneiform writing systems and of the linear North Semitic



Ugaritic alphabet tablet
From D. Diringer, *Writing*

alphabet, though similarities in certain letters suggest that it may have been patterned after the North Semitic alphabet. Unlike the North Semitic alphabet, however, Ugaritic was written from left to right; its 30 symbols included 3 syllabic signs for vowels, as opposed to the 22 consonantal letters in the North Semitic alphabet. Extant documents in Ugaritic are written on clay tablets with a wedge-shaped stylus and date from the 15th–14th century BC. They were found primarily at Ugarit (Ras Shamra) on the Syrian coast in 1929. Two other inscriptions in Ugaritic, found at Beth-Shemesh in Palestine (modern Tel Bet Shemesh, Israel) and in Lower Galilee (modern northern Israel), suggest that the script may have been known throughout a fairly wide area.

Ugedei (Mongol ruler): *see* Ögödei.

Ughelli, town, Delta state, southern Nigeria. Ughelli lies in the western Niger River delta east of Warri. Originally an agricultural-trade centre (cassava, plantains, sugarcane, palm oil and kernels) for the Urhobo (Isoko) people, it has also developed industries producing sheet glass, glass bottles, and natural gas. Petroleum deposits were discovered in the vicinity, and since 1965 crude oil from the Ughelli fields has been shipped via the 140-mile (225-kilometre) Trans-Niger Pipeline southeastward to the port of Bonny for export. The town has a technical college. Pop. (1991) 54,206.

Ugo DI SEGNI, also called UGOLINO DI SEGNI (pope): *see* Gregory IX.

Ugolnye Kopi (west-central Russia): *see* Kopeysk.

Ugra, Battle of the (1480), bloodless confrontation between the armies of Muscovy and the Golden Horde, traditionally marking the end of the "Mongol yoke" in Russia. By 1480 the Golden Horde had lost control of large portions of its empire; Ivan III of Moscow had stopped paying tribute to the Horde and no longer recognized it as an authority over Muscovy. In 1480 Akhmet, khan of the Golden Horde, led an army to the Ugra River, about 150 miles (240 km) southwest of Moscow, and waited there for his Lithuanian allies. The Muscovite army was drawn up on the opposite bank of the river. The two armies faced each other but did not fight. When the Lithuanians did not appear and Akhmet received word that his base camp near Sarai had been raided by allies of Ivan, he withdrew his army. The Muscovite army returned home. Although the event itself had little significance, Muscovite chroniclers later composed grandiose tales about it, giving rise to the notion that the Muscovites had won a great victory on the Ugra and liberated themselves from Mongol rule.

Uguccione DELLA FAGGIUOLA (b. *c.* 1250, Massa Trabaria, Tuscany [Italy]—d. Nov. 1, 1319, Vicenza), Tuscan noble who, as tyrant of Pisa and Lucca, played a role in the 14th-century Italian struggle between papal and imperial factions.

A member of an old Ghibelline (pro-imperial) family, Uguccione had served as *podestà* (chief magistrate) and captain general in several Italian cities when the sudden death of Holy Roman Emperor Henry VII left Ghibelline Pisa without effective leadership. Offered the position of *podestà*, the 60-year-old Uguccione soon became captain of war and virtual dictator. A Ghibelline rising in Lucca, led by the mercenary captain Castruccio Castracani, enabled Uguccione to make an easy conquest of the neighbouring city. Invading Florentine territory in 1315, he won a resounding victory over Guelf (papal) forces at Montecatini, northwest of Florence; in 1316, however, he was overthrown in Pisa and Lucca by Castracani.

After an unsuccessful attempt to retake the two cities, aided by Cangrande I della Scala, lord of Verona, Uguccione returned to Verona and became *podestà* of Vicenza. He died the following year.

uguns māte (Baltic religion): *see* gabija.

Uhaimer, Tall al- (Iraq): *see* Kish.

UHF, abbreviation of ULTRAHIGH FREQUENCY, conventionally defined portion of the electromagnetic spectrum, encompassing radiations having a wavelength between 0.1 and 1 m and a frequency between 3,000 and 300 megahertz. UHF signals are used extensively in televison broadcasting. UHF waves typically carry televison signals on channels 14 through 83.

UHF waves are very weakly reflected by the ionized layers of the upper atmosphere. Therefore, unlike longer waves, they bend very little around the curvature of the Earth and are easily obstructed by tall buildings and mountains. They can, however, be concentrated into narrow, highly directional signal beams. These characteristics make UHF suitable for line-of-sight applications that require high accuracy. Besides their use in television broadcasting, UHF waves are utilized in ship and aircraft navigation systems and for certain types of police communications. In some instances, radio communications between spacecraft and Earth-based tracking stations are carried via UHF signals. *See also* VHF.

Uhland, Ludwig, in full JOHANN LUDWIG UHLAND (b. April 26, 1787, Tübingen, Württemberg [Germany]—d. Nov. 13, 1862, Tübingen), German Romantic poet and political figure who was an important figure in the development of German medieval studies.



Uhland, oil painting by Gottlob Wilhelm Morff, 1818; in the Schiller National Museum, Marbach, Ger.
By courtesy of the Schiller-Nationalmuseum, Marbach, Ger.

Uhland studied law and classical and medieval literature at the University of Tübingen. He wrote his first poems while in Tübingen, publishing *Vaterländische Gedichte* ("Fatherland Poems") in 1815. It was the first of some 50 editions of the work issued during his lifetime. The collection, which was inspired by the contemporary political situation in Germany, reflected both his serious study of folklore and his ability to create ballads in the folk style.

From 1812 to 1814 Uhland served as secretary in the Ministry of Justice at Stuttgart. He then practiced law and began to support the struggle for parliamentary democracy in Württemberg. From 1819 to 1827 he represented Tübingen in the Ständeversammlung (parliament), and from 1826 to 1829 he represented Stuttgart. In 1829 Uhland was appointed professor at Tübingen, but, when he was refused leave of absence by the university to sit as a liberal in the Landtag (provincial diet), he resigned the professorship (1833). In 1848 he was a member of the German National Assembly in Frankfurt.

The spirit of German Romanticism and nationalism inspired much of Uhland's poetry, as did his political career and his researches into the literary heritage of Germany. His poetry utilizes the classical form developed by Johann Wolfgang von Goethe and Friedrich von Schiller, but his naive, precise, and graceful style is uniquely his own.

Uhlenbeck, George Eugene (b. Dec. 6, 1900, Batavia, Java [now Jakarta, Indon.]—d. Oct. 31, 1988, Boulder, Colo., U.S.), Dutch-American physicist who, with Samuel A. Goudsmit, proposed the concept of electron spin.

In 1925, while working on his Ph.D. at the University of Leiden, Neth. (1927), he and Goudsmit put forth their idea of electron spin after ascertaining that electrons rotate about an axis. Uhlenbeck joined the physics department at the University of Michigan, U.S., in 1927, returned to The Netherlands, as professor at the State University at Utrecht, and then became full professor at the University of Michigan in 1939. From 1943 to 1945 he worked at the Radiation Laboratory of the Massachusetts Institute of Technology, and in the postwar period he worked in The Netherlands. In 1960 he was appointed professor and

physicist at the Rockefeller Medical Research Center at the State University of New York, New York City, becoming professor emeritus in 1974. He wrote many papers on atomic structure, quantum mechanics, kinetic theory of matter, and nuclear physics.

Üich'ŏn (Buddhist priest): *see* Daigak Guksa.

Uíge, formerly CARMONA, town, northwestern Angola. Uíge grew from a small market centre in 1945 to become Angola's major centre for coffee production in the 1950s. The Portuguese designated Uíge a city in 1956. Its prosperity was short-lived, however, as recurrent fighting between the National Front for the Liberation of Angola (FNLA), one of three preindependence guerrilla movements, and Portuguese forces from 1961 to 1974 resulted in heightened instability in the locality. Portuguese settlers abandoned the town in 1974–75 prior to Angolan independence. In 1976 the town, which had become the headquarters of the FNLA, was captured by forces of the Popular Movement for the Liberation of Angola (MPLA), the preindependence guerrilla movement that later became the national government. Attempts at reviving coffee production in the locality since then have had only limited success. Pop. (1985 est.) 69,484.

Uighur, Chinese (Pinyin) UYGUR, Turkic-speaking people of interior Asia who live for the most part in northwestern China, in the Uighur Autonomous Region of Sinkiang; a small number live in the Central Asian republics. There were more than 7,700,000 Uighurs in China in the late 20th century, most of them in Sinkiang; there were also some 300,000 in Uzbekistan, Kazakstan, and Kyrgyzstan.

The Uighur language is part of the Turkic language group, and the Uighur are among the oldest Turkic-speaking peoples of Central Asia. They are mentioned in Chinese records from the 3rd century AD. They first rose to prominence in the 8th century, when they established a kingdom along the Orhon River in what is now north-central Mongolia. In 840 this state was overrun by the Kyrgyz, however, and the Uighur migrated southwestward to the area around the Tien Shan (mountains). There the Uighur formed another independent kingdom in the Turfan region, but this was overthrown by the expanding Mongols in the 13th century.

The Uighur are, in the main, a sedentary, village-dwelling people, their habitat being the network of oases formed in the valleys and lower slopes of the Tien Shan, Pamirs, and related mountain systems. The region is one of the most arid in the world; hence, for centuries they have practiced irrigation to conserve their water supply for agriculture. Their principal food crops are wheat, corn (maize), kaoliang (a form of sorghum), and melons. The chief industrial crop is cotton, which has long been grown in the area. Many Uighur are employed in petroleum extraction, mining, and manufacturing in urban centres.

The chief Uighur cities are Urumchi, the capital of Sinkiang, and Kashgar, an ancient centre of trade near the Russo-Chinese border. The Uighur have lacked political unity in recent centuries, except for a brief period during the 19th century when they were in revolt against Peking. Their social organization is centred on the village. The Uighur of Sinkiang are Sunnite Muslims.

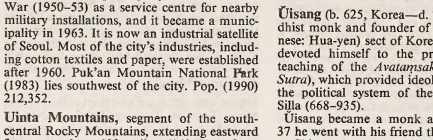
Uighur Autonomous Region of Sinkiang (China): *see* Sinkiang, Uighur Autonomous Region of.

Uighur language, also called NEW-UIGHUR, member of the Turkic subfamily of the Altaic language family, spoken by Uighurs in the Uighur Autonomous Region of Sinkiang of northwestern China and in portions of Uzbekistan, Kazakstan, and Kyrgyzstan. The modern Uighur language, which was based on the Taranchi dialect spoken in Russia prior to the Russian Revolution of 1917, is classified with Uzbek in the southeastern (Uighur-Chagatai) branch of the Turkic languages. The Turkic language known as Yellow Uighur was closely related to Uighur but subsequently developed in isolation from it.

The Uighur literary language was originally written in Arabic script; but a modified Latin alphabet was officially adopted in 1930, and in 1947, a modified Cyrillic alphabet was adopted within the Soviet Union. In China the Arabic script continues to be widely used for writing Uighur. *See also* Turkic languages.

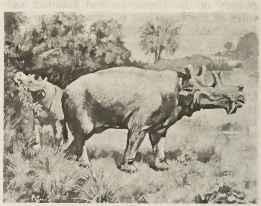
Üijŏngbu, city, Kyŏnggi *do* (province), northwestern South Korea. Üijŏngbu lies 12 miles (20 km) north of Seoul. Its name, meaning "the Cabinet" in old Korean, derives from its being the temporary site of the Cabinet office during the Chosŏn (Yi) dynasty (1392–1910). The city was formerly the market centre for agricultural products grown in the surrounding area. It developed rapidly after the Korean War (1950–53) as a service centre for nearby military installations, and it became a municipality in 1963. It is now an industrial satellite of Seoul. Most of the city's industries, including cotton textiles and paper, were established after 1960. Puk'an Mountain National Park (1983) lies southwest of the city. Pop. (1990) 212,352.

Uinta Mountains, segment of the south-central Rocky Mountains, extending eastward for more than 100 miles (160 km) from the Wasatch Range across northeastern Utah and slightly into southwestern Wyoming, U.S. Many of the range's summits exceed 13,000 feet (4,000 m), including Kings Peak (13,528 feet [4,123 m]), the highest point in Utah. The mountains are a headstream region for the Provo, Bear, and Duchesne rivers and include parts of the Ashley, Wasatch, and Uinta national forests. The Uintah and Ouray Indian Reservation lies to the south.



Bear River valley and the Uinta Mountains, northern Utah
David Muench

Uintatherium, extinct genus of large, primitive hoofed mammals found as fossils in North America in terrestrial deposits of the Middle and Late Eocene Epochs (52 million to 36.6 million years ago). The uintatherium, which was as large as the modern rhinoceros, was among the largest animals of its time. The limbs were strongly constructed in order to support the massive body. The skull was mostly occupied by bone rather than brain, and uintatherium must have had a very limited intelligence. Three pairs of bony growths, or protuberances, were present on the skull of the uintatherium. The anteriormost pair may have supported prominent horns. Uintatherium's teeth were distinctive: males of the genus possessed large, powerful canines; incisors were absent in the upper jaw but present in a reduced state in the lower; and the upper molars were characterized by the presence of V-shaped crests. By the end of the Eocene Epoch, uintatherium and closely related forms became extinct; they were unable to adapt to the changing environmental conditions of that time.



Uintatherium from Wyoming, restoration by Charles R. Knight
By courtesy of the American Museum of Natural History, New York

Üisang (b. 625, Korea—d. 702, Korea), Buddhist monk and founder of the Hwaŏm (Chinese: Hua-yen) sect of Korean Buddhism. He devoted himself to the propagation of the teaching of the *Avataṃsaka-sūtra* (*Garland Sutra*), which provided ideological support for the political system of the state of Unified Silla (668–935).

Üisang became a monk about 650, and at 37 he went with his friend the monk Wŏnhyo to China, where he studied the *Garland Sutra* under the direction of Chih-yen, the 2nd patriarch of the Chinese Hua-yen (Garland) sect. While in China he wrote his major work, *An Explanatory Diagram on the Garland World System,* which elicited high acclaim from his master and is still read widely in the Buddhist circles of East Asia. On returning home in 671, he built, sponsored by King Munmu, the Pusŏk Temple as the centre of the Hwaŏm sect.

Uist, either of two islands of the Outer Hebrides, both lying off the northwestern coast of Scotland. *See* South Uist.

Uitenhage, town, Eastern province, South Africa, near the Indian Ocean, northwest of Port Elizabeth. It was founded in 1804 by J.A. Uitenhage de Mist, a Dutch governmental official sent to the Cape Colony by the government of the Batavian Republic, and it contains a number of 19th-century buildings, including the Drostdy (1815), Town Hall (1882, extended in 1952), and Court House (1898). Uitenhage is an industrial town, with automobile-assembly plants, railway workshops, and textile and tire factories. It is also the centre of a substantial sheep- and

goat-farming district. Pop. (1985) mun., 54,-987.

Uitlander (Afrikaans: "outlander"), any British or other non-Afrikaner immigrant in the Transvaal region in the 1880s and '90s. The prospect of gold lured large numbers of newcomers to Johannesburg, where they became a majority of the citizenry and were led by an aristocracy of wealthy mine owners. The Transvaal's long-established rural population of Boers (Afrikaners), afraid of being overwhelmed, passed laws to restrict the Uitlanders' influence. A law of 1888 declared that only the Dutch language could be used in legal proceedings and official documents.

Naturalization and the right to vote, under a law passed in 1890, involved not only a naturalization fee but also a minimum of 14 years' residence. These restrictions on the franchise became a focus of Uitlander protest. In 1892 the lawyer Charles Leonard organized the National Union, which held meetings and circulated petitions demanding that Uitlanders be given the right to vote. From that time on, tensions mounted steadily, aggravated by the Jameson Raid of 1895 and by open British support for the Uitlanders. War finally erupted in 1899 (*see* South African War).

Uitzilopochtli (Aztec god): *see* Huitzilopochtli.

uji, any of the hereditary lineage groups that, until their official abolition in AD 604, formed the basic, decentralized ruling structure of early Japan. They are often referred to as the great clans because of their traditions of common descent, and they were ruled by an *uji* chief who was considered a direct descendant of the deity (*ujigami*) worshiped by the group's members. The *uji* members, who had the privilege of having personal surnames and being called by titles of respect, were supported by the labour of common workers, who were organized into subunits of the *uji* known as *be* (*q.v.*).

When the Yamato *uji* began to establish itself as the leading power in the 3rd century, its chief created the Japanese imperial line, which is said to be descended from Amaterasu, the sun goddess and deity of the Yamato. Imperial rule over the autonomous *uji* remained weak until the adoption of centralized government in the mid-7th century.

Uji, city, Kyōto *fu* (urban prefecture), west-central Honshu, Japan. It lies along the Uji River in the southeastern corner of the Kyōto Basin. It developed in about the 7th century as a river crossing. During the Tokugawa era (1603–1867) it was the main post town on the road between Nara and Ōtsu.

Uji is best known as the place where tea was first cultivated in Japan in the Muromachi era (1338–1573). High-quality green tea is still grown on the fertile alluvial fan of the Uji River, and there is cormorant fishing in the river. With improved road and rail connections to Kyōto, the city became a residential suburb and resort, serving the greater urban centre. Among its many historic temples and shrines is the Byōdō Temple, which was built as a residence in the mid-11th century for a minister who later converted the building into a Buddhist temple when he became a Buddhist monk. Minamoto Yorimasa, a warrior and poet who supposedly killed the *nue* (a monster having the head of a monkey, the body of a tiger, and the tail of a serpent) in 1153, fought against the Taira clan at Uji Bridge in 1180. After his defeat he took refuge in the Byōdō Temple, where he committed seppuku. Pop. (1994 est.) 183,880.

Uji-Yamada (Japan): *see* Ise.

ujigami, in the Shintō religion of Japan, the tutelary deity of a village or geographic area. The meaning of *ujigami* has undergone considerable evolution over the centuries, mainly because of the historical migrations of clan communities in Japan. Originally the term referred to the ancestral deity (*kamī*) of a family or clan (*uji*), blood kinship forming the basis of the spiritual relationship. The extent of the *ujigami*'s protection was later enlarged to cover those who lived with the clan or near it and since has extended over the parish into which one is born. *Ujiko* are those who live within or were born within the geographic boundaries of the tutelary deity and who help manage the shrine affairs.

Ujjain, city, western Madhya Pradesh state, central India. It is located just east of the Siprā River. Ujjain, one of seven sacred Hindu cities, is the site of the Kumbh Mela festival every 12 years.



The Mahākāla temple in Ujjain, Madhya Pradesh, India
Baldev—Shostal Assoc.

Lying on the first meridian of the ancient Hindu geographers, it was the capital (as Ujjayinī) of the Aryan Avanti kingdom (6th–4th century BC). In the 2nd century BC, Ujjain was the seat of the emperor Aśoka, the last of the Mauryan rulers and one of the most influential early Buddhists. The city was known to the Greek geographer Ptolemy in the 2nd century AD as Ozene, the capital of the Western Satraps; *i.e.,* the Greek, Scythian, and Parthian rulers of western India. An important trade centre in ancient times, it passed in 400 to Candra Gupta II of Magadha. In 1235 Iltutmish of Delhi sacked Ujjain, and it remained in Muslim hands until its capture in 1750 by the Sindhias, who made it their capital. With the transfer of the capital to Lashkar in Gwalior (1810) and the rise of Indore, Ujjain declined in importance. It was constituted a municipality in 1887. Near the Sindhia palace is the Mahākāla (Śiva) temple, one of the most sacred in India, which was destroyed in 1235 but subsequently restored. Just southeast is the observatory built by Maharaja Jai Singh of Jaipur, governor of Mālwa (1728–34) under the Mughals. Just north lies Bharathari Cave, an 11th-century temple.

A rail junction, the city is a major agricultural and textile-trade centre. Cotton ginning and milling, oilseed milling, handweaving, and the manufacture of metalware, tiles, hosiery, confectionery, strawboard, and batteries are important industries. Ujjain is the seat of Vikram University (founded 1957). Pop. (1991) city, 362,266; metropolitan area, 362,633.

ʿUjmān (United Arab Emirates): *see* ʿAjmān.

Ujung-Kulon National Park, English POINT KULON NATIONAL PARK, national park on the island of Java, in Jawa Barat *provinsi* (province), Indonesia. A remote area of low hills and plateaus, with small lagoons and coastal dunes, it occupies 475 square miles (1,229 square km) on a peninsula and some islands at the extreme western tip of Java. The park faces the Sunda Strait, separating Java from Sumatra, and includes Panaitan Island, about 6 miles (10 km) north of the peninsula.

The Krakatau Islands, a small group of islands that are remnants of the famous volcanic eruption of Krakatoa in 1883, are located about 40 miles (65 km) north of the peninsula. Following Krakatoa's explosions and tidal waves, the peninsula was blanketed by a layer of volcanic ash and dust. After the jungle grew back and the area was reinhabited by wildlife, it was set aside as a nature reserve in 1921; the national park was proposed in 1980 and formally established in 1992. The park today contains the last remaining low-relief forest on Java; typical trees are of the genera *Ficus* and *Barringtonia.* Ujung-Kulon is best known as the last refuge of the one-horned Javan rhinoceros. Other species in the park include the Javan tiger, banteng (a species of wild cattle), Javan gibbon, Javan leaf-monkey, crocodile, green sea turtle, green peafowl, jungle fowl, the muntjac (barking deer), and the chevrotain, or mouse deer.

Ujung Pandang, formerly MACASSAR, or MAKASAR, *kotamadya* (municipality) and capital, Sulawesi Selatan *provinsi* (province), Celebes, Indonesia. It lies on the western side of the most southerly peninsula of Celebes.

Already a flourishing port when the Portuguese arrived in the 16th century, Makasar subsequently came under control of the Dutch, who built a trading station in 1607 and finally deposed the sultan in 1667. It was briefly (1946–49) the capital of the Dutch-sponsored state of Indonesia Timur (East Indonesia). The people, the Makasarese, are a branch of the Malay people and are closely related to the Buginese.

The main exports from Ujung Pandang are copra, gums and resins, rubber, coffee, and rattan. The port is also a distribution centre for other parts of Celebes, the Moluccas, and the Lesser Sunda Islands. There is an airport, and good roads link the city to the hinterland.

Cultural amenities include Hasanuddin University (founded 1956), the major university of eastern Indonesia. There are historical exhibits in the restored Dutch fort that guards the harbour. Nestled in forest-clad hills to the northeast is a cave with prehistoric art. Also nearby is the Bantimurung waterfall. Pop. (1990) 913,196.

Újvidék (Yugoslavia): *see* Novi Sad.

U.K.: *see* United Kingdom.

ukelele: *see* ukulele.

Ukemochi no Kami (Japanese: "Goddess Who Possesses Food"), in Shintō mythology, the goddess of food. She is also sometimes identified as Wakaukanome ("Young Woman with Food") and is associated with Toyuke (Toyouke) Ōkami, the god of food, clothing, and housing, who is enshrined in the Outer Shrine of the Grand Shrine of Ise.

According to the legend recounted in the *Nihon shoki* ("Chronicles of Japan"), the moon god, Tsukiyomi, was dispatched to earth by his sister, the sun goddess Amaterasu, to visit Ukemochi no Kami. (According to the *Kojiki,* "Records of Ancient Matters," it was another brother, the storm god Susanoo, who was sent on the mission.) The food goddess welcomed him by facing the land and disgorging from her mouth boiled rice, turning toward the

sea and spewing out all kinds of fishes, and turning toward the land and disgorging game. She presented these foods to him at a banquet, but he was displeased at being offered the goddess's vomit and drew his sword and killed her. When he returned to heaven and informed his sister of what he had done, she became angry and said, "Henceforth I shall not meet you face to face," which is said to explain why the Sun and the Moon are never seen together.

Another messenger sent to the food goddess by Amaterasu found various stuffs produced from her dead body. From her head came the ox and the horse; from her forehead, millet; from her eyebrows, silkworms; from her eyes, panic grass (a cereal); from her belly, rice; and from her genitals, wheat and beans. Amaterasu had the food grains sown for humanity's future use and, placing the silkworms in her mouth, reeled thread from them, thereby beginning the art of sericulture—the production of raw silk.

Ukhta, also spelled UCHTA, industrial city, Komi republic, northwestern Russia, on the Ukhta River. It was founded as the village of Chibyu in 1931 and became a city in 1943, when it was linked to the Pechora railway. Ukhta lies within the Pechora Basin, a significant oil and natural gas area. Some oil is refined locally, but most is conveyed via pipeline to refineries between St. Petersburg and Moscow. The city has institutes for the oil, forestry, and railway industries. Pop. (1993 est.) 111,000.

ukiyo-e (Japanese: "pictures of the floating world"), one of the most important genres of art of the Tokugawa period (1603–1867) in Japan. The style is a mixture of the realistic narrative of the *emaki* ("picture scrolls") produced in the Kamakura period and the mature decorative style of the Momoyama and Tokugawa periods. The ukiyo-e style also has about it something of both native and foreign realism.

Screen paintings were the first works to be done in the style. These depicted aspects of the entertainment quarters (euphemistically called the "floating world") of Edo (modern Tokyo) and other urban centres. Common subjects included famous courtesans and prostitutes, kabuki actors and well-known scenes from kabuki plays, and erotica. More important than screen painting, however, were woodblock prints, ukiyo-e artists being the first to exploit that medium. A new interest in the urban everyday world and its market motivated the swift development of ukiyo-e prints designed for mass consumption.

Hishikawa Moronobu is generally accredited as the first master of ukiyo-e. The transition from single- to two-colour prints was made by Okumura Masanobu. In 1765 polychrome prints using numerous blocks were introduced by Suzuki Harunobu. The essence of the ukiyo-e style was embodied in the works of Utamaro, Hokusai, and Hiroshige.



"Hanshozuku Bijin Soroi," ukiyo-e colour woodcut by Okumura Masanobu (1686–1764), Tokugawa period; in the Philadelphia Museum of Art

By courtesy of the Philadelphia Museum of Art, given by Mrs. Anne Archbold

Ukkel (Belgium): *see* Uccle.

Ukraine, Ukrainian UKRAYINA, country in southeastern Europe, the second largest of the continent after Russia. Ukraine is bordered by Belarus on the north, by Russia on the north, northeast, and east, by the Sea of Azov and the Black Sea on the south, by Moldova and Romania on the southwest, and by Hungary, Slovakia, and Poland on the west. The capital is Kiev. Area 233,100 square miles (603,700 square km). Pop. (1995 est.) 52,003,000.

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

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

Physical and human geography. Ukraine consists almost entirely of level plains and occupies a large portion of the East European Plain. The central part of the country consists of the Dnieper Lowland, through which the Dnieper River runs from north to south. Other lowlands extend along the shores of the Black and Azov seas in southern Ukraine, while the Crimean Peninsula, in the extreme south, has both lowlands and low mountains. Western Ukraine has some uplands, and the Carpathian Mountains extend through that region for more than 150 miles (240 km).

Ukraine lies in a temperate climatic zone and receives 16 to 24 inches (400 to 600 mm) of precipitation annually. The Dnieper, Don, Dniester, and other rivers all drain southward through the plains to empty into the Azov-Black Sea Basin. Ukraine's most important river, the Dnieper, is extensively dammed along much of its course for hydroelectric and irrigation purposes.

Ethnic Ukrainians make up more than seven-tenths of the total population. The Ukrainian language is closely related to Russian and Belarusian and belongs to the Slavic group of languages. Russians are the largest minority group, accounting for about two-tenths of the population. The highest population densities are found in the industrialized Donets Basin and Dnieper Bend regions and in the agriculturally productive forest-steppe belt.

The belt of mixed forest and steppe running west-east across south-central Ukraine has rich black soils whose intense cultivation has made the country a major producer of winter wheat and sugar beets. Other crops include sunflower seeds, corn (maize), potatoes, grapes, oats, rye, millet, and buckwheat. Fruits and vegetables are grown on the outskirts of cities, and cattle and pigs are raised throughout the country.

Ukraine has rich reserves of iron ore, bituminous and anthracite coals, and manganese-bearing ores located in close proximity to each other in the Donets Basin. This region, in east-central Ukraine, is the industrial heartland of the country and one of the major heavy-industrial and mining-metallurgical complexes of Europe. Ukraine also produces natural gas and petroleum, though reserves of these fuels were much depleted during the Soviet period.

The Ukrainian economy largely depends on heavy industry and agriculture. Besides its basic mining industries, the Donets Basin has ferrous-metals industries that produce iron and steel in large quantities. Durable goods manufactured in the Donets Basin include mining and metallurgical equipment, automobiles, and tractors. The chemical industry produces large amounts of sulfuric acid and mineral fertilizers. Ukraine's food-processing industries yield granulated sugar and meat, fruit, and dairy products. The country's light-industrial and consumer-goods sectors are underdeveloped in comparison to its heavy industry and agriculture, however.



Ukraine

Ukraine's political system underwent rapid change in the early 1990s after the country gained its independence from the collapsing Soviet Union in late 1991. During the Soviet period (1922–91), Ukraine had been governed by the Ukrainian Communist Party, which in turn was subordinated to the Communist Party of the Soviet Union. After independence, however, Ukraine's rubber-stamp legislature, the Supreme Soviet, was converted to a functioning parliament called the Supreme Council, whose members are chosen to four-year terms in free, multicandidate elections. The chief executive of Ukraine is the president, who is also chosen in free elections. The day-to-day administration of the government rests in the hands of the prime minister, who heads the Cabinet of Ministers and is chosen by the president with parliamentary approval.

Illiteracy was virtually eliminated during the Soviet period, and education is compulsory between the ages of 7 and 15. In higher education, Ukrainian is once again becoming the main language of instruction after being displaced by Russian during the Soviet period. Primary and secondary schools using Russian still prevail in the Donets Basin and in the south, where there are large Russian minorities.

History. Ukraine was not widely called by its present name until the 19th century. Different parts of Ukraine were invaded and occupied in the first millennium BC by the Cimmerians, Scythians, and Sarmatians and in the first millennium of the Christian era by the Goths, Huns, Bulgars, Avars, Khazars, Magyars, and Pechenegs. The most significant development of this entire period, however, was the movement of some Slavic tribes in the 5th and 6th centuries from their primordial homeland north of the Carpathian Mountains eastward into the forest and forest-steppe region of western and north-central Ukraine. From there the Slavs would eventually expand farther north into territories of the future Russian state around Moscow. Among the Slavs' earliest settlements was that of Kiev along the Dnieper River, which was the capital of the Polianian tribe among them. The state known as Kievan Rus arose from the intermixture of the Polianians with those Varangians (Norsemen) who controlled the Dnieper River trade

route connecting the Baltic Sea with Byzantium. The name Rus, which first designated the lands around Kiev, later came to include the entire Kievan domain.

The Kievan Rus state reached its zenith in the 10th and 11th centuries under Vladimir I (St. Vladimir) and his son Yaroslav I (Yaroslav the Wise). Vladimir I adopted Christianity as the official religion about AD 990, and a church hierarchy was formed under the auspices of the Byzantines and the patriarch at Constantinople. Christianity gave the eastern Slavic peoples their first written language, called Church Slavonic. Kievan Rus power peaked in the 11th century, and Kiev became eastern Europe's chief political and cultural centre. (*See also* Rurik dynasty.)

Owing to internal dissension, struggles with the invading Kipchak, and shifts in trade routes, Kiev declined in the 12th and 13th centuries. The Mongol conquest in the mid-13th century decisively ended Kievan power, but this Slavic principality of Galicia-Volhynia in western Ukraine that had emerged about 1200 continued into the 14th century.

In the 14th century Lithuania annexed most Ukrainian lands except for the Galician principality, which passed to the kingdom of Poland; southern Ukraine remained under control of the Mongol khanate of the Golden Horde. After the Union of Lublin in 1569, rule over Ukraine was transferred from Lithuania to Poland. The negotiation of the Union of Brest-Litovsk in 1596 divided Ukrainians into Orthodox and Ukrainian Catholic faithful.

Religious dissent and social strife between the Ukrainians and their Polish overlords were augmented by the Zaporozhian Cossacks, who were nominally subjects of Poland's king but were also a class of free warriors. From their base along the lower Dnieper River, the Cossacks in 1648, led by Bohdan Khmelnytsky, rose against the Poles and formed a quasi-independent, if short-lived, state. Khmelnytsky's need for help against the Poles led to an agreement with the Muscovite tsar in 1654, which was considered an act of submission by the Muscovites. Poland-Lithuania was forced to recognize Muscovite suzerainty over Kiev and the lands east of the Dnieper, and the Cossack hetmanate was gradually absorbed into the Russian Empire.

In the late 18th-century partitions of Poland, the Russian Empire obtained Ukrainian lands west of the Dnieper, except for Galicia, which Austria received. A Ukrainian nationalist movement developed in the 19th century, but the movement faced political repression and restrictions. In Austria-Hungary conditions were more favourable, and, by the time of World War I, the Ukrainians of Galicia had set up a network of viable cultural, political, and religious institutions.

After the Russian Revolution of February 1917, Ukrainian and Bolshevik forces struggled for control of Ukraine until 1921, when the Bolsheviks prevailed. In 1924 the Ukrainian Soviet Socialist Republic became a republic of the Soviet Union. Northwestern Ukraine (including Galicia and part of Volhynia) remained in the hands of Poland, which had fought against the Bolsheviks in 1919–20.

Beginning in the 1930s, the Soviet Union carried out a policy of rapid industrialization and collectivization of agriculture in the Ukrainian S.S.R. Collectivization met with peasant resistance, prompting the confiscation of grain from Ukrainian farmers by Soviet authorities. The result was a famine that claimed an estimated five million lives. The Soviet regime also tightened its control over Ukrainian cultural life and suppressed all manifestations of Ukrainian nationalism.

The German-Soviet Treaty of Nonaggression (1939) that extinguished independent Poland brought the territories of eastern Galicia and western Volhynia into the Ukrainian S.S.R. Germany's attack on the Soviet Union (1941) and its conquest of Ukraine initially found some local support, but the Germans' ruthless exploitation of Ukrainian agriculture and labour soon provoked guerrilla resistance. After Germany's defeat in 1945, all ethnically Ukrainian lands that had been part of Poland, Romania, or Czechoslovakia between the World Wars were taken by the Soviet Union, with most going to the Ukrainian S.S.R.

In 1986 the Ukrainian S.S.R. was the site of the Chernobyl accident (*q.v.*), a catastrophic fire and partial meltdown at a Soviet-built nuclear power plant. After the Soviet leader Mikhail Gorbachev introduced the reforms of glasnost and perestroika into national policy in the late 1980s, Ukrainian nationalism gradually appeared, leading the newly democratized Ukrainian parliament to declare the republic's sovereignty in 1990. After a failed coup against Gorbachev, the Ukrainian parliament declared Ukraine's independence (August 1991), an act that was approved in a referendum in December. After the dissolution of the Soviet Union that month, Ukraine gained international recognition.

In the 1990s Ukraine experienced turmoil as it attempted to implement economic and political reforms, suffering declining production, rising inflation, and widespread labour unrest. In 1994 Leonid Kuchma, a supporter of economic liberalization and closer ties with Russia, was elected president. Owing to the strength of the Communist Party in the legislature, there was constant tension between the president and the legislature. Despite disagreements with Russia over the status of Crimea and the Black Sea naval fleet, Russia and Ukraine signed a friendship agreement in 1997. Ukraine also oriented itself toward western Europe, joining the Council of Europe and the North Atlantic Treaty Organization's Partnership for Peace and signing an economic cooperation agreement with the European Union.

Ukrainian Catholic Church, largest of the Eastern Catholic churches, in communion with Rome since the Union of Brest-Litovsk (1596). Byzantine Christianity was established among the Ukrainians in 988 by St. Vladimir (Volodimir) and followed Constantinople (now Istanbul) in the Great Schism of 1054. Temporary reunion with Rome was effected in the mid-15th century, and a definitive union was achieved at Brest-Litovsk in 1596, when Metropolitan Michael Ragoza of Kiev and the bishops of Vladimir, Lutsk, Polotsk, Pinsk, and Kholm agreed to join the Roman communion, on condition that their traditional rites be preserved intact. The Orthodox did not accept the union peacably; and the bishops of Lvov (now Lviv) and Przemyśl, as well as the Orthodox Zaporozhian Cossacks, opposed the Catholics. In 1633 the metropolitanate of Kiev returned to Orthodoxy. Lvov joined the union in 1677, Przemyśl in 1692.

The partition of Poland at the end of the 18th century brought all Ukrainians, except those in the province of Galicia, under Russian control; and by 1839 the tsarist government had forcibly returned the Ukrainian Catholics to Orthodoxy. Galicia meanwhile came under the domination of the Austro-Hungarian Empire, and 1807 It was organized into the metropolitanate of Lvov. With the occupation of Galicia by Soviet armies in 1939, all church activity was suppressed, and the hierarchy was interned. In 1944 the Soviet authorities began to put pressure on the Ukrainian bishops to dissolve the Union of Brest-Litovsk. On their refusal, they were arrested and imprisoned or deported. A spurious synod in 1946 broke the union with Rome and "united" the Ukrainian Catholics with the Russian Orthodox. Not until December 1989 was the Ukrainian Catholic Church again made legal.

A great number of Ukrainians emigrated to the Americas and western Europe between 1880 and 1914 and again after World War II. They are organized into the metropolitanate of Canada, with the sees of Winnipeg (metropolitan see), Edmonton, Saskatoon, and Toronto, and the metropolitanate of the United States, with the metropolitan see of Philadelphia and the eparchies of Stamford, Conn., and St. Nicholas of Chicago. Apostolic exarchies exist in Argentina (Buenos Aires), Australia (Melbourne), Brazil (Curitiba), France (Paris), England (London), and Germany (Munich).

Ukrainian language, also called RUTHENIAN, Ukrainian UKRAINSKA MOVA, East Slavic language spoken in Ukraine and in Ukrainian communities in neighbouring Belarus, Russia, Poland, and Slovakia. Ukrainian is the lineal descendant of the colloquial language used in Kievan Rus (10th–13th century). It is written in a form of the Cyrillic alphabet and is closely related to Russian and Belarusian, from which it was indistinguishable until the 12th or 13th century. Ukrainian resembles Russian more than Belarusian, though all three languages are mutually intelligible.

After the fall of Kievan Rus in the 13th century, the dialectal characteristics that distinguish Ukrainian from its sister languages emerged, but for many centuries thereafter the language had almost no literary expression owing to Ukraine's long political subordination. It was not until the end of the 18th century that modern literary Ukrainian emerged out of the colloquial Ukrainian tongue. Like Belarusian, the Ukrainian language contains a large number of words borrowed from Polish, but it has fewer borrowings from Church Slavonic than does Russian.

Ukrainian literature, the body of writings in the Ukrainian language. The earliest Ukrainian writings, works produced in Kievan Rus from the 11th to the 13th century, were composed in Church Slavonic and are the common literary heritage of the Russians and Belarusians as well. After the Mongol invasion (13th century), Ukrainian literature declined until its revival in the 16th century. By the early 19th century the Ukrainian vernacular had become the primary vehicle of literary expression, and an era of prolific writing began.

Nineteenth-century Ukrainian literature reflected the rapid development of Ukrainian national consciousness under Russian rule. Ivan Kotlyarevsky, classicist poet and playwright, inaugurated modern Ukrainian literature with his *Eneida* (1798), a burlesque travesty of Virgil's *Aeneid* that transformed its heroes into Ukrainian Cossacks. Modern Ukrainian prose was inaugurated by Hryhoriy Kvitka Osnovyanenko's novel *Marusya* (1834).

About 1830 Kharkiv became the centre of Ukrainian Romanticism, with such authors as Izmaïl Sreznevsky, Levko Borovykovsky, Amvrosi Metlynsky, and Mykola Kostomarov publishing ethnographic materials, native interpretations of Ukrainian history, and collections of folk legends and Cossack chronicles. In western Ukraine, Romanticism was represented by the "Ruthenian Triad": Markian Shashkevych, Yakov Holovatsky, and Ivan Vahylevych. The Romantic movement peaked in the work of the Kiev Romantics and found its highest expression in the Brotherhood of Saints Cyril and Methodius (1846).

The early poetry of Taras Shevchenko, the outstanding Ukrainian poet of the 19th century, expressed the interests of the Romantics, but it soon moved to a more sombre portrayal of Ukrainian history, especially in the long poem *Haidamaky* (1841; "The Haidamaks"), and to works satirizing Russia's oppression of Ukraine—*e.g.*, *Son* ("The Dream"), *Kavkaz* ("The Caucasus"), and *Poslaniie* ("The Epistle"). His later poetry, written after his release (1857) from exile, treats broader themes. After

Shevchenko, the most important Romantic was Panteleymon Kulish, poet, prose writer (*Chorna rada:* "The Black Council"), translator, and historian.

Ukrainian realism, which began with Marko Vovchok (*Narodni opovidannia,* 1857; "Tales of the People"), was long confined to populist themes and the portrayal of village life. Realist poetry developed with the work of Stepan Rudansky and Leonid Hlibov. The novelist Ivan Nechuy-Levytsky's work ranged from the portrayal of village life in *Kaydasheva simya* (1879; "The Kaydash Family") to that of the Ukrainian intelligentsia in *Khmary* (1908; "The Clouds"). Panas Myrny (pseudonym of Panas Rudchenko) was the major representative of Ukrainian realism. His depiction of social injustice and the birth of social protest in *Khiba revut voly, yak yasla povni?* (1880; "Do the Oxen Low When the Manger Is Full?") had a new psychological dimension. Ivan Franko's naturalistic novels chronicling contemporary Galician society and his long narrative poems *Moysey* ("Moses"), *Panski zharty* ("Nobleman's Jests"), and *Ivan Vyshensky* mark the height of his literary achievement.

The modernism of the late 19th and early 20th centuries is seen in the poetic dramas and dialogues of one of the finest Ukrainian poets, Lesya Ukrainka, and in the prose of such writers as Mikhaylo Kotsyubinsky and Vasyl Stefanyk. In the first three decades of the 20th century, Ukrainian literature experienced a renaissance characterized by a variety of literary movements. Realism, with a distinctly decadent strain, was the most notable characteristic of Volodymyr Vynnychenko's prose, while Pavlo Tychyna was the leading Symbolist poet. Neoclassicism produced the poet Mykola Zerov, and Futurism was initiated by Mykhailo Semenko.

After the Russian Revolution, during a period of relative freedom granted by the Bolsheviks between 1917 and 1932, a host of other talented writers emerged, including the short-story writer and critic Mykola Khvylovy, who at first extolled the revolution but became increasingly critical of Soviet policies before his death. But in 1932 the Communist Party began enforcing Socialist Realism as the required literary style. The Soviet leader Joseph Stalin's great purges of 1933–38 decimated the ranks of Ukrainian writers, many of whom were imprisoned or executed or who fled into exile.

The post-Stalinist period saw the emergence of a new generation that rejected Socialist Realism, but repressive measures taken in the 1970s silenced many of these authors or else turned them back to Socialist Realism. Ukraine's attainment of independence in 1991 opened up unprecedented opportunities for indigenous literary expression, but the Soviet suppression of so much Ukrainian talent in prior decades left the task largely to the younger generation.

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Ukrainka, Lesya, pseudonym of LARISA PETROVNA KOSACH-KVITKA (b. Feb. 13 [Feb. 25, New Style], 1871, Novograd-Volynsky, Ukraine, Russian Empire [now Novohrad-Volynskyy, Ukraine]—d. July 19 [Aug. 1], 1913, Surami, Georgia, Russian Empire [now in Georgia]), poet, dramatist, short-story writer, essayist, and critic who was the foremost woman writer in Ukrainian literature and a leading figure in its modernist movement.

The daughter of intellectuals, Ukrainka was stricken with tuberculosis in 1881 and traveled widely thereafter in search of a cure. Her early lyrical verse, influenced by Taras Shevchenko, dealt with the poet's loneliness and social alienation and was informed by a love of freedom, especially national freedom. The collections *Na krylakh pisen* (1893; "On the Wings of Songs"), *Dumy i mriyi* (1899; "Thoughts and Dreams"), and *Vidhuky* (1902; "Echoes") established her as the leading young Ukrainian poet of the day.

She was active in the Ukrainian struggle against tsarism and joined Ukrainian Marxist organizations, translating the Communist Manifesto into Ukrainian in 1902. In 1907 she was arrested and, following her release, was kept under observation by the tsarist police. She married the court official Klyment Kvitka in 1907.

Ukrainka concentrated on poetic dramas from about 1906 on. Her plays were inspired by various historical milieus—*e.g.,* the Old Testament in *Oderzhyma* (1901; "A Woman Possessed") and *Vavylonsky polon* (1908; *The Babylonian Captivity*), the world of ancient Greece and Rome, the early Christian era in *U katakombakh* (1906; *In the Catacombs*) and *Na poli krovy* (1911; "On the Field of Blood"), and the medieval period. Folk songs and fairy tales provide the framework for *Lisova pisnya* (1912; *Forest Song*), in which Ukrainka reflects on the timeless tension between exalted ideals and sordid reality. Her historical drama *Boyarynya* (1914; *The Noblewoman*) is a psychological tragedy centring on a Ukrainian family in the 17th century.

Ukrainka also wrote short stories and critical essays and did masterful translations of works by Homer, William Shakespeare, Lord Byron, Victor Hugo, and Ivan Turgenev.

ukulele, also spelled UKELELE (Hawaiian: "flea"), small guitar derived from the *machada,* or *machete,* a four-stringed guitar introduced into Hawaii by the Portuguese in the 1870s. It is seldom more than 24 inches (60 cm) long.

The ukulele has been played in Europe and the United States as a jazz and solo instrument in the 20th century. It is tuned (in the middle-C octave) g′–c′–e′–a′ or d′–f♯′–a′–b′.

Ulaanbaatar, also spelled ULAN BATOR, formerly URGA, or NIISLEL KHURE HEH, capital and largest city of Mongolia. It is situated on the Tuul River on a windswept plateau at an elevation of 4,430 feet (1,350 m). The city originated as a seasonal migratory abode of the Mongolian princes and in 1639 finally attained permanence on the present site with the construction of Da Khure Monastery. This building became the residence of the *bodgo-gegen,* high priest of the Tibetan Buddhist religion (to which the Mongols adhere), and remained as such for about 200 years. Da Khure became known to the Russians as Urga and developed as a trade centre between China and Russia. In 1911, when Outer Mongolia declared itself independent, the city was renamed Niislel Khureheh ("Capital of Mongolia"). In 1921 it was occupied by troops of Mongolia's revolutionary leader, Damdiny Sühbaatar, and the Soviet Red Army. When Mongolia was declared a people's republic in 1924, the city was renamed Ulaanbaatar, which means "Red Hero."

With Soviet help, a new city was planned, and its central feature was Sühbaatar Square, site of a Neoclassic government building, a history museum, and the national theatre. The city is also the site of the National University of Mongolia (1942), several professional and technical schools, and the Academy of Sciences of Mongolia.

Ulaanbaatar is the main industrial centre of Mongolia. An industrial complex produces a variety of consumer goods. There are cement, iron, and brick works; footwear and garment factories; vehicle-repair works; food-processing plants; and other factories. A railroad and an international airport connect the city with China and Russia. The scenic wooded peaks of the Hentiyn Mountains extend to the northeast of the city. Pop. (2000 est.) 691,000.

Ulai (Iran): *see* Kārūn River.

Ulaid cycle (Gaelic literature): *see* Ulster cycle.

Ulala (Russia): *see* Gorno-Altaysk.

Ulam, Stanislaw M., in full STANISLAW MARCIN ULAM (b. April 13, 1909, Lemberg, Pol., Austrian Empire [now Lviv, Ukraine]—d. May 13, 1984, Santa Fe, N.M., U.S.), mathematician who played a major role in the development of the hydrogen bomb at Los Alamos.

Ulam received a doctoral degree (1933) at the Polytechnic Institute in Lvov (now Lviv). At the invitation of John von Neumann, he worked at the Institute for Advanced Study in Princeton, N.J., in 1936. He lectured at Harvard University in 1939–40 and taught at the University of Wisconsin, Madison, from 1941 to 1943. In 1943 he became an American citizen and was recruited to work at Los Alamos on the development of the atomic bomb. He remained at Los Alamos until 1965 and taught at various universities thereafter.

Ulam had a number of specialties, including set theory, mathematical logic, functions of real variables, thermonuclear reactions, topology, and the Monte-Carlo theory. Working with physicist Edward Teller, Ulam solved one major problem encountered in work on the fusion bomb by suggesting that compression was essential to explosion and that shock waves from a fission bomb could produce the compression needed. He further suggested that careful design could focus mechanical shock waves in such a way that they would promote rapid burning of the fusion fuel. Teller suggested that radiation implosion, rather than mechanical shock, be used to compress the thermonuclear fuel. This two-stage radiation implosion design, which became known as the Teller-Ulam configuration, led to the creation of modern thermonuclear weapons.

Ulam's work at Los Alamos had begun with his development (in collaboration with von Neumann) of the Monte-Carlo method, a technique for finding approximate solutions to problems by means of artificial sampling. Through the use of electronic computers, this method became widespread, finding applications in weapons design, mathematical economy, and operations research. Ulam also improved the flexibility and general utility of computers and wrote a number of papers and books on aspects of mathematics. The latter include *A Collection of Mathematical Problems* (1960), *Stanislaw Ulam: Sets, Numbers and Universes* (1974), and *Adventures of a Mathematician* (1976).

ulama, also spelled ULEMA, Arabic *ʿulamāʾ,* the learned of Islām, those who possess the quality of *ʿilm,* "learning," in its widest sense. From the *ʿulamāʾ,* who are versed theoretically and practically in the Muslim sciences, come the religious teachers of the Islāmic community—theologians (mutakallimun), canon lawyers (muftis), judges (qadis), professors—and high state religious officials like the shaikh al-Islām. In a narrower sense, *ʿulamāʾ* may refer to a council of learned men holding government appointments in a Muslim state.

Historically, the *ʿulamāʾ* have been a powerful class, and in early Islām it was their consensus (*ijmāʿ*) on theological and juridical problems that determined the communal practices of future generations. Their authority over the community was so pervasive that Muslim

governments always attempted to secure their support; in the Ottoman and Mughal empires they sometimes decisively influenced important policies. Although there is no priesthood in Islām, and every believer may perform priestly functions such as leading the liturgical prayer, the *'ulamā'* have played a clerical role in Islāmic society. Hence they are sometimes referred to as the "Muslim priests."

In modern times the *'ulamā'* have gradually lost ground to the new Western-educated classes; although they have been abolished in Turkey, their hold on the conservative masses in the rest of the Muslim world remains firm. One of the most crucial problems facing 20th-century Islām has been the integration of the *'ulamā'* and the modern laity.

Ulan-Ude, city and capital of Buryatiya, east-central Russia. It lies at the confluence of the Selenga and Uda rivers and in a deep valley between the Khamar-Daban and Tsagan-Daban mountain ranges. The wintering camp of Udinskoye, established there in 1666, became the town of Verkhne-Udinsk in 1783; it was renamed Ulan-Ude in 1934.

The city's development was greatly stimulated when the Trans-Siberian Railroad reached it in 1900 and later by the construction of a branch line to Ulaanbaatar in Mongolia in 1949—a branch extended to Peking in 1956. Ulan-Ude's role as a major rail junction led to the establishment of large locomotive and carriage repair works. Other industries include glassmaking, food processing, and other light industries. Ulan-Ude has agricultural, teacher-training, technological, and cultural institutes, several theatres, and a philharmonic hall. Pop. (1991 est.) 362,400.

Ulanova, Galina (Sergeyevna) (b. Jan. 8, 1910, St. Petersburg, Russia—d. March 21, 1998, Moscow), first *prima ballerina assoluta* of the Soviet Union and a People's Artist of the Republic.

The daughter of dancers Sergey Ulanov and Marie Romanova of the Mariinsky Theatre (called the Kirov State Academic Theatre of Opera and Ballet during the Soviet period), Ulanova was trained in the Leningrad State School of Choreography, where she studied under Agrippina Vaganova. After graduation she joined the Kirov Theatre, where her first major creation was the role of Maria in R.V. Zakharov's *Fountain of Bakhchisaray* (1934). Another important creation in L.M. Lavrovsky's *Romeo and Juliet* (1940) displayed her skill as a dramatic dancer. She also excelled in such classical ballets as *Giselle* and *Swan Lake.*



Galina Ulanova as Giselle

By courtesy of the Dance Collection, the New York Public Library at Lincoln Center

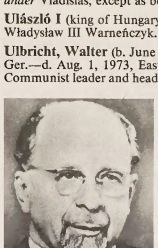
In 1944 Ulanova was transferred to the Bolshoi Ballet in Moscow. Her first appearance outside the Soviet Union was in Florence in 1951. She danced with the Bolshoi company at the Royal Opera House, London, in 1956, gaining immediate popularity, and also performed with the Bolshoi in several other countries. She made her American debut with the Bolshoi Ballet in 1959, winning accolades for *Giselle* and *Romeo and Juliet.* Her performances in films of the Bolshoi Ballet did much to increase world interest in ballet.

A lyrical dancer in the tradition of Anna Pavlova, Ulanova was considered the embodiment of the Soviet school of ballet. Appearing only occasionally after 1959 and retiring about 1963, she coached young dancers (notably the ballerina Yekaterina Maksimova in *Giselle*), served as ballet mistress of the Bolshoi Theatre, and occasionally wrote dance articles for Soviet journals.

Uläszló (Hungarian personal name): *see under* Vladislas, except as below.

Uläszló I (king of Hungary and Poland): *see* Władysław III Warneńczyk.

Ulbricht, Walter (b. June 30, 1893, Leipzig, Ger.—d. Aug. 1, 1973, East Berlin), German Communist leader and head of the post-World War II German Democratic Republic, or East Germany.



Ulbricht, 1966

By courtesy of the Portraitsammlung Deutsche Staatsbibliothek, Berlin

Ulbricht, a cabinetmaker by trade, joined the Social Democratic Party (SPD) in 1912 and during World War I served on the Eastern Front, deserting twice. After the war he entered the new German Communist Party (KPD). A bureaucrat and organizer, he was elected to the party's central committee in 1923. With the rise of Joseph Stalin, Ulbricht became instrumental in Bolshevizing the German party and organizing it on a cell basis. He became a member of the Reichstag (federal lower house) in 1928 and led the Berlin party organization from 1929.

After Adolf Hitler's accession to power in Germany (January 1933), Ulbricht fled abroad, serving for the next five years as an agent of both the KPD and the Comintern in Paris and Moscow and in Spain during the Spanish Civil War (1936–39), all the time relentlessly persecuting Trotskyites and other deviationists. Back in Moscow at the start of Germany's invasion of the Soviet Union (1941), Ulbricht was assigned to propagandize German prisoners of war and process information from the German army.

Returning to Germany on April 30, 1945, Ulbricht helped reestablish the KPD and was charged with organizing an administration in the Soviet-occupied zone of Germany. He played a leading role in the merger of the KPD and the SPD into the Socialist Unity Party (SED; April 1946), which controlled East Germany until 1989.

On the formation of the German Democratic Republic (Oct. 11, 1949), Ulbricht became deputy prime minister, adding the post of general secretary of the SED in 1950. When, on the death of President Wilhelm Pieck (1960), the presidency was abolished and a council of state instituted in its stead, Ulbricht became its chairman, thus formally taking supreme power. He crushed all opposition and became so powerful that he was able to block the de-Stalinization movement that swept eastern Europe after the death of the Soviet dictator. Only after the erection of the Berlin Wall (1961) did the government finally begin to ease its strict control and permit a certain amount of economic liberalization and decentralization. East Germany became one of the most industrialized nations in eastern Europe, yet Ulbricht remained implacably opposed to the Federal Republic of Germany. Forced to retire as first secretary of the SED in May 1971, he retained his position as head of state until his death.

BIBLIOGRAPHY: Carola Stern, *Ulbricht: A Political Biography* (1965); and Gregory W. Sandford, *From Hitler to Ulbricht* (1983), examine Ulbricht's role in the Communist reconstruction of East Germany.

ulcer, a lesion or sore on the skin or mucous membrane resulting from the gradual disintegration of the surface epithelium. An ulcer may be superficial or it may extend into the deeper layer of the skin or other underlying tissue. An ulcer has a depressed floor or crater surrounded by sharply defined edges that are sometimes elevated above the level of the adjoining surface. The main symptom of ulcers is pain. Any ulcer that is hard to the touch may well be a cancer.

The main causes of ulcers are infection, faulty blood circulation, nerve damage, trauma, nutritional disturbances, or cancer. Such bacterial infections as tuberculosis or syphilis can cause ulcers on any surface of the body. Any infection under the skin, such as a boil or carbuncle, may break through the surface and form an inflammatory ulcer. The ulcers on the legs of persons with varicose veins are caused by the slow circulation of the blood in the skin. Diabetics may sustain ulcers on their feet or toes after losing sensation in those areas due to nervous-system damage. A bedsore (*q.v.*), or decubitus ulcer, typically occurs on the skin of the back in immobilized or bedridden persons. Ulcers can also result from burns, electric burns, frostbite, or other external traumas, as well as from an inadequate intake of thiamine or other vitamins. A peptic ulcer (*q.v.*) is an ulcer in that part of the intestinal tract bathed by gastric juice, *i.e.,* the stomach and the first segment of the duodenum.

When an ulcer of the skin has been present for at least one month, the possibility of cancer must be considered. If the patient is past middle age, the probability of cancer is increased. Ulcers on the vermilion border of the lower lip in elderly men are frequently cancers. Such cancers must be recognized and treated early before they spread and become inoperable. By contrast, superficial ulcers on the lips, known as cold sores, are caused by a virus and are not serious. Ulcers in the mouth and throat are frequently caused by infection but are sometimes cancerous, especially in older persons. Cancerous ulcers may also occur in the small or large intestine and the rectum.

Uleåborg (Finland): *see* Oulu.

Ulenspegel, Dyl: *see* Eulenspiegel, Till.

ulexite, borate mineral that consists of hydrated sodium and calcium borate ($NaCaB_5O_9 \cdot 8H_2O$). Individual crystals are colourless and have a vitreous lustre, whereas the more common nodular, rounded, or lenslike crystal aggregates (often resembling cotton balls) are white and have a silky or satiny lustre.

Ulexite is found in arid regions, where it may be derived from boron leached from sediments and pyroclastic rocks by circulating waters. Typical occurrences are in saline playas (dry lakes) and marshes, as in Esmeralda county, Nevada; in Death Valley and the Kramer district, California; in the nitrate region of Chile, where it is widespread; and in Canada's Maritime provinces. For detailed physical properties, *see* borate mineral (table).

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Ulfilas, Gothic WULFILA (b. *c.* 311—d. *c.* 382, Constantinople [now Istanbul, Tur.]), Christian bishop and missionary who evangelized the Goths, reputedly created the Gothic alphabet, and wrote the earliest translation of the Bible into a Germanic language. Although his life cannot be reconstructed with certainty, fragments have come from 4th- and 5th-century ecclesiastical historians.

Ulfilas is believed to have descended from 3rd-century Cappadocians, who, captured by the Goths, were displaced and settled north of the Danube River. At the age of 30 he was supposedly sent on an embassy to the Roman emperor and was consecrated (341) bishop of the Gothic Christians by Eusebius of Nicomedia, bishop of Constantinople, an Arian (*i.e.,* a follower of the heretical doctrine that the Son was neither equal with God the Father nor eternal). Because of persecution by the Gothic ruler, Ulfilas, after working for seven years among the Goths north of the Danube, led his congregation to Moesia (now part of Bulgaria) with the consent of the Arian Roman emperor Constantius II. Some historians report that Ulfilas in about 375 helped the persecuted Christian Goths to cross the Danube into Roman territory.

By the time of his consecration, Ulfilas had accepted the homoean formula (*i.e.,* the Trinitarian doctrine affirming that the Son was "like" the Father) promulgated by the Council of Constantinople (360), which he attended. He subsequently taught the similarity of the Son to the Father and the complete subordination of the Holy Spirit, an Arian form of Christianity that he carried to the Visigoths. He was certainly the principal agent in their conversion, a fact of great significance for the history of the Christian church and of Europe. When in 379 a champion of Nicene orthodoxy, Theodosius I the Great, became Roman emperor, Ulfilas apparently led a party of compromise and conciliation with the homoean position. After the Council of Aquileia (381), Theodosius summoned Ulfilas to Constantinople for discussions, during which he died.

Ulfilas' outstanding contribution to writing is his invention of the Gothic alphabet, which he devised from Greek (primarily) and Latin. For the first time in the Germanic world, writing could be used for the propagation of ideas. He coined a Germanic Christian terminology, some of which is still in use. Before 381 he translated parts of the Bible from Greek to Gothic. Much of his Gothic translations of the Gospels and Pauline Letters survive, together with fragments of his Book of Nehemiah. Although he reputedly translated the whole Bible except the Books of Kings, the extent of his work cannot be ascertained. Surviving passages from his Bible translation are in W. Streitberg's *Gotische Bibel* (3rd ed., 1950). He reportedly wrote many sermons and interpretations in Gothic, Greek, and Latin, and some extant Arian writings have been ascribed to him.

The national Gothic church that Ulfilas helped to create, endowing it with a vernacular Bible and probably liturgy, was Arian from the start. The Goths' adherence to Arianism caused a breach between them and the Roman Empire that made Arianism part of the national self-consciousness of the Visigoths and of other Germanic peoples, including Ostrogoths, Vandals, and Burgundians.

Ulfsdotter, Katarina: *see* Catherine of Sweden, Saint.

Ulhāsnagar, city, northwestern Mahārāshtra state, western India. It lies northeast of Bombay. Part of the Thāna industrial area, it specializes in the manufacture of chemicals and silk and nylon textiles. The town became important in 1947 as a refugee camp for displaced persons from Sindh, Pakistan. It has an industrial-training institute. Pop. (1991) 369,077.

Ulianovsk, also spelled ULJANOVSK (Russia): *see* Simbirsk.

Ulithi, also called URUSHI, or MACKENZIE ISLAND, coral atoll in the Federated States of Micronesia, in the western Pacific Ocean. Its islets have a total land area of 1.75 square miles (4.5 square km).

Ulithi was probably sighted by the Portuguese in 1526, but it remained undisturbed until 1783, when it was visited by a British naval vessel. The site of a Japanese seaplane base during World War II, Ulithi was captured in 1944 by U.S. forces and served as a large American naval base for the duration of the war. The atoll's inhabitants, who are generally lighter skinned than the Micronesians, are probably partly Polynesian and speak a distinctive dialect. Pop. (1990 est.) 847.

Ulixes (Greek mythology): *see* Odysseus.

Ull, Old Norse ULLR, in Norse mythology, the god of snowshoes, hunting, the bow, and the shield; he was a handsome stepson of the thunder god Thor. Ull possessed warrior-like attributes and was called upon for aid in individual combat. He resided at Ydalir (Yew Dales).

Although not much has been recorded about Ull, he must have been a very prominent deity in the Norse pantheon at one time because, according to one tradition, the god Odin offered Ull's favours as a reward to the one who would aid him. In addition, Ull's name appears as part of many Swedish and Norwegian place-names. In the chronicles of the Danish historian Saxo Grammaticus, Ollerus is the equivalent of Ull.

Ulladulla, town, southeastern New South Wales, Australia. It lies 40 miles (65 km) south of Jervis Bay. The town was established in the 1820s as an anchorage for ships importing cedarwood to Sydney (108 miles [174 km] northeast), and its name was derived from an Aboriginal word meaning "safe harbour."

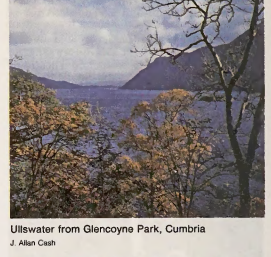
Serving a hinterland of dairying, intensive agriculture, and lumbering, the town has an artificial harbour from which large sport- and commercial-fishing fleets sail, the latter supplying much of Sydney's fish. Situated along the Prince's Highway, Ulladulla is a growing resort, with fine ocean beaches extending between Conjola and Burril lakes (lagoons). Pop. (1996) 8,384.

Ullathorne, William Bernard (b. May 7, 1806, Pocklington, Yorkshire, Eng.—d. March 21, 1889, Oscott, Warwickshire), Roman Catholic missionary to Australia and first bishop of Birmingham, Eng. He was influential in securing the final abolition (1857) of the British system of transporting convicts to Australia.

Ullathorne was a descendant of Sir Thomas More. He served as a cabin boy before joining the Benedictines at Downside Abbey, near Bath, in 1823 and was ordained in 1831. He volunteered to serve the convicts in Australia, where he was sent the following year as vicar general. He was the first chaplain to visit the penal colony on Norfolk Island in the southern Pacific Ocean, between New Caledonia and northern New Zealand. While working with the convicts (1832–42), he made visits to Rome and England. In 1836 his *Horrors of Transportation Briefly Unfolded* was published, and in 1838 he gave evidence before the Parliamentary Commission on Transportation, which influenced the abolition of the transportation system.

Ullathorne left Australia to work in Coventry, Eng., where he remained until his appointments as vicar apostolic of England's western district (1846) and of the central district (1848) and subsequently as first bishop of Birmingham (1850). Ullathorne cofounded the Dominican convent at Stone, Staffordshire, in 1853. When he resigned from his diocese in 1888, he was made titular archbishop of Cabasa, Egypt. Ullathorne's autobiography, *From Cabin-Boy to Archbishop,* was edited in 1941 by S. Leslie.

Ullswater, lake, in the county of Cumbria in the Lake District of England. It is the district's second largest lake, with an area of about 3 square miles (0.8 square km), and is about 7.5 miles (12 km) long and 0.5 mile (0.8 km) wide, with a maximum depth of 205 feet (62 m). It is drained by the River Eden



Ullswater from Glencoyne Park, Cumbria
J. Allan Cash

to Solway Firth. Pooley Bridge is a locality situated at the outlet. The lake has four small islands in the north, and nearby is the Aira Force waterfall. Adjacent Gowbarrow was established as a national park in 1910.

Ullŭng Island, volcanic island, Kyŏngsangpuk *do* (province), South Korea. It lies in the Sea of Japan (East Sea), 75 miles (120 km) off the northeastern coast of South Korea. With the associated islands of Kkakse, Chuk, and Tok, Ullŭng Island constitutes Ullŭng county of the province. Before its domination by the Silla kingdom (57 BC–AD 935) in 512, it was an independent kingdom named Usan-guk. The island has an area of 28 square miles (73 square km), and its summit, Sŏngin Peak (3,228 feet [984 m]), has a caldera crater.

The entire coastline has rocky bluffs 100–300 feet high, which preclude port development. Neighbouring waters with the interchange of warm and cold currents offer good fishing ground for cuttlefish, which is exported, and various other marine products. Agricultural products, however, must be imported. The mountain area produces Chinese juniper, birch, and princess trees, all used to make

quality furniture. Ullüng-do is connected with Pusan and Jukbyŏn by regular sea routes. Pop. (1995) Ullüng-gun, 11,306.

Ulm, city, Baden-Württemberg *Land* (state), southwestern Germany, on the left bank of the Danube River at its junction with the Iller and the Blau, opposite the Bavarian town of Neu Ulm. It was first mentioned as a royal domain in 854 and was chartered in the 12th century by the Hohenstaufen emperors. It played a leading part in the town leagues and wars of the 14th and 15th centuries, becoming



Ulm cathedral, facing the Danube River, Germany
Toni Schneiders—Bruce Coleman

a free imperial city with extensive territorial authority. Ulm's location at the hub of important trade routes and its prominence in the manufacture of linen and fustian brought it great prosperity in the Middle Ages. It became Protestant in 1530 and declined after the religious French wars of the 16th and 17th centuries. It passed to Bavaria in 1802, losing its territories and immunities, and in 1810 it was ceded to Württemberg. In 1869 the former suburb of Neu Ulm on the Danube's right bank was chartered as a Bavarian town. By the mid-20th century Ulm had expanded industrially and commercially to become the economic hub of the area.

Although it was severely damaged in World War II, most of the important buildings have been repaired and many medieval walls, gates, and fountains survive. The Gothic Münster (cathedral), founded in 1377 and restored and completed in 1890, escaped damage; its tower, one of the highest in the world (528 ft [161 m]), dominates the city. Other notable landmarks include the town hall, built as a warehouse for weavers, textile merchants, and saddlers (1370, extended in the 20th century), the Neuer Bau (1585–93), and the Schwörhaus (1613), where the freemen and the town council annually swore to maintain the city's constitution. A major road, rail, and communications centre, Ulm's industries include the manufacture of motor vehicles and machinery, electrical equipment, and diversified light manufacturing. Ulm University was founded in 1967. The city has an unusual Bread Museum displaying breads typical of ancient Egypt and of medieval times. Pop. (1998 est.) 115,628.

Ulm, Battle of (Sept. 25–Oct. 20, 1805), major strategic triumph of Napoleon, conducted by his Grand Army of about 210,000 men against an Austrian Army of about 72,000 under the command of Baron Karl Mack von Leiberich.

Austria had joined the Anglo-Russian alliance (Third Coalition) against Napoleon in August 1805. The Austrians planned to make Italy the main battleground and concentrated the bulk of their forces there.

On September 11 Baron Mack led a smaller Austrian force into Bavaria, which was allied to France. He concentrated between Ulm and Günzburg, on the upper Danube, about 80 miles (130 kilometres) from the eastern edge of the Black Forest, through which he expected Napoleon to march; he then waited for the slow-moving Russians under M.I. Kutuzov to join him. Mack expected Napoleon to have no more than 70,000 troops to meet him. Napoleon, however, chose to make Germany the main battleground and massed the Grand Army to annihilate Mack before the Russians arrived. On September 25 the first French troops crossed the Rhine River north of the Black Forest, wheeled south, and, moving about 18 miles a day, crossed the Danube two weeks later, before Mack was aware of it.

The Grand Army, its movements effectively screened by its cavalry, moved on Mack's rear along the Danube, between Ingolstadt and Donauwörth, and cut his lines of retreat eastward. During the second week of October several battles took place in which large numbers of Austrian troops were dispersed or captured as the net around Ulm drew tighter. Napoleon forced the main Austrian body to retire into the city of Ulm on the 15th. On the 16th, French artillery fired on the town, and Mack saw that his troops were in no condition to withstand a siege until the Russian reinforcements arrived. After negotiations Mack surrendered on the 20th, with the Russians still about 100 miles away. Austrian prisoners captured by the manoeuvre around Ulm numbered between 50,000 and 60,000. French losses were insignificant.

Ulmaceae, the elm family of the nettle order (Urticales), with 15 genera of trees and shrubs, distributed primarily throughout temperate regions. Members of the family have watery sap, and its leaves alternate along the stem. The leaves usually have toothed edges and often are lopsided at the base. The flowers lack petals. Male and female flowers are borne together or apart on the same plant. The fruit, a samara, may be winged, fleshy, or nutlike.

Elms (*Ulmus*) and hackberries (*Celtis*) are important shade and ornamental trees. The planer tree, or water elm (*Planera aquatica*), of southeastern North America produces useful timber known as false sandalwood. Trees and shrubs in the Eurasian genus *Zelkova* sometimes are planted as ornamentals. *See also* elm; hackberry; Zelkova.

Ulman, Douglas Elton (actor): *see* Fairbanks, Douglas.

Ulmanis, Kārlis (b. Sept. 4, 1877, Berze, Latvia, Russian Empire—d. 1942), a leader in the fight for Latvian independence in the early decades of the 20th century. He was the first head of the Latvian Republic in 1918 and again in 1936–40 and was premier in 1918, 1919–21, 1925–26, 1931–32, and 1934–40.

Ulmanis studied agronomy in Germany as a young man and afterward worked to improve dairy farming and cattle breeding in Latvia. During the period of upheaval at the time of the Russian Revolution of 1905, he worked to promote freedom from Russia, which had controlled the country for more than a century. The defeat of the revolution forced Ulmanis to seek exile in the United States, where he taught in the agriculture department of the University of Nebraska.

In 1913 he was granted amnesty by the Russian government and returned to Latvia. At the time of the Russian Revolution of 1917, he founded the Latvian Farmers' Union to press for independence. Then with other nationalists he formed a Latvian national council that proclaimed independence on Nov. 18, 1918, and appointed Ulmanis head of the provisional government.

He remained in power until June 1921, during the confused period immediately following the end of World War I, when the new nation was forced to fight to maintain itself in the face of threats, pressure, and military action from Russia, native Latvian Communists, and German forces. With a Latvian army formed by Gen. Jānis Balodis and supported on occasion by French and British naval forces and Polish troops, the new government was able to clear the country of opposition. Ulmanis organized the election of a constituent assembly, and the first Saeima (parliament) convened on Aug. 11, 1920. That same month peace was concluded with the Soviet Union.

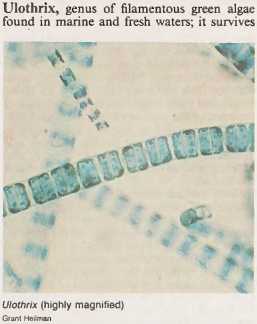
Ulmanis again served as premier from December 1925 to May 1926 and from March 1931 to December 1932. He came to power for the last time on March 17, 1934, during a period of great tension created by the demands of right-wing nationalists and the Nazified German minority. On May 15, 1934, Ulmanis and General Balodis declared a state of siege, dissolving the Saeima and all political parties, and instituting authoritarian rule. In June 1940, under an ultimatum backed by Soviet military forces, Ulmanis resigned, and Russian forces occupied the country. Ulmanis was arrested on July 21, 1940, by Soviet authorities and deported to Russia.

ulna, inner of two bones of the forearm (when viewed with the palm facing forward), present in all land vertebrates.

In humans the upper end of the bone presents a large C-shaped notch, the semilunar, or trochlear, notch, which articulates with the trochlea of the humerus (upper arm bone) to form the elbow joint. The projection that forms the upper border of this notch is called the olecranon process—it articulates behind the humerus in the olecranon fossa and may be felt as the point of the elbow. The projection that forms the lower border of the trochlear notch, the coronoid process, enters the coronoid fossa of the humerus when the elbow is flexed. On the outer side is the radial notch, which articulates with the head of the radius. The head of the bone is elsewhere roughened for muscle attachment. The shaft is triangular in cross section; an interosseous ridge extends its length and provides attachment for the interosseous membrane connecting the ulna and radius. The lower end of the bone presents a small cylindrical head that articulates with the radius at the side and the wrist bones below. Also at the lower end is a styloid process, medially, that articulates with a disk between it and the cuneiform (os triquetrum) wrist bone.

In amphibians and some reptiles, the radius and ulna do not articulate. The elbow joint evolved first among birds and mammals. The radius tends to be slender in birds; but the ulna is more often reduced in mammals, especially in those adapted for running and, in the case of bats, flying.

Ulothrix, genus of filamentous green algae found in marine and fresh waters; it survives



Ulothrix (highly magnified)
Grant Heilman

best at low temperatures and thrives during winter and spring months. Each cell contains a distinct nucleus, a central vacuole, and a large, thin chloroplast with at least one pyrenoid.

Ulothrix shows little cellular differentiation other than the specialized cell for attachment, called the holdfast. In most species, all the cells can form reproductive bodies. *Ulothrix* reproduces vegetatively by fragmentation, asexually by nonmotile resting spores (aplanospores) and motile quadriflagellate spores (zoospores), and sexually by biflagellate gametes.

Consult the INDEX *first*

Ulpian, Latin in full DOMITIUS ULPIANUS (b. Tyre, Phoenicia—d. AD 228), Roman jurist and imperial official whose writings supplied one-third of the total content of the Byzantine emperor Justinian I's monumental Digest, or Pandects (completed 533). He was a subordinate to Papinian when that older jurist was praetorian prefect (chief adviser to the emperor and commander of his bodyguard) under Lucius Septimius Severus (reigned 193–211), and he annotated Papinian's works. Afterward Ulpian was master of petitions to the emperor Caracalla, and under Severus Alexander he served as praetorian prefect from 222 until 228, when he was murdered by officers in his command.

Ulpian wrote prolifically on law in a clear, elegant style. Like Papinian, he was an intelligent editor and interpreter of existing ideas rather than an original legal thinker, such as Marcus Antistius Labeo. His major works are the commentaries *Libri ad Sabinum* (51 books interpreting the civil law; incomplete) and *Libri ad edictum* (81 books concerning praetorian edicts). Justinian's compilers, headed by Tribonian, drew heavily on these and other treatises and monographs by Ulpian. A work variously called *Tituli ex corpore Ulpiani, Epitome Ulpiani,* or *Regulae Ulpiani* is no longer believed to be his.

Ulrich (b. Feb. 8, 1487, Reichenweier, Alsace—d. Nov. 6, 1550, Tübingen, Württemberg), duke of Württemberg (1498–1519, 1534–50), a prominent figure in the German religious Reformation.

A grandson of Ulrich V, count of Württemberg, he succeeded his kinsman Eberhard II as duke of Württemberg in 1498, being declared of age in 1503. He obtained territories from the Palatinate through alliance with the Holy Roman emperor Maximilian I and with the Wittelsbachs of Bavaria but fell deeply into debt through keeping too splendid a court. A new tax (1514) provoked the peasant insurrection known as the "Poor Conrad" rising. The States General then forced him to conclude the Treaty of Tübingen, whereby, in return for their assuming liability for his debts, he granted them important rights. Subsequent breaches of the general peace by Ulrich led to his being expelled by the Swabian League in 1519; and in 1520 the Swabian League sold Württemberg to the emperor Charles V, who in turn granted the territory to his brother Ferdinand.

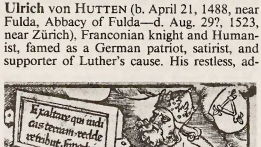
Ulrich passed some time in Switzerland, France, and Germany, occupied with brigand exploits and in service under Francis I of France; but he never lost sight of the possibility of recovering Württemberg, and in about 1523 he announced his conversion to the Protestant faith. On the disintegration of the Swabian League and with the aid of Francis I, Ulrich returned to Württemberg in 1534; and Ferdinand, who was preoccupied with war against the Turks, agreed to his restoration in the Treaty of Kaaden, on condition that he should hold Württemberg as an Austrian fief. Ulrich then invited Lutheran theologians to reform the church, dissolved the monasteries, confiscated ecclesiastical lands, and gave the universities and schools over to the new doctrine. Though the emperor Charles V occupied Württemberg again during his war against the League of Schmalkalden, he restored it to Ulrich on payment of a heavy war indemnity (1547).

Ulrich, SAINT, Ulrich also spelled ULRIC (b. *c.* 890, Augsburg, Alemannia—d. July 4, 973, Augsburg; canonized 993; feast day July 4), bishop and patron saint of Augsburg, the first person known to have been canonized by a pope.

Of noble birth, he studied at the monastic school of Sankt Gallen (St. Gall), Switz., and was then trained by his uncle Bishop Adalbero of Augsburg. He returned to Zürich in 910, remaining there until 924, when he was appointed bishop of Augsburg by the German king Henry I the Fowler.

A supporter of the Holy Roman emperor Otto I the Great, he acted as mediator in the imperial struggle with Otto's son Liudolf of Swabia, who had rebelled against his father but submitted in 955. By fortifying Augsburg, Ulrich also enabled that city to withstand a siege by the Magyars (Hungarians) until Otto arrived to defeat them at the Battle of Lechfeld (Aug. 10, 955), near Augsburg. Otto then granted Ulrich the unprecedented right to coin money. He was canonized by Pope John XV in 993.

Ulrich von HUTTEN (b. April 21, 1488, near Fulda, Abbacy of Fulda—d. Aug. 29?, 1523, near Zürich), Franconian knight and Humanist, famed as a German patriot, satirist, and supporter of Luther's cause. His restless, adventurous life, reflecting the turbulent Reformation period, was occupied with public and private quarrels, pursued with both pen and sword.



Ulrich von Hutten, woodcut portrait from the German edition of his dialogues, 1520

By courtesy of the Library of Congress, Washington, D.C.

As a supporter of the ancient status of the knightly order (*Ritterstand*), Ulrich looked back to the Middle Ages; but as a writer he looked forward, employing the new literary forms of the Humanists in biting Latin dialogues, satirizing the pretensions of princes, the papacy, Scholasticism, and obscurantism. He was the main contributor to the second volume of the *Epistolae obscurorum virorum* (1515–17; "Letters of Obscure Men"), a famous attack on monkish life and letters. As a patriot, he envisioned a united Germany and after 1520 wrote satires in German. His vigorous series of satiric pamphlets on Luther's behalf, which first were published in Latin, were subsequently translated into German in his *Gesprächbüchlein* (1522; "Little Conversation Book").

Ulrich joined the forces of Franz von Sickingen (*q.v.*) in the knights' war (1522) against the German princes. On the defeat of their cause he fled to Switzerland, where he was refused help by his former friend Erasmus. Penniless and dying of syphilis, he was given refuge by Huldrych Zwingli.

The legend of Ulrich as a warrior for freedom has been much romanticized in German literature, notably by C.F. Meyer in *Huttens letzte Tage* (1871; "Hutten's Last Days").

Ulrika Eleonora (b. Jan. 23, 1688, Stockholm—d. Nov. 24, 1741, Stockholm), Swedish queen whose short reign (1718–20) led to Sweden's Age of Freedom—a 52-year decline of absolutism in favour of parliamentary government.

Ulrika Eleonora was a sister of the unmarried king Charles XII; after the death of her elder sister Hedvig Sofia in 1708, she became heir to the Swedish throne. Ulrika Eleonora was married to Frederick of Hesse-Kassel in 1715, after Charles XII assured her that marriage to a Calvinist would not jeopardize her succession. Ulrika's devotion to her husband led her to subordinate her own ambitions to those of Frederick. Thus, although Ulrika became queen in 1718 after Charles's death, she abdicated in 1720 in favour of her husband, who came to the Swedish throne as Frederick I (ruled 1720–51).



Ulrika Eleonora, detail from a portrait by Martin van Mytens, *c.* 1730; in Gripsholm Castle, Sweden

By courtesy of the Svenska Portrattarkivet, Stockholm

Even in 1718, however, when Ulrika was vying for the throne against her nephew, Charles Frederick of Holstein-Gottorp, both she and Frederick came under the influence of the anti-absolutist parliamentary forces led by Count Arvid Bernhard Horn. Therefore, when Frederick became king, he gave up significant powers to Parliament, thus inaugurating the Swedish Age of Freedom.

Ulsan, city, Kyŏngsang-namdo (South Kyŏngsang Province), southeastern South Korea. At the eastern end of T'aebaek-sanmaek (mountains), facing the Sea of Japan (East Sea), on Ulsan-man (bay), it is 45 mi (72 km) north-northeast of Pusan. It is the heart of the country's special industrial area known as the Ulsan Industrial District.



Oil refinery in Ulsan, South Korea

Shostal—EB Inc.

Until 1962, when the city was connected by rail and highway with Seoul, Pusan, Taegu, and Taejŏn, it was primarily a fishing port and a market centre for agricultural products (especially pears) from the Ulsan plain

and the delta of the T'aehwa River. By the end of the first five-year economic plan (1966), the city had become an open port, and major industrial plants had been built. Installations include a thermoelectric power plant, an oil refinery, and fertilizer, automobile, aluminum, nylon, synthetic textile, and thermoplastic resin factories, within an area of about 10 square miles (26 square km). The port of Pangŏjin, on Ulsan Bay, became part of Ulsan in 1962. Shipbuilding is carried on there. Pop. (2000) 1,012,110.

Ulster, ancient ULAID, one of the ancient provinces of Ireland, and subsequently the northernmost of Ireland's four traditional provinces (the others being Leinster, Munster, and Connaught). Owing to the Ulster cycle of Irish Gaelic literature, which recounts the exploits of Cú Chulainn and many other Ulster heroes, Ulster has a place of great prominence in Irish literature.

Ancient Ulster extended from the northern and northeastern coasts of Ireland south to what is now County Louth and west to what is now County Donegal. About the beginning of the Christian era, when the ancient provinces of Ireland were first taking permanent shape, Ulster had its capital at Emain Macha, near Armagh. Attacks from the midland kingdom of Meath (Midhe, or Mide) led to Ulster's disintegration in the 4th and 5th centuries. The province subsequently split into the three kingdoms of Oriel, or Airgialla (in central Ulster), Aileach (in western Ulster), and the smaller kingdom of Ulaid (in eastern Ulster).

During the Anglo-Norman invasion of Ireland in the late 12th century, one of the baronial adventurers, John de Courci, captured eastern Ulster and ruled that small kingdom until dispossessed in 1205 by King John, who created Hugh de Lacy (d. 1242) earl of Ulster. From 1263 to 1333 the earldom was held by the Anglo-Norman family of de Burgh, passing then to an heiress who married Lionel, duke of Clarence, a son of King Edward III, and ultimately to the crown.

In the 16th century Ulster was administratively divided into nine shires (counties), of which those in the Republic of Ireland still exist. Meanwhile, the O'Neills (of County Tyrone) and the O'Donnells (of County Tyrconnell) had become virtually supreme in much of Ulster. These two Roman Catholic clans were involved in a serious rebellion against Queen Elizabeth I from 1594 to 1601, caused in part by attempts to impose the English Reformation on the Irish. The failure of negotiations with James I led to the flight of the northern earls of Tyone, Tyrconnell, and many others in 1607. Soon afterward thousands of settlers, mainly Lowland Scots Presbyterians, were introduced into Ulster, and particularly into its eastern portions, which became predominantly Protestant as a result. Their descendants prospered, and their refusal to join the rest of Ireland in accepting Home Rule led to the establishment of the state of Northern Ireland in 1920, consisting of the six Ulster counties of Antrim, Down, Armagh, Londonderry, Tyrone, and Fermanagh (replaced in the early 1970s by 26 local districts). The three Ulster counties of Monaghan, Cavan, and Donegal were included in the Republic of Ireland. The name Ulster is now commonly applied to Northern Ireland.

Ulster, EARLS OF, titled Anglo-Irish nobility of several creations, grouped below chronologically and indicated by the symbol •.

• **Ulster, Hugh de Lacy, earl of** (b. *c.* 1176—d. before Dec. 26, 1242, Ulster, Ire.), one of the most powerful Anglo-Norman lords in Ulster (in Ireland) in the first half of the 13th century.

He was the younger son of Hugh de Lacy, 1st lord of Meath. For a time he was coadjutor of John de Courci in Leinster and Munster, but after 1200 the rivalry between the two developed into war, and in 1203 de Lacy drove de Courci out of Down and in the following year took him prisoner. He was rewarded by King John with grants of land in Ulster and Connaught, which were confirmed by a charter on May 29, 1205, on which date (or earlier) Hugh was created earl. He returned to Ireland with quasi-viceregal authority. In 1207 war broke out between the Earl of Ulster and the justiciar. This brought King John in person to Ireland, where he expelled the earl's brother, Walter de Lacy, from Meath, and compelled the earl himself to flee to Scotland.

For several years Ulster took part in the wars in France, and he did not return to Ireland until 1221, when he allied himself with the O'Neills against the English. In 1226 his lands in Ulster were handed over to his brother Walter, but they were restored to him in the following year, after which date he appears to have loyally served the king, being more than once summoned to England to give advice about Irish affairs. On his death he left no surviving legitimate children, and the earldom of Ulster reverted to the crown.

• **Ulster, Richard de Burgh, 2nd earl of** (b. 1259?—d. July 29, 1326, Athassel Monastery, near Cashel, County Tipperary, Ire.), one of the most powerful Irish nobles of the late 13th and early 14th centuries, a member of a historic Anglo-Irish family, the Burghs, and son of Walter de Burgh (*c.* 1230–71), the 1st earl of Ulster (of the second creation).

In 1286 he ravaged Connaught and reestablished his family's power there, deposing Brian O'Neill as chief native king and substituting a nominee of his own. He also attacked the native king of Connaught in favour of that branch of the O'Connors whom his own family supported. He led his forces from Ireland to support England's King Edward I in his Scottish campaigns; and, on Edward de Bruce's invasion of Ulster in 1315, the Earl of Ulster marched against him, although he had given his daughter Elizabeth in marriage to Robert de Bruce, afterward king of Scotland, about 1304. Occasionally summoned to English Parliaments, he spent most of his 40 years of activity in Ireland, where he was the greatest noble of his day, usually fighting the natives or his Anglo-Norman rivals, the Geraldines.

• **Ulster, Lionel of Antwerp, earl of:** *see* Clarence, Lionel of Antwerp, duke of.

• **Ulster, Edmund Mortimer, 3rd earl of:** *see* March, Edmund Mortimer, 5th earl of.

Ulster cycle, Irish Gaelic ULAID CYCLE, in ancient Irish Gaelic literature, a group of legends and tales dealing with the heroic age of the Ulaids, a people of northeast Ireland from whom the modern name Ulster derives. The stories, set in the 1st century BC, were recorded from oral tradition between the 8th and 11th century and are preserved in the 12th-century manuscripts *The Book of the Dun Cow* (*q.v.*; *c.* 1100) and *The Book of Leinster* (*q.v.*; *c.* 1160) and also in later compilations, such as *The Yellow Book of Lecan* (14th century). They reflect the customs of a free pre-Christian aristocracy who fought from chariots, took heads as trophies, were subject to taboo (*geis*), and were influenced by druids. Mythological elements are freely intermingled with legendary elements that have an air of authenticity. Events centre on the reign of the semi-historical King Conor (Conchobar mac Nessa) at Emain Macha (near modern Armagh) and his Knights of the Red Branch (*i.e.*, the palace building in which the heads and arms of vanquished enemies were stored). A rival court at Connaught is ruled by King Ailill and Queen Medb (*q.v.*). The chief hero of the Red Branch is the Achilles-like Cú Chulainn (*q.v.*), born of a mortal mother, Dechtire, the sister of King Conor, and a divine father, the god Lug of the Long Arm.

Most of the stories are short prose narratives, using verse for description and for scenes of heightened emotion. They fall into types such as destructions, cattle raids, or elopements. The longest tale and the closest approach to an epic is *The Cattle Raid of Cooley* (*q.v.*), dealing with a conflict between the men of Ulster and of Connaught. One tale portrays the familiar father–son duel, in which Cú Chulainn unknowingly kills his own son, who has come to seek him. Another tale, *Bricriu's Feast*, contains a beheading game that is the source for *Sir Gawayne and the Grene Knight*. The tale having the most profound influence on later Irish literature is *The Fate of the Sons of Usnech*, the tragic love story of Deirdre (*q.v.*) and Noísi, which was retold in dramatic form in the 20th century by John Millington Synge and William Butler Yeats.

Ulster Defence Association (UDA), loyalist paramilitary organization, largest of the Protestant militant groups in Northern Ireland. The UDA was founded in September 1971 by Andy Tyrie.

Ostensibly not an armed force but a defense force, the UDA is not banned by the Northern Ireland government. Members began their activities in the early 1970s seeking to "defend the streets" during the mass bombings and heaviest attacks of the Irish Republican Army (IRA). The group sees itself and is viewed by the Protestant community as defensive. Yet its members claimed responsibility for such acts as the murders on Oct. 29, 1980, of four Irish nationalists who had been trying to win political privileges for IRA terrorists in Northern Ireland prisons. The UDA's political program is one of opposition to Home Rule, which would remove Northern Ireland from the government of the United Kingdom and unite it with the (Catholic) Republic of Ireland.

Ulster Volunteer Force (UVF), a paramilitary group formed in Northern Ireland in 1966 by Protestant militants opposed to the militant Irish Republican Army (IRA), which was fighting to force Northern Ireland out of the United Kingdom and into unification with the Republic of Ireland. The UVF's name was a revival of that of a Protestant loyalist organization of 1913–20, which then had successfully resisted Home Rule for Northern Ireland.

From its founding the UVF openly declared its violent opposition to the IRA. On June 28, 1966, the government of Northern Ireland proscribed the UVF and charged three of its members with conspiring to incite disorder and murder; the three were found guilty and sentenced to life imprisonment. During succeeding years a series of bombings, assassinations, murders, and reprisals were carried out in the name of the UVF. Notably, 11 extremists, most of them UVF members, were sentenced on Feb. 20, 1979, to long terms of imprisonment for the murder of 19 Roman Catholics (most of whom were victims chosen at random) in revenge for IRA and Provisional IRA terrorist attacks.

ultimogeniture (inheritance): *see* primogeniture and ultimogeniture.

ultisol, weathered, frequently reddish, acidic soil type of humid areas in the middle to low latitudes. The characteristic profile consists of a moderately to strongly acidic clay horizon, a dark surface horizon rich in humus, and a leached horizon. Not as intensely weathered as the oxisols, with which they are geographically associated, ultisols still contain appreciable amounts of such primary minerals as feldspars and micas, as well as a mixture of clay types.

The addition of lime raises the pH of these soils, thereby reducing aluminum toxicity and

increasing the availability of nutrients provided by application of organic fertilizers. Where this treatment has been used, in areas such as the southeastern United States and Southeast Asia, which have a long year-round growing season and ample rainfall, the ultisols rank among the world's most productive soils.

ultra, abbreviation of ULTRAROYALIST, French ULTRAROYALISTE, the extreme right wing of the royalist movement in France during the Second Restoration (1815–30). The ultras represented the interests of the large landowners, the aristocracy, clericalists, and former émigrés. They were opposed to the egalitarian and secularizing principles of the Revolution, but they did not aim at restoring the ancien régime; rather, they were concerned with manipulating France's new constitutional machinery in order to regain the assured political and social predominance of the interests they represented.

The ultras emerged within the royalist movement in 1815. They controlled the Chamber of Deputies (the lower house of the French parliament) in 1815–16 and again from 1821 to 1827. They dominated the cabinet in 1821–24 (*i.e.,* the last years of Louis XVIII's reign), and in the latter year their leader, the count d'Artois, succeeded to the throne as Charles X (*q.v.*). During his reign the ultras were able to partly fulfill their political program, which called for tightened restrictions on the press and increased power for the Roman Catholic church. Owing to the unpopularity of their policies, the ultras lost control of the Chamber of Deputies in 1827, and their ministry ended (along with Charles X's reign) in the July Revolution of 1830, after which the faction ceased to exist.

Ultra, Allied intelligence system that, in tapping the very highest-level communications among the German armed forces, as well as (after 1941) those of the Japanese armed forces, contributed to the Allied victory in World War II.

In the early 1930s Polish cryptographers first broke the code of Germany's cipher machine Enigma. They were led by mathematician Marian Rejewski and assisted by material provided to them by French intelligence agents. For much of the decade the Poles were able to decipher their neighbour's radio traffic, but in 1939, faced with a possible invasion and difficulties decoding messages due to changes in Enigma's operating procedures, they turned their information over to the Allies. Early in 1939 Britain's secret service set up the Ultra project at Bletchley Park, 50 miles (80 km) north of London, for the purpose of intercepting the Enigma signals, deciphering the messages, and controlling the distribution of the resultant secret information. Strict rules were established to restrict the number of people who knew about the existence of the Ultra information and to ensure that no actions would alert the Axis powers that the Allies possessed knowledge of their plans.

The incoming signals from the German war machine (more than 2,000 daily at the war's height) were of the highest level, even from Adolf Hitler himself. Such information enabled the Allies to build up an accurate picture of enemy plans and orders of battle, forming the basis of war plans both strategic and tactical. Ultra intercepts of signals helped the Royal Air Force to win the Battle of Britain. Signals between Adolf Hitler and General Günther von Kluge led to the destruction of a large part of the German forces in Normandy in 1944 after the Allied landing. In the Pacific the Germans had supplied their Japanese ally with an Enigma machine as early as 1937; the modified Japanese version, called "Purple" by the Americans, was duplicated by the U.S. Signal Intelligence Service well before Pearl Harbor. Resultant revelations of Japanese plans led to U.S. naval victories in the battles of the Coral Sea and Midway, crushing the offensive power of the Japanese fleet, and enabled American flyers to find and shoot down the plane carrying Admiral Yamamoto Isoroku, the Japanese commander in the Pacific.

For 29 years after the war the existence of Ultra remained an official British secret. The ban was not lifted until 1974, the year that a key participant in the Ultra project, Frederick William Winterbotham, published *The Ultra Secret.*

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Ultraism, Spanish ULTRAÍSMO, movement in Spanish and Spanish-American poetry after World War I, characterized by a tendency to use free verse, complicated metrical innovations, and daring imagery and symbolism instead of traditional form and content. Influenced by the emphasis on form of the French Symbolists and Parnassians, a distinguished coterie of avant-garde poets (*ultraístas*) produced verse that often defied objective analysis and gave the impression of a coldly intellectual experimentation. Launched in Madrid in 1919 by the poet Guillermo de Torre, Ultraism attracted most of the important contemporary poets. Their works were published chiefly in the two major avant-garde periodicals, *Grecia* (1919–20) and *Ultra* (1921–22).

Jorge Luis Borges introduced Ultraism to South America in 1921. There the movement attracted poets such as the Chileans Pablo Neruda and Vicente Huidobro and the Mexican poets Jaime Torres Bodet and Carlos Pellicer. Although the movement had subsided by 1923, the sociopolitical overtones of much of the writing of the South American *ultraístas,* as seen in the verse of César Vallejo of Peru, flowered into the Marxist poetry of the following decade. Later the verbal techniques of the *ultraístas* were revived by post-World War II avant-garde writers.

ultramarine, pigment in the gem lapis lazuli, used by painters as early as the European Middle Ages. Ore containing the colour was ground, and the powdered lapis lazuli was separated from the other mineral matter. The pigment was first produced artificially in the late 1820s in France and Germany, being made from about equal amounts of china clay, sulfur, and sodium carbonate, with lesser amounts of silica and rosin or pitch. The mixture is fired slowly to 750° C (1,380° F) and cooled in a sealed furnace. Depending on the proportion of the ingredients, the shade varies from greenish to reddish blue.

Ultramarine is used in paints, lacquers, and decorating materials. It has a particularly brilliant blue colour and is very lightfast, but it is not suitable for use outdoors because it weathers to a dull-blue powder.

ultramicroscope, microscope arrangement used to study colloidal-size particles that are too small to be visible in an ordinary light microscope. The particles, usually suspended in a liquid, are illuminated with a strong light beam perpendicular to the optical axis of the microscope. These particles scatter light, and their movements are seen only as flashes against a dark background; their structure is not resolved.

Ultramontanism (from Medieval Latin *ultramontanus,* "beyond the mountains"), in Roman Catholicism, a strong emphasis on papal authority and on centralization of the church. The word identified those northern European members of the church who regularly looked southward beyond the Alps (that is, to the popes of Rome) for guidance.

During the period of struggle within the church over the extent of papal prerogatives—beginning especially in the 15th century with the conciliar movement and continuing in the following centuries with the growth of strong nationalism and theological liberalism—the Ultramontanists were opposed by those, such as the Gallicans, who wished to restrict papal power. The Ultramontane Party triumphed in 1870 at the first Vatican Council when the dogma of papal infallibility was defined as a matter of Roman Catholic belief.

ultrasonics, vibrational or stress waves in elastic media that have a frequency above those of sound waves that can be detected by the human ear—*i.e.,* above 20 kilohertz. Such waves may be longitudinal waves of the same type as the sound waves that travel in air, or, in solids, they may be transverse or shear waves. In addition, some ultrasonic waves propagate along the surface of a solid (Rayleigh waves) or in thin rods and sections of material (Lamb waves).

A brief treatment of ultrasonics follows. For full treatment, *see* MACROPAEDIA: Sound.

There are numerous means of generating and detecting ultrasonic vibration. The most common are magnetostrictive or piezoelectric transducers, which convert high-frequency alternating magnetic fields or electric currents into mechanical vibrations. A distinction is made between high-power and low-power ultrasonics on the basis of whether the waves produce a distortion in the medium.

High-power applications include ultrasonic welding; ultrasonic drilling, in which the direction of vibration and thus of cutting is perpendicular to the surface of the material to be cut, so that holes may be drilled in any shape; and ultrasonic irradiation of fluid suspensions, which may be used for the clarification of wine by precipitation or the coagulation of particles suspended in factory exhaust fumes. High-amplitude ultrasonic waves applied to a liquid may cause the liquid to cavitate and generate shock waves that produce vigorous streaming and shear processes. These effects can be exploited in the production of emulsions, the cleaning of surfaces, and the disruption of biological structures.

Low-power ultrasonic waves are used in sonar devices for underwater detection and navigation and for mapping the seabed profile and composition. Similar pulse-echo techniques are used in the nondestructive testing of industrial materials and structures (*e.g.,* reinforced plastics, railway lines, aircraft, and reactor vessels); ultrasonic waves are scattered by discontinuities in a test object and can thus be used to detect cavities or cracks or to measure thickness.

In medicine, low-power ultrasonics can be used in place of X rays to produce an image of internal bodily structures. (*See* ultrasound.)

Ultrasonic waves are used in the laboratory to study certain properties of materials, including the compressibility of molecules in solution, the elastic moduli of solids, and the molecular structure of gases and liquids. At very high frequencies (100 megahertz and upward), ultrasonic microscopy gives visualization of small structures with resolution comparable to that of optical microscopy. Ultrasonics at these frequencies are also used in solid-state physics.

ultrasound, also called ULTRASONOGRAPHY, in medicine, the use of high-frequency sound (ultrasonic) waves to produce images of structures within the human body. Ultrasonic waves are sound waves that are above the range of sound audible to humans. The ultrasonic waves are produced by the electrical stimulation of a piezoelectric crystal and can be aimed at a specific area of the body. As the waves travel through bodily tissues, they

are reflected back at any point where there is a change in tissue density, as, for instance, in the border between two different organs of the body. The reflected echoes are received by an electronic apparatus that determines the intensity level of the echoes and the position of the tissue giving rise to the echoes. The images thus formed can be displayed in static form, or, through the use of rapid multiple sound scans, they can in effect provide a moving picture of the inside of the body.

Part of ultrasound's usefulness derives from the fact that the sound waves are less potentially harmful to human tissues than are X rays or other ionizing radiations. Because it is an invasive procedure, theoretical risks to the tissues do exist; however, there are no known examples of tissue damage from conventional ultrasound imaging. Ultrasound is most commonly used to examine fetuses in utero in order to ascertain size, position, or abnormalities. Ultrasound is also used to provide images of the heart, liver, kidneys, gallbladder, breast, eye, and major blood vessels.

ultraviolet astronomy, study of the ultraviolet spectra of astronomical objects. It has yielded much important information about chemical abundances and processes in interstellar matter, the Sun, and certain other stellar objects, such as white dwarfs.

Ultraviolet astronomy became feasible with the advent of rockets capable of carrying instruments above the Earth's atmosphere, which absorbs most electromagnetic radiation of ultraviolet wavelengths (*i.e.*, roughly 100 to 4,000 angstroms) from celestial sources. Much radiation is lost even at the highest altitudes that balloons can reach. During the 1920s, unsuccessful attempts were made to photograph the Sun's ultraviolet spectrum from balloons; not until 1946 did a rocket-borne camera succeed in doing so. Since the early 1960s the United States and several other countries have placed in Earth orbit unmanned satellite observatories carrying telescopes with optical surfaces specially coated for high ultraviolet reflectivity. These include eight Orbiting Solar Observatories, launched from 1962 to 1975 by the U.S. National Aeronautics and Space Administration (NASA), which enabled astronomers to obtain thousands of ultraviolet spectra of the Sun's corona. Another series of U.S. satellites, known as Orbiting Astronomical Observatories, have permitted the study of the interstellar medium and remote stars in the spectral range of 1,200 to 4,000 angstroms.

A telescope carried aboard the International Ultraviolet Explorer spacecraft (launched in 1978 by British and European space agencies in collaboration with NASA) allowed significant ultraviolet observations to be made of objects such as comets and quasars. The high-resolution Hubble Space Telescope, deployed in 1990, also collected ultraviolet-wavelength data about faint objects such as nebulae and distant star clusters. NASA's Extreme Ultraviolet Explorer satellite was launched in 1992.

ultraviolet radiation, that portion of the electromagnetic spectrum extending from the violet, or short-wavelength, end of the visible light range to the X-ray region. Ultraviolet (UV) radiation is undetectable by the human eye, although when it falls on certain materials it may cause them to fluoresce—*i.e.*, emit electromagnetic radiation of lower energy, such as visible light. Many insects, however, are able to see ultraviolet radiation.

Ultraviolet radiation lies between wavelengths of about 400 nanometres (1 nanometre [nm] is 10^{-9} metre, or 10 angstrom units) on the visible-light side and about 100 nm on the X-ray side, though some authorities extend the short-wavelength limit to 4 nm. Based on the interaction of wavelengths of ultraviolet radiation with biological materials, three divisions have been designated: UVA (400–315 nm), also called black light; UVB (315–280 nm), responsible for the radiation's best-known effects on organisms; and UVC (280–100 nm), which does not reach the Earth's surface.

Ultraviolet radiation is produced by high-temperature surfaces, such as the Sun, in a continuous spectrum and by atomic excitation in a gaseous discharge tube as a discrete spectrum of wavelengths. Most of the ultraviolet radiation in sunlight is absorbed by oxygen in the Earth's atmosphere, which forms the ozone layer of the lower stratosphere. Of the ultraviolet that does reach the Earth's surface, almost 99 percent is UVA radiation. When the ozone layer becomes thin, more UVB radiation reaches the Earth's surface and may have hazardous effects on organisms.

Unlike X rays, ultraviolet radiation has a low power of penetration, hence its direct effects on the human body are limited to the surface skin. The direct effects include reddening of the skin (sunburn), pigmentation development (suntan), aging, and carcinogenic changes. Ultraviolet sunburns can be mild, causing only redness and tenderness, or they can be so severe as to produce blisters, swelling, seepage of fluid, and sloughing of the outer skin. The blood capillaries (minute vessels) in the skin dilate with aggregations of red and white blood cells to produce the red coloration. Tanning is a natural body defense relying on melanin to help protect the skin from further injury. Melanin is a chemical pigment in the skin that absorbs ultraviolet radiation and limits its penetration into tissues. A suntan occurs when melanin pigments in cells in the deeper tissue portion of the skin are activated by ultraviolet radiation, and the cells migrate to the surface of the skin. When these cells die, the pigmentation disappears. Persons of light complexion have less melanin pigment and so experience the harmful effects of ultraviolet radiation to a greater degree. The application of sunscreen to the skin can help to block absorption of ultraviolet radiation in such persons.

Constant exposure to the Sun's ultraviolet radiation induces most of the skin changes commonly associated with aging, such as wrinkling, thickening, and changes in pigmentation. There is also a much higher frequency of skin cancer, particularly in persons with fair skin. The three basic skin cancers, basal- and squamous-cell carcinoma and melanoma, have been linked to long-term exposure to ultraviolet radiation and probably result from changes generated in the DNA of skin cells by ultraviolet rays.

Ultraviolet radiation also has positive effects on the human body, however. It stimulates the production of vitamin D in the skin and can be used as a therapeutic agent for such diseases as psoriasis. Because of its bactericidal capabilities at wavelengths of 260–280 nm, ultraviolet radiation is useful as both a research tool and a sterilizing technique. Fluorescent lighting, which exploits the ability of ultraviolet radiation to interact with materials known as phosphors and cause the emission of visible light, is a highly efficient form of artificial lighting.

Ulúa River, Spanish RÍO ULÚA, river in northwestern Honduras. Its headstreams rise deep in the central highlands, draining much of northwestern Honduras. The Ulúa proper, about 190 miles (240 km) long, is formed by the union of the Jicatuyo and Otoro rivers, northwest of Santa Bárbara. Flowing northeastward, it emerges from the highlands, enters the Sula Valley (famous for its banana plantations), and becomes navigable. The Ulúa enters the Gulf of Honduras of the Atlantic Ocean east-northeast of Puerto Cortés.

Ulūgh Beg (b. 1394, Soltāniyeh, Timurid Iran—d. Oct. 27, 1449, Samarkand, Timurid empire [now in Uzbekistan]), grandson of the Asian conqueror Timur (Tamerlane) and one whose primary interest was in the arts and intellectual matters. Under his brief rule the Timurid dynasty of Iran reached its cultural peak.

His father, Shāh Rokh, captured the city of Samarkand and gave it to Ulūgh Beg, who made it a centre of Muslim culture. There he wrote poetry and history and studied the Qur'ān. His greatest interest was astronomy, and he built an observatory (begun in 1428) at Samarkand. In his observations he discovered a number of errors in the computations of the 2nd-century Alexandrian astronomer Ptolemy, whose figures were still being used.

Ulūgh Beg was a failure in more mundane affairs. On his father's death in 1447 he was unable to consolidate his power, though he was Shāh Rokh's sole surviving son. Other Timurid princes profited from his lack of action, and he was put to death at the instigation of his son, 'Abd al-Latīf.

Ulundi, town, capital of KwaZulu/Natal province, South Africa. It lies on the north bank of the White Mfolozi River. The site was chosen by Cetshwayo for his new capital when he became king of the Zulu in 1873. He called it UluNdi ("the High Place"). The village was captured and burned by the British in 1879 in the last battle of the Anglo-Zulu War, in which Cetshwayo was defeated. A memorial has been erected on the site.

In the 1970s the South African white government decided to build the new capital of what was then KwaZulu at Ulundi. KwaZulu/Natal province was created out of Natal province and KwaZulu in 1994, and Ulundi was named its capital that same year. Light industries in the area process foodstuffs, tobacco, and timber. Roads and a railway link the town with Vryheid and Richards Bay. The population is predominantly Zulu, and Christianity is the dominant religion. Pop. (1985) 4,312.

Ulva (algae): *see* sea lettuce.

Ulyanov, Vladimir Ilich: *see* Lenin, Vladimir Ilich.

Ulyanovsk, *oblast* (province), western Russia. The *oblast* lies athwart the middle Volga River, which is there transformed into a broad lake by the downstream Samara dam. The larger western part lies on the Volga Upland, which is dissected by river valleys and erosion gullies; the smaller Trans-Volga is a low plain. In the west are extensive oak woods, but elsewhere the forest-steppe vegetation on fertile soils has been largely cleared for intensive agriculture. Grains, especially wheat, together with sunflowers and sugar beets, are the main crops. The communities, apart from Ulyanovsk, the *oblast* headquarters, are small and engaged chiefly in processing farm produce. Area 14,400 square miles (37,300 square km). Pop. (1993 est.) 1,462,200.

Ulyanovsk, formerly (until 1780) SINBIRSK, or (1780–1924) SIMBIRSK, city and administrative centre of Ulyanovsk *oblast* (province), western Russia. It lies along the Volga River at its confluence with the Sviyaga. Founded in 1648, it was a key fortress on the Sinbirsk defensive line; in 1924 it was renamed after V.I. Ulyanov (Lenin), who was born there and whose home is preserved as a museum. Ulyanovsk has engineering industries that produce buses and light trucks, machine tools, and motors; there are also food-processing and consumer-goods industries. The city has polytechnic, agricultural, and teacher-training institutes. Pop. (1993 est.) 681,400.

Ulysses (Greek mythology): *see* Odysseus.

Uman, city, Cherkasy *oblast* (province), central Ukraine, on the Umanka River. It dates from the Middle Ages and was incorporated in 1795. Uman is an industrial centre specializing in scientific instruments, with some

engineering, food, and building-materials industries. It has teacher-training and agricultural institutes. Pop. (1991 est.) 92,700.

Umanak Fjord, also spelled ŪMÂNAQ (Greenland): *see* Uummannaq Fjord.

umangite, a copper selenide (Cu_3Se_2) occurring only in small grains or fine granular aggregates with other copper minerals of the sulfide group. The mineral is bluish black with a reddish tint. Deposits of the mineral are found in the Sierra de Umango (for which it is named) in Argentina; in the Harz Mountains of Germany; and at Skrickerum, Sweden. Umangite alters to malachite. For detailed physical properties, *see* sulfide mineral (table).

ʿUmar, also spelled OMAR, Turkish ÖMER, name of Muslim caliphs, grouped below chronologically and indicated by the symbol •.

• **ʿUmar I,** in full ʿUMAR IBN AL-KHAṬṬĀB (b. *c.* AD 586, Mecca, Arabia [now in Saudi Arabia]—d. Nov. 3, 644, Medina, Arabia), the second Muslim caliph (from 634), under whom Arab armies conquered Mesopotamia and Syria and began the conquest of Iran and Egypt.

A member of the clan of ʿAdi of the Meccan tribe of Quraysh (Koreish), ʿUmar at first opposed Muḥammad but, about 615, became a Muslim. By 622, when he went to Medina with Muḥammad and the other Meccan Muslims, he had become one of Muḥammad's chief advisers, closely associated with Abū Bakr. His position in the state was marked by Muḥammad's marriage to his daughter Ḥafṣa in 625. On Muḥammad's death in 632 ʿUmar was largely responsible for reconciling the Medinan Muslims to the acceptance of a Meccan, Abū Bakr, as head of state (caliph). Abū Bakr (reigned 632–634) relied greatly on ʿUmar and nominated him to succeed him. As caliph, ʿUmar was the first to call himself "commander of the faithful" (*amīr al-muʾminīn*). His reign saw the transformation of the Islāmic state from an Arabian principality to a world power. Throughout this remarkable expansion ʿUmar closely controlled general policy and laid down the principles for administering the conquered lands. The structure of the later Islāmic empire, including legal practice, is largely due to him. Assassinated by a Persian slave for personal reasons, he died at Medina 10 years after coming to the throne. A strong ruler, stern toward offenders, and himself ascetic to the point of harshness, he was universally respected for his justice and authority.

• **ʿUmar II,** in full ʿUMAR IBN ʿABD AL-ʿAZĪZ (b. 682/683, Medina, Arabia [now in Saudi Arabia]—d. February 720, near Aleppo, Syria), pious and respected caliph who attempted to preserve the integrity of the Muslim Umayyad caliphate (661–750) by emphasizing religion and a return to the original principles of the Islāmic faith.

His father, ʿAbd al-ʿAzīz, was a governor of Egypt, and through his mother he was a descendant of ʿUmar I (second caliph, 634–644). He received a traditional education in Medina and won fame for his piety and learning. In February or March 706, ʿUmar was appointed governor of the Hejaz. During his tenure of office, he initiated policies that later characterized his reign, particularly his creation of a consultative body of pious men to aid him in his rule.

ʿUmar was elevated to the caliphate by the will of his predecessor, the caliph Sulaymān, in September or October 717. At his accession the stability of the Umayyad caliphate was threatened by the discontent of the Mawālī (non-Arab Muslims) and the "pious opposition," who resented the Umayyads allegedly for putting political interests ahead of established religious principles. ʿUmar, who was mainly interested in home affairs, attempted no major military conquests, and soon after his accession he lifted his predecessor's disastrous siege of Constantinople (now Istanbul). Initiating a policy of internal consolidation, he dismissed unpopular governors, reformed the taxation system, and granted the Mawālī the same fiscal rights as Arab Muslims.

Although many of his policies seemed untenable, ʿUmar attempted to arrest the disintegration of the Umayyad caliphate by appealing to a broad segment of the Muslim population. He, alone of the Umayyads, was respected by the later ʿAbbāsid dynasty and was highly regarded even among the Shīʿites, schismatic followers of Muḥammad's son-in-law ʿAlī.

ʿUmar ibn Abī Rabīʿah, full name ʿUMAR IBN ʿABD ALLĀH IBN ABĪ RABĪʿAH AL-MAKHZŪMĪ (b. November 644, Mecca, Arabia [now in Saudi Arabia]—d. 712/ 719, Mecca), one of the greatest early Arabic poets.

ʿUmar belonged to the wealthy merchant family of Makhzūm, a member of the Meccan tribe of Quraysh (of which the Prophet Muḥammad was also a member). He spent most of his life in Mecca, also traveling to southern Arabia, Syria, and Mesopotamia. Little is known about his life, for the numerous anecdotes related about him are manifestly literary fabrications. The internal evidence of his poetry, however, gives a valuable picture of the social life of the Meccan and Medinan aristocracy of his time.

His poetry centres on his own life and emotions, eschewing the traditional themes of journeys, battles, and tribal lore, and celebrates his love affairs with the noble Arab ladies who came to Mecca on pilgrimage. Although this genre had been sporadically practiced before his time, ʿUmar ibn Abī Rabīʿah was the first to perfect it with a light metre and an accurate emotional perception.

ʿUmar Tal, in full AL-ḤĀJJ ("the Pilgrim") ʿUMAR IBN SAʿĪD TAL, also spelled EL-HADJ OMAR IBN SAʿĪD TAL (b. *c.* 1797, Halvar, Fouta-Toro [now in Senegal]—d. Feb. 12, 1864, near Hamdalahi, Tukulor empire [now in Mali]), West African Tukulor leader who, after launching a jihad (holy war) in 1854, established a Muslim realm, the Tukulor empire, between the upper Senegal and Niger rivers (in what is now upper Guinea, eastern Senegal, and western and central Mali). The empire survived until the 1890s under his son, Aḥmadu Sekou.

Early life and pilgrimage to Mecca. ʿUmar Tal was born in the upper valley of the Sénégal River, in the land of the Tukulor people. His father was an educated Muslim who instructed students in the Qurʾān, and ʿUmar, a mystic, perfected his studies in Arabic and the Qurʾān with Moorish scholars who initiated him into the Tijānī brotherhood.

At the age of 23, ʿUmar set out on the pilgrimage to Mecca. He was already well known for his piety and erudition and was received with honour in the countries through which he traveled. Muḥammad Bello, emir of Sokoto in Nigeria, offered him his daughter Maryam in marriage. Enriched by this princely alliance, ʿUmar had become an important personage when he reached Mecca about 1827. He visited the tomb of the Prophet in Medina, returned to Mecca, and then settled for a while in Cairo. On a visit to Jerusalem he succeeded in curing a son of Ibrahim Pasha, the viceroy of Egypt. In Mecca, finally, he was designated caliph for black Africa by the head of the Tijānī brotherhood.

Armed with his prestige as a scholar, mystic, and miracle worker, ʿUmar returned to the interior of Africa in 1833. Trained for political leadership by his father-in-law, Muḥammad Bello, the emir of Sokoto, with whom he again spent several years, and his position strengthened by the title of caliph, ʿUmar now decided to obey the voice of God and to convert the pagan Africans to Islām. By now he not only was looked upon as a miracle worker but also had acquired a bodyguard of followers and of devoted Hausa slaves.

Upon the death of Bello, he departed for his native country, hoping to conquer the Fouta region with the assistance of the French, in exchange for a trade treaty, an agreement the French declined because of ʿUmar's growing strength. ʿUmar realized that faith without force would be ineffective and made careful preparations for his task. In northeastern Guinea, where he first established himself, he wrote down his teachings in a book called *Kitāb rimāḥ ḥizb ar-raḥīm* ("Book of the Spears of the Party of God"). Deriving his inspiration from Ṣūfism—a mystic Islāmic doctrine—he defined the Tijānī "way" as the best one for saving one's soul and for approaching God. He recommended meditation, self-denial, and blind obedience to the sheikh. He gained many followers in Guinea, but, when in 1845 he went to preach in his own country, he met with little success.

Military achievements. Having built up an army, ʿUmar decided to use force. In March 1854 he issued an order for a jihad to sweep away the pagans and bring back the Muslims who had strayed from the fold. Starting out with about 10,000 men who lived off the land, he spread terror in order to force the pagan chieftains to submit. In 1855 he defeated the Bambara pagans of Mali, adding to his empire. He forcibly converted them, yet these conversions proved to be ineffectual. To defend his authority ʿUmar had 300 hostages executed, but revolt broke out again as soon as his armies were removed.

After an unsuccessful attack on a French fort that had refused to supply him weapons, ʿUmar again set off toward the east, but he had great difficulty subsisting in a land already ravaged. His men deserted, and his companions began to doubt his mission.

Having been unable to decisively conquer his adversaries, ʿUmar was to spend the next 10 years trying to contain his empire. Repressing new revolts, he was led eastward by the resistance he stirred up. In 1860 he signed a treaty with the French general Louis Faidherbe, governor of Senegal, accepting the Sénégal River as a common boundary.

ʿUmar perennially had to defend his conquests and foil hostile coalitions without giving up the principle of the jihad. This proved difficult, however, when he was confronted by the Fulani people of the Masina, who were Muslims, followers of the Qādirī brotherhood. When ʿUmar attacked the Fulani, he no longer represented the "wrath of God"—he was a conqueror; his mission turned into a fratricidal war. Both armies prayed to the same God before the battle. ʿUmar, recognizing the danger to his divine mission, proposed a duel with Aḥmadu III, the leader of the Fulani army. But the latter refused the judgment of God. ʿUmar won the battle, and Aḥmadu was captured and beheaded.

In 1863 ʿUmar took possession of the city of Timbuktu, but, defeated by the nomadic Tuaregs, he had to beat a retreat. In a subsequent battle, attacked by the Tuaregs, the Moors, and the Fulani, his army was destroyed. He withdrew to the city of Hamdalahi, where he was besieged. He escaped and took refuge in a cave but was killed when the cave was blown up with gunpowder.

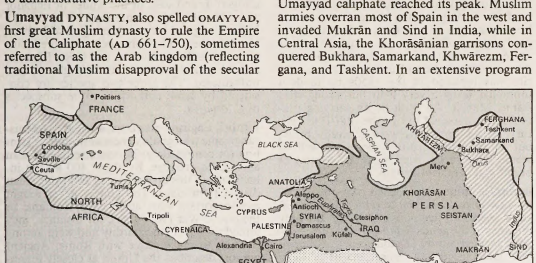
Al-Ḥājj ʿUmar Tal's empire lasted 50 years, from 1848 to 1897, when it was annexed by the French. Few of the Mali people still remember it, except the descendants of the Tijānī initiates or the Fulani and Bambaras, who suffered the conqueror's cruelties. The mosque of Dinguiraye in Guinea is all that remains of ʿUmar's empire. (J.C.F./Ed.)

'Umarī, al-, in full SHIHĀB AD-DĪN AḤMAD IBN FAḌL ALLĀH AL-'UMARĪ (b. June 12, 1301, Damascus—d. March 1, 1349, Damascus), scholar and writer whose works on the administration of the Mamlūk dominions of Egypt and Syria became standard sources for Mamlūk history.

A scion of a family of bureaucrats, al-'Umarī, as his name implies, traced his origin to 'Umar, the second Islāmic caliph. His father held the important post of *kātib as-sirr* (head of the chancery) of the Mamlūk Empire. Al-'Umarī began his career as an assistant to his father. By temperament he was unsuited to the civil service; he was much too independent of mind and action to have survived in any bureaucracy. In *c.* 1337 he was dismissed from office and imprisoned. On the death of his father in 1337, his brother was appointed as head of the chancery. In 1339 al-'Umarī was released from prison and appointed to his father's old post, but in 1342 he was again banished from office and replaced by another brother.

Al-'Umarī spent his remaining years in the pursuit of scholarship. He wrote *at-Ta'rīf bi-al-muṣṭalaḥ ash-sharīf*, a comprehensive study of the principles of Mamlūk administration, and *Masālik al-abṣār fī mamālik al-amṣār*, an encyclopaedic compendium also relating to administrative practices.

Umayyad DYNASTY, also spelled OMAYYAD, first great Muslim dynasty to rule the Empire of the Caliphate (AD 661–750), sometimes referred to as the Arab kingdom (reflecting traditional Muslim disapproval of the secular



The expansion of the caliphal empire through the conquests of the Umayyads

Adapted from R. Trehame and H. Fullard (eds.), *Muir's Historical Atlas: Ancient, Medieval and Modern*, 9th ed. (1965); George Philip & Son Ltd., London

nature of the Umayyad state). The Umayyads, headed by Abū Sufyān, were a largely merchant family of the Quraysh tribe centred at Mecca. They had initially resisted Islām, not converting until 627, but subsequently became prominent administrators under Muḥammad and his immediate successors. In the first Muslim civil war (*fitnah*; 656–661)—the struggle for the caliphate following the murder of 'Uthmān, the third caliph (reigned 644–656)—Abū Sufyān's son Mu'āwiyah, then governor of Syria, emerged victorious over 'Alī, Muḥammad's son-in-law and fourth caliph; Mu'āwiyah then established himself as the first Umayyad caliph.

Umayyad rule was divided between two branches of the family: the Sufyānid (reigned 661–684), descendants of Abū Sufyān, and the Marwanid (reigned 684–750), Marwān I and his successors. The Sufyānids, notably Mu'āwiyah I (reigned 661–680), centralized caliphal authority in Damascus. The Syrian army became the basis of Umayyad strength, enabling the creation of a united empire through greater control of the conquered provinces and of Arab tribal rivalries. Muslim rule expanded to Khorāsān, garrison cities were founded at Merv and Seistan as bases for expeditions into Central Asia and northwestern India, and the invasion of northwestern Africa was begun. A new fleet conducted a series of campaigns against Constantinople (669–678), which, while ultimately unsuccessful, offset the secular image of the state, because they were directed against the Christians. Though the Sufyānids generally retained the Byzantine and Persian administrative bureaucracies they inherited in the provinces, politically they were organized along Arab tribal lines, in which the caliph was chosen by his peers to become, theoretically, "first among equals" and act on the advice of a *shūrā* (tribal council). Mu'āwiyah, however, in securing during his lifetime an oath of allegiance to his son Yazīd I, disregarded the traditional election (*bay'ah*) and introduced the alien concept of hereditary succession.

Civil war and the deaths of Yazīd I in 683 and of Mu'āwiyah II in 684 brought Sufyānid rule to an end. Marwān I was proclaimed caliph in Syria in 684 amid tribal wars.

Under 'Abd al-Malik (reigned 685–705), the Umayyad caliphate reached its peak. Muslim armies overran most of Spain in the west and invaded Mukrān and Sind in India, while in Central Asia, the Khorāsānian garrisons conquered Bukhara, Samarkand, Khwārezm, Fergana, and Tashkent. In an extensive program of Arabization, Arabic became the official state language; the financial administration of the empire was reorganized, with Arabs replacing Persian and Greek officials; and a new Arabic coinage replaced the former imitations of Byzantine and Sāsānian coins. Communications also improved with the introduction of a regular post service from Damascus to the provincial capitals, and architecture flourished.

Decline began with the disastrous defeat of the Syrian army by the Byzantine Leo III, the Isaurian (717). Then the fiscal reforms of the pious 'Umar II (reigned 717–720), intended to mollify the increasingly discontented *mawālī* (non-Arab Muslims) by placing all Muslims on the same footing, without respect of nationality, led to financial crisis, while the recrudescence of feuds between southern (Kalb) and northern (Qays) Arab tribes seriously reduced military power.

Hishām (reigned 724–743) was able to stem the tide temporarily. As the empire was reaching the limits of expansion—the Muslim advance into France was decisively halted at Poitiers (732), and Arab forces in Anatolia were destroyed (740)—frontier defenses, manned by Syrian troops, were organized to meet the challenge of Turks in Central Asia and Berbers in North Africa.

But in the years following Hishām's death, feuds between the Qays and the Kalb erupted into major revolts in Syria, Iraq, and Khorāsān (745–746), while the *mawālī* became involved with the Hāshimiyah (*q.v.*), a religio-political sect that denied the legitimacy of Umayyad rule. In 749 the Hāshimiyah, aided by the western provinces, proclaimed as caliph Abū al-'Abbās as-Saffāḥ, who thereby became first of the 'Abbāsid dynasty.

The last Umayyad, Marwān II (reigned 744–750), was defeated at the Battle of the Great Zāb River (750). Members of the Umayyad house were hunted down and killed, but one of the survivors, 'Abd ar-Raḥmān, escaped and established himself as a Muslim ruler in Spain (756), founding the dynasty of the Umayyads of Córdoba.

Umayyad Mosque: *see* Damascus, Great Mosque of.

Umbala (India): *see* Ambāla.

Umbelliferae (plant family): *see* Apiaceae.

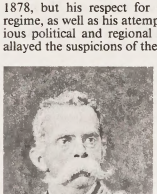
Umberto (Italian personal name): *see under* Humbert, except as below.

Umberto, English HUMBERT, name of kings of Italy, grouped below chronologically and indicated by the symbol •.

• **Umberto I** (b. March 14, 1844, Turin, Piedmont, Kingdom of Sardinia—d. July 29, 1900, Monza, Italy), duke of Savoy and king of Italy who led his country out of its isolation and into the Triple Alliance with Austria and Germany. He supported nationalistic and imperialistic policies that led to disaster for Italy and helped create the atmosphere in which he was assassinated.

Having received a totally military education, Umberto first fought in the war against Austria (1866). The calm and decisive leadership he showed in saving his troops at the Italian debacle at Custoza (June 1866) won him great popularity. His marriage to his cousin Margherita Teresa Giovanna, princess of Savoy (April 22, 1868), and the birth of their son, the future Victor Emmanuel III (Nov. 11, 1869), also gained him public sympathy in spite of prevailing anti-monarchist sentiment.

Umberto ascended the throne on Jan. 9, 1878, but his respect for the constitutional regime, as well as his attempt to reconcile various political and regional elements in Italy, allayed the suspicions of the leftists. Neverthe-



Umberto I, detail of a portrait by Antonio Piccinni

By courtesy of the Museo Centrale del Risorgimento, Rome

less, he maintained an authoritarian view of the king's prerogative, which he used, probably under the influence of the ambitious and energetic queen, to bring Italy into the Triple Alliance (May 20, 1882) with Germany and Austria-Hungary. He also urged Italy's entry into the armaments race despite the country's limited resources, and he encouraged colonial adventures in Africa.

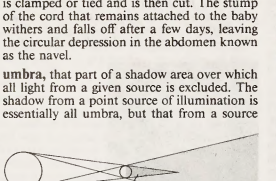
A tariff war with France led to grave economic difficulties (1888), and the defeat of the Italians by Ethiopians in the Battle of Adowa (1896) meant the failure of Italian colonialism. In the face of increasing social unrest, Umberto condoned the imposition of martial law (1898) and the harsh repression that followed, especially at Milan. This period of turmoil culminated in Umberto's assassination by an anarchist, G. Bresci.

•Umberto II (b. Sept. 15, 1904, Racconigi, Italy—d. March 18, 1983, Geneva, Switz.), prince of Savoy and briefly king of Italy in 1946 until he was forced to abdicate after a republican form of government was approved in a general referendum.

The son of King Victor Emmanuel III, Umberto graduated from the Royal Military Academy in Turin. He became a general in 1931 and commanded an armoured division in World War II. On Mussolini's recommendation he was made marshal in October 1942. After the Allies took Rome, his father appointed him lieutenant general of the realm (June 2, 1944) and abdicated in his favour on May 9, 1946. Although Umberto campaigned to rally the monarchist forces, the Italian people voted for a republic. On June 14 Umberto and his male heirs were permanently banished from Italy. He took residence at Cascais, Port., under the title Count of Sarre.

umbilical cord, Latin FUNICULUS UMBILICALIS, narrow cord of tissue that connects a developing embryo, or fetus, with the placenta (the extra-embryonic tissues responsible for providing nourishment and other life-sustaining functions). In the human fetus, the umbilical cord arises at the belly and by the time of birth is about 2 feet (60 cm) long and 0.5 inch (1.3 cm) in diameter. It contains two umbilical arteries and one umbilical vein, through which the fetal heart pumps blood to and from the placenta, in which exchange of nutrient and waste materials with the circulatory system of the mother takes place. The umbilical vein carries blood oxygenated in the maternal body from the placenta to the fetus, while the umbilical arteries carry deoxygenated blood and fetal wastes from the fetus to the placenta, where they are treated in the maternal body. After birth, the umbilical cord is clamped or tied and is then cut. The stump of the cord that remains attached to the baby withers and falls off after a few days, leaving the circular depression in the abdomen known as the navel.

umbra, that part of a shadow area over which all light from a given source is excluded. The shadow from a point source of illumination is essentially all umbra, but that from a source



Umbra

of some size (as from the Sun) consists of a small umbra and a much larger partial shadow called the penumbra (*q.v.*). Thus, in an eclipse of the Sun, the regions of umbra are those experiencing total eclipse and those of penumbra, partial eclipse. The term is also used for the darkest inner portion of a sunspot.

umbrella, a portable, hand-held device that is used for protection against rain and sunlight. The modern umbrella consists of a circular fabric or plastic screen stretched over hinged ribs that radiate from a central pole. The hinged ribs permit the screen to be opened and closed so that the umbrella can be carried with ease when not in use.

Umbrellas in ancient Egypt, Mesopotamia, China, and India were used to protect important persons from the sun. They were often large and held by bearers, and they served as marks of honour and authority for the wearer. The ancient Greeks helped introduce umbrellas into Europe as sunshades, and the Romans used them to protect against rain. The use of umbrellas disappeared in Europe during the Middle Ages but had reappeared in Italy by the late 16th century, where they were regarded as marks of distinction for the pope and clergy. By the 17th century the use of the umbrella had spread to France, and by the 18th century umbrellas were common throughout Europe. A small, dainty umbrella used for shading women's faces from the sun became known as a parasol and was a standard element of fashionable women's outdoor attire in the 18th and 19th centuries. The traditional construction of umbrellas using cane ribs was replaced in the 1850s by modern umbrellas using a very light but strong steel frame. Men in the West began carrying umbrellas for personal use in the mid-19th century. Men's umbrellas were generally black, but in the 20th century men's as well as women's umbrellas were made in a variety of bright and colourful designs.

umbrella pine, also called JAPANESE UMBRELLA PINE (*Sciadopitys verticillata*), coniferous evergreen tree native to Japan, the only member of the genus *Sciadopitys* of the deciduous cypress family (Taxodiaceae). Although slow growing, it may reach a height of 36 m (116 feet), with a trunk diameter of 1.2 m (4 feet). The short branches are arranged in circles about the trunk. The small, scalelike leaves are less than 6 mm (0.2 inch) long and adhere closely to the bark. Modified shoots assuming the form and function of leaves occur in umbrella-like whorls of 15 to 35 at the tips of the twigs. Several varieties of the umbrella pine are cultivated as ornamentals. Its wood is used in making boats; its bark, in the form of oakum, is used for caulking.

umbrella plant, any of several unrelated but similarly leaved plants. *Cyperus alternifolius* (family Cyperaceae), also called umbrella palm and umbrella sedge, is widely cultivated in water gardens and as a potted plant. It grows up to 1 m (3 feet) high. Native to Madagascar, Réunion, and Mauritius, it is widely naturalized in the tropics and subtropics.

Eriogonum alenii, native to the western United States, is a white woolly member of the buckwheat family (Polygonaceae). It grows to 50 cm (20 inches). Another umbrella plant, in the family Saxifragaceae, is *Peltiphyllum peltatum;* its leaves are about 25 cm (10 inches) across, with 10–15 lobes. It grows well in wet places, reaching about 2 m (6 feet) in height.

umbrellabird, any of three species of cotingas (family Cotingidae, order Passeriformes) of tropical American forests. They are notable for their unique, umbrella-like crest and for the pendant suspended from the throat, which is an inflatable wattle. When displaying, the male spreads the crest to cover his head and, at the same time, makes rumbling noises.


Long-wattled umbrellabird (*Cephalopterus penduliger*)
Painting by Murrell Butler

The three species are black and 38–50 cm (15–20 inches) long. All spend most of their lives in the canopies of tall trees. In the ornate umbrellabird (*C. ornatus*) of the Amazon basin, the wattle is short, triangular, and devoid of feathers on the hindside. In the long-wattled umbrellabird (*Cephalopterus penduliger*), found west of the Andes in Ecuador and Colombia, the wattle may be 28 cm (11 inches) long and is entirely shingled with short, black feathers. The bare-necked umbrellabird (*C. glabricollis*) of Panama and Costa Rica has a short, round wattle, which is bright red and unfeathered. The latter two species are considered by some authorities to be subspecies of *C. ornatus.*

Umbri, English UMBRIANS, ancient pre-Etruscan people who gradually concentrated in Umbria (in central Italy) in response to Etruscan and Gallic pressure. By about 400 BC the inhabitants of this area spoke an Indo-European dialect (Umbrian). The Umbri never fought any important wars against the Romans; in the Social War (90–89 BC), for instance, they joined the rebel allies tardily and were among the first to make peace with Rome. Ancient authors described the Umbri as closely resembling their Etruscan enemies in their habits, and the Umbrian alphabet was undoubtedly of Etruscan origin.

Umbria, region, central Italy, including the provinces of Perugia and Terni, with an area of 3,265 square miles (8,456 square km). It lies roughly equidistant between Rome (south) and Florence (north). The modern region takes its name from the Umbria of Roman times.

The Roman emperor Augustus made Umbria (together with the district of Ager Gallicus) one of the 11 regions into which he administratively divided Italy in the 1st century BC. After the Lombard invasion in the 6th century AD, most of the region was incorporated in the Duchy of Spoleto, but part remained in Byzantine hands until the establishment of the temporal power of the Holy See. Later rivalry between the popes and the Holy Roman emperors gave rise to conditions that favoured the emergence of communes, and Perugia (*q.v.*) became the dominant city-state of Umbria. The campaigns of Cesare Borgia and Pope Julius II in the 15th and early 16th centuries won back most of the towns for the Papal States, and in 1540 Pope Paul III finally subdued Perugia. The expression "Province of Umbria" embraced the modern region (minus Orvieto) and Rieti in the late 17th century and was extended to include Camerino in the 18th. Umbria was attached to the Roman Republic in 1798, restored to papal rule in 1800, and incorporated in the French empire in 1808. Under papal rule again from 1814, the "Legation of Umbria" comprised the "delega-

tions" of Spoleto, Perugia, and Rieti until its occupation by the forces of Sardinia-Piedmont in 1860. Under the kingdom of Italy (from 1861) the region had only one province, that of Perugia, until that of Terni was created in 1927.

While Umbria has some interesting monuments of the Roman and early medieval periods, such architectural glories as the cathedrals of Assisi and Orvieto and palaces such as those of Todi, Perugia, and Gubbio were built during the medieval Gothic period, some embellished by the greatest artists of the 13th and 14th centuries. During the Renaissance, Umbria once more occupied a place of honour in the creative arts as the home of the Umbrian school of painting, with such masters as Perugino and Pinturicchio.

Umbria's core is the upper and middle valley of the Tiber River, flanked on the west and east by low hills that gradually rise in the east to the Umbrian-Marchigian Apennines. The characteristic feature of the region's physiography is the prevalence of wide basins, some of lacustrine origin (Lake Trasimeno), some being sections of river valleys, and others small, isolated depressions such as the plains of Gubbio and Terni.

Farming in the hills and valleys is prosperous and is characterized by intensive land use, especially intercropping. Wheat, corn (maize), potatoes, sugar beets, grapes, and olives are grown, and the wine of Orvieto is known throughout Italy. Livestock raising is extensive. The major power centre of Umbria is the hydroelectric complex of Terni, which supports steel, chemical, and electrochemical industries at Terni, Narni, and Foligno. Textile and food industries at Perugia, the regional capital, are important. The region is served by two major rail lines from Rome and has an excellent system of highways and bus communications. Pop. (1992 est.) 811,638.

Umbrian language, one of the ancient Italic languages closely related to Oscan and Volscian and more distantly related to Latin and Faliscan. Umbrian was spoken in central Italy, probably only in the area of the Tiber River valley in the last few centuries BC; it was displaced by Latin at an unknown date. Modern knowledge of the language is derived almost entirely from the Iguvine Tables (*q.v.*), a set of bronze tablets discovered near Gubbio (ancient Iguvium), Italy, in 1444. Dating from between about 300 BC and about 90 BC, the tables are written in an Umbrian alphabet derived from Etruscan and in the Latin script. As it appears in these tablets, Umbrian is quite similar to the Oscan language and Latin language in structure but shows a series of sound shifts and some differences in vocabulary.

Umbriel, one of the major satellites of the planet Uranus. It orbits the planet at a distance of 266,300 km (165,110 miles). Umbriel has an orbital period of 4.144 days. Its discovery is usually attributed to William Lassell in 1851, but William Herschel, who discovered Uranus and two other satellites, probably detected it more than 60 years earlier, in 1787, or possibly in 1798.

Umbriel's diameter is estimated at 1,110 km (690 miles), and its mass is about 1.2×10^{-5} that of Uranus. Astronomers believe that the satellite is composed largely of water ice intermixed with small amounts of frozen methane and rocky material. Umbriel is distinct from the other major satellites of Uranus in that it shows no evidence of tectonic activity. However, like the Moon's, its surface is covered with impact craters, most measuring from about 100 to 200 km (60 to 125 miles) across.

Umbundu (people): *see* Ovimbundu.

Umeå, town and capital of Västerbotten *län* (county), northeastern Sweden. It lies on the left bank of the Umeå River near the Gulf of Bothnia. It has long been an educational and cultural centre for northern Sweden. In 1622 it was incorporated by Gustav II Adolf. After suffering several destructive fires, especially in 1888, it was largely rebuilt. It is a commercial centre and port and manufactures furniture and machinery; it also has sawmills, the products of which are exported from its foreport, Holmsund. Umeå University (1965) has a sizable school of medicine. An open-air museum in the town has exhibits and collections illustrating the area's past. Pop. (1994 est.) mun., 97,190.

Umehara Ryūzaburō (b. March 9, 1888, Kyōto, Japan—d. Jan. 16, 1986, Tokyo), Western-style Japanese painter whose vibrant colours, dynamic brushstrokes, and liberated spirit had a strong impact on young Japanese painters.

Umehara first studied painting under Asai Chū at the Kansai Art School. From 1908 to 1913 he toured Europe. In 1909 he was in France, where he studied in Paris at the Académie Julian and met Pierre-Auguste Renoir and became his devoted pupil. He founded several artist groups in Tokyo, including the Nikakai in 1914 and the Shun yōkai in 1922. From 1944 to 1952 he was a professor at Tokyo University.

Among his famous works are "Woman Wearing a Bonnet" (1908), "Necklace" (1913), "Landscape of Naples" (1912), "Seated Nude" (1921), and the landscapes "Kirishima" (1937), "Sakura Island" (1937), and "Mount Asama" (1950). He was given the Order of Cultural Merit in 1952 and the Asahi Culture Prize in 1956.

Umfolozi Game Reserve, wild animal sanctuary in northern KwaZulu/Natal province, South Africa. The reserve lies southwest of the Hluhluwe Game Reserve, about 55 miles (56 km) inland from the Indian Ocean. It was established in 1897 and has an area of 185 square miles (478 square km). A wooded savanna area with thorn trees, it is the habitat of rare white rhinoceroses, as well as black rhinoceroses, assorted species of antelope, wildebeests, zebras, giraffes, and numerous birds.

umiak, boat used by the Greenland and later by the Alaskan Eskimos for transport. It was called the woman's boat, as opposed to the kayak, the men's hunting and fishing boat.

Like the kayak, the umiak was made of seal or other animal skins stretched over a driftwood or whalebone frame and was paddled. Unlike the kayak, it was an open boat, either round in shape or elongated much like the birchbark canoe. The umiak was used by women for transporting themselves, children, the elderly, and possessions; the umiak was also used by the men for whaling. In the 20th century the umiak was first furnished with an outboard motor and finally displaced by conventional motorboats, as was the kayak, except for recreation or sporting.

umland: *see* hinterland.

Umlazi, new town, southeastern KwaZulu/Natal province, South Africa. It lies along the south bank of the Umlazi (Umlass) River and adjoins the city of Durban on the southwest. The present site of Umlazi was occupied by American missionaries in 1836, but it became an Anglican mission reserve in 1856. Umlazi was officially opened to black residents in 1965 (most of whom formerly resided in Durban) and acquired town status in 1973. Local industries in Umlazi produce beverages, wearing apparel, leather goods, sawn wood and wood products, paper, rubber goods, and plastic products. Many of the inhabitants commute to Durban, Hammarsdale, and Pietermaritzburg for employment. A branch campus of the University of Zululand is located at Umlazi, and the town lies near the Pietermaritzburg-Durban railway. Pop. (1985) 194,933.

Umm al-Qaywayn, also spelled UMM AL-QAIWAIN, constituent emirate of the United Arab Emirates, on the Arabian Peninsula facing the Persian Gulf. The second smallest in area and the least populous of the federation's seven emirates, Umm al-Qaywayn is roughly triangular in shape and is bounded by the emirates of Ra's al-Khaymah (northeast) and ash-Shāriqah (south and west). On the northwest, it fronts the Persian Gulf for 17 miles (27 km) in a straight-line distance; actually, Umm al-Qaywayn's coastline is much longer and is extremely irregular, with numerous small inlets, spits, and offshore islets. On one of these spits is the town of Umm al-Qaywayn, which is the capital and only settlement of consequence.

In the early 19th century the sheikhs of Umm al-Qaywayn acknowledged the more powerful state of ash-Shāriqah as their liege; ash-Shāriqah rulers, of the Qawāsim people, were leaders of the Persian Gulf's coastal pirates, and Umm al-Qaywayn town was a pirate harbour. Because of the piracy in the Gulf, Britain intervened forcibly and compelled the Gulf states, including Umm al-Qaywayn, to sign the General Treaty of Peace of 1820; this was Umm al-Qaywayn's first recognition as an independent power. The sheikhdom subsequently came under British control, and when the British finally withdrew from the Persian Gulf area (1971), Umm al-Qaywayn became a founding member of the United Arab Emirates.

The local economy was traditionally dependent upon pearl diving and fishing, based at Umm al-Qaywayn town. Between World Wars I and II, the harbour, now silted up, was one of the chief trade emporiums of the Trucial Coast. Native boatbuilding, long a specialty, is still practiced.

Umm al-Qaywayn town is connected by paved road with Ra's al-Khaymah town and Abu Dhabi town. About 20 miles (32 km) inland from the capital is the oasis of Falaj al-Mu'allā, with extensive plantations of date palms. Otherwise, the emirate is almost entirely uninhabited desert. In 1964–72 a large portion of its revenues came from the sale of postage stamps, printed abroad not for any legitimate postal purpose but entirely for sale to collectors.

The emirate has deposits of natural gas, but no oil has been found. Although electricity and a few modern improvements have been introduced, it has remained the most undeveloped of any of the seven emirates. Area 300 square miles (780 square km). Pop. (1991 est.) 27,000.

Umm Qays (Jordan): *see* Gadara.

Umm Sa'īd (Qatar): *see* Musay'īd.

Umniati River, river, tributary of the Zambezi River in north-central Zimbabwe. It has its source in the Daramumbe Range on the main watershed north of Chivhu. Flowing northwest for 325 miles (520 km), the Umniati joins the Zambezi River near the Kariba Dam. Its tributaries include the Sebakwe, Umsweswe, and Umfuli rivers. Its lower course, formed by the confluence with the Umfuli River, is also known as the Sanyati. The river valley has been interesting to mineral prospectors for years, and copper has been mined near the confluence with the Umfuli.

'umrah, the "minor pilgrimage" undertaken by Muslims whenever they enter Mecca. It is also meritorious, though optional, for Muslims residing in Mecca. Its similarity to the major and obligatory Islāmic pilgrimage (hajj) made some fusion of the two natural, though pilgrims have the choice of performing the *'umrah* separately or in combination with the hajj. As in the hajj, the pilgrim begins the

'umrah by assuming the state of ihram (ritual purity). Following a formal declaration of intent (*niyah*) to perform the *'umrah,* he enters Mecca and circles the sacred shrine of the Ka'bah seven times. He may then touch the Black Stone, pray at the sacred stone Maqām Ibrāhīm, drink the holy water of the Zamzam spring, and touch the Black Stone again, though these ceremonies are supererogatory. The *sa'y,* running seven times between the hills of aṣ-Ṣafā and al-Marwah, and the ritual shaving of the head complete the *'umrah.*

In its present form, the *'umrah* dates from Muḥammad's lifetime and is a composite of several pre-Islāmic ceremonies that were reinterpreted in monotheistic terms and supplemented by Muslim prayers. *See also* hajj.

Umsiligasi (South African king): *see* Mzilikazi.

Umtali (town, Zimbabwe): *see* Mutare.

Umtata, town, Eastern Cape province, South Africa. It was the capital of Transkei, a nominally independent but not internationally recognized southern African republic that was reincorporated into South Africa in 1994. Located on the Umtata ("The Taker") River (so named because of its destructive flooding), the town lies at an elevation of 2,290 feet (698 m) in the Kaffraria region near the southeast coast of South Africa.

The town began as a European settlement in 1869 and functioned as a buffer zone between the warring Pondo and Tembu peoples. A military post was later established at Umtata, and it was officially proclaimed a town in 1882. It became the headquarters of the Transkeian Territories General Council (known as the Bunga) in 1903. A summit meeting of the black homeland leaders was held at Umtata in 1973, when they decided to federate their own states after independence. When Transkei was declared independent in 1976, Umtata became its capital.

Subsistence agriculture and livestock raising are the primary economic activities in the area; Umtata has some secondary industries that produce textiles, wood products, foodstuffs, and processed tobacco. The town has buildings dating back to colonial times, including the Town Hall and a hospital. It also has a technical college, the University of Transkei (1977), and road and rail connections with East London to the south. There is an airfield, and the Umtata Falls are 2 miles (3 km) southeast of the town. Pop. (1984 est.) mun., 80,000.

Umuahia, town, capital of Abia state, southern Nigeria. It lies along the railroad from Port Harcourt to Enugu. It is an agricultural market centre and (since 1916) collecting point on the railway for the crops of the surrounding region: yams, cassava, corn (maize), taro, citrus fruits, and palm oil and kernels. The town has a palm-oil-processing plant and several breweries, and the National Root Crops Research Institute, at Umudike, is adjacent to the town. Umuahia has teacher-training colleges, Trinity College (theological), and several hospitals. Pop. (1991 est.) 58,080.

Umvukwe Range, mountain range in northern Zimbabwe, extending about 100 miles (160 km) north from the Hunyani River and rising to a high point of 5,748 feet (1,752 m). The range forms the northern section of an enormous tabular block of igneous rock (norite) and is a major chrome-mining area. Major towns in the area are Darwendale, Maryland Junction, and Kildonan.

UMWA: *see* United Mine Workers of America.

UN: *see* United Nations.

Una, city, southwestern Himāchal Pradesh state, northern India. It lies along the Soān River at an elevation of 1,815 feet (550 m), about 60 miles (95 km) northwest of Simla, the state capital. Formerly an important commercial centre, it declined after the construction of all-weather roads that bypass the city. Agriculture and horticulture, mainly orchards, are the basis of the economy. Manufactures include paints and varnishes, plastic bags, resin, and turpentine. Una has a government college affiliated with Himāchal Pradesh University at Simla. Pop. (1991 prelim.) 12,001.

Unaka Mountains, segments of the Blue Ridge and Appalachian mountain systems in the southeastern United States. They extend from southwestern Virginia along the Tennessee–North Carolina border into northern Georgia. The main ridges average 5,000 feet (1,500 m), rising in the Great Smoky Mountains to Clingmans Dome (6,643 feet [2,025 m]), Tennessee's highest point. Other features in the Unakas are the Iron Mountains, the Chilhowee, Unicoi, Stone, Bald, and Holston ranges, and Brasstown Bald (4,784 feet [1,458 m]; the highest point in Georgia). The Unakas have been severely dissected by stream erosion and in general are characterized by steep slopes and deep, narrow valleys that are clothed with hardwood forest. The Unaka region abounds with wildlife and is included in the Pisgah, Nantahala, Jefferson, and Cherokee national forests. Tourism is popular, especially in the Great Smoky Mountains National Park. The Cherokee Indians named the mountains Unaka ("White"), probably in reference to a persistent white haze or to some white rock formations. Often the name Unaka is applied specifically to those peaks in Avery and Mitchell counties of North Carolina and in Unicoi and Carter counties of Tennessee.

Unamuno, Miguel de, in full MIGUEL DE UNAMUNO Y JUGO (b. Sept. 29, 1864, Bilbao, Spain—d. Dec. 31, 1936, Salamanca), educator, philosopher, and author whose essays had considerable influence in early 20th-century Spain.

Unamuno was the son of Basque parents. After attending the Vizcayan Institute of Bilbao, he entered the University of Madrid in 1880 and in four years received a doctorate in philosophy and letters. Six years later he became professor of Greek language and literature at the University of Salamanca.

In 1901 Unamuno became rector of the university, but he was relieved of his duties in 1914 after publicly espousing the Allied cause in World War I. His opposition in 1924 to General Miguel Primo de Rivera's rule in Spain resulted in his forced exile to the Canary Islands, from which he escaped to France. When Primo de Rivera's dictatorship fell, Unamuno returned to the University of Salamanca and was reelected rector of the university in 1931, but in October 1936 he denounced General Francisco Franco's Falangists, was removed once again as rector, and was placed under house arrest. He died of a heart attack two months later.

Unamuno was an early existentialist who concerned himself largely with the tension between intellect and emotion, faith and reason. At the heart of his view of life was his personal and passionate longing for immortality. According to Unamuno, man's hunger to live on after death is constantly denied by his reason and can only be satisfied by faith, and the resulting tension results in unceasing agony.

Although he also wrote poetry and plays, Unamuno was most influential as an essayist and novelist. If his vigorous and iconoclastic essays have any common theme, it is that of the need to preserve one's personal integrity in the face of social conformity, fanaticism, and hypocrisy. His first published work was the essays collected in *En torno al casticismo* (1895), in which he critically examined Spain's isolated and anachronistic position in western Europe at the time. His *Vida de Don Quijote y Sancho* (1905; *Life of Don Quixote and Sancho*) is a detailed analysis of Miguel de Cervantes' literary characters. Unamuno's mature philosophy found its fullest expression in *Del sentimiento trágico de la vida en los hombres y en los pueblos* (1913; *The Tragic Sense of Life in Men and Peoples*), in which he stressed the vital role spiritual anxiety plays in driving man to live the fullest possible life. This and other themes were explored in *La agonía del cristianismo* (1925; *The Agony of Christianity*).

Unamuno's novels are intensely psychological depictions of agonized characters who illustrate and give voice to his own philosophical ideas. His most famous novel is *Abel Sánchez: una historia de pasión* (1917; *Abel Sanchez*), a modern re-creation of the biblical story of Cain and Abel, which centres on the painfully conflicting impulses of the character representing Cain. His other novels include *Amor y pedagogía* (1902; "Love and Pedagogy"), which describes a father's attempt to raise his son scientifically, ending in failure and the son's ruin; *Niebla* (1914; *Mist*); and *San Manuel Bueno, mártir* (1933; "Saint Manuel the Good, Martyr"), the story of an unbelieving priest. Unamuno's *El Cristo de Velázquez* (1920; *The Christ of Velázquez*), a study in poetic form of the great Spanish painter, is regarded as a superb example of modern Spanish verse.

Unanimism, French UNANIMISME, French literary movement based on the psychological concept of group consciousness and collective emotion and life. It called for the poet to merge with this transcendent consciousness. Founded by Jules Romains about 1908, Unanimism particularly influenced some members of the Abbaye group, a loose organization of young artists and writers interested in printing and publicizing new works. *Petit traité de versification* (1923; "Small Treatise on Versification"), by Romains and Georges Chennevière, and *Notes sur la technique poétique* (1910; "Notes on Poetic Technique"), by Georges Duhamel and Charles Vildrac, outlined the Unanimist theories of prosody, which resembled those of the American poet Walt Whitman in encouraging the use of strongly accented rhythms and the replacement of symbols and allegory by simple and unadorned diction.

Unas (fl. 24th century BC), last king of the 5th dynasty (*c.* 2465–*c.* 2325 BC) in Egypt, the first pharaoh to inscribe the interior of his pyramid with religious and magical texts known as Pyramid Texts. According to later king lists, Unas was the last ruler of the 5th dynasty, but the innovations in his pyramid complex and the use of blocks from his predecessor's monuments in his own pyramid have led some to consider him the founder of the 6th dynasty, or at least a transitional ruler.

The reliefs and texts in Unas' burial chamber and other rooms were meant to assist the deceased pharaoh in the afterlife. The texts preserve many archaic practices and are a valuable compendium of early Egyptian beliefs. Unas' causeway, connecting his pyramid complex on the high desert with the valley temple near the edge of cultivation, contained interesting reliefs that probably recount events of his reign. His texts depict the transport of granite blocks from Aswān for the king's temple. The first known battle scene in Egyptian relief, probably recording a raid against the Bedouins of the northeast frontier, also appears. Trade with Syria and Palestine is attested by scenes of ships carrying foreign peoples. Finally, a fragmentary but vivid scene of starving people depicts a famine; some scholars suggest that it describes Unas' aid to famished desert tribesmen. The work of the complex represents a high point of subject variety in Old Kingdom scenes.

Unas' daughter married his successor Teti, whom the ancient sources considered the founder of the 6th dynasty.

unau, either of two species of tree-dwelling mammals also known as two-toed sloths. *See* sloth.

uncertainty principle, also called HEISENBERG UNCERTAINTY PRINCIPLE, or INDETERMINACY PRINCIPLE, statement, articulated (1927) by the German physicist Werner Heisenberg, that the position and the velocity of an object cannot both be measured exactly, at the same time, even in theory. The very concepts of exact position and exact velocity together, in fact, have no meaning in nature.

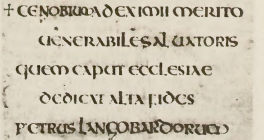
Ordinary experience provides no clue of this principle. It is easy to measure both the position and the velocity of, say, an automobile, because the uncertainties implied by this principle for ordinary objects are too small to be observed. The complete rule stipulates that the product of the uncertainties in position and velocity is equal to or greater than a tiny physical quantity, or constant (about 10^{-34} joule-second, the value of the quantity $h/(2\pi)$, where h is Planck's constant). Only for the exceedingly small masses of atoms and subatomic particles does the product of the uncertainties become significant.

Any attempt to measure precisely the velocity of a subatomic particle, such as an electron, will knock it about in an unpredictable way, so that a simultaneous measurement of its position has no validity. This result has nothing to do with inadequacies in the measuring instruments, the technique, or the observer; it arises out of the intimate connection in nature between particles and waves in the realm of subatomic dimensions.

Every particle has a wave associated with it; each particle actually exhibits wavelike behaviour. The particle is most likely to be found in those places where the undulations of the wave are greatest, or most intense. The more intense the undulations of the associated wave become, however, the more ill defined becomes the wavelength, which in turn determines the momentum of the particle. So a strictly localized wave has an indeterminate wavelength; its associated particle, while having a definite position, has no certain velocity. A particle wave having a well-defined wavelength, on the other hand, is spread out; the associated particle, while having a rather precise velocity, may be almost anywhere. A quite accurate measurement of one observable involves a relatively large uncertainty in the measurement of the other.

The uncertainty principle is alternatively expressed in terms of a particle's momentum and position. The momentum of a particle is equal to the product of its mass times its velocity. Thus, the product of the uncertainties in the momentum and the position of a particle equals $h/(2\pi)$ or more. The principle applies to other related (conjugate) pairs of observables, such as energy and time: the product of the uncertainty in an energy measurement and the uncertainty in the time interval during which the measurement is made also equals $h/(2\pi)$ or more. The same relation holds, for an unstable atom or nucleus, between the uncertainty in the quantity of energy radiated and the uncertainty in the lifetime of the unstable system as it makes a transition to a more stable state.

uncial, in calligraphy, ancient majuscular book hand characterized by simple, rounded strokes. It apparently originated in the 2nd century AD when the codex form of book developed along with the growing use of parchment and vellum as writing surfaces. Unlike its prototype square roman, uncial is adapted to direct strokes of the pen held in one position and was thus the natural favourite of scribes; most of the works of Latin literature



Uncials from the Codex Amiatinus, Northumbrian, before 716 (Florence, Laurentian Library, Amiat. 1, c. 1v)

By courtesy of the Biblioteca Medicea Laurenziana, Florence

for more than 500 years were copied in this hand.

Half-uncial, or semi-uncial, script developed through the scribes' tendency in certain schools, such as the Insular script of the British Isles, to adopt more cursive forms, admitting ascenders and descenders.

uncinariasis: *see* hookworm disease.

Uncle Sam, popular U.S. symbol usually associated with a cartoon figure having long white hair and chin whiskers and dressed in a swallow-tailed coat, vest, tall hat, and striped trousers. His appearance is derived from two



James Montgomery Flagg's representation of Uncle Sam, which was first used on World War I recruiting posters

By courtesy of the Library of Congress, Washington, D.C.

earlier symbolic figures in American folklore—Brother Jonathan and Yankee Doodle.

The origin of the term Uncle Sam, though disputed, is usually associated with a businessman from Troy, N.Y., Samuel Wilson, known affectionately as "Uncle Sam" Wilson. The barrels of beef that he supplied the army during the War of 1812 were stamped "U.S." to indicate government property. This identification is said to have led to the widespread use of the nickname Uncle Sam for the United States; and a resolution passed by Congress in 1961 recognized Wilson as the namesake of the national symbol.

Uncle Sam and his predecessor Brother Jonathan were used interchangeably to represent the United States by U.S. cartoonists from the early 1830s to 1861. Cartoonists of the British humour magazine *Punch* helped evolve the modern figure by their drawings of both Brother Jonathan and Uncle Sam as lean, whiskered gentlemen wearing top hats and striped pants. Probably the first U.S. political cartoonist to crystallize the figure of Uncle Sam was Thomas Nast, beginning in the early 1870s. One of the most familiar treatments in the 20th century was shown in James Montgomery Flagg's World War I recruiting poster, also used in World War II, for which the caption read, "I Want You."

unconscious, also called SUBCONSCIOUS, the complex of mental activities within an individual that proceed without his awareness. Sigmund Freud, the founder of psychoanalysis, stated that such unconscious processes may affect a person's behaviour even though he cannot report on them. Freud and his followers felt that dreams and slips of the tongue were really concealed examples of unconscious content too threatening to be confronted directly.

Some theorists (*e.g.,* the early experimental psychologist Wilhelm Wundt) denied the role of unconscious processes, defining psychology as the study of conscious states. Yet, the existence of unconscious mental activities seems well established and continues to be an important concept in modern psychiatry.

Freud distinguished among different levels of consciousness. Activities within the immediate field of awareness he termed conscious; *e.g.,* reading this article is a conscious activity. The retention of data easily brought to awareness is a preconscious activity; for example, one may not be thinking (conscious) of his address but readily recalls it when asked. Data that cannot be recalled with effort at a specific time but that later may be remembered are retained on an unconscious level. For example, under ordinary conditions a person may be unconscious of ever having been locked in a closet as a child; yet under hypnosis he may recall the experience vividly.

Because one's experiences cannot be observed directly by another (as one cannot feel another's headache), efforts to study these levels of awareness objectively are based on inference; *i.e.,* at most, the investigator can say only that another individual behaves *as if* he were unconscious or *as if* he were conscious.

Efforts to interpret the origin and significance of unconscious activities lean heavily on psychoanalytic theory, developed by Freud and his followers. For example, the origin of many neurotic symptoms is held to depend on conflicts that have been removed from consciousness through a process called repression. As knowledge of psychophysiological function grows, many psychoanalytic ideas are seen to be related to activities of the central nervous system. That the physiological foundation of memory may rest in chemical changes occurring within brain cells has been inferred from clinical observations that: (1) direct stimulation of the surface of the brain (the cortex) while the patient is conscious on the operating table during surgery has the effect of bringing long-forgotten (unconscious) experiences back to awareness; (2) removal of specific parts of the brain seems to abolish the retention of specific experiences in memory; (3) the general probability of bringing unconscious or preconscious data to awareness is enhanced by direct electrical stimulation of a portion of the brain structure called the reticular formation, or the reticular activating system. Also, according to what is called brain blood-shift theory, the transition from unconscious to conscious activities is mediated by localized changes in the blood supply to different parts of the brain. These biopsychological explorations have shed new light on the validity of psychoanalytic ideas about the unconscious. *See also* psychoanalysis.

UNCTAD: *see* United Nations Conference on Trade and Development.

Undenominational Fellowship of Christian Churches and Churches of Christ, also called INDEPENDENT CHRISTIAN CHURCHES, autonomous Protestant churches in the United States that were formerly associated primarily with the Disciples of Christ. These churches refused to become part of the restructured Christian Church (Disciples of Christ) in 1968 because they feared that the development of denominational institutions in the reorganized church would infringe on the freedom of the local congregation. From 1967 to 1969 the number of congregations listed in the *Yearbook of Christian Churches (Disciples of Christ)* dropped from 8,046 to 5,278.

The Independent Christian Churches do not identify with the Churches of Christ, however, because the independents accept the use of musical instruments in church services, which the Churches of Christ reject. In general, the independents are more conservative theologically than the members of the Christian Church (Disciples of Christ). They have no denominational structure or national organization.

underground film, motion picture made and distributed outside the commercial film industry, usually as an artistic expression of its maker, who often acts as its producer, director, writer, photographer, and editor. Underground films usually display greater freedom in form, technique, and content than films directed toward a mass audience and distributed through regular commercial outlets. The term underground film came into common use in the 1950s, when the greater availability of good-quality 16-millimetre film stock and equipment permitted an increasing number of nonprofessionals to engage in cinema art. The term was also applied to earlier films that were considered too experimental, too frank, or too esoteric for the general public, made both by professionals and by amateurs.

In the underground film the interplay of light and shadow basic to cinema art often takes precedence over narrative structure. The filmmaker ordinarily uses inexpensive production methods and a 16-millimetre or 8-millimetre camera. He may incorporate overexposures, underexposures, or triple exposures. Some underground films are purely abstract patterns of light and colour. Such films vary considerably in length. Robert Breer's *Fist Fight* (1954) is 14 seconds long, while Andy Warhol, the most highly publicized of the underground filmmakers, did a study of the Empire State Building, *Empire* (1964), that lasts eight hours. During the 1920s filmmaking was stimulated by nonobjective art, represented by the Dadaist, Cubist, and Surrealist movements. Leading filmmakers such as Jean Renoir, René Clair, and Sergey Eisenstein made private experiments in addition to their publicly shown films. The classic *Un Chien andalou* (1928; "An Andalusian Dog") by the director Luis Buñuel and the Surrealist artist Salvador Dalí, financed by Buñuel's mother, was a product of this period.

Little of comparable interest was produced until the late 1950s, when a host of new cinema artists arose in the United States. Unlike their predecessors, they were strongly influenced by the techniques and personal expression of commercial films by directors such as Jean-Luc Godard, Ingmar Bergman, and Federico Fellini. Jonas Mekas, Stan Brakhage, and Stan Vanderbeek were among the creative leaders of the movement, which grew rapidly. Students from newly established film departments in universities across the country released thousands of independently produced film experiments. Outstanding examples, such as Stan Vanderbeek's *Breathdeath* (1963–64) and Kenneth Anger's *Scorpio Rising* (1962–64), were seen over the years by a vast audience. In the 1970s underground filmmakers, many of whom had a background in painting or sculpture, continued to emphasize composition and form and an intensity of feeling rather than dramatic structure. Magic and the supernatural and political protest, traditionally popular topics in the underground, remained prominent among the great variety of subjects considered.

Underground Railroad, in the United States, a system existing in the Northern states before the Civil War by which escaped slaves from the South were secretly helped by sympathetic Northerners, in defiance of the Fugitive Slave Acts (*q.v.*), to reach places of safety in the North or in Canada. Though neither underground nor a railroad, it was thus named because its activities had to be carried out in secret, using darkness or disguise, and because railway terms were used in reference to the conduct of the system. Various routes were lines, stopping places were called stations, those who aided along the way were conductors, and their charges were known as packages or freight. The network of routes extended in all directions throughout 14 Northern states and "the promised land" of Canada, which was beyond the reach of fugitive-slave hunters. Those who most actively assisted slaves to escape by way of the "railroad" were members of the free black community (including such former slaves as Harriet Tubman), Northern abolitionists, philanthropists, and such church leaders as Quaker Thomas Garrett. Harriet Beecher Stowe, famous for her novel *Uncle Tom's Cabin,* gained firsthand knowledge of fugitive slaves through her contact with the Underground Railroad in Cincinnati, Ohio.

Estimates of the number of black people who reached freedom vary greatly, from 40,000 to 100,000. Although only a small minority of Northerners participated in the Underground Railroad, its existence did much to arouse Northern sympathy for the lot of the slave in the antebellum period, at the same time convincing many Southerners that the North as a whole would never peaceably allow the institution of slavery to remain unchallenged.

underground railway: *see* subway.

Underhill, Evelyn (b. Dec. 6, 1875, Wolverhampton, Staffordshire, Eng.—d. June 15, 1941, London), English mystical poet and author of such works as *Mysticism* (1911), *The Mystic Way* (1913), and *Worship* (1936), which helped establish mystical theology as a respectable discipline among contemporary intellectuals.

Underhill was a lifelong Anglican, but she was also attracted by Roman Catholic piety and religious experience. By 1940 she had supplemented her earlier and more diffuse mystical attitudes with a greater understanding and acceptance of institutional and sacramental elements in traditional Christianity, and she had come to centre her theology on an experience of Christ.

A frequent lecturer at conferences and seminaries, she also conducted retreats from 1924 and gained a reputation as a leading religious counselor. She was a contributor to numerous journals and was the theological editor of *The Spectator* from 1929 to 1932. Among her other works are *Man and the Supernatural* (1927), *The Mystery of Sacrifice* (1938), and two books of poetry, *The Bar-lamb's Ballad Book* (1902) and *Immanence* (1913).

Underhill, John (b. *c.* 1597, Kenilworth, Warwickshire, Eng.—d. Sept. 21, 1672, Killingworth, Oyster Bay, N.Y.), British-American colonial military officer, privateer, and magistrate.

John Underhill received his initial military training in Holland. He immigrated to Boston in 1630 and organized the militia of Massachusetts Bay Colony. He became a town selectman in 1634; later that year he traveled to England seeking to increase the colony's military supplies.

During the Pequot War in 1637, Underhill's troops joined with Captain John Mason's Connecticut forces in destroying the Indian fort at Mystic. Underhill subsequently wrote an excellent descriptive account of the war, *News from America.* After the conflict, Underhill's support of the antinomian religious dissidents resulted in his banishment by the Massachusetts General Court. He fled Massachusetts Bay for Dover, N.H., where he organized a church and declared himself governor of the settlement. His actions and conduct were challenged by Massachusetts authorities, however, and in 1640 he was temporarily excluded from the church after he openly confessed to adultery before Boston's First Church.

Although he was reinstated in the Congregational order and his sentence of banishment was repealed in 1641, Underhill left Massachusetts for New Haven. He became a member of that colony's legislature. From New Haven he went to New Netherlands, where he served that government as a military officer and, later, as a member of the Council for New Amsterdam. The outbreak of the Anglo-Dutch wars in 1652 obliged him to leave the colony for Providence, R.I. There he obtained a privateer's commission and campaigned against his former Dutch employers.

When the English seized New Netherlands (1664), Underhill retired to his estate on Long Island and served as surveyor of customs for Long Island and as high constable and sheriff of Yorkshire. He was also a member of the Hempstead Convention that in 1665 drafted the so-called Duke of York's laws, a law code first applied to Yorkshire and eventually extended to the whole of New York province.

undersea cable, also called MARINE CABLE, assembly of conductors enclosed by an insulating sheath and laid on the ocean floor for the transmission of messages. Undersea cables for transmitting telegraph signals antedated the invention of the telephone; the first undersea telegraph cable was laid in 1850 between England and France. The Atlantic was spanned in 1858 between Ireland and Newfoundland, but the cable's insulation failed and it had to be abandoned. The first permanently successful transatlantic cable was laid in 1866, and in the same year another cable, partially laid in 1865, was also completed. The American financier Cyrus W. Field and the British scientist Lord Kelvin were closely associated with the two enterprises. Use of long undersea cables suitable for telephony followed the development in the 1950s of telephone repeaters with sufficiently long life to make the operation economically practical. The development of vacuum-tube repeaters that could operate continuously and flawlessly with no attention for at least 20 years, at depths up to 2,000 fathoms (12,000 feet [3,660 m]), made possible the first transatlantic telephone cable, from Scotland to Newfoundland (1956). The system provided 36 telephone circuits. Similar undersea systems between Port Angeles, Wash., and Ketchikan, Alaska, and between California and Hawaii were later put into service. A 5,300-nautical-mile (9,816-kilometre) cable between Hawaii and Japan (1964) provided 128 voice circuits; the same number of circuits were provided in 1965 by a cable linking the United States and France. Newer cables use transistorized repeaters and provide even more voice circuits; some are capable of transmitting television programs.

undertow, a strong seaward bottom current returning the water of broken waves back out to sea. There is in fact no such current in a gross sense, for the overall flow of surface

water toward the shore in a surf zone is very small. The water actually thrown up on the shore by breaking waves does flow back, however, and under certain circumstances this return flow may be experienced by swimmers as a strong current. Returning water may, for example, be channelized by the presence or form of obstacles on the bottom into rip currents of significant velocity but quite narrow lateral dimension. Also, since the volume of returning water varies with the size of the waves, the swimmer who waits for a low-water trough or a cycle of low waves before standing up to walk to shore may encounter the return flow from large waves just gone by and again experience a seemingly strong current.

underwater diving, also called UNDERWATER SWIMMING, swimming done underwater either with a minimum of equipment, as in skin diving (free diving) or with a scuba (abbreviation of self-contained underwater-breathing apparatus) or an Aqualung. The only aspect of underwater diving that is competitive is spearfishing.

Underwater swimming and diving is as old as swimming and has been perpetuated into the present by pearl divers and sponge divers. Skin diving requires only a face mask, goggles, a short breathing tube (protruding from the mouth and kept above water), and flippers, or foot fins. A wet suit, a dry suit, or the latter over the former may be used in cold water. Skin diving was first popularized in the 1920s and 1930s in the Mediterranean and off the California coast, notably by the American diver Guy Gilpatric, whose *The Compleat Goggler* (1938) gave great impetus to the sport and aroused the interest of the French naval engineer and diver Jacques Cousteau. The goggles, flippers, snorkel (the name given the air tube from the German submarine air exhaust and intake device that allowed submerged operation), and face mask were all developed into their basic forms in the 1930s.

Attempts to construct diving apparatus go back to the 19th century, but the sport of scuba, or Aqualung, diving dates from 1943, when Cousteau and the French engineer Émile Gagnan developed the first fully automatic compressed-air Aqualung. Cousteau also did important work on the development of underwater cameras and photography and popularized the sport in *Le Monde du silence* (1952; *The Silent World*), written with Frédéric Dumas, and in other writings and television and film productions. Clubs formed after 1943 as fast as equipment became available; national associations were formed in France, Italy, Great Britain, Canada, and the United States; and in 1959 Cousteau formed, with 15 national organizations (later more than 50), the Confédération Mondiale des Activités Subaquatique (CMAS; World Underwater Federation).



Scuba diver wearing open-circuit equipment
Russ Kinne—Photo Researchers

The fish hunted for food and the coral hunted for ornament by primitive divers are still objects of search for modern skin divers and scuba divers. An improved spear gun devised in the 1930s is used for food hunting, and special underwater cameras are widely used for recreational and scientific purposes. In addition, scuba diving has been useful scientifically in oceanography, in the study of fish and other marine organisms, and in the study of water pollution, as well as in the exploration of ships on the ocean floor and for salvage work, in which the earlier diving helmet with air line from on shipboard has been largely replaced.

Underwood, Francis Henry (b. Jan. 12, 1825, Enfield, Mass., U.S.—d. Aug. 7, 1894, Edinburgh), American author and lawyer who became a founder of *The Atlantic Monthly* in order to further the antislavery cause.

Following a year at Amherst (Mass.) College, Underwood went to Kentucky where he studied law. There his strong aversion to slavery was heightened by close observation. In 1850 he returned to Massachusetts and, after three years of political work, joined the publishing house of Phillips, Sampson and Company as assistant editor. The antislavery atmosphere of the northeast led him to the idea of publishing a literary magazine to oppose slavery. By 1857, after several years of editorial experience, he had gained the support of such liberal writers as Harriet Beecher Stowe, Oliver Wendell Holmes, Ralph Waldo Emerson, Henry David Thoreau, Henry Wadsworth Longfellow, and James Russell Lowell and persuaded his firm to publish a magazine. Edited by Lowell, with Underwood as assistant editor, *The Atlantic Monthly* began publication in November 1857. Underwood left the magazine in 1859 after it was purchased by another firm, resuming his political activity and writing the biographies of Lowell, Longfellow, and the poet and reformer John Greenleaf Whittier, as well as several short stories and novels. His best known book is *Quabbin: The Story of a Small Town* (1893), an account of his boyhood in Enfield. At his death he was U.S. consul in Scotland.

Underwood, Oscar W(ilder) (b. May 6, 1862, Louisville, Ky., U.S.—d. Jan. 25, 1929, Fairfax County, Va.), U.S. congressman from Alabama (1895–1927) who drafted the Underwood Tariff Act of 1913.

After studying law at the University of Virginia he was admitted to the bar in 1884. Underwood settled in Birmingham, Ala., and was elected to the U.S. House of Representatives (1895–96; 1897–1915), rising to chairman of the Ways and Means Committee and becoming an expert on trade and tariffs. He ran for the Senate in 1914 and served for two terms (1915–27).

Underwood decided to seek the Democratic presidential nomination in 1912. He lost the nomination to Woodrow Wilson, but the winning candidate was for the most part receptive to his views on the subject of protective tariffs, and it was under the Wilson administration that Underwood was able to enact the tariff legislation that bears his name. The bill, passed in 1913, sought to promote international trade by lowering import duties (and, to make up for the expected loss of revenue, levied the first federal income tax). Underwood generally supported Wilson's programs, promoting passage of the Federal Reserve Act (1913) and advocating U.S. participation in the League of Nations.

He was a member of the U.S. delegation to the Washington conference on arms limitations (1921–22) under the administration of Warren G. Harding and reportedly refused Harding's offer of an appointment to the Supreme Court. He sought the Democratic presidential nomination once again in 1924, but his denunciation of the Ku Klux Klan—which alienated his Southern colleagues—and his opposition to Prohibition were largely responsible for his failure to win the party's support.

Undset, Sigrid (b. May 20, 1882, Kalundborg, Den.—d. June 10, 1949, Lillehammer, Nor.), Norwegian novelist whose readership is international and who received the Nobel Prize for Literature in 1928.

Her father was an archaeologist, and her home life was steeped in legend, folklore, and the history of Norway. Both this influence and her own life story are constantly present



Sigrid Undset
By courtesy of the Royal Norwegian Embassy, London

in her works—from *Elleve aar* (1934; *Eleven Years*), in which she tells of her childhood, to the story of her flight from Nazi-occupied Norway, published originally in English as *Return to the Future* (1942; Norwegian *Tillbake til fremtiden*).

She worked in the office of an electrical engineering firm for 10 years before she married, bore children, and began to write. Her early novels deal with the woman's position in the contemporary unromantic world of the lower middle class. These include *Splinten av troldspeilet* (1917; *Images in a Mirror*) and *Jenny* (1911). She then turned to the distant past and created what is considered her masterpiece, the trilogy *Kristin Lavransdatter* (1920–22). Though the medieval climate of the novel is strikingly evoked, it is still a story of a woman's fate, portraying the proud, independent Kristin's growth, through her marriage to a charming but irresponsible man, into a strong but humble and self-sacrificing woman. Both in this and in the four-volume historical novel *Olav Audunssøn* (1925–27; *The Master of Hestviken*), religious problems are prominent and reflect the author's preoccupation with such matters. She was converted to the Roman Catholic faith in 1924, and in her later novels, in which she returned to contemporary themes, her new religion continues to play an important role. During the Nazi occupation of Norway, she fled the country and spent the remainder of the war years in the United States, lecturing and writing on behalf of her war-torn country and its government-in-exile.

undulant fever: *see* brucellosis.

Undur Khan (Mongolia): *see* Öndörhaan.

Unebourg, Dominique-René Vandamme, comte d' (count of): *see* Vandamme, Dominique-René.

unemployment, the condition of one who is capable of working, actively seeking work, but unable to find any work. It is important to note that to be considered unemployed a per-

son must be an active member of the labour force and in search of remunerative work.

Underemployment is the term used to designate the situation of those who are able to find employment only for shorter than normal periods—part-time workers, seasonal workers, day or casual workers. The term may also describe the condition of workers whose education or training make them overqualified for their jobs.

Statistics on unemployment are collected and analyzed by government labour offices in most countries and have come to be considered a chief indicator of economic health. Trends in unemployment and statistical differences among groups in the population are studied for what they may reveal of general economic trends and as bases for possible governmental action. Full employment has been a stated goal of many governments since World War II, and a variety of programs have been devised to attain it. It should be pointed out that full employment is not necessarily synonymous with a zero unemployment rate, for at any given time the unemployment rate will include some number of persons who are between jobs and not unemployed in any long-term sense. In the United States an unemployment rate of 2 percent is often cited as a "base" rate.

For international statistical data on unemployment, *see* BRITANNICA BOOK OF THE YEAR.

unemployment insurance, a form of social insurance (*q.v.*) designed to compensate certain categories of workers for unemployment that is involuntary and short-term. Unemployment insurance programs were created primarily to provide financial assistance to laid-off workers during a period deemed long enough to enable them to find another job or be rehired at their original job. In most countries, workers who have been permanently disabled or who have been unemployed for a long period of time are not covered by unemployment insurance but are usually covered by other plans. In such countries as Canada, Germany, Israel, Norway, and the United Kingdom, all occupations are covered; the United States denies coverage to farm workers, domestic servants, workers who have been employed only briefly, government workers, and most self-employed workers; such countries as Austria, Ireland, and Japan exclude public employees.

Benefits vary from one legal jurisdiction to another. In most countries the benefits are related to earnings; a few countries pay a flat rate to all beneficiaries. In addition, benefits are usually paid only for a limited period of time.

Funding for unemployment insurance varies from country to country. Employers or employees may be taxed specifically for unemployment insurance, or funding may come out of general government revenues.

Unequal Treaty, in Chinese history, any of a series of treaties in which China was forced to concede many of its territorial and sovereignty rights. They were negotiated during the 19th and early 20th centuries between China and foreign imperialist powers, especially Great Britain, France, Germany, the United States, Russia, and Japan.

Patterned largely on the terms of an accord in 1835 between China and the khanate of Kokand, the Unequal Treaties were initiated by the trading conflict between Britain and China known as the first Opium War (1839–42), which was terminated by the Treaty of Nanking (Aug. 29, 1842). Under the terms of this agreement, China paid the British an indemnity, ceded the territory of Hong Kong, and agreed to establish a "fair and reasonable" tariff. Moreover, British merchants, who were previously allowed to trade only at the South China port of Canton, were now to be allowed to trade at five ports (called treaty ports), including Canton and Shanghai.

The agreement was supplemented the following year by the British Supplementary Treaty of the Bogue (Oct. 8, 1843), which granted British citizens in China extraterritorial rights, by which they were to be under the control of their own consuls and were not subject to Chinese law. It also included a most-favoured-nation clause, guaranteeing to Britain all privileges that China might grant to any other power.

Over the next few years China concluded a series of similar treaties with other powers; the most important treaties were the Treaty of Wanghia with the United States and the Treaty of Whampoa with France (both 1844). Each additional treaty expanded upon the rights of extraterritoriality, and as a result the foreigners obtained an independent legal, judicial, police, and taxation system within the treaty ports.

Following the defeat of China by Britain and France in the second Opium War (1856–60), a new series of agreements was negotiated. The resulting treaties of Tientsin (1858) supplemented the old treaties by providing for the residence of foreign diplomats in Peking, the right of foreigners to travel in the interior of China, the opening of the country's major waterway, the Yangtze River, to foreign navigation, permission for Christian missionaries to propagate their faith, legalization of opium importation and the coolie trade, and the opening of 10 new ports to foreign trade and residence. Russia, meanwhile, signed a separate agreement, the Treaty of Aigun (May 16, 1858), by which Russia would have jurisdiction over the lands north of the Amur River from its junction with the Argun River to the Tatar Strait, China would control the lands south of the Amur from the Argun to the Ussuri River, and the territory east of the Ussuri to the Sea of Japan would be held in common. According to the treaty, only Russian and Chinese vessels would have been permitted to navigate the Amur, Ussuri, and Songhuajiang rivers.

In 1860, after the Chinese had failed to ratify these treaties, the British and French resumed the war, captured Peking, and forced the Chinese to sign the Peking Convention, in which they agreed to carry out the initial settlements. Other Western nations again exacted similar agreements. The Chefoo Convention, negotiated with Britain in 1876 (although not ratified by Britain until 1885) following the murder of a British explorer by Chinese nationals, resulted in more Chinese concessions and the opening of several new ports. (*See also* Opium Wars.) By the Treaty of Peking (Nov. 14, 1860), Russia attained what it had sought in the unratified Treaty of Aigun; Russia was also given jurisdiction over the lands east of the Ussuri and south of Lake Khanka, which included the settlement of Vladivostok.

In 1885 another Treaty of Tientsin concluded the Sino-French War and ceded Annam (now in Vietnam) to France, while the Treaty of Shimonoseki, signed in 1895 following the Sino-Japanese War, ceded Taiwan and the Pescadores to Japan, recognized the independence of Korea, and provided for the opening of still more ports as well as the right of Japanese nationals to operate factories inside China. The Boxer Protocol, signed in 1901 following China's unsuccessful attempt to expel all foreigners from the country during the Boxer Rebellion, provided for the stationing of foreign troops at key points between Peking and the sea.

After the Russian Revolution, the Soviet government terminated most of the privileges gained by tsarist Russia under the Unequal Treaties. Between 1928 and 1931 the Chinese Nationalists succeeded in persuading the Western powers to return tariff autonomy to China, but extraterritorial privileges were not relinquished by Britain, France, and the United States until 1946. British rights in Hong Kong, Portuguese rights in Macau, and Russian possessions in Turkistan are still contested by the Chinese.

UNESCO: *see* United Nations Educational, Scientific and Cultural Organization.

uneven parallel bars, also called ASYMMETRICAL PARALLEL BARS, gymnastic apparatus developed in the 1930s and used in women's competition. The dimensions and construction are the same as for the parallel bars (*q.v.*) used in men's gymnastics, except that the top bar is 2.3 m (90.6 in.) above the floor, while the lower bar is 1.5 m high. The apparatus was first used in international competition at the 1936 Olympic Games. It allows a great variety of movements, although hanging and swinging exercises predominate. In her routine the performer strives for smoothness and equal use of both bars. *See* Sporting Record: *Gymnastics. See also* Olympic Games.

Ung Lich (Vietnamese emperor): *see* Ham Nghi.

Ungaretti, Giuseppe (b. Feb. 10, 1888, Alexandria—d. June 1, 1970, Milan), Italian poet, founder of the Hermetic movement (*see* Hermeticism) that brought about a reorientation in modern Italian poetry.

Born in Egypt of parents who were Italian settlers, Ungaretti lived in Alexandria until he was 24; the desert regions of Egypt were to provide recurring images in his later work. He went to Paris in 1912 to study at the Sorbonne and became close friends with the poets Guillaume Apollinaire, Charles Péguy, and Paul Valéry and the then avant-garde artists Pablo Picasso, Georges Braque, and Fernand Léger. Contact with French Symbolist poetry, particularly that of Stéphane Mallarmé, was one of the most important influences of his life.

At the outbreak of World War I, Ungaretti enlisted in the Italian Army, and while on the battlefield he wrote his first volume of poetry, each poem dated individually as if it were to be his last. These poems, published in *Il porto sepolto* (1916; "The Buried Port"), used neither rhyme, punctuation, nor traditional form; this was Ungaretti's first attempt to strip ornament from words and to present them in their purest, most evocative form. Though reflecting the experimental attitude of the Futurists, Ungaretti's poetry developed in a coherent and original direction, as is apparent in *Allegria di naufragi* (1919; "Gay Shipwrecks"), which shows the influence of Giacomo Leopardi and includes revised poems from Ungaretti's first volume.

Further change is evident in *Sentimento del tempo* (1933; "The Feeling of Time"), which, containing poems written between 1919 and 1932, used more obscure language and difficult symbolism.

Ungaretti went to South America for a cultural conference and from 1936 to 1942 taught Italian literature at the University of São Paulo, Brazil. His nine-year-old son died in Brazil, and Ungaretti's anguish over his loss as well as his sorrow over the atrocities of Nazism and World War II are expressed in the poems *Il dolore* (1947; "Grief"). In 1942 Ungaretti returned to Italy and taught contemporary Italian literature at the University of Rome until his retirement in 1957. Important volumes published during this time are *La terra promessa* (1950; "The Promised Land") and *Un grido e paesaggi* (1952). Among his later volumes were *Il taccuino del vecchio* (1960; "An Old Man's Notebook") and *Morte delle stagioni* (1967; "Death of the Seasons").

Ungaretti also translated into Italian Racine's *Phèdre,* a collection of Shakespeare's sonnets, and works of Luis de Góngora y Argote, Stéphane Mallarmé, and William Blake;

all were later incorporated in *Traduzioni,* 2 vol. (1946–50). An English translation of Ungaretti's poetry is Allen Mandelbaum's *Selected Poems of Giuseppe Ungaretti* (1975).

Ungava, peninsular section of northern Quebec province, Canada, bounded by the Hudson Strait (north), Ungava Bay and Labrador (east), the Eastmain River (south), and the Hudson Bay (west). Physically, Ungava is a part of the Canadian Shield, a rocky, glacial-scoured plateau characterized by innumerable lakes and thin, poorly drained soils. After the Quebec-Newfoundland border was established in 1927, the term Ungava was generally applied to the repetitive northern Quebec part of the peninsula (Ungava Peninsula) occupying about 240,000 square miles (622,000 square km), whereas the term Labrador (q.v.) referred to the Newfoundland portion; the geographic usage of both terms, however, is employed irrespective of political divisions. Economic activity is centred along the Quebec-Newfoundland border, an area with immense iron-ore deposits, where the region's largest towns of Schefferville in Quebec and Labrador City and Wabush in Newfoundland have sprung up since exploitation of the deposits began in the 1950s.

Ungava Bay, French BAIE D'UNGAVA, inlet off the Hudson Strait, on the northeast coast of Nord-du-Québec region, northern Quebec province, Canada. The bay is approximately 200 miles (320 km) long, 160 miles (260 km) wide at the mouth, and has a maximum depth of 978 feet (298 m). It is fed by several large rivers, notably the Feuilles, Arnaud, Baleine, and George. Akpatok Island (area 551 square miles [1,427 square km]), at the bay's mouth, rises to 930 feet (283 m). Its coastal region is rich in minerals, including iron-ore deposits to the west. Because the bay is ice-free only four months a year, much of the ore is stockpiled in Greenland and Newfoundland for shipment.

Ungava-Quebec Crater, formerly CHUBB CRATER, the largest crater on the Earth's surface that is definitely known to be of meteoritic origin. It is located in the northwestern part of the Ungava Peninsula, northern Quebec province, Canada. First studied in 1950, the crater is 2.1 miles (3.3 km) in diameter and 1,203 feet (367 m) deep, with a rim standing 333 feet (101 m) above ground level. Filled by a lake, it is surrounded by many smaller circular lakes. The surrounding strata are tilted upward toward the centre of the crater and are broken here and there by radial fissures.

Unggi, city, extreme northeastern North Korea. It lies 16 miles (26 km) southwest of the estuary of the Tumen River, which forms North Korea's boundary with Russia. Until Unggi's port was opened in 1921, it was a poor village, but it developed rapidly during the Japanese occupation (1910–45) as a transportation junction, connecting with China by rail and with Japan by a sea route. After North Korea gained independence, however, Unggi declined in importance as Ch'ŏngjin, to the south, was developed instead. The neighbouring waters are fishing grounds for codfish, pollack, and herring. The city's industries include chemicals and ceramics. It is connected with Najin by the Ungna Tunnel. Pop. (latest est.) 20,882.

ungulate, generally, any hoofed mammal. Although the term is no longer used in formal classification, it is still widely applied to a diverse group of placental mammals that are characterized as hoofed, herbivorous quadrupeds. The feature that unites them, the hoof, consists of hornlike dermal (skin) tissue, comparable to the human fingernail, which extends over the end of a broadened terminal digit.

Modern hoofed mammals are composed of four orders: Artiodactyla, even-toed ungulates (swine, camels, deer, and bovines); Perissodactyla, odd-toed ungulates (horses, tapirs, and rhinoceroses); Proboscidea (elephants); and Hyracoidea (hyraxes). Ten orders of fossil ungulates are also recognized: Condylarthra (condylarths); Pyrotheria (pyrotheres); Xenungulata (xenungulates); Pantodonta (pantodonts); Dinocerata (uintatheres); Desmostylia (desmostylians); Embrithopoda (embrithopods); Notoungulata (notoungulates, including the toxodonts); Astrapotheria (astrapotheres); and Litopterna (litopterns).

UNHCR: *see* United Nations High Commissioner for Refugees, Office of the.

UNIA: *see* Universal Negro Improvement Association.

UNICEF: *see* United Nations Children's Fund.

unicorn, mythological animal resembling a horse or a kid with a single horn on its forehead. The unicorn appeared in early



Unicorn, detail from "The Lady and the Unicorn" tapestry, late 15th century; in the Musée de Cluny, Paris
Giraudon—Art Resource

Mesopotamian artworks, and it also was referred to in the ancient myths of India and China. The earliest description in Greek literature of a single-horned (Greek: *monokerōs;* Latin: *unicornis*) animal was by the historian Ctesias (*c.* 400 BC), who related that the Indian wild ass was the size of a horse, with a white body, purple head, and blue eyes; on its forehead was a cubit-long horn coloured red at the pointed tip, black in the middle, and white at the base. Those who drank from its horn were thought to be protected from stomach trouble, epilepsy, and poison. It was very fleet of foot and difficult to capture. The actual animal behind Ctesias' description was probably the Indian rhinoceros.

Certain poetical passages of the biblical Old Testament refer to a strong and splendid horned animal called *re'em.* This word was translated "unicorn" or "rhinoceros" in many versions of the Bible, but many modern translations prefer "wild ox" (aurochs), which is the correct meaning of the Hebrew *re'em.* As a biblical animal the unicorn was interpreted allegorically in the early Christian church. One of the earliest such interpretations appears in the ancient Greek bestiary known as the *Physiologus,* which states that the unicorn is a strong, fierce animal that can be caught only if a virgin maiden is thrown before it. The unicorn leaps into the virgin's lap, and she suckles it and leads it to the king's palace. Medieval writers thus likened the unicorn to Christ, who raised up a horn of salvation for mankind and dwelt in the womb of the Virgin Mary. Other legends tell of the unicorn's combat with the elephant, whom it finally spears to death with its horn, and of the unicorn's purifying of poisoned waters with its horn so that other animals may drink.

Cups reputedly made of unicorn horn but actually made of rhinoceros horn or narwhal tusk were highly valued by important persons in the Middle Ages as a protection against poisoned drinks. Many fine representations of the hunt of the unicorn survive in medieval art, not only in Europe but also in the Islāmic world and in China.

unicorn beetle (*Dynastes tityus*), a large, easily recognized insect of the Dynastinae subfamily of the beetle family Scarabaeidae (order Coleoptera). The unicorn beetle is closely related to the rhinoceros and elephant beetles. Hornlike structures on the thorax (region behind the head) and on the head of the male (usually lacking in the females) make it conspicuous.

The unicorn beetle is about 62 mm (2.4 inches) in length and is found in northern temperate regions. The function or evolutionary value of the horns is not yet known; they can give a strong pinch, however. The larvae can damage plant roots; adults usually live under rotting bark.

unicorn fish, also spelled UNICORNFISH, any of certain exclusively marine fishes belonging to the genus Naso, in the family Acanthuridae (order Perciformes), occurring in the tropical Indo-Pacific region. The 17 species are herbivorous algae eaters. Unicorn fishes have a pair of sharp forward-pointing spines that protrude from the side of the tail shaft, and the fishes also have a long spike, a frontal horn, protruding from the forehead.

The eellike *Eumecichthys fiski,* in the crestfish family Lophotidae (order Lampridiformes), is also called unicorn fish.

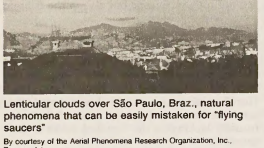
unicorn plant, any North American herb of the family Martyniaceae of the flowering plant order Scrophulariales, and particularly *Proboseidea louisianica.* There are nine species of unicorn plants, most having large purple or creamy white flowers.

The unicorn plant is often grown for its novel fruits, which are hanging, hornlike, woody pods with a thick body, 3 or 4 inches (76 or 101 mm) long, ending in a curved beak of equal or even greater length. When dry, the beak splits into two clawlike appendages.

unidentified flying object (UFO), also called FLYING SAUCER, any aerial object or optical phenomenon not readily explainable to the observer. UFO's became a major subject of interest with the developments in aeronautics and astronautics following World War II.

In 1948 the U.S. Air Force began maintaining a file of UFO reports called Project Blue Book. A series of radar detections coincident with visual sightings near the National Airport in Washington, D.C., in July 1952, led the U.S. government to establish a panel of scientists headed by H.P. Robertson, a physicist of the California Institute of Technology (Pasadena), and including engineers, meteorologists, physicists, and an astronomer. The thrust of public and governmental concern was indicated by the fact that the panel was organized by the Central Intelligence Agency

(CIA) and was briefed on U.S. military activities and intelligence and that its report was originally classified Secret. Later declassified, the report revealed that 90 percent of UFO sightings could be readily identified with astronomical and meteorologic phenomena (*e.g.*, bright planets, meteors, auroras, ion clouds) or with aircraft, birds, balloons, searchlights, hot gases, and other phenomena, sometimes complicated by unusual meteorologic conditions.



Lenticular clouds over São Paulo, Braz., natural phenomena that can be easily mistaken for "flying saucers"

By courtesy of the Aerial Phenomena Research Organization, Inc., Tucson, Ariz.

The publicity given to early sightings in the press undoubtedly helped stimulate further sightings not only in the United States but also in western Europe, the Soviet Union, Australia, and elsewhere. A second panel, organized in February 1966, reached conclusions similar to those of its predecessor. This left a number of sightings admittedly unexplained, and in the mid-1960s a few scientists and engineers, notably James E. McDonald, a University of Arizona (Tucson) meteorologist, and J. Allen Hynek, a Northwestern University (Evanston, Ill.) astronomer, concluded that a small percentage of the most reliable UFO reports gave definite indications of the presence of extraterrestrial visitors.

This sensational hypothesis, promoted in newspaper and magazine articles, met with prompt resistance from other scientists. The continuing controversy led in 1968 to a UFO study sponsored by the U.S. Air Force and conducted at the University of Colorado under the direction of E.U. Condon, a noted physicist. The Condon Report, "A Scientific Study of UFO's," was reviewed by a special committee of the National Academy of Sciences and released in early 1969. A total of 37 scientists wrote chapters or parts of chapters for the report, which covered investigations of 59 UFO sightings in detail. Condon's own "Conclusions and Recommendations" firmly rejected ETH—the extraterrestrial hypothesis—and declared that no further investigation was needed.

This left a wide variety of opinions on UFO's. A large fraction of the American public, and a few scientists and engineers, continued to support ETH. A middle group of scientists felt that the possibility of extraterrestrial visitation, however slight, justified continued investigation, and still another group favoured continuing investigation on the grounds that UFO reports are useful in sociopsychological studies. In 1973 a group of American scientists organized the Center for UFO Studies in Northfield, Ill., to conduct further work.

Official records of UFO sightings and events. By 1969 Project Blue Book had recorded reports of 12,618 sightings or events, each of which was ultimately classified as "identified" with a known astronomical, atmospheric, or artificial phenomenon, or as "unidentified," including cases in which information was insufficient. The project, however, was terminated in December 1969 on the basis of the conclusions of the Condon Report. The only other official and fairly complete records of UFO sightings were maintained in Canada, where they were transferred in 1968 from the Canadian Department of National Defense to the Canadian National Research Council. The Canadian records totaled about 750 in the late 1960s. Less-complete records have been maintained in Great Britain, Sweden, Denmark, Australia, and Greece.

Types of UFO reports. UFO reports have varied widely in reliability, as judged by the number of witnesses, whether the witnesses were independent of each other, by the observing conditions (fog, haze, illumination, etc.), and by the direction of sighting. Typically, the witness who reports a sighting considers the object to be of extraterrestrial origin, or possibly a military vehicle, but certainly under intelligent control; this inference is usually based on what is perceived as formation-flying by sets of objects, unnatural motions seemingly centred on a target, or sudden, apparently purposive alterations in direction, brightness, and motion.

That the unaided human eye plays tricks bordering on hallucinations is well known. A bright light, such as the planet Venus, often appears to move, although a clamped telescope or a sighting bar shows it to be fixed. Visual impressions of distance are also highly unreliable, being based on assumed size. Reflections from windows and eyeglasses can provide superimposed views. Optical defects can turn point sources of light into apparently saucer-shaped objects. Such optical illusions, and the psychological desire to interpret visual images, are known to account for many visual UFO reports. Radar sightings, while more reliable in certain respects, fail to discriminate between physical objects and meteor trails, tracks of ionized gas, rain, or thermal discontinuities. Furthermore, several effects can give false radar echoes: electronic interference, reflections from ionized layers or clouds, and reflections from regions of humidity, as in a cumulus cloud. Even "contact events"—in which activities besides sighting were reported—have been found most frequently to involve dreams or hallucinations; the reliability of such reports depended heavily on whether there were two or more independent witnesses.

Unification Church, byname of HOLY SPIRIT ASSOCIATION FOR THE UNIFICATION OF WORLD CHRISTIANITY, religious movement that was founded in South Korea in 1954 by Sun Myung Moon (*q.v.*). The movement shifted its base to New York City in 1971. Its network of missionary, cultural, and economic enterprises extends to more than 100 countries and is said to involve more than 200,000 believers. Only about 10,000, with considerable turnover, are members of the highly visible American branch.

The basic teachings of the movement are posited in *Divine Principle*, written by Moon in the early 1950s with the aid of biblical study and revelation. The movement, influenced by yin-yang motifs and Korean shamanism, seeks to establish divine rule on earth through the restoration of the family based on the union of the Lord and Lady of the Second Advent (believed to be Moon and his wife, Hak Ja Han). According to Unification doctrine, God's efforts to reestablish rightful order reached a provisional climax in Jesus, who, by exemplifying individual oneness with God, inaugurated the kingdom spiritually but was prevented by his crucifixion from restoring divine rule through procreative marriage. The completion of Christ's thwarted work is believed to be approaching its final stages in the mission conferred by the ascended Jesus on Moon.

Unification stresses communal and devotional discipline as well as unreserved commitment to such practical work as fund-raising, business operations, and educational, missionary, and humanitarian activity. Controversy about the "Moonies"—a derisive name the members of the Unification Church now espouse—has mounted with regard to their recruitment practices (said to include protein starvation and brainwashing), appeals for money, business policies, and conformity to immigration and tax laws.

Consult the INDEX *first*

unified field theory, in particle physics, an attempt to describe all fundamental forces and the relationships between elementary particles in terms of a single theoretical framework. In physics, forces can be described by fields that mediate interactions between separate objects. In the mid-19th century James Clerk Maxwell formulated the first field theory in his theory of electromagnetism. Then, in the early part of the 20th century, Albert Einstein developed general relativity, a field theory of gravitation. Later, Einstein and others attempted to construct a unified field theory in which electromagnetism and gravity would emerge as different aspects of a single fundamental field. They failed, and to this day gravity remains beyond attempts at a unified field theory.

At subatomic distances, fields are described by quantum field theories, which apply the ideas of quantum mechanics to the fundamental field. In the 1940s quantum electrodynamics (QED), the quantum field theory of electromagnetism, became fully developed. In QED, charged particles interact as they emit and absorb photons (minute packets of electromagnetic radiation), in effect exchanging the photons in a game of subatomic "catch." This theory works so well that it has become the prototype for theories of the other forces.

During the 1960s and '70s particle physicists discovered that matter is composed of two types of basic building block—the fundamental particles known as quarks and leptons. The quarks are always bound together within larger observable particles, such as protons and neutrons. They are bound by the short-range strong force, which overwhelms electromagnetism at subnuclear distances. The leptons, which include the electron, do not "feel" the strong force. However, quarks and leptons both experience a second nuclear force, the weak force. This force, which is responsible for certain types of radioactivity classed together as beta decay, is feeble in comparison with electromagnetism.

At the same time that the picture of quarks and leptons began to crystallize, major advances led to the possibility of developing a unified theory. Theorists began to invoke the concept of local gauge invariance, which postulates symmetries of the basic field equations at each point in space and time (*see* gauge theory). Both electromagnetism and general relativity already involved such symmetries, but the important step was the discovery that a gauge-invariant quantum field theory of the weak force had to include an additional interaction—namely, the electromagnetic interaction. Sheldon Glashow, Abdus Salam, and Steven Weinberg independently proposed a unified "electroweak" theory of these forces based on the exchange of four particles: the photon for electromagnetic interactions, and two charged W particles and a neutral Z particle for weak interactions.

During the 1970s there was developed a similar quantum field theory for the strong force,

called quantum chromodynamics (QCD). In QCD, quarks interact through the exchange of particles called gluons. The aim of researchers now is to discover whether the strong force can be unified with the electroweak force in a grand unified theory (GUT). There is evidence that the strengths of the different forces vary with energy in such a way that they converge at high energies. However, the energies involved are extremely high, more than a million million times as great as the energy scale of electroweak unification, which has already been verified by many experiments.

Grand unified theories describe the interactions of quarks and leptons within the same theoretical structure. This gives rise to the possibility that quarks can decay to leptons and specifically that the proton can decay. Early attempts at a GUT predicted that the proton's lifetime must be in the region of 10^{32} years. This prediction has been tested in experiments that monitor large amounts of matter containing on the order of 10^{32} protons, but there is no evidence that protons decay. If they do in fact decay, they must do so with a lifetime greater than that predicted by the simplest GUTs. There is also evidence to suggest that the strengths of the forces do not converge exactly unless new effects come into play at higher energies. One such effect could be a new symmetry called "supersymmetry."

A successful GUT will still not include gravity. The problem here is that theorists do not yet know how to formulate a workable quantum field theory of gravity based on the exchange of a hypothesized graviton. *See also* quantum field theory. (Ch.Su)

unified model (physics): *see* collective model.

unified science, in the philosophy of logical positivism, a doctrine holding that all sciences share the same language, laws, and method or at least one or two of these features. A unity-of-science movement arose in the Vienna Circle, a group of scientists and philosophers that met regularly in Vienna in the 1920s and '30s and was associated in particular with Rudolf Carnap and Otto Neurath. Versions of the unity-of-science thesis are still supported by many contemporary philosophers of science.

The claim that all sciences share a common language may mean one of two things: (1) For the logical positivist, the claim often meant that all scientific terms could be restated as, or reduced to, a set of basic statements, or "protocol" sentences, describing immediate experience or perception. (2) More recently, unity of language has meant the reduction of all scientific terms to terms of physics.

The unity of law means that the laws of the various sciences are to be deduced from some set of fundamental laws, often thought to be those of physics.

Finally, the unity of method means that the procedures for testing and supporting statements in the various sciences are basically the same. The procedures of the populations biologist, for example, purportedly are fundamentally no different than those of the theoretical physicist.

Unified Silla DYNASTY (668–935), dynasty that unified the three kingdoms of the Korean peninsula—Silla, Paekche, and Koguryŏ. The old Silla kingdom had forged an alliance with T'ang China (618–907) and had conquered the kingdom of Paekche to the southeast in 660 and the northern Korean kingdom of Koguryŏ—largest of the three—in 668.

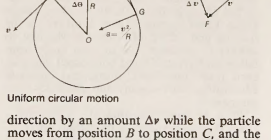
This was the first occasion within historical times that the Korean peninsula had been unified under indigenous leadership. For nearly a decade after 668, fighting ensued in which Silla finally expelled T'ang forces. Thereafter the Korean nation was divided for only brief transitional periods. Under the Silla dynasty, Korea, which was one of the earliest of the nation-states to emerge, assumed many of the cultural, linguistic, and geographic features it maintains today.

After the unification, the country was reorganized in accord with the Chinese bureaucratic model. A complex system of ministries and bureaus was created; the peninsula was divided into nine provinces, which were in turn divided into prefectures and subprefectures; and military garrisons were established throughout the country. But a bureaucratic class based on merit, as in China, was never firmly established, and the old aristocracy remained firmly in control.

The visual arts of the Unified Silla period reflected the international style of T'ang realism, but without its eroticism. Silla art's idealized naturalism emphasized flowing lines and soft contours. Rich ornamental tiles featured lotus blossoms and complex floral patterns.

After more than 100 years of peace, the kingdom was torn in the 9th century by conflicts among the aristocracy and by peasant uprisings. In 935 the Silla was overthrown, and the new Koryŏ dynasty was established.

uniform circular motion, motion of a particle moving at a constant speed on a circle. In the Figure, the velocity vector $\boldsymbol{v}$ of the particle is constant in magnitude, but it changes in



Uniform circular motion

direction by an amount $\Delta\boldsymbol{v}$ while the particle moves from position B to position C, and the radius R of the circle sweeps out the angle $\Delta\Theta$. Because OB and OC are perpendicular to the velocity vectors, the isosceles triangles OBC and DEF are similar, so that the ratio of the chord BC to the radius R is equal to the ratio of the magnitudes of $\Delta\boldsymbol{v}$ to $\boldsymbol{v}$. As $\Delta\Theta$ approaches zero, the chord BC and the arc BC approach one another, and the chord can be replaced by the arc in the ratio. Because the speed of the particle is constant, if Δt is the time corresponding to $\Delta\Theta$, the length of the arc BC is equal to $v\Delta t$; and, using the ratio relationship, $v\Delta t/R = \Delta v/v$, from which, approximately, $\Delta v/\Delta t = v^2/R$. In the limit, as Δt approaches zero, v^2/R is the magnitude of the instantaneous acceleration $\boldsymbol{a}$ of the particle and is directed inward toward the centre of the circle, as shown at G in the Figure; this acceleration is known as the centripetal acceleration, or the normal (at a right angle to the path) component of the acceleration, the other component, which appears when the speed of the particle is changing, being tangent to the path.

uniformitarianism, in geology, the doctrine that existing processes acting in the same manner and with essentially the same intensity as at present are sufficient to account for all geologic change. Uniformitarianism posits that natural agents now at work on and within the Earth have operated with general uniformity through immensely long periods of time. When William Whewell, a University of Cambridge scholar, introduced the term in 1832, the prevailing view (called catastrophism) was that the Earth had originated through supernatural means and had been affected by a series of catastrophic events such as the biblical Flood. In contrast to the catastrophic view of geology, the principle of uniformity postulates that phenomena displayed in the rocks may be entirely accounted for by geologic processes that continue to operate at the present day—in other words, the present is the key to the past. This principle is fundamental to geologic thinking and underlies the whole development of the science of geology. The expression uniformitarianism, however, has passed into history, for the controversy between catastrophists and uniformitarians has largely died. Geology as an applied science draws on the other sciences, but in the early 19th century geologic discovery had outrun the physics and chemistry of the day. As geologic phenomena became explicable in terms of advancing physics, chemistry, and biology, the reality of the principle of uniformity as a major philosophical tenet of geology became established and the controversy ended.

The idea that the laws that govern geologic processes have not changed during the history of the Earth were articulated by the 18th-century Scottish geologist James Hutton, who in 1785 presented his ideas—later published in two volumes as *Theory of the Earth* (1795)—at meetings of the Royal Society of Edinburgh. In this work Hutton showed that the Earth had a long history and that this history could be interpreted in terms of processes observed at the present, of which he gave examples. He showed, for instance, how soils were formed by the weathering of rocks and how layers of sediment accumulated. He stated that there was no need of any preternatural cause to explain the geologic record. Hutton's proposal challenged the concept of a biblical Earth (with a history of some 6,000 years) that was created especially to be a home for man; the effect of his ideas on the learned world can be compared only with the earlier revolution in thought brought about by Nicolaus Copernicus, Johannes Kepler, and Galileo when they displaced the concept of a universe centred on the Earth with the concept of a solar system centred on the Sun. Both advances challenged existing thought and were fiercely resisted for many years. In the publication *Principles of Geology,* 3 vol. (1830–33), the Scottish geologist Sir Charles Lyell deciphered the history of the Earth employing Huttonian principles and made available a host of new geologic evidence in support of the view that physical laws were permanent and that any form of supernaturalism can be rejected. Lyell's work in turn profoundly influenced Charles Darwin, who recognized Lyell as having produced a revolution in science.

The publication in 1859 of the conclusions of Darwin and Alfred Wallace on the origin of species extended the principle of uniformity to the plant and animal kingdoms. Although the catastrophists continued to fight a rearguard action against the Huttonian-Lyellian-Darwinian view until the end of the century, a new criticism was raised by William Thomson (later Lord Kelvin), one of the leading researchers on thermodynamics. Thomson pointed out that the Earth is losing heat by conduction and that the nature of geologic processes may have changed as a consequence; he also concluded that this cooling placed an upper limit on the age of the Earth. With the discovery of radioactivity and the recognition that radioactive isotopes within the Earth provide a continuing internal source of heat, it became clear that Thomson's conclusion that the Earth was less than 100 million years old was incorrect, but his argument that the Earth suffers an irreversible loss of energy remains valid.

This heat loss, owing in part to the decay of the heat-producing radionuclides, has an important consequence. Although the principle of uniformity is correct in that physical laws have not changed over geologic time, the behaviour of the Earth has altered as temperatures have fallen. One important consequence is that the extent of igneous activity and movement of the crust has changed during geologic

time. It is possible that the plate tectonism that operates today and that has operated in past geologic intervals of time was preceded by somewhat different processes of deformation during Precambrian times.

Unigenitus, in full UNIGENITUS DEI FILIUS, bull issued by Pope Clement XI on Sept. 8, 1713, condemning the doctrines of Jansenism, a dissident religious movement within France. The publication of the bull began a doctrinal controversy in France that lasted throughout much of the 18th century and that merged with the French church's fight for autonomy, called Gallicanism, and with the opposition of the Parlements (supreme courts) to the crown.

Unigenitus, which condemned 101 theological propositions of the Jansenist writer Pasquier Quesnel contained in the book *Réflexions morales,* was issued at the request of the French king, Louis XIV, who wished to suppress the Jansenist faction. Louis was able to secure initial acceptance of the bull, but some French bishops (led by Louis-Antoine de Noailles, cardinal-archbishop of Paris) rejected it, and the Parlement of Paris accepted it only with reservations. The Jansenists were supported by the magistrates of the Parlements, who regarded the bull as an unwarranted papal interference with the French church. The crown, in supporting the pope and those French bishops who accepted the bull, found itself increasingly at odds with the *parlementaires.*

The controversy over *Unigenitus* broke out in earnest after the death of Louis XIV in 1715. In 1717 four bishops appealed against the bull to a future ecumenical council (which they held to have authority over the pope). But the bishops' effective opposition ended with the death of Cardinal de Noailles in 1729.

As a further blow to the Jansenist cause, a royal declaration of 1730 made the bull a law of the state and threatened ecclesiastics who rejected it with loss of lands.

The final episode in the controversy occurred from 1749 to 1754 over the issue of *billets de confession.* The *billets* were papers affirming submission to the bull that suspected Jansenists were ordered to sign by the archbishop of Paris, Christophe de Beaumont. If they refused, the last sacraments and burial in consecrated ground would be denied them. The Parlement of Paris, claiming jurisdiction over matters of ecclesiastical discipline and supported by public opinion, opposed the *billets.* It ordered priests to administer the sacraments to every one of the faithful under pain of banishment and confiscation of goods. In 1754 King Louis XV forbade continuation of the dispute.

Unilever, either of twin companies, Unilever PLC (based in London) and Unilever NV (based in Rotterdam), which are the holding companies for more than 500 companies worldwide engaged in the manufacture and sale of soaps, foods, and other products mainly for household consumption. The boards of directors of the two companies are identical in membership, and mutual agreements equalize dividends on ordinary capital, so that the companies, though dual in appearance, are unitary in fact.

The modern Unilever is descended chiefly from three companies founded in the 19th century. In The Netherlands the Jurgens family had been in the dairy business for some 50 years when in 1854 two brothers, Anton and Johannes, formed a partnership, Gebroeders Jurgens, at Oss and began concentrating on butter export, chiefly to Britain. The heavy demand for increasingly expensive butter, however, led the company in 1871 to start producing the newly invented margarine. Meanwhile, another family in Oss, the Van den Berghs, had established themselves in the butter trade at midcentury and, in the 1870s, also began making margarine.

In the following decade, in 1885, in Britain, William Hesketh Lever (later Viscount Leverhulme), together with his brother, James Darcy Lever, founded Lever Brothers for the making and selling of soap. He was first to market the wrapped bar of soap made from tallow and vegetable and cottonseed oils and, even more important, introduced energetic advertising, with slogans and giveaway-prize campaigns.

The three businesses grew at a great rate—Lever Brothers expanding operations into continental Europe and overseas, and the Jurgens and Van den Berghs extending more into Britain and other parts of the world. By the First World War the British were also making margarine, and the Dutch were also producing soap, for both products were made from similar oils and fats.

In 1927 the two Dutch firms merged to form Margarine Unie NV in The Netherlands and Margarine Union Limited in Britain, bonded together with common directors and equalized dividends and capital values. In 1928 other major European producers of oils, soaps, and margarines were brought in. Finally, in 1929, Lever Brothers and its associated firms joined the group, and the twin companies were renamed Unilever.

By the late 20th century the majority of Unilever sales were in home products—soaps and detergents, margarines, cooking fats, salad dressings, dairy products, toiletries (toothpastes, hairsprays, etc.), packaged and processed foods, and packaging materials. The group also produces other paper and plastic products, industrial chemicals, and animal feeds.

Union, town ("township"), Union county, northeastern New Jersey, U.S., on the Elizabeth River, immediately northwest of the town of Elizabeth. Settled in the 1740s as Connecticut Farms, Union was originally a part of Elizabeth but was incorporated as a separate community in 1808. It once included what is now Roselle Park (separated in 1901), Kenilworth (1907), part of the Elmora section of Elizabeth (1908), and Hillside (Lyons Farms, 1913). A residential and industrial town, Union has a variety of light and heavy industry. Liberty Hall, or Ursino (1762), was once the home of William Livingston, first governor of New Jersey. Kean College of New Jersey (formerly Newark State College, founded 1855) moved to Union in 1958. Pop. (1990) 50,024.

Union, city, seat of Union county, northern South Carolina, U.S. It lies in Piedmont country near Broad River, about 60 miles (100 km) northwest of Columbia. Union was first settled in 1791 as Unionville around Union Church (1765), which was used by various denominations. During the American Civil War, when Columbia was burned, Dawkins House (one of several antebellum homes remaining in Union) became the provisional statehouse. Economic development has been based on the manufacture of textiles and hosiery, lumbering, and agriculture. A regional campus of the University of South Carolina is in the city. Immediately south is the Enoree Division of the Sumter National Forest, embracing Rose Hill State Park, former estate of South Carolina Governor William H. Gist. Inc. 1837. Pop. (1990) 9,836.

union: *see* trade union.

Union, Act of (May 1, 1707), treaty that effected the union of England and Scotland under the name of Great Britain.

Since 1603 England and Scotland had been under the same monarchs. After the Revolution of 1688 and again in 1702–03, projects for a closer union miscarried, and in 1703–04 international tension provoked a dangerous legislative warfare between the separate parliaments of England and Scotland. On both sides of the border, however, statesmen were beginning to realize that an incorporating union



Evolution of the Union Jack

offered the only mutually acceptable solution to a problem that had suddenly become urgent: Scotland's need for economic security and material assistance and England's need for political safeguards against French attacks and a possible Jacobite restoration, for which Scotland might serve as a conveniently open back door. England's bargaining card was freedom of trade; Scotland's was acquiescence in the Hanoverian succession. Both points were quickly accepted by the commissioners appointed by Queen Anne to discuss union, and within three months they had agreed on a detailed treaty (April–July 1706).

The two kingdoms were to be united, the Protestant succession was adopted, and trade was to be free and equal throughout Great Britain and its dominions. Subject to certain temporary concessions, taxation, direct and indirect, would also be uniform; and England compensated Scotland for undertaking to share responsibility for England's national debt by payment of an equivalent of £398,085 10 shillings. Scots law and the law courts were to be preserved. In the united Parliament Scotland, because of its relative poverty, was given the inadequate representation of 45 commoners and 16 lords. By separate statutes annexed to the treaty, the Presbyterian Church of Scotland and the Episcopal Church of England were secured against change.

With only minor amendments the Scottish Parliament passed the treaty in January 1707, and the English passed it soon after. The royal assent was given on March 6, and the union went into effect on May 1, 1707.

Union, Act of (Jan. 1, 1801), legislative agreement uniting Great Britain (England and Scotland) and Ireland under the name of the United Kingdom of Great Britain and Ireland.

The Irish Rebellion of 1798 brought the Irish question forcibly to the attention of the British Cabinet; and William Pitt the Younger, the British prime minister, decided that the best solution was a union. By legislative enactments in both the Irish and the British parliaments, the Irish Parliament was to be abolished, and Ireland thenceforth was to be represented at the Parliament in Westminster, London, by 4 spiritual peers, 28 temporal peers, and 100 members of the House of Commons. A union, Pitt argued, would both strengthen the connection between the two countries and provide Ireland with opportunities for economic development. It would also, he thought (mistakenly), make it easier to grant concessions to the Roman Catholics, since they would be a minority in a United Kingdom. Naturally the union met with strong resistance in the Irish Parliament, but the British government, by the undisguised purchase of votes, either by cash or by bestowal of honours, secured a majority in both the British and Irish Houses that carried the union on March 28, 1800. The Act of Union received the royal assent on Aug. 1, 1800, and it came into effect on Jan. 1, 1801. Henceforth, the monarch was called the king (or queen) of the United Kingdom of Great Britain and Ireland.

The union remained until the recognition of the Irish Free State (excluding six of the counties of the northern province of Ulster) by the Anglo-Irish treaty concluded on Dec. 6, 1921. The union officially ended on Jan. 15, 1922, when it was ratified by the Provisional Government led by Michael Collins in Ireland. (On May 29, 1953, by proclamation, Elizabeth II became known as queen of the United Kingdom of Great Britain and Northern Ireland.)

Union Bank of Switzerland, byname UBS AG, Switzerland's largest bank following its merger in June 1998 with the Swiss Bank Corporation. Headquarters are in Zürich.

The bank was founded in 1912 in the merger of Bank in Winterthur (established 1862) and Toggenburger Bank (1863). Later it absorbed a number of other Swiss banks, and it expanded businesses in real estate, securities, raw materials, energy, and investment banking. UBS AG acquired American brokerage and investment firm PaineWebber in 2000, forming a new subsidiary known as UBS PaineWebber, headquartered in New York City.

Consult the INDEX *first*

Union Carbide Corporation, major American manufacturer of chemicals, petrochemicals, and related products that merged with the Dow Chemical Company (*q.v.*) in 2001.

The company was formed in 1917 as Union Carbide and Carbon Corporation, acquiring four earlier companies: Linde Air Products Company (established 1907), National Carbon Company (1899), Prest-O-Lite Company, Inc. (1913), and Union Carbide Company (1898).

Formed during wartime, the company immediately took on the manufacture of new diversified products, providing helium, ferrozirconium, and activated carbon for the U.S. military, thus setting the pattern for the company's future development. After World War I, it retained its chemicals business and moved into the consumer field, becoming one of the first companies to use market research to discover potential consumer needs and creating products to fill them. Early products of this type were the first antifreeze, Prestone, and the first batteries for portable radios, under the Eveready brand.

World War II further expanded the company's research and development activities. Union Carbide was a major contributor to the development of the first atomic bomb. Union Carbide had already become a pioneer in the manufacture of petrochemicals. It also produced plastics, industrial gases, metals and carbon products, and electronics and medical products. In 1986–87, however, it sold many of its home and automobile products businesses (such as those for batteries, waxes, and antifreeze).

On Dec. 3, 1984, Union Carbide's pesticide plant in Bhopal, India, was the scene of one of the worst industrial accidents in history when poisonous gas leaked and spread over a populated area, killing about 2,500 people and injuring many more. Suits for damages were brought against the company, and in 1989 India's Supreme Court ordered Union Carbide to pay $470 million in compensation to the victims of the accident.

Union City, city, Hudson county, northeastern New Jersey, U.S., just north of Hoboken. It lies near the western end of the Lincoln Tunnel, on the Palisades overlooking the Hudson River and New York City. In an area originally settled by the Dutch and later by many Germans, the city was established in 1925 in the merger of West Hoboken (originally incorporated in 1861) and Union (1864). The city is both residential and industrial, best known for the manufacture of textiles, clothing, toilet preparations, paper products, and lamps. In the West Hoboken section is St. Michael the Archangel monastery church (1898), which is used as a retreat for the Passionists, a Roman Catholic order for men. Annually since 1914 St. Joseph's Roman Catholic Church has presented the passion play *Veronica's Veil* during Lent. Pop. (2000) 67,088.

Union Française: *see* French Union.

Union Group (southwestern Pacific Ocean): *see* Tokelau.

Union Jack, national flag of the United Kingdom, in which are combined the crosses of St. George (England), St. Andrew (Scotland), and St. Patrick (Ireland).

The earliest form of the flag of Great Britain, developed in 1606 and used during the reigns of James I (1603–25) and Charles I (1625–49), displayed the red cross of England superimposed on the white cross of Scotland, with the blue field of the latter. Because in heraldry a red on blue is not considered permissible, the red cross had to be bordered with white, its own correct field. During the Commonwealth period (1649–60), Oliver Cromwell added an Irish harp at the centre, but the flag resumed its original form on the restoration of Charles II in 1660. Thus did the old flag—the "Union Flag," or "Great Union,"—continue in use until Jan. 1, 1801, the effective date of the legislative union of Great Britain and Ireland. The need then was to incorporate the cross of St. Patrick (diagonal, red on white) with the existing flag. To combine the three crosses without losing their individual identities, the designers made the background white broader on one side than Irish red than on the other. In fact, the continuity of direction of the arms of the red St. Patrick's cross was broken by portions of it being removed from the centre. Thus the Irish and the Scottish crosses can be distinguished easily from each other, while the Irish (red) cross has its proper white background.

The Union Jack is the most important of all British ensigns and is flown by representatives of the United Kingdom all the world over. In certain authorized military, naval, royal, and other uses, the Union Jack may be incorporated into another flag. It is part of the flags of such Commonwealth nations as Australia, Fiji, New Zealand, and Tuvalu, as well as of the U.S. state of Hawaii, the Australian states, and three Canadian provinces. For illustrations of the Union Jack and its constituent flags, *see* page 132 opposite. For illustrations of other Commonwealth flags, *see* flag.

Union League, also called LOYAL LEAGUE, in U.S. history, any of the associations originally organized in the North to inspire loyalty to the Union cause during the American Civil War. During Reconstruction, they spread to the South to ensure Republicans of support among newly enfranchised blacks.

Ohio Republicans established the first Union League of America in 1862 to counteract such antiwar groups as the Copperheads and to stem the tide of Democratic political victories resulting from too many Northern defeats on the battleground. Attempting to rouse enthusiasm for the war effort and to infuse new vitality into the Republican Party, the leagues quickly spread throughout the North, serving as a social as well as a political force.

As the Federal armies swept southward toward the end of the war, the leagues followed. Under Radical Reconstruction (1865–77), the societies became the main vehicle for propagandizing the Republican cause among the emancipated blacks.

Unwilling to share political power, Southern whites countered by organizing their own secret societies, such as the Ku Klux Klan, to keep blacks from the polls through intimidation and violence. Eventually, the Republican effort to claim some of the fruits of victory was lost by the Union leagues, and the machinery of government in the Southern states gradually reverted to traditional white Democratic control by the end of Reconstruction.

Union of ———: *see under* substantive word (*e.g.*, Lublin, Union of), except as below.

Union of Soviet Socialist Republics (U.S.S.R.), also called SOVIET UNION, Russian SOYUZ SOVETSKIKH SOTSIALISTICHESKIKH RESPUBLIK, or SOVETSKY SOYUZ, former

northern Eurasian empire (1917/22–1991) stretching from the Baltic and Black seas to the Pacific Ocean and, in its final years, consisting of 15 soviet socialist republics—Armenia, Azerbaijan, Belorussia (now Belarus), Estonia, Georgia, Kazakhstan, Kirgiziya (now Kyrgyzstan), Latvia, Lithuania, Moldavia (now Moldova), Russia, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan. It also contained 20 autonomous soviet socialist republics—16 within Russia, 2 within Georgia, 1 within Azerbaijan, and 1 within Uzbekistan. Its capital was Moscow, then and now the capital of Russia.

A brief treatment of the Soviet Union follows. For full treatment, *see* MACROPAEDIA: Union of Soviet Socialist Republics.

Following the 1917 Russian Revolution, four socialist republics were established on the territory of the former Russian Empire: the Russian Soviet Federated Socialist Republic, the Transcaucasian Soviet Federated Socialist Republic, the Ukrainian Soviet Socialist Republic, and the Belorussian Soviet Socialist Republic. (The former grand duchies of Finland and Poland became entirely independent, as did the territories of Estonia, Latvia, and Lithuania.) On Dec. 30, 1922, the Union of Soviet Socialist Republics was established by the four constituent republics and effected on July 6, 1923. Subsequently, further constituent union republics were set up over the years (the independent Baltic states of Estonia, Latvia, and Lithuania being reintroduced into the empire in 1940).

Republics of the U.S.S.R., 1990

name*	area		joined Union as S.S.R.
	square miles	square km	
Russia, *or* Russian S.F.S.R.	6,592,800	17,075,400	Dec. 30, 1922
Kazakhstan, *or* Kazakh S.S.R.	1,049,200	2,717,300	Dec. 5, 1936
Ukraine, *or* Ukrainian S.S.R.	233,100	603,700	Dec. 30, 1922
Turkmenistan, *or* Turkmen S.S.R.	188,500	488,100	Oct. 27, 1924
Uzbekistan, *or* Uzbek S.S.R.	172,700	447,400	Oct. 27, 1924
Belorussia, *or* Belorussian S.S.R.	80,200	207,600	Dec. 30, 1922
Kirgiziya, *or* Kirgiz S.S.R.	76,600	198,500	Dec. 5, 1936
Tajikistan, *or* Tajik S.S.R.	55,250	143,100	Dec. 5, 1929
Azerbaijan, *or* Azerbaijan S.S.R.	33,400	86,600	Dec. 5, 1936†
Georgia, *or* Georgian S.S.R.	26,900	69,700	Dec. 5, 1936†
Lithuania, *or* Lithuanian S.S.R.	25,200	65,200	Aug. 3, 1940
Latvia, *or* Latvian S.S.R.	24,900	64,500	Aug. 5, 1940
Estonia, *or* Estonian S.S.R.	17,400	45,100	Aug. 6, 1940
Moldavia, *or* Moldavian S.S.R.	13,000	33,700	Aug. 2, 1940‡
Armenia, *or* Armenian S.S.R.	11,500	29,800	Dec. 5, 1936†

*S.F.S.R. = Soviet Federated Socialist Republic; S.S.R. = Soviet Socialist Republic. †On Dec. 5, 1936, the Transcaucasian S.F.S.R. (one of the four original union republics of Dec. 30, 1922) was abolished, and its three constituent republics—Azerbaijan, Georgia, and Armenia—entered the U.S.S.R. as republics in their own right. ‡The Moldavian A.S.S.R. was created within Ukraine on Oct. 12, 1924. After being enlarged with territory seized from Romania, Moldavia became a full republic on Aug. 2, 1940.

The union republics were administratively divided into autonomous soviet socialist republics (A.S.S.R.'s), *oblasts* (provinces), and *krays* (regions). The A.S.S.R.'s were administrative divisions based largely on nationality; their boundaries were drawn to give political recognition to important ethnic groups. The *oblast*, a purely administrative division, was subdivided into *rayons* (sectors); subordinate to the *rayons* were smaller towns and rural soviets. Larger towns were directly subordinate to the *oblast* authority; the largest towns and cities were divided into urban *rayons* and came directly under the union republics. The *kray* was primarily an administrative division but also contained lesser political subdivisions based on nationality groups, autonomous *oblasts*, and national *okrugs* (districts).

The U.S.S.R. officially came to an end on Dec. 25, 1991, after most of the constituent republics had already declared their independence. Russia assumed the Soviet Union's membership in the United Nations and its permanent membership on the UN Security Council and also took possession of all its embassies and other foreign missions around the world.

According to the 1926 census (the first after creation of the U.S.S.R.), the total area was approximately 8,378,000 square miles (21,700,000 square km), and its population was 147,027,915. By the beginning of 1991, the year of its dissolution, the U.S.S.R. had a total area of about 8,582,300 square miles (22,228,200 square km) and an estimated population of 282,086,500.

The structure of the Communist Party government. The U.S.S.R. introduced a unique system of governance, there being two parallel governments—that of the Communist Party of the Soviet Union (which possessed the true power) and that of the formal constitutional government (which was an instrument of the party).

Under the 1952 rules of the party, the party's organizations were created as separate from the organizations of the state, but they paralleled them in almost all instances. Hierarchically, there were organizations for the U.S.S.R. as a whole, for each of the republics (except for the Russian republic, where a coordinating bureau existed), and for provinces, districts, and large cities. The All-Union Congress with its Central Committee was placed nominally at the top of the Soviet party hierarchy; it convened in regular session every four years or in special session and generally rubber-stamped the policy decisions taken by the party leadership.

The Central Committee carried the major burden of party work in its meetings, required at intervals of not more than six months. It formally named the members of the three agencies designed to sit in perpetual session



U.S.S.R., 1990

(though the members were usually prechosen behind the scenes). The first agency, the Politburo (called the Presidium from 1952 to 1966), directed the work of the Central Committee and in fact initiated party—and therefore national—policy. The second, the Secretariat, appointed the men to execute policy at lower levels and conducted the paperwork of the party. The third, the Commission of Party Control, verified fulfillment of party decisions and instituted disciplinary proceedings against violators.

The party Secretariat proved under Joseph Stalin to be the seat of Soviet power, for it was from here that he launched his campaign after Vladimir I. Lenin's death in 1924 to establish himself as dictator by appointing loyal supporters as party functionaries throughout the party. (Interestingly, as party leader, he commanded the Soviet Union without officially holding any post in the formal Soviet government, at least not until World War II.) On Stalin's death his heirs resolved publicly to direct the party as a collective leadership functioning through party procedures, but no institutional change was made. By 1957 Nikita Khrushchev, from the position of first secretary, had established dominance, but he ruled with less severity than Stalin, perhaps because the expanding ranks of educated specialists, technicians, and bureaucrats made necessary by industrialization of the economy created new pressures that prevented a recurrence of Stalin-type purges in which large numbers of the new technical experts had been imprisoned and even executed on allegations of treason or sabotage. In 1964 Khrushchev was ousted and collective leadership was reestablished for a time under Leonid Brezhnev.

Party organization at intermediate levels corresponded to that at the top. There was a periodic meeting of delegates from below, organized as a congress, and also an executive committee and a secretariat. At the bottom, membership was grouped in primary party organizations, sometimes known as "cells," stemming from the instruments designed before the Revolution to infiltrate and undermine the tsar's government. These cells were organized in factories, villages, collective farms, educational institutions, and units of the armed forces.

The Communist Party of the Soviet Union held exclusive power until 1990, when it officially rescinded its monopoly on power. The following year, when the Soviet Union disappeared, the Communist Party disappeared with it.

Autonomous republics of the U.S.S.R., 1990

name*	area		joined Union as A.S.S.R.
	square miles	square km	
Russian S.F.S.R.			
Bashkiriya, *or* Bashkir A.S.S.R.	55,450	143,600	March 23, 1919
Buryatiya, *or* Buryat A.S.S.R.	135,650	351,300	May 30, 1923†
Checheno-Ingushetiya, *or* Chechen-Ingush A.S.S.R.	7,450	19,300	Dec. 5, 1936
Chuvashiya, *or* Chuvash A.S.S.R.	7,066	18,300	April 21, 1925
Dagestan, *or* Dagestan A.S.S.R.	19,400	50,300	Jan. 20, 1921
Kabardino-Balkariya, *or* Kabardino-Balkar A.S.S.R.	4,825	12,500	Dec. 5, 1936
Kalmykiya, *or* Kalmyk A.S.S.R.	29,300	75,900	Oct. 20, 1935
Karelia, *or* Karelian A.S.S.R.	66,550	172,400	June 16, 1956‡
Komi, *or* Komi A.S.S.R.	160,600	415,900	Dec. 5, 1936
Mari, *or* Mari A.S.S.R.	8,950	23,200	Dec. 5, 1936
Mordoviya, *or* Mordvinian A.S.S.R.	10,100	26,200	Dec. 20, 1934
Severnaya Ossetiya, *or* Severo-Ossetian A.S.S.R.	3,100	8,000	Dec. 5, 1936
Tatarstan, *or* Tatar A.S.S.R.	26,250	68,000	May 27, 1920
Tuva, *or* Tuvinian A.S.S.R.	65,850	170,500	Oct. 10, 1961
Udmurtiya, *or* Udmurt A.S.S.R.	16,250	42,100	Dec. 28, 1934
Yakutiya, *or* Yakut A.S.S.R.	1,198,150	3,103,200	April 27, 1922
Georgian S.S.R.			
Abkhaziya, *or* Abkhaz A.S.S.R.	3,300	8,600	February 1931
Adzhariya, *or* Adzhar A.S.S.R.	1,150	3,000	July 16, 1921
Azerbaijan S.S.R.			
Nakhichevan, *or* Nakhichevan A.S.S.R.	2,100	5,500	Feb. 9, 1924
Uzbek S.S.R.			
Karakalpakiya, *or* Karakalpak A.S.S.R.	63,670	164,900	March 20, 1932

*A.S.S.R. = Autonomous Soviet Socialist Republic. †Buryatiya was called the Buryat-Mongolian A.S.S.R. from May 30, 1923, to July 7, 1958. ‡Karelia first became the Karelian A.S.S.R. on July 25, 1923. After the addition of territory seized from Finland, it became the Karelian-Finnish S.S.R. (a full republic) on March 31, 1940. This enlarged entity reverted to the name and status of Karelian A.S.S.R. on June 16, 1956.

Structure of the government of the U.S.S.R. The first Soviet constitution was adopted in 1918 by the All-Russian Congress of Soviets for the Russian Soviet Federated Socialist Republic. Between 1920 and 1922 treaties of incorporation were concluded between the Russian S.F.S.R. and the Belorussian and Transcaucasian S.S.R.'s On Dec. 30, 1922, Russia, Ukraine, Belorussia, and Transcausia formed together the Union of Soviet Socialist Republics.

On July 6, 1923, the Central Executive Committee of the U.S.S.R. promulgated a new federal constitution that on Jan. 31, 1924, was adopted by the second Congress of Soviets of the U.S.S.R. The 1924 constitution created a legislative Congress of Soviets of the U.S.S.R., which on Dec., 5, 1936, adopted a second, new constitution (the "Stalin Constitution"). Under this 1936 constitution the All-Union Congress was replaced by the Supreme Soviet (Verkhovny Soviet), a nominally new body, that purportedly exercised exclusively the legislative power of the U.S.S.R. (but of course merely endorsed the policies and programs enunciated by the Communist Party leadership). The Supreme Soviet consisted of two chambers, the Soviet of the Union and the Soviet of Nationalities, the former being elected on the basis of one deputy for every 300,000 citizens, the latter being elected by citizens of the union republics, autonomous republics, autonomous regions, and national areas. Because the right to nominate candidates was limited to the Communist Party and its organs, there was generally only one candidate for each office, and the elections were merely approvals.

On October 7, 1977, the Supreme Soviet approved a new Soviet constitution, which showed no basic differences from the Stalin Constituion of 1936. It endorsed the role of the Communist Party of the Soviet Union as the driving and integrating force and main control mechanism of state and society in the U.S.S.R. The party, rather than the state, continued to dominate life in the U.S.S.R.

Constitutionally, the highest executive body was the Presidium, which was nominally elected by the Supreme Soviet and consisted of a chairman and usually about 20 members. The post of chairman, often popularly called the "president," was sometimes assumed by the first secretary of the Communist Party, as Stalin did at the beginning of World War II and as his successors were wont to do after consolidating their party power. Directly subordinate to the Presidium was the Council of Ministers (known until March 1946 as the Council of People's Commissars), which was constitutionally defined as "the highest executive and administrative organ of the state power of the U.S.S.R."; it was designed to oversee the various ministries, both all-union and republican.

When Mikhail Gorbachev became general secretary of the Communist Party on March 11, 1985, he began almost immediately to overhaul the leadership of the party and military and state bureaucracies. At the supreme party conference in June 1988, he proposed a new system of government that would reduce the role of the Communist Party and shift much of the day-to-day power to the soviets. Without benefit of a new constitution, a new Congress of People's Deputies replaced the Supreme Soviet and was to be—in fact as well as in name—the highest organ of state power. Elections began on March 26, 1989, the first popularly contested national legislative elections since 1917. Members of the Congress then chose 542 of their number to serve on



Military parade in Red Square, Moscow, May 1985
Tass from Sovfoto

the restructured Supreme Soviet, which became the nation's standing legislature. The Congress of People's Deputies elected Gorbachev to the newly created, Western-style post of president on March 14, 1990, greatly increasing his power—or so it was thought. After a failed coup of hard-liners in August 1991, several republics moved rapidly toward independence. On December 25 President Gorbachev, having become a leader without a country, announced his immediate resignation. Soon after, the Supreme Soviet voted itself out of existence.

The Soviet economy. Under the Soviet system as it evolved, all land, minerals, capital stock, and buildings were owned by the state. Private property was limited to such personal property as household items, personal-care objects, automobiles, financial assets, and homes (though most urban habitations were rented). Although private individuals could not own land, they were, under limited conditions, permitted access to plots on which to garden or build private housing.

Soviet industry and agriculture were organized hierarchically. At the top of the planning mechanism was the Council of Ministers, which attempted to determine the broad lines of economic policy and the principal plan priorities. It controlled several agencies, the most important being Gosplan, which was charged with drafting detailed plans, and Gosbank, the central bank. Operation plans were extremely detailed, specifying what any single enterprise might have in labour, materials, and capital and what it should produce according to specified target dates. The central plans, however, described how the central planners hoped the economy would work rather than how it actually functioned. The system was simply too vast and the variables too prolific and complex. Individual enterprises thus de facto engaged in considerable marketing and bargaining outside the formal system. There was always a "gray" economy of invisible off-the-books transactions that were part of the reality of everyday existence in the Soviet Union.

Farming in the U.S.S.R. was fully socialized, the two basic agricultural units being the collective and the state farm (*kolkhoz* and *sovkhoz*, respectively). The collective farm was obliged to meet a delivery quota but made its own decisions on profit sharing. State farms were owned and operated by the state, and their employees were paid a regular wage that was not usually significantly affected by their performance. From the 1950s the number and importance of state farms progressively increased, often at the expense of collectives. In general, Soviet agriculture was notoriously inefficient from its inception and was long plagued by poor harvests and occasional crop failures owing to inefficient use of land, the inadequate level of mechanization, and poor storage and distribution facilities. The Soviet Union was often dependent on Western imports for its food requirements.

Manufacturing industries (together with mining and public utilities) accounted for more than two-fifths of the net material product and employed about one-third of the work force. Within the capital-goods sector, which made up approximately two-thirds of total industrial production, the principal emphasis was on the development of machinery building (defined as producing the means of production), metalworking, metallurgy, and the chemical industry. Collectively these branches formed the backbone of Soviet industry, accounting for more than half the total industrial production. Traditionally, especially during the Stalin years, the emphasis was on heavy industry, and consumer goods were always in short supply.

Nearly all workers belonged to state-sponsored labour unions, which nominally participated in the management of industries, administered state social-insurance funds, and sponsored vocational training and other educational services. Under the Soviet system, unions did not bargain with management to reach wage agreements or to improve working conditions.

See also collectivization; Communist Party of the Soviet Union; KGB; Politburo; Red Army; Russia; Russian Civil War; Russian Revolution.

Union Pacific Railroad Company, company that extended the American railway system to the Pacific Coast; it was incorporated by an act of the U.S. Congress on July 1, 1862. The original road was built westward 1,006 miles (1,620 km) from Omaha, Neb., to meet the Central Pacific, which was being built eastward from Sacramento, Calif. The two railroads were joined at Promontory, Utah, on May 10, 1869.

The Union Pacific was largely financed by federal loans and land grants, but it overextended itself through its involvement in the Crédit Mobilier scandal, in which a few manipulators reaped enormous profits. After exposure of the scheme, which left the railroad badly in debt, the company went into receivership in 1893. It was reorganized in 1897 under the leadership of Edward H. Harriman, who was responsible for major improvements and standardization and who led the railroad to participate in the economic development of the West. Harriman used the railroad as a holding company for the securities of other transportation companies in his empire.

The Union Pacific grew to operate in 13 western states, extending from Council Bluffs, Iowa, and Kansas City, Mo., to Portland, Ore., and Los Angeles. Since 1969 it has been owned by the Union Pacific Corporation, a holding company.

In 1982 the Union Pacific merged with two other railroads, the Missouri Pacific Railroad Company (*q.v.*) and the Western Pacific Railroad Company (headquartered in San Francisco), to form what came to be called the "Union Pacific System." Union Pacific and Missouri Pacific retained their separate corporate identities to some degree (under the holding company Union Pacific Corporation), but Western Pacific became a subsidiary of Union Pacific. Trafficking and marketing of all three railroads were fully unified. Its acquisition of the Southern Pacific Rail Corporation in 1996 made Union Pacific the largest railroad in the United States, with control of almost all of the rail-based shipping in the western two-thirds of the country. The Union Pacific Corporation is headquartered in Bethlehem, Pa.

Consult the INDEX *first*

union shop, arrangement under which workers are required to join a particular union within a specified period of time after beginning employment. Such an arrangement differs from the closed shop in that the employer's choice of new employees is not restricted to union members. The justification given for the union shop is that it prevents workers from enjoying the benefits of unionism without bearing their share of the costs of such representation.

Union shop agreements are uncommon in most countries, where one union seldom gains exclusive bargaining rights for all the workers of a plant. In the United States, however, where a single union may be chosen by majority vote to represent all the workers, and in Japan, where a single union customarily represents all the employees of an enterprise, union shop agreements are both legal and common. In some states of the United States, however, so-called right-to-work laws prohibit requiring union membership as a condition of employment, thus forbidding both the union shop and the closed shop.

unionism, enterprise (Japanese labour): *see* enterprise unionism.

Uniontown, city, seat (1784) of Fayette county, southwestern Pennsylvania, U.S. It lies along Redstone Creek, among the rugged foothills of the Alleghenies, 45 miles (72 km) southeast of Pittsburgh. Settled in 1767 and laid out (1776) by Henry Beeson, a Quaker, it was first known as Beeson's Town. Its location on the old National Road was an important factor in its early development. It is now a trade and marketing centre with coal, steel, and textile industries. Fort Necessity National Battlefield, 11 miles (18 km) southeast, is the site of the opening battle of the French and Indian Wars. George C. Marshall, World War II general and secretary of state and of defense, was born in Uniontown. The Fayette campus of Pennsylvania State University was opened in 1934. Inc. borough, 1796; city, 1916. Pop. (1994 est.) 12,143.



First Bolshevik national flag, of Russia, 1918–20 (initials of Russian Federated Soviet Socialist Republic in canton)



Flag of the Union of Soviet Socialist Republics, 1922–91



Red Army flag, 1918–46

Various flags of the Soviet Union

unique-headed bug, also called GNAT BUG, any of the approximately 130 insect species of the family Enicocephalidae (order Heteroptera). The unique-headed bug, found



Unique-headed bug feeding on a millipede
E.S. Ross

throughout the world, is about 4 mm (0.2 inch) long and, as indicated by its common name, has an unusual elongated head that is constricted behind the eyes and also at the base. Its forewings are entirely membranous. Both the beak and the antennae have four joints, and the front pair of legs is adapted for grasping prey.

unisexuality, in biology, the condition of an organism or species capable of producing only male or female gametes (sex cells) but never both. A unisexual organism of a bisexual species is one in which the male and female gonads are found in separate individuals. In plants this condition is often called dioecism. A unisexual species is one in which all individuals are of the same sex. Some species of whiptail lizards, for example, are only female. New individuals grow from eggs that develop without fertilization (parthenogenesis).

Unisys Corporation, American manufacturer of computer systems. The company was formed in 1986 from the merger of Sperry Corporation and Burroughs Corporation.

The Sperry Corporation arose out of the merger of North American Aviation Company, Curtiss-Wright Corporation, and Sperry Gyroscope in 1933. The corporation specialized in the manufacture of gyroscopes and other aeronautical machinery, machine tools, and heavy and precision machinery. In 1955 Sperry merged with Remington Rand, Inc., becoming Sperry Rand Corporation. Remington Rand had been formed in 1927, combining several manufacturers of office machines and business equipment, including the Remington Typewriter Company (established in 1873) and the Rand Kardex Bureau (1886). Remington Rand's main business had developed around typewriters, business machines, and electric shavers. Sperry Rand Corporation was renamed Sperry Corporation in 1979.

The Burroughs Corporation began as the Burroughs Adding Machine Company in 1905, producing the world's first practical adding machines, which had been perfected by the inventor William Seward Burroughs a decade or so before. The company succeeded Burroughs' own American Arithmometer Company. The Burroughs Adding Machine Company became the world's largest manufacturer of such devices, and in the 1950s and '60s it branched out into the manufacture of computer systems for business and office uses. It was renamed the Burroughs Corporation in 1953.

At the time of the 1986 merger, Sperry mainly produced military electronics systems and computer systems for use in the transportation and utilities industries. Burroughs had concentrated on computer systems for banking and other financial uses. Since 1994 the company's leading business has been providing information technology services to business and government.

unit train, freight train composed of cars carrying a single type of commodity that are all bound for the same destination. By hauling only one kind of freight for one destination, a unit train does not need to switch cars at various intermediate junctions and so can make nonstop runs between two terminals. This reduces not only the shipping time but also the cost. The unit train was introduced by American railroad companies in the 1950s so that they could offer lower shipping rates and thereby make their freight service more marketable. Initially, unit trains were used primarily to haul coal from mines to power plants. By the late 20th century about 50 percent of the coal shipped in the United States was carried by these trains. Other forms of bulk cargo, such as grain and cement, were also transported in this fashion.

To fully exploit the advantages of the unit train and to extend this service to shippers of manufactured goods, American railroads in the second half of the 20th century redesigned their equipment. They developed larger freight cars, many of which are specially constructed to carry particular commodities. The 10,000-cubic-foot (280-cubic-metre) boxcar, for example, can economically transport such items as automobile parts and television sets. Another key innovation is the tri-level rack car capable of carrying 12 to 15 finished automobiles from assembly points to distribution points. Unit trains are most widely employed in the United States.

Unitarian Universalist Association, religious organization in the United States formed in May 1961 by merger of the Universalist Church of America and the American Unitarian Association. The American Unitarian Association was founded in 1825 as the result of a gradual development of Unitarianism (the denial of the Trinity) within New England Congregationalism in the late 18th and early 19th centuries. The Universalist Church of America developed from an 18th-century movement in the eastern United States among those who believed in universal salvation. The first Universalist Church was formed in 1779, and in 1790 the Universalists adopted a doctrinal statement and plan for church government at a convention in Philadelphia.

The Unitarian Universalist Association has no creed, and individual congregations vary widely in their worship service, religious beliefs, and religious practices. National headquarters, in Boston, Mass., consist of departments dealing with the ministry, extension, religious education, adult education, world service, world churches, and publications. District organizations cover the continental area, with boards and executives responsible to district churches and fellowships. The General Assembly of delegates from churches and fellowships meets annually.

Unitarianism, religious movement that stresses the free use of reason in religion, holds generally that God exists only in one person, and denies the divinity of Christ and the doctrine of the Trinity.

A brief treatment of Unitarianism follows. For full treatment, *see* MACROPAEDIA: Protestantism: *Unitarians and Universalists*.

Theological foundations for the view of God as a unity and for the humanity of Jesus are found in 2nd- and 3rd-century monarchianism and in the teachings of Arius (*c.* 250–*c.* 336) and his followers (Arians)—both early groups of Christians whose doctrines were later declared heretical by the church. The modern roots of Unitarianism are traced to the 16th-century Protestant Reformation, when certain liberal, radical, and rationalist reformers revived the Platonic emphasis on reason and the unity of God. Many such thinkers fled Italy during the Inquisition. Michael Servetus, a leading Neoplatonic Unitarian, fled eventually to Geneva, where he was burned at the stake by Calvinists. Some Italians found refuge in Poland. Chief among these was Faustus Socinus, who arrived at Kraków in 1579. Socinus' theology stressed the complete humanity of Jesus, a view still held by most Unitarians and Universalists. In Transylvania, Ferenc Dávid was convicted as a heretic for teaching that prayers could not be addressed to Jesus (since Jesus was merely human). He died in prison in 1579. The church that Dávid founded in Transylvania is the world's oldest extant Unitarian body.

Although some unorthodox thinkers in England drew upon Socinus and others, the mainstream of British Unitarianism, like that of American Unitarianism, grew out of Calvinist Puritanism. Calvin's doctrine of providence, coupled with an increasingly scientific view of the universe, led to a decline in religious orthodoxy and an increased emphasis on reason and morals among the more liberal Calvinist clergy. Joseph Priestley, an English scientist and dissenting minister, was among those who began preaching "Unitarian Christianity," emphasizing Jesus' humanity, God's omnipotence, and the rational faculty of man. The English Unitarians became strong in Parliament, the professions, and social reform. The name "Free Christian" was adopted by some groups who opposed the name "Unitarian" as sectarian and divisive. The movement fared less well in Scotland and Ireland.

American Unitarianism developed more slowly out of New England Congregationalist churches that rejected the 18th-century revival movement. Congregational autonomy protected from controversy those ministers who stressed moderation, reason, and morals over spiritual revivalism. The Transcendentalist movement of the 19th century injected Unitarianism with a new interest in the intuitive and emotional aspects of religion. When Unitarianism spread into the frontier of the Middle West, its religious fundamentals changed to human aspiration and scientific truth, rather than Christianity and the Bible.

Both British and American Unitarian groups formed national associations in 1825. In 1961 American Unitarians merged with the national organization of Universalist churches, with whom they shared a history of liberal idealism. In polity, most Unitarians and Universalists are congregational. Forms of worship, based on Protestant tradition, vary widely from group to group. *See also* Universalism.

Unitas, Johnny, byname of JOHN CONSTANTINE UNITAS (b. May 7, 1933, Pittsburgh, Pa., U.S.—d. Sept. 11, 2002, Timonium, Md.), American football quarterback who in 1969 was named greatest all-time National Football League (NFL) quarterback.

Unitas played football at St. Justin's High School (Pittsburgh), but his weight (145 pounds) caused him to be rejected for an athletic scholarship at Notre Dame University. He played for the University of Louisville, where he grew to 6 feet 1 inch and a weight of 190 pounds. He was drafted by the NFL Pittsburgh Steelers in 1955 but was released before the regular season. He worked at construction jobs and played for the semiprofessional Bloomfield Rams for $6 a game until he joined the NFL Baltimore Colts in 1957. His rise to stardom from such lowly beginnings made him the quintessential rags-to-riches hero as professional football emerged as the top spectator sport in the United States in the 1960s. His legendary status was cemented by his performance in the 1958 championship game, in which he led the Colts to a 23–17 overtime victory over the New York Giants. The dramatic game, viewed by a national television audience, is regarded as a key step in the NFL's rise in popularity.

Unitas led the Colts to five league championship games (1958–59, 1964, 1968, and 1970) and to two Super Bowl games after the 1968 and 1970 seasons. He led the league four times each in passing yards and in touchdown passes and retired with career NFL records for passing yards, touchdowns, and completions. He was traded to the NFL San Diego Chargers in 1973, his last season. He was elected to the Pro Football Hall of Fame in 1979.

Unitas Fratrum (Latin: "Unity of Brethren"), Protestant religious group inspired by Hussite spiritual ideals in Bohemia in the mid-15th century. They followed a simple, humble life of nonviolence, using the Bible as their sole rule of faith. They denied transubstantiation but received the Eucharist and deemed religious hymns of great importance. In 1501 they printed the first Protestant hymnbook, and in 1579–93 they published a Czech translation of the Bible (the Kralice, or Kralitz, Bible), the outstanding quality of which made it a landmark in Czech literature. Their *Confessio Bohemica,* reflecting Lutheran and Calvinist influences, effected a union with Lutheran Hussites in 1575 that received Holy Roman imperial sanction in 1609. By that time the Unitas Fratrum constituted half of the Protestants in Bohemia and more than that in Moravia. About the mid-16th century, Unitas emigrants moved into Poland and survived there for some two centuries.

Having joined the Czech estates in their fight with the Holy Roman emperor Ferdinand I (Thirty Years' War), the Unitas Fratrum forces' defeat in 1620 at the Battle of the White Mountain was a prelude to their suppression. In 1627 an imperial edict outlawed all Protestants in Bohemia. The Unitas was destroyed, with all its churches, its Bible, and its hymnbooks, and its members were forcibly "catholicized" or exiled. Remnants of the group, however, eventually found refuge in Saxony and under the name of Herrnhuters had great religious influence through their missionary activities. Both the Moravian Church and the Evangelical Czech Brethren Church in the Czech Republic trace their origin to the Unitas Fratrum.

United Aircraft Corporation: *see* United Technologies Corporation.

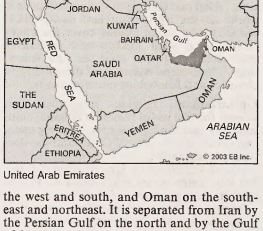
United Airlines, Inc., American international airline serving North America, Asia, Latin America, the Caribbean, and Europe. Headquarters are at Elk Grove Village, a suburb of Chicago, Ill.

United Airlines dates to 1929, when William E. Boeing (1881–1956), Frederick B. Rentschler (1887–1956), and their associates founded United Aircraft Transport Corporation, a conglomerate of both aircraft manufacturing and air transport. By 1930 it had acquired four mail carriers—Boeing Air Transport (formed in 1927), Pacific Air Transport (1926), Varney Air Lines (1926), and National Air Transport (1925)—and in 1931 established United Airlines, Inc., in Chicago as a holding company providing an umbrella management for the four operating divisions. In 1934, under U.S. congressional pressure, aircraft conglomerates were forced to dissolve, separating the manufacture of aircraft from air transport. United Airlines, Inc., became an independent operating company, fully unifying all the transport divisions. (The Boeing and United Aircraft manufacturing companies also emerged from the dissolution.) William A. "Pat" Patterson (1899–1980), the new president, was the major influence on the company's progress until his retirement in 1966.

From 1930 the company had a network of routes from New York City to San Francisco and Seattle, Wash., along with a number of north-south routes in the West; and in that year the company's (and the world's) first stewardesses were trained and put into service on the Chicago–San Francisco flights. Transcontinental flights from New York followed. After World War II, the expansion of United's routes and services was phenomenal. In 1961, upon its merger with Capital Airlines, United became the largest air carrier (in terms of number of passengers) in the Western world, exceeded globally only by the Soviet Union's Aeroflot. In 1968–69 United Airlines reorganized itself, and in 1986 it acquired Pan American World Airways' trans-Pacific routes (connecting the United States with East Asia and the South Pacific). In 1990 United Airlines acquired Pan American's routes between London and the United States, and in 1991 United bought the bankrupt Pan American's Latin American and Caribbean route systems.

Following its reorganization in 1968–69, United also embarked on a number of corporate mergers. Its new parent and holding company, UAL, Inc., acquired the Western International (later Westin) Hotels (a large American hotel chain) in 1970, the Hertz Corporation (the largest car-rental business in the United States) in 1985, and Hilton International Co. (another large hotel chain) in early 1987. These businesses were sold off in late 1987, however, and henceforth the parent company concentrated on its major subsidiary, United Airlines, which remained one of the largest air carriers in the world. In 1994 United employees purchased a controlling (55 percent) share of the airline in return for $4.9 billion in wage and work-rule concessions. The buyout made United the largest employee-owned company in the United States.

United Arab Emirates (U.A.E.), Arabic DAWLAT AL-IMĀRĀT AL-ʿARABĪYAH AL-MUTTAḤIDAH, union of seven emirates lying along the oil-rich eastern coast of the Arabian Peninsula. The union consists of Abu Dhabi (accounting for almost nine-tenths of the union's area), Dubayy (Dubai), ʿAjmān, Ash-Shāriqah, Umm al-Qaywayn, Raʾs al-Khaymah, and Al-Fujayrah. Extending about 70 miles (110 km) from north to south and about 330 miles (530 km) from east to west, the U.A.E. is bordered by Qatar on the northwest, Saudi Arabia on



United Arab Emirates

the west and south, and Oman on the southeast and northeast. It is separated from Iran by the Persian Gulf on the north and by the Gulf of Oman on the east. The capital is Abu Dhabi town. Area 32,280 square miles (83,600 square km). Pop. (2002 est.) 3,550,000.

A brief treatment of the United Arab Emirates follows. For full treatment, *see* MACROPAEDIA: Arabia.

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

The land. The only landscape feature breaking the monotony of the United Arab Emirates' low-lying desert plain is the intrusion of Oman's Al-Ḥajar Mountains along the Musandam Peninsula in the east. The desert plains, generally lying at less than 500 feet (150 m) above sea level, rise dramatically at Al-Ḥajar Mountains to elevations of nearly 10,000 feet (3,050 m). Although the union's longest coastline borders the Persian Gulf to the north, its three natural deepwater harbours are located along the much shorter eastern coast on the Gulf of Oman.

The climate is hot and humid along the coast and hot and dry in the interior. Rainfall averages only 3 to 4 inches (75 to 100 mm) annually, and the summer heat may reach 115° F (46° C) along the coast and 120° F (49° C) or more in the desert interior. The average January temperature is 65° F (18° C).

Vegetation is scanty and largely limited to the low shrubs that offer forage to herds tended by nomads. The gulf waters are home to schools of mackerel, grouper, and tuna.

The U.A.E.'s estimated proven reserves of petroleum and natural gas are among the world's largest. Its reserves of petroleum represented about 10 percent of world totals in the late 20th century. Natural-gas reserves represented almost 5 percent of world reserves but still ranked among the world's 10 largest.

The people. The United Arab Emirates' indigenous inhabitants are Arabs who adhere to the Sunnite and Shiʿite sects of Islām but make up only one-fourth of the union's residents. A large part of the population consists of South Asian immigrants (Indian, Pakistani, Bangladeshi, and Iranian). The official language is Arabic. English, Persian, Urdu, and Hindi are also spoken. About two-thirds of the population is male, owing to the huge influx of petroleum and construction workers. The U.A.E.'s annual rate of population growth in the 1980s was one of the highest in the Middle East, owing largely to immigration. Abu Dhabi emirate has the largest population of the emirates, followed by Dubayy and Ash-Shāriqah. Most of the union's population is concentrated in Abu Dhabi town and the towns of the peninsula, including Dubayy town and Ash-Shāriqah town.

The economy. The United Arab Emirates has a developing mixed state and private-enterprise economy. The gross national product (GNP) per capita is the highest in the Middle East and one of the world's highest. The GNP is not growing as fast as the population, however. Petroleum and natural-gas extracting and refining account for about one-third of the gross domestic product (GDP), and the service sector accounts for about two-fifths.

Less than 0.5 percent of the total land in the U.A.E. is arable or permanently cropped, and of this two-fifths requires irrigation. In the oases, date palms, which are the emirates' major crop, are cultivated together with alfalfa. Other foods grown include wheat, barley, millet, and fruits and vegetables. Animal life is mostly restricted to domesticated goats, sheep, and camels. Fishing from the Persian Gulf supplies domestic needs.

Petroleum and natural-gas extraction are the principal industries in the union, with production concentrated in Abu Dhabi (producing most of the petroleum and natural gas), Dubayy, and Ash-Shāriqah emirates.

Manufacturing and utilities account for about one-tenth of the GDP. Refined petroleum, liquefied natural gas, cement and building materials, and aluminum are the principal products. Electric-energy production is from thermal-power plants. Large oil revenues have made possible the extensive construction of new buildings, roads, and industrial plants. More than four-fifths of the U.A.E.'s labour force are foreign nationals, most concentrated in unskilled construction work.

Each emirate in the union sets its own domestic economic policy, although a significant portion of the federal budget is earmarked for national development, providing the federal government with a measure of control. Abu

Dhabi contributes the major part of the federal budget. National and foreign banks have flourished in the U.A.E.

Roads link major towns throughout the seven emirates. Each emirate administers its own shipping; Dubayy, on the Persian Gulf, is the emirates' main port. Exports traditionally have greatly exceeded imports and consist mainly of petroleum and natural gas, followed by dates, aluminum, dried fish, and pearls.

Government and social conditions. Each of the seven emirates in the U.A.E. is governed by its own hereditary ruler, and each retains primary control over mineral rights, taxation, and police powers.

The union's provisional constitution, adopted in 1971 and renewed thereafter for five-year periods, vests highest federal authority in the Supreme Council of Rulers, which consists of the rulers of the seven emirates. All decisions must gain the approval of no fewer than five rulers, including those from Abu Dhabi and Dubayy, the largest emirates. The council elects the president and vice president from its members. The president appoints the prime minister and the Federal Council of Ministers to assume the country's executive authority. Proposed laws are reviewed by the Federal National Council, a 40-member consultative body appointed to two-year terms by the seven rulers.

The federal government provides free hospital treatment and medical care throughout the U.A.E. and has devoted large amounts of oil revenue to the building of hospitals and rural and mobile health clinics. The U.A.E. has many physicians, mostly recruited from foreign countries. Average life expectancy is 72 years.

Education in the U.A.E. is compulsory between the ages of 6 and 12. A dearth of native teachers has forced the government to staff schools with teachers from other Arab countries. The country's only institution of higher learning is the United Arab Emirates University, which opened in 1977. All education is provided free. Although it is free from overt censorship, the nation's press never criticizes the government.

The U.A.E.'s culture is that of Islām. The people are divided into tribal groups united under the patriarchal emirates of each of the rulers. Although the U.A.E. has undergone extensive modernization, many of its people continue to practice traditional ways of life.

History. Excavations at Bahrain and Kuwait attest to those areas' importance as trading and commercial centres of the Persian Gulf region as early as Sumerian times (*c.* 3000 BC). Their conversion to Islām occurred within Muḥammad's lifetime, but his death brought apostasy, and the Caliphate had to restore orthodoxy by force. Influences from Iran, across the gulf, brought many conversions to Shī'ism.

The Portuguese entered the Persian Gulf in the early 16th century. The British East India Company arrived about 100 years later. In 1819–20 the British launched an attack upon the coastal ports and exacted the General Treaty of 1820, by which the local inhabitants renounced piracy. By 1853 the Treaty of Maritime Peace in Perpetuity had been signed, and the area became known as the Trucial Coast. In 1892 Britain gained control over the foreign policy of the area by securing the pact known as the Exclusive Agreements with the Rulers of the Trucial States.

From 1873 to 1947 the Trucial Coast was administered by British India and after 1947 by the London Foreign Office, but the British never assumed sovereignty. Each state maintained full internal control. In 1960 the Trucial States Council was formed, with representation from the rulers of the various states. When the British vacated the Persian Gulf in 1971, the Trucial States federated and became known as the United Arab Emirates. Ra's al-Khaymah joined the federation in 1972, while Bahrain and Qatar opted for separate independence.

United Arab Republic (U.A.R.), Arabic AL-JUMHŪRĪYAH AL-ʿARABĪYAH AL-MUTTAḤIDAH, political union of Egypt and Syria proclaimed on Feb. 1, 1958, and ratified in nationwide plebiscites. It ended on Sept. 28, 1961, when Syria, following a military coup, declared itself independent of Egypt. Despite the dissolution of the union, Egypt retained the name United Arab Republic until Sept. 2, 1971, when it took the name Arab Republic of Egypt.

United Artists Corporation, major investor in and distributor of independently produced motion pictures in the United States. The corporation was formed in 1919 by Charlie Chaplin, the comedy star; Mary Pickford and her husband, Douglas Fairbanks, the popular film stars; and D.W. Griffith, the director who was a pioneer in the development of camera techniques. They were the leading filmmakers of their day and wanted complete freedom in producing and distributing their films. The company also handled the distribution of high-quality films made by independent producers. United Artists was the first major production company to be controlled by its artists rather than by businessmen. It also started the trend among studios to act as distributing agencies for films other than those it produced.

Besides the films of its founders (including Chaplin's *The Gold Rush,* 1925), United Artists prospered in the 1920s with films starring Gloria Swanson, Norma Talmadge, Buster Keaton, and Rudolph Valentino. The company met the new challenge of sound films in the 1930s with the talents of such producers as Samuel Goldwyn, Howard Hughes, and Alexander Korda. The corporation eventually encountered financial difficulties, though, and was reorganized in 1951: the production studio was sold, and United Artists became solely a financing and distributing facility. Although the new administration established itself with modestly budgeted films, the company was fully competitive by the mid-1950s with all the major studios because of such films as *The African Queen* (1951), *High Noon* (1952), *Marty* (1955), *Witness for the Prosecution* (1957), *Some Like It Hot* (1959), *The Apartment* and *The Magnificent Seven* (both 1960), and *West Side Story* (1961). The company's subsequent successes included the James Bond and Pink Panther series and such films as *One Flew over the Cuckoo's Nest* (1975) and *Rocky* (1975). In its later years, United Artists underwent various ownerships and corporate organizations.

United Australia Party (UAP; 1931–44), political party formed by a fusion of Nationalist Party and conservative Australian Labor Party members, which alone or in coalition with the Country Party controlled the Australian commonwealth government for 10 years. Brought to power in the general election of 1931, the UAP sought to meet the Great Depression with deflationary policies. The UAP's conservative economic program gave Australians a sense of security and, along with factional strife within the opposition Australian Labor Party, allowed the UAP to stay in power despite the fact that no dramatic economic upsurge resulted from the UAP's governmental measures. With the death in 1939 of the UAP prime minister Joseph A. Lyons, a power struggle within the UAP-Country coalition prepared the way for the Labor Party to take the reins of government in 1941. The UAP was dissolved in 1944 and was succeeded by the Liberal Party.

United Automobile, Aerospace and Agricultural Implement Workers of America: International Union, also called (1941–62) UNITED AUTOMOBILE, AIRCRAFT AND AGRICULTURAL IMPLEMENT WORKERS OF AMERICA, or (1935–41) UNITED AUTOMOBILE WORKERS OF AMERICA (UAW), American industrial union of automotive and other vehicular workers, headquartered in Detroit, Mich.

The United Automobile Workers was a product of the Committee for Industrial Organization (CIO), which began to organize automotive workers with the passage of the National Labor Relations Act (Wagner Act) in 1935. As long as the constitutionality of the act remained in doubt, the industry refused to yield; the union's rank-and-file organizers retaliated by importing from France the technique of the "sit-down" strike. The success of this tactic, together with President Franklin D. Roosevelt's overwhelming success in the election of 1936 and the sustaining of the Wagner Act by the Supreme Court the following year, prompted General Motors to change its policy. The company agreed to accept the UAW as the bargaining agent for its employees, whereupon most of the rest of the industry followed suit. Some years of violent conflict ensued before the Ford Motor Company and the UAW finally came to terms in 1941, however.

Walter Reuther, an early and vigorous organizer, became president of the union in 1946 and held that position until his death in 1970. (He also became president of the CIO in 1952.) Under Reuther's leadership, the UAW signed a series of multiyear contracts with the major automotive manufacturers that set the standard for all industrial unions in the United States. These guaranteed wages adjusted to the cost of living, health plans and annual vacations, and even unemployment benefits supplementing those paid by the government. When the American Federation of Labor (AFL) and the CIO merged in 1955, Reuther held positions making him second only to George Meany, president of the combined AFL-CIO. Their relationship was uneasy, and in 1967 the friction between the two men broke into the open. As a result, the UAW withdrew from the AFL-CIO that year and joined the International Brotherhood of Teamsters in a new alliance. Dissatisfaction with the corruption in the Teamsters, however, led to dissolution of the alliance in 1972. In 1981 the UAW reaffiliated with the AFL-CIO. The union subsequently had to concede some of its members' vaunted economic benefits in order to help American car manufacturers compete against foreign imports. This policy provoked the separation of Canadian autoworkers from the parent body in 1985–86.

United Brands Company, American corporation formed in 1970 in the merger of United Fruit Company and AMK Corporation (the holding company for John Morrell and Co., meat-packers). It engages in the production and distribution of bananas and other fruits and produce, the processing and distribution of meats, the manufacture and distribution of other foods, fats, oils, and beverages, and the administration of diversified activities in plastics, animal feeds, telecommunications, and other areas. Headquarters for United Brands are in New York City.

United Fruit Company, the main company, was founded in 1899 in the merger of the Boston Fruit Company and other companies producing and marketing bananas grown in the Caribbean islands, Central America, and Colombia. The principal founder was Minor C. Keith, who had begun to acquire banana plantations and to build a railroad in Costa Rica as early as 1872. In 1884 he contracted with the Costa Rican government to fund the national debt and to lay about 50 more miles of track. In return he received, for 99 years,

full rights to these rail lines and 800,000 acres (325,000 hectares) of virgin land, tax exempt for 20 years.

United Fruit Company was capitalized at $11,230,000 at its founding. The company then expanded its capitalization to $215,000,000 by 1930 by absorbing more than 20 rival firms, and it became the largest employer in Central America. From the time the company began, Caribbean and Latin-American governments made available vast undeveloped tracts of jungle lands, which United Fruit cleared, planted, and supplied with extensive railroad and port facilities. Marketing operations included a shipping arm, the Great White Fleet, one of the largest of private merchant navies. All these efforts were matched by an advertising campaign that was extremely successful in marketing bananas in North America and Europe.

As a foreign corporation of conspicuous size, United Fruit sometimes became the target of popular attacks. The Latin-American press often referred to it as *el pulpo* ("the octopus"), accusing it of exploiting labourers, bribing officials, and influencing governments during the period of Yankee "dollar diplomacy" in the first decades of the 20th century. The company's defenders, however, have pointed out that United Fruit's early excesses were somewhat mitigated later. Through the Associated Producers Program, the company gradually transferred title of portions of its landholdings to individual growers, provided them with reasonable credit terms and technological assistance, and acted as marketing agent for their produce; its workers were comparatively well paid and were provided with medical care.

United Brands still owns or leases extensive banana plantations in Honduras, Costa Rica, Guatemala, Panama, and Colombia. It also has continued to produce, for the U.S. government, Jamaican sugar; Costa Rican, Panamanian, and Ecuadorian cocoa; and abaca in Guatemala. Throughout Central America and northern South America, it has maintained holdings that produced tropical woods, quinine, essential oils, and rubber.

United Church of Canada, church established June 10, 1925, in Toronto, Ont., by the union of the Congregational, Methodist, and Presbyterian churches of Canada. The three churches were each the result of mergers that had taken place within each denomination in Canada in the 19th and early 20th century. In 1968 the Canada Conference of the Evangelical United Brethren Church merged with the United Church.

Before the end of the 19th century, the three denominational groups began cooperating in order to avoid duplication of ministries and interconfessional competition and to serve an expanding and developing country more effectively. In 1904 the three churches began official negotiations for organic unity, and by 1908 the Basis of Union was prepared. It stated the principles of doctrine, church government, the ministry, administration, and law that would apply to the new church. The Methodists and Congregationalists soon approved the basis and declared their readiness to unite. A strong minority among the Presbyterians, however, were not in favour of the basis or of the union itself on any terms. Although the Presbyterian General Assembly voted several times by a large majority to enter the union, unwillingness to split the denomination prevented its doing so for several years.

In many western settlements, however, many local Presbyterian and Methodist congregations united, using the principles of the Basis of Union. By 1923 there were more than 3,000 union congregations, and these congregations put pressure on the three denominations to merge officially. The Presbyterian General Assembly finally decided to proceed with the union, even if a minority of its churches stayed out. The final result was that 784 Presbyterian congregations out of a total of 4,512 voted to remain out of the union and continued as the Presbyterian Church in Canada. Only eight Congregational churches refused to join, but all of the 4,797 Methodist congregations entered the union. The new United Church had about 600,000 members, and in the period after the union it grew faster than the general Canadian population.

The system of church government accepted by the United Church is presbyterian. Its doctrine, as stated in the Basis of Union, is conservative in nature and attempts to do justice to the basic beliefs of the three denominations. While this remains the official statement of the church's doctrine, with which ministers must be "in essential agreement," the Statement of Faith (1940) and the Catechism (1944), approved by the General Council, are contemporary in style and liberal in content. The United Church endeavours to be tolerant of all shades of doctrinal opinion consistent with the acceptance of Jesus Christ as Lord.

In attempting to be not only a united but also a uniting church, the United Church of Canada is ecumenical in spirit, open in discussion, and cooperative in action. It is a member of the World Methodist Council, the World Alliance of Reformed Churches (Presbyterian and Congregational), the Canadian Council of Churches, and the World Council of Churches.

Articles are alphabetized word by word, not letter by letter

United Church of Christ, Protestant denomination in the United States, formed by union of the Evangelical and Reformed Church (*q.v.*) and the General Council of Congregational Christian Churches (*q.v.*). Each was the result of former unions. Negotiations toward union of the two bodies were begun in 1942, and during the next 15 years there were seven revisions of the Basis of Union. The United Church of Christ was formed in a uniting General Synod on June 25, 1957, and its constitution was declared in force on July 4, 1961.

A Statement of Faith for the new church was adopted by the two uniting groups in 1959 in Oberlin, Ohio. This statement is, however, considered a testimony to the faith of the uniting churches rather than a final rule of faith. The local churches are neither bound by it nor required to accept it.

Church government is a combination of congregationalism and presbyterianism. The autonomy of each local church in the management of its own affairs is guaranteed by the constitution of the United Church of Christ. Local churches in an area are combined into an association, and several associations make up a conference (usually composed of a state). Associations and conferences hold annual meetings. The highest representative body of the United Church of Christ is the General Synod, which is composed of about 700 delegates chosen by the conferences. It meets biennially. Headquarters of the church are in New York City.

United Daughters of the Confederacy (UDC), American women's patriotic society, founded in Nashville, Tenn., on Sept. 10, 1894, that draws its members from descendants of those who served in the Confederacy's armed forces or government or who gave to either their loyal and substantial private support. Its chief purpose is broadly commemorative and historical: to preserve and mark sites; to gather historical records and other material; to celebrate historic occasions; and, by offering prizes, to encourage student essays on the historic South. In addition, it aids needy descendants of loyal Confederates, especially in securing education.

United East India Company: *see* Dutch East India Company.

United Evangelical Lutheran Church, church organized in 1896 in Minneapolis, Minn., as the United Danish Evangelical Lutheran Church in America by merger of the Danish Evangelical Lutheran Church in North America (the North Church) and the Danish Evangelical Lutheran Church Association in America (the Blair Church). "Danish" was dropped from the church's name in 1946. Both of the merging groups had earlier separated from other Lutheran groups.

The group that formed the North Church had the same early history in the United States as members of the American Evangelical Lutheran Church (formed as the Danish Evangelical Lutheran Church in America in 1874), but the North Church group formed its own church in 1894 because they were Pietists who wished to emphasize personal religious experience. The Blair Church was formed in 1884 by Danish pastors who separated from the Norwegian-Danish Conference to better serve the Danish immigrants.

The United Evangelical Lutheran Church was strongly Pietistic. It stressed the need for repentance, congregations often held prayer meetings, and the laity had a strong role in church government. Niels C. Carlsen, president of the church (1925–50), proposed union negotiations in 1948 that resulted in the merger of the United Evangelical Lutheran Church into the American Lutheran Church (*q.v.*) in 1960.

United Evangelical Lutheran Church of Germany, German VEREINIGTE EVANGELISCH-LUTHERISCHE KIRCHE DEUTSCHLANDS (VELKD), union of 10 Lutheran territorial churches in Germany, organized in 1948 at Eisenach, E.Ger. The territorial churches were those of Bavaria, Brunswick, Hamburg, Hanover, Mecklenburg, Saxony, Schaumburg-Lippe, Schleswig-Holstein, and Thüringia. The territorial churches of Württemberg and Oldenburg did not join. The Lutheran territorial church of Lübeck joined the united church in 1949, and then in 1967 Eutin joined. Also in 1967 Mecklenburg, Saxony, and Thüringia withdrew from the union and formed the United Evangelical Lutheran Church in the German Democratic Republic (East Germany).

The Lutheran, Reformed, and United, or Union (a combination of Lutheran and Reformed), territorial churches in Germany had developed out of the changes in church life and organization and the various religious and political settlements brought about by the 16th-century Protestant Reformation. Until 1918 the prince of each German territory was the head of the church in his territory, which was either Lutheran, Reformed, or United. After the defeat of Germany in World War I, the German Empire was replaced by the German Republic, and the churches were no longer state churches headed by princes. They reorganized themselves into self-governing churches, but they remained independent territorial churches. Attempts to attain closer union were made, and during the Nazi era (1933–45) the churches cooperated in various ways to resist the German government's efforts to gain control over them. After World War II ended, the Lutheran churches were able to complete their long-sought union by forming the VELKD.

Although the member territorial churches retained considerable autonomy, the VELKD considers itself a united church rather than a federation of churches. Each of the member

churches is headed by a bishop, and all the bishops are members of the bishops' council of the VELKD. A presiding bishop is elected to head the united church. In addition, a general synod, which meets annually, an executive committee, and an administrative office make up the church government.

The VELKD cooperates with the Evangelical Church in Germany (Evangelische Kirche in Deutschland; EKD), which is a federation of Lutheran, Reformed, and United territorial churches organized in 1948. It is also a member of the Lutheran World Federation and of the World Council of Churches.

United Free Church of Scotland, Presbyterian church formed in 1900 as the result of the union between the Free Church of Scotland and the United Presbyterian Church (*qq.v.*). A series of unanimous decisions brought the United Presbyterian Church into the union. In the Free Church, however, a small minority strongly opposed union. They claimed to be the authentic Free Church and engaged in legal action to have their position and their sole right to the property of the Free Church recognized and declared. In the Scottish courts in 1901 and 1902, the verdict was unanimously against the claim and for the United Free Church, but in 1904 the House of Lords reversed this decision. The situation thus created was so difficult that government action followed. After an investigation a commission was set up that assigned to the United Free Church all the properties that the Free Church was not able to use.

Meanwhile, the turmoil had helped to weld the United Free Church into a closer unity as a vital, active church. From 1900 to 1929 it supported three colleges, in Aberdeen, Edinburgh, and Glasgow, and many of these schools' professors were among the notable scholars of the period. What has come to be regarded as the first milestone in the Protestant Ecumenical Movement, the World Missionary Conference of 1910, was housed in the General Assembly Hall of the United Free Church in Edinburgh.

When the United Free Church united with the Church of Scotland in 1929, a small minority of its members chose to remain outside. *See also* Scotland, Church of.

United Front, in Chinese history, either of two coalitions between the Chinese Communist Party (CCP) and the Nationalist Party (Kuomintang [KMT]). The first United Front was begun in 1924. In return for Soviet military and organizational aid, Sun Yat-sen, the founder of the KMT, agreed to a "bloc within" alliance in which CCP members joined the KMT as individuals while retaining their separate CCP memberships. The alliance was held together by the personal prestige of Sun Yat-sen. After Sun's death, in 1925, tension began to develop between the right wing of the KMT and the Communists. Finally, in March 1926, Chiang Kai-shek, who had been made commander in chief of the KMT army, expelled the Communists from positions of high leadership. A short time later, Chiang began his Northern Expedition to eliminate the powerful provincial warlords among whom the country was divided. The Northern Expedition met with success, and, as a result, Chiang gained the support of financial circles in Shanghai and of a number of warlords, whose armies were incorporated into his. In April 1927 Chiang began a bloody purge of all Communists in areas under his control. The Communist labour movement, which had been instrumental in aiding Chiang in the capture of the large South China cities, was almost entirely destroyed. The left wing of the KMT, which had already established an independent regime in Wu-han, in central China, continued to support the Communists, but the Wu-han regime's military situation became untenable, and friction developed between the Communists and the KMT left wing. In July 1927 they dissolved their alliance, officially ending the first United Front.

Communist remnants fled to the countryside, where they began to organize the peasantry and established several independent "soviets" in rural areas. In 1936 the Communists moved to North China, near the Manchurian area (Northeast Provinces) then occupied by Japanese troops. Led by Mao Zedong, the Communists responded to the growing anti-Japanese sentiment of their countrymen by calling on the KMT to join with them in expelling the Japanese. Chiang at first ignored these pleas; he was forced to change his attitude after the Sian Incident (*q.v.*) in December 1936, when he was kidnapped and held captive by troops of the Manchurian warlord Chang Hsüeh-liang, who wanted the KMT to fight the Japanese, not the Communists. Chiang was compelled, not only by his personal situation but by the pressure of events in general, to agree to Chang Hsüeh-liang's demands.

Thus in 1937 the second United Front between the KMT and the Communists was formally established, this time on the basis of a "bloc without" alliance between two separate groups; the Communists reorganized their army as the New 4th Army and put it nominally under KMT direction. In the fighting against the Japanese, however, the regular KMT armies either were crushed or were ordered to retreat. Afraid of high casualty rates, Chiang pulled his best troops off the front lines as early as 1939. Communist guerrillas, who mobilized the population behind the Japanese lines, soon became the only forces still fighting the Japanese. Worried about the resulting growth in Communist strength, the KMT began to use their troops to blockade Communist positions, several times even fighting against them. The United Front, however, continued officially until 1945, when, at the end of World War II, talks on unification between the two sides broke down, and a full-scale civil war ensued between the Communists and the KMT.

United Fruit Company, major division of United Brands Company (*q.v.*).

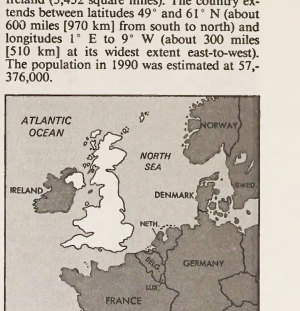
United House of Prayer for All People, Pentecostal Holiness church founded by Bishop Charles Emmanuel ("Sweet Daddy") Grace (1881/84?–1960). After leaving a job as a cook on a Southern railway, he began to preach, assuming the name "Grace" and proclaiming himself "Bishop." He established a house of worship in 1926 in Charlotte, N.C., and later moved to Newark, N.J. He claimed to be an emissary of God with authority to grant or withhold salvation. The death of Grace led to temporary difficulties for the group over tax litigation and the succession to Grace's leadership.

The key to the success of this cult was that the many offerings went directly to Daddy Grace to advance the sale of his healing-power products: soap, stationery, tea, coffee, cookies, toothpaste, facial creams, talcum powder, hair dressing, and the *Grace Magazine.* The church is headquartered in Washington, D.C., and has a reported membership of 50,000.

United Ireland Party, Irish political party officially called by its Irish name, Fine Gael (*q.v.*).

United Irishmen, Society of, Irish political organization formed in October 1791 by Theobald Wolfe Tone, James Napper Tandy, and Thomas Russell to achieve Roman Catholic emancipation and (with Protestant cooperation) parliamentary reform. British attempts to suppress the society caused its reorganization as an underground movement dedicated to securing complete Irish independence. In April 1794 the society opened negotiations with Revolutionary France for military aid, but the British government soon learned of the activity. Twice in 1796–97 French expeditionary forces failed to reach Ireland. Still anticipating help from France, the United Irishmen made plans for a rebellion in 1798. The principal conspirators were arrested in advance of the uprising, and the meagre aid provided by France came too late to be effective. Only in County Wexford did the rebels make any gains, but they were unable to hold the area, and the rebellion collapsed.

United Kingdom, officially UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND, byname GREAT BRITAIN, or BRITAIN, island nation, situated off the northwestern coast of Europe in the Atlantic Ocean, covering an area of 94,251 square miles (244,110 square km). The capital is London. The United Kingdom comprises the island of Great Britain—consisting of England (50,363 square miles [130,440 square km]), occupying most of the southern two-thirds of the island; Scotland (30,418 square miles [78,782 square km]), occupying the northern one-third of the island; and Wales (8,019 square miles [20,769 square km]), lying to the west of England—and Northern Ireland, also known as Ulster, lying in the northeastern part of the island of Ireland (5,452 square miles). The country extends between latitudes 49° and 61° N (about 600 miles [970 km] from south to north) and longitudes 1° E to 9° W (about 300 miles [510 km] at its widest extent east-to-west). The population in 1990 was estimated at 57,376,000.



United Kingdom

A brief treatment of the United Kingdom follows. For full treatment, *see* MACROPAEDIA: United Kingdom.

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

The land. The land area of the United Kingdom is about evenly divided between lowlands (elevation less than 330 feet [100 m] above sea level) and uplands (between 330 and 2,000 feet [100 and 610 m]), with some 5 percent consisting of highlands (above 2,000 feet). England has three hill regions of up to 3,000 feet (900 m) in the north, west, and southwest and two lowland regions (below 1,000 feet [300 m]) in the southeast and east. The northern hill region includes the north–south Pennine Range, which peaks at Cross Fell (2,930 feet [893 m]), and England's highest point, Scafell Pike (3,210 feet [978 m]), in the Cumbrian Mountains of the Lake District. The countryside connecting these five regions is composed mainly of rich agricultural plains. The Thames and Severn are the principal rivers in England; the Mersey and Humber estuaries are significant for developing port activities.

Scotland has three distinct physiographic regions: the Northern Highlands, whose Ben

Sovereigns of Britain			Sovereigns of Scotland*	
name	dynasty or house	reign	name	reign
Kings of Wessex (West Saxons)			Kenneth I MacAlpin	843–858
Egbert	Saxon	802–839	Donald I	858–862
Aethelwulf (Ethelwulf)	Saxon	839–856/858	Constantine I	862–877
Aethelbald (Ethelbald)	Saxon	855/856–860	Aed (Aodh)	877–878
Aethelberht (Ethelbert)	Saxon	860–865/866	Eochaid (Eocha) and Giric (Cinic)†	878–889
Aethelred I (Ethelred)	Saxon	865/866–871	Donald II	889–900
Alfred the Great	Saxon	871–899	Constantine II	900–943
Edward the Elder	Saxon	899–924	Malcolm I	943–954
Sovereigns of England			Indulf	954–962
Athelstan‡	Saxon	925–939	Dub	962–966
Edmund I	Saxon	939–946	Culen	966–971
Eadred (Edred)	Saxon	946–955	Kenneth II	971–995
Eadwig (Edwy)	Saxon	955–959	Constantine III	995–997
Edgar	Saxon	959–975	Kenneth III	997–1005
Edward the Martyr	Saxon	975–978	Malcolm II	1005–34
Ethelred II the Unready (Aethelred)	Saxon	978–1013	Duncan I	1034–40
Sweyn Forkbeard	Danish	1013–14	Macbeth	1040–57
Ethelred II the Unready (restored)	Saxon	1014–16	Lulach	1057–58
Edmund II Ironside	Saxon	1016	Malcolm III Canmore	1058–93
Canute	Danish	1016–35	Donald Bane (Donalbane)	1093–94
Harold I Harefoot	Danish	1035–40	Duncan II	1093–94
Hardecanute	Danish	1040–42	Donald Bane (restored)	1094–97
Edward the Confessor	Saxon	1042–66	Edgar	1097–1107
Harold II	Saxon	1066	Alexander I	1107–24
William I the Conqueror	Norman	1066–87	David I	1124–53
William II	Norman	1087–1100	Malcolm IV	1153–65
Henry I	Norman	1100–35	William I the Lion	1165–1214
Stephen	Blois	1135–54	Alexander II	1214–49
Henry II	Plantagenet	1154–89	Alexander III	1249–86
Richard I	Plantagenet	1189–99	Margaret, Maid of Norway	1286–90
John	Plantagenet	1199–1216	*Interregnum*	1290–92
Henry III	Plantagenet	1216–72	John de Balliol	1292–96
Edward I	Plantagenet	1272–1307	*Interregnum*	1296–1306
Edward II	Plantagenet	1307–27	Robert I the Bruce	1306–29
Edward III	Plantagenet	1327–77	David II	1329–71
Richard II	Plantagenet	1377–99	*House of Stewart (Stuart)*§	
Henry IV	Plantagenet: Lancaster	1399–1413	Robert II	1371–90
Henry V	Plantagenet: Lancaster	1413–22	Robert III	1390–1406
Henry VI	Plantagenet: Lancaster	1422–61	James I	1406–37
Edward IV	Plantagenet: York	1461–70	James II	1437–60
Henry VI (restored)	Plantagenet: Lancaster	1470–71	James III	1460–88
Edward IV (restored)	Plantagenet: York	1471–83	James IV	1488–1513
Edward V	Plantagenet: York	1483	James V	1513–42
Richard III	Plantagenet: York	1483–85	Mary, Queen of Scots	1542–67
Henry VII	Tudor	1485–1509	James VI ‖	1567–1625
Henry VIII	Tudor	1509–1547		
Edward VI	Tudor	1547–53		
Mary I	Tudor	1553–58		
Elizabeth I	Tudor	1558–1603		
Sovereigns of Great Britain and the United Kingdom ‖ ¶				
James I (VI of Scotland) ‖	Stuart	1603–25		
Charles I	Stuart	1625–49		
Commonwealth				
Oliver Cromwell, Lord Protector		1653–58		
Richard Cromwell, Lord Protector		1658–59		
Charles II	Stuart	1660–85		
James II	Stuart	1685–88		
William III and Mary II℣	Orange/Stuart	1689–1702		
Anne	Stuart	1702–14		
George I	Hanover	1714–27		
George II	Hanover	1727–60		
George III¶	Hanover	1760–1820		
George IV♁	Hanover	1820–30		
William IV	Hanover	1830–37		
Victoria	Hanover	1837–1901		
Edward VII	Saxe-Coburg-Gotha	1901–10		
George V ▫*	Windsor	1910–36		
Edward VIII ◇	Windsor	1936		
George VI	Windsor	1936–52		
Elizabeth II	Windsor	1952–		

*Knowledge about the early Scottish kings, until Malcolm II, is slim and is partly based on traditional lists of kings. The dating of reigns is thus inexact.

†Eochaid may have been a minor and Giric his guardian; or Giric may have been a usurper. Both appear in the lists of kings for the period.

‡Athelstan was king of Wessex and the first king of all England.

§"Stewart" was the original spelling for the Scottish family; but, during the 16th century, French influence led to the adoption of the spelling Stuart (or Steuart), owing to the absence of the letter "w" in the French alphabet.

‖James VI of Scotland became also James I of England in 1603. Upon accession to the English throne he styled himself "King of Great Britain" and was so proclaimed. Legally, however, he and his successors held separate English and Scottish kingships until the Act of Union of 1707, when the two kingdoms were united as the Kingdom of Great Britain.

¶The United Kingdom was formed on Jan. 1, 1801, with the union of Great Britain and Ireland. After 1801 George III was styled "King of the United Kingdom of Great Britain and Ireland."

℣William and Mary, as husband and wife, reigned jointly until Mary's death in 1694. William then reigned alone until his own death in 1702.

♁George IV was regent from Feb. 5, 1811.

▫ In 1917, during World War I, George V changed the name of his house from Saxe-Coburg-Gotha to Windsor.

◇Edward VIII succeeded upon the death of his father, George V, on Jan. 20, 1936, but abdicated on Dec. 11, 1936, before coronation.

Nevis (4,406 feet [1,343 m]) is the highest point in the United Kingdom; the Central Lowlands (more than 500 feet [150 m] elevation); and the Southern Uplands (up to 2,800 feet [850 m]). The Clyde, Spey, and Tweed are the main rivers in Scotland.

Most of Wales is occupied by the Cambrian Mountains, and much of the land is suitable only for pasture. Wales's highest point is found in Snowdonia (3,560 feet [1,085 m]); the Dee, Tywi, and Teifi are the main rivers.

Northern Ireland consists mainly of low plateaus and hills (average elevation 500 to 600 feet [150 to 180 m]); Lough Neagh, the largest freshwater lake (150 square miles [390 square km]) of the United Kingdom, is in the centre of Northern Ireland; the Bann, Erne, and Foyle are the major rivers.

The climate of the United Kingdom is temperate, being warmed by the North Atlantic Current and by southwest winds. Average temperatures range from 39° to 43° F (4° to 6° C) in winter in the north and from 53° to 63° F (12° to 17° C) in summer in the south. The mean annual temperature is 43° F (6° C) in the extreme north of Scotland (the Hebrides) and 52° F (11° C) in southwestern England. The average annual rainfall is more than 40 inches (1,000 mm), ranging from 20 inches (500 mm) on the southeastern coasts to as much as 200 inches (5,100 mm) in the western and northern highlands.

Forests cover less than one-tenth of the total area of the United Kingdom and are concentrated chiefly in northeastern Scotland and southeastern England; oak, elm, ash, beech, pine, and birch are the most common trees. Fauna includes red deer, fox, otter, squirrel, and rabbit.

The United Kingdom has very few mineral resources. The ancient tin mines of Cornwall and the iron-ore deposits of north-central England, which helped to build the Industrial Revolution, were exhausted or uneconomical to work by the late 20th century. Moreover, coal, once the primary energy source of the British economy, has also declined steadily in output and significance since the early 1950s. At the same time, however, a valuable, relatively new energy source is the nation's proved petroleum and natural-gas reserves, principally in the British sector of the North Sea.

The people. The English are the predominant ethnic group, constituting the majority of the population. Scots, Irish, and Welsh also make up significant proportions. Since the early 1950s a rapidly growing percentage of the country's population has been formed of Commonwealth immigrants, particularly from India, the West Indies, Pakistan, and Bangladesh. The United Kingdom has a very small estimated annual rate of population growth. Birth and death rates have continued to decline since 1871. Infant mortality, however, is relatively high for a developed country. Because the birth rates are low, the population as a whole is aging, and children 15 years and younger constitute less than one-fifth of the population, whereas persons 60 years and older account for more than one-fifth. Life expectancy is 72 years for males and 78 years for females.

English is the major language throughout the United Kingdom, although a substantial number in Wales speak Welsh as their sole language. Almost three-fifths of the population belong to the Church of England (Anglican); Roman Catholics constitute one-eighth of the population; there are some Presbyterians, Methodists, and Baptists; and the remainder are mostly other Protestants, Muslims, Jews, Hindus, and Sikhs.

About 92 percent of the population in the United Kingdom live in urban areas. England and Wales are the most heavily urbanized, followed by Scotland and then Northern Ireland. Between 1971 and 1981, however, many urban inhabitants migrated to nonmetropolitan

areas. The population of the Shetland Islands increased by more than 50 percent because of the development of the North Sea oil industries in the late 1970s. Since 1871, emigration has usually surpassed immigration, except during the 1930s, when there was an influx of European refugees, and between 1957 and 1962, when there was an inflow from the Commonwealth countries.

The economy. The United Kingdom has a developed mixed private- and public-enterprise economy that is largely based on services, especially international trade, and manufacturing. The government controls the production of coal, steel, and ships; it also runs certain utilities, the railways, and most civil aviation. The gross national product (GNP) is growing faster than the population, but only slowly. The GNP per capita lags behind those of most other western European countries.

Agriculture accounts for less than 2 percent of the GNP and employs some 2 percent of the workforce. Farming is highly mechanized, though farms are not extremely large, and is dominated by the raising of sheep and cattle. Pastures cover about one-half of the land. Arable land is limited to less than one-third of the nation's land area, and the United Kingdom is not agriculturally self-sufficient. Chief crops include barley, wheat, sugar beets, and potatoes.

The Forestry Commission manages one-half of the country's productive woodland. Fishing is highly mechanized, and British trawlers land huge quantities of fish annually. Catches consist largely of cod, haddock, plaice, herring, and mackerel, and nearly one-tenth of the total catch is shellfish.

The mineral industry accounts for approximately 6 percent of the GNP but employs less than 1 percent of the workforce. Production from oil fields in the North Sea has allowed the United Kingdom to become virtually self-sufficient in petroleum. The British National Oil corporation, established by the government in 1975, is active in the production and marketing of petroleum; the government moved to divest the corporation of its control over offshore oil fields in 1981 and offered private firms a controlling interest over production. The United Kingdom's coal industry, despite its steady decline since the early 1950s, remains one of the largest and most technologically advanced in Europe. The government controls the production of coal through the National Coal Board; private operators are allowed to operate certain small mines. A public corporation also controls the production of iron and steel, which has been heavily subsidized by the government and the European Coal and Steel Community.

Manufacturing industries account for one-fifth of the GNP and employ a similar proportion of the workforce. Small companies predominate, though companies with 500 or more employees employ a larger percentage of the workforce. Major manufactures include motor vehicles, aerospace equipment, electronic data-processing and telecommunication equipment, metal goods, precision instruments, petrochemicals, and other chemicals.

Electricity is largely generated from domestic fuels, although about one-fifth comes from nuclear power.

The Trades Union Congress, which was founded in 1868, encompasses all but a small number of unions in England and Northern Ireland; there are similar central bodies in Scotland and Wales. The Confederation of British Industry represents employers.

Public revenues ordinarily fall short of expenditures and are chiefly derived from income taxes, which are highly progressive, and excises. A single graduated income tax was introduced in 1973. Deficits are offset by public borrowing.

Exports of goods and services account for

Prime ministers of Great Britain and the United Kingdom*

	party†	term
Robert Walpole (from 1725, Sir Robert Walpole; from 1742, earl of Orford)	Whig	1721–42
Spencer Compton, earl of Wilmington	Whig	1742–43
Henry Pelham	Whig	1743–54
Thomas Pelham-Holles, 1st duke of Newcastle (*1st time*)	Whig	1754–56
William Cavendish, 4th duke of Devonshire	Whig	1756–57
Thomas Pelham-Holles, 1st duke of Newcastle (*2nd time*)	Whig	1757–62
John Stuart, 3rd earl of Bute		1762–63
George Grenville		1763–65
Charles Watson Wentworth, 2nd marquess of Rockingham (*1st time*)	Whig	1765–66
William Pitt, 1st earl of Chatham		1766–68
Augustus Henry Fitzroy, 3rd duke of Grafton		1768–70
Frederick North, Lord North (from 1790, 2nd earl of Guilford)		1770–82
Charles Watson Wentworth, 2nd marquess of Rockingham (*2nd time*)	Whig	1782
William Petty-Fitzmaurice, 2nd earl of Shelburne (from 1784, 1st marquess of Lansdowne)		1782–83
William Henry Cavendish-Bentinck, 3rd duke of Portland (*1st time*)	Whig	1783
William Pitt, THE YOUNGER (*1st time*)	Tory	1783–1801
Henry Addington (from 1805, 1st Viscount Sidmouth)	Tory	1801–04
William Pitt, THE YOUNGER (*2nd time*)	Tory	1804–06
William Wyndham Grenville, 1st Baron Grenville		1806–07
William Henry Cavendish-Bentinck, 3rd duke of Portland (*2nd time*)	Whig	1807–09
Spencer Perceval	Tory	1809–12
Robert Banks Jenkinson, 2nd earl of Liverpool	Tory	1812–27
George Canning	Tory	1827
Frederick John Robinson, 1st Viscount Goderich (from 1833, 1st earl of Ripon)	Tory	1827–28
Arthur Wellesley, 1st duke of Wellington (*1st time*)	Tory	1828–30
Charles Grey, 2nd Earl Grey	Whig	1830–34
William Lamb, 2nd Viscount Melbourne (*1st time*)	Whig	1834
Arthur Wellesley, 1st duke of Wellington (*2nd time*)	Tory	1834
Sir Robert Peel, 2nd Baronet (*1st time*)	Tory	1834–35
William Lamb, 2nd Viscount Melbourne (*2nd time*)	Whig	1835–41
Sir Robert Peel, 2nd Baronet (*2nd time*)	Conservative	1841–46
John Russell, Lord Russell (from 1861, 1st Earl Russell) (*1st time*)	Whig-Liberal	1846–52
Edward Geoffrey Stanley, 14th earl of Derby (*1st time*)	Conservative	1852
George Hamilton-Gordon, 4th earl of Aberdeen		1852–55
Henry John Temple, 3rd Viscount Palmerston (*1st time*)	Liberal	1855–58
Edward Geoffrey Stanley, 14th earl of Derby (*2nd time*)	Conservative	1858–59
Henry John Temple, 3rd Viscount Palmerston (*2nd time*)	Liberal	1859–65
John Russell, 1st Earl Russell (*2nd time*)	Liberal	1865–66
Edward Geoffrey Stanley, 14th earl of Derby (*3rd time*)	Conservative	1866–68
Benjamin Disraeli (*1st time*)	Conservative	1868
William Ewart Gladstone (*1st time*)	Liberal	1868–74
Benjamin Disraeli (from 1876, earl of Beaconsfield) (*2nd time*)	Conservative	1874–80
William Ewart Gladstone (*2nd time*)	Liberal	1880–85
Robert Cecil, 3rd marquess of Salisbury (*1st time*)	Conservative	1885–86
William Ewart Gladstone (*3rd time*)	Liberal	1886
Robert Cecil, 3rd marquess of Salisbury (*2nd time*)	Conservative	1886–92
William Ewart Gladstone (*4th time*)	Liberal	1892–94
Archibald Philip Primrose, 5th earl of Rosebery	Liberal	1894–95
Robert Cecil, 3rd marquess of Salisbury (*3rd time*)	Conservative	1895–1902
Arthur James Balfour (from 1922, 1st earl of Balfour)	Conservative	1902–05
Sir Henry Campbell-Bannerman	Liberal	1905–08
H.H. Asquith (from 1925, 1st earl of Oxford and Asquith)	Liberal	1908–16
David Lloyd George (from 1945, 1st Earl Lloyd-George of Dwyfor)	Liberal	1916–22
Bonar Law	Conservative	1922–23
Stanley Baldwin (*1st time*)	Conservative	1923–24
Ramsay Macdonald (*1st time*)	Labour	1924
Stanley Baldwin (*2nd time*)	Conservative	1924–29
Ramsay Macdonald (*2nd time*)	Labour	1929–35
Stanley Baldwin (from 1937, 1st Earl Baldwin of Bewdley) (*3rd time*)	Conservative	1935–37
Neville Chamberlain	Conservative	1937–40
Winston Churchill (*1st time*)	Conservative	1940–45
Clement Attlee (from 1955, 1st Earl Attlee)	Labour	1945–51
Winston Churchill (from 1953, Sir Winston Churchill) (*2nd time*)	Conservative	1951–55
Sir Anthony Eden (from 1961, 1st earl of Avon)	Conservative	1955–57
Harold Macmillan (from 1984, 1st earl of Stockton)	Conservative	1957–63
Sir Alec Douglas-Home (until 1963, Alexander Frederick Douglas-Home, 14th earl of Home; from 1974, Alexander Frederick Douglas-Home, Baron Home)	Conservative	1963–64
Harold Wilson (*1st time*)	Labour	1964–70
Edward Heath	Conservative	1970–74
Harold Wilson (from 1976, Sir Harold Wilson) (*2nd time*)	Labour	1974–76
James Callaghan	Labour	1976–79
Margaret Thatcher	Conservative	1979–90
John Major	Conservative	1990–97
Tony Blair	Labour	1997–

*The origin of the term prime minister and the question to whom it should originally be applied have long been issues of scholarly and political debate. Although the term was used as early as the reign of Queen Anne (1702–14), it acquired wider currency during the reign of George II (1727–60), when it began to be used as a term of reproach toward Sir Robert Walpole. The title prime minister did not become official until 1905, to refer to the leader of a government. †Before the development of the Conservative and Liberal parties in the mid-19th century, parties in Britain were largely simply alliances of prominent groups or aristocratic families. The designations Whig and Tory tend often to be approximate. In all cases, the party designation is that of the prime minister; he might lead a coalition government, as did David Lloyd George and Winston Churchill (in his first term).

as much as a third of the GNP, and the British merchant marine—merchant navy, in British usage—remains one of the world's largest. The European Union accounts for nearly half of the country's trade. Exports to Commonwealth countries also represent a significant share of the United Kingdom's total exports and ordinarily exceed imports.

Government and social conditions. The United Kingdom is a constitutional monarchy and a parliamentary democracy. Its constitution is partly unwritten and is flexible. The constitution's basic sources are legislative enactments of Parliament and decisions made by courts of law. The reigning monarch is permanent head of state. Royal powers are largely honorific; for instance, the right to veto legislative acts has not been exercised since the 18th century. Executive power is wielded by the prime minister, who is the leader of the majority party in Parliament, and the cabinet, which is appointed by the prime minister from among his or her party. The prime minister also appoints about 25 ministers outside the cabinet, as well as 50 junior ministers. Legislative power is vested in the Parliament, consisting of the monarch, the mainly appointive House of Lords, and the elected House of Commons. The 651 members of the House of Commons are elected to five-year terms, although the prime minister may call general elections at any time. The House of Lords was stripped of most of its power in 1911, and now its main function is to revise legislation. The cabinet, representing the majority party in the House of Commons, can effectively control legislation. A two-party system has existed in the United Kingdom since the late 17th century, though it is occasionally threatened by a third party. The Conservative Party and the Labour Party are the dominant parties. Scotland, Wales, and Northern Ireland have separate and partly autonomous legislatures and governments. The independent judiciary is headed by the Supreme Court of Judicature, which is composed of the Appeal Court, the High Court of Justice, and the Crown Court. Scotland has a distinct legal system based on Roman law. No court can overturn legislation. The United Kingdom is a member of the North Atlantic Treaty Organization (NATO).

The United Kingdom's comprehensive social-security system provides cash benefits for sickness, maternity, temporary disability, and unemployment; family allowances; and old-age, invalidity, permanent-disability, and survivor pensions. The National Health Service, in operation since 1948, offers free medical treatment to all citizens through a network of about 2,400 hospitals. An environmental provision dating from 1956 regulates air quality through the establishment of smokeless zones, where emission from chimneys is prohibited. The overall supply of housing meets the overall demand; however, regional or local shortages exist. More than three-fifths of the total housing is owner-occupied, one-fourth is publicly owned and rented, and the remainder is privately owned and rented.

The educational system is administered primarily by elected local education officials. Education is compulsory and free, in state-supported schools, between the ages of 5 and 16. General education may lead to technical or commercial study or to higher education. Internationally prominent universities include those of Oxford (12th century) and Cambridge (13th century).

The communications media of the United Kingdom include a diversified newspaper industry, supported by a high circulation rate of readers per inhabitants. High editorial standards mark some of the most prestigious papers, such as *The Times* of London, *The Guardian,* and *The Observer*. The state-owned British Broadcasting Corporation (BBC) has an international reputation for impartiality and objectivity. Its radio and television broadcasts include news, educational, cultural, and entertainment programs. The Independent Television Commission oversees commercial television companies, while the Radio Authority regulates commercial radio.

History. The early pre-Roman inhabitants of Great Britain were Celtic-speaking peoples, including the Britons of present-day England and Wales and the Picts of Scotland. Celts also settled in Ireland about 500 BC. Julius Caesar invaded Britain in 55 and 54 BC, but the island was not subdued by Rome until the 1st century AD. The Roman province of Britannia endured until the 5th century and included present-day England and Wales. In the 5th century Germanic tribes of Angles, Saxons, and Jutes invaded Britain, driving many Celtic inhabitants into Cornwall and Wales. The invasions did not displace the Celtic peoples of Wales and Scotland. Christianity was introduced throughout the United Kingdom in the 6th century, and during the 7th century it began to flourish as many kingdoms converted to Christianity. During the 8th and 9th centuries, Vikings, particularly Danes, raided the coasts of Britain and often sent conquering armies.

In the late 9th century Alfred the Great (reigned 871–899), ruler of Wessex, repelled a Danish invasion, which helped bring about the unification of England under Athelstan (924–939). About that time, the Scots attained dominance in Scotland, and Malcolm II (1005–34) completed the unification of Scotland. William of Normandy conquered England in 1066 and became William I (1066–87). The Norman kings established a strong central government and feudal state. The French language of the Norman rulers eventually merged with the Anglo-Saxon of the common people to form the English language. From the 11th century, Scotland came under the influence of the English throne.

Henry II (reigned 1154–89) conquered eastern Ireland in the late 12th century. His sons Richard I (1189–99) and John (1199–1216) had conflicts with the clergy and nobles, and eventually John was forced to grant the nobles certain concessions in the Magna Carta (1215), thus establishing the constitutional principle that the king must govern according to law.

The concept of community of the realm developed during the 13th century, providing the foundation for parliamentary government. During the reign of Edward I (1272–1307), statute law developed to supplement English common law, and the first Parliament was convened. Edward conquered Wales and made it a principality of England (1284), passed exclusively to the heir to the English throne (Prince of Wales; 1301). Edward also attempted to dominate the affairs of Scotland. In 1314 Robert the Bruce won independence for Scotland by defeating English forces at Bannockburn, and in 1328 English monarchs recognized the independence of Scotland. The house of Stewart (Stuart after 1603) ascended to the Scottish throne in 1371 with the coronation of Robert II.

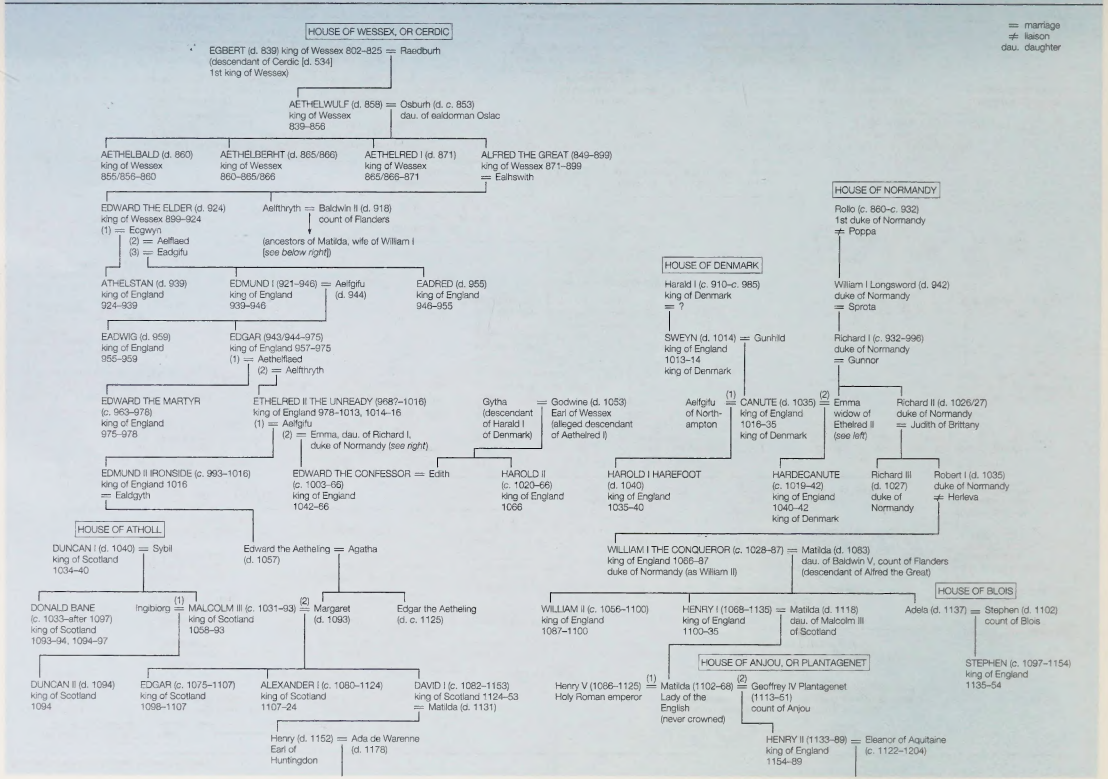
The Tudors became the ruling family of England following the War of the Roses (1455–85). Henry VIII (1509–47) established the Church of England and incorporated Wales as part of England. The reign of Elizabeth I (1558–1603) began a period of colonial expansion, as English sailors and explorers challenged Spanish supremacy of the high seas and in the New World, and English armies completed the conquest of Ireland. In 1588 the defeat of the Spanish Armada prevented an invasion of England by Spain. In 1603 James VI of Scotland ascended to the English throne, becoming James I and establishing a personal union of the two kingdoms. Civil war erupted in 1642 between Royalists and Parliamentarians, ending in the execution of Charles I (1649). After eleven years of Puritan rule under Oliver Cromwell and his son (1649–60), the monarchy was restored with Charles II. In 1707 England and Scotland assented to the Act of Union, forming the kingdom of Great Britain. The Hanoverians ascended to the English throne in 1714, when George Louis, elector of Hanover, became George I of Great Britain. During the reign of George III, Great Britain's American colonies won independence in 1783. This was followed by a period of war with revolutionary France and later the empire of Napoleon Bonaparte (1789–1815). In 1801 legislation united Great Britain with Ireland to create the United Kingdom of Great Britain and Ireland.

Britain was the birthplace of the Industrial Revolution in the late 18th century, and it remained the world's foremost economic power until the late 19th century. During the reign of Queen Victoria (1837–1901), Britain's colonial expansion reached its zenith, though the older dominions, such as Canada and Australia, were gradually granted independence (1867 and 1901, respectively). The growth of parliamentary government during the 19th century was enhanced by the leadership of prime ministers such as Sir Robert Peel, Benjamin Disraeli, and William Gladstone. The United Kingdom entered World War I allied with France and Russia in 1914. Following the war, revolutionary disorder erupted in Ireland, and in 1921 the Irish Free State was granted dominion status. The six counties of Ulster, however, remained in the United Kingdom as Northern Ireland.

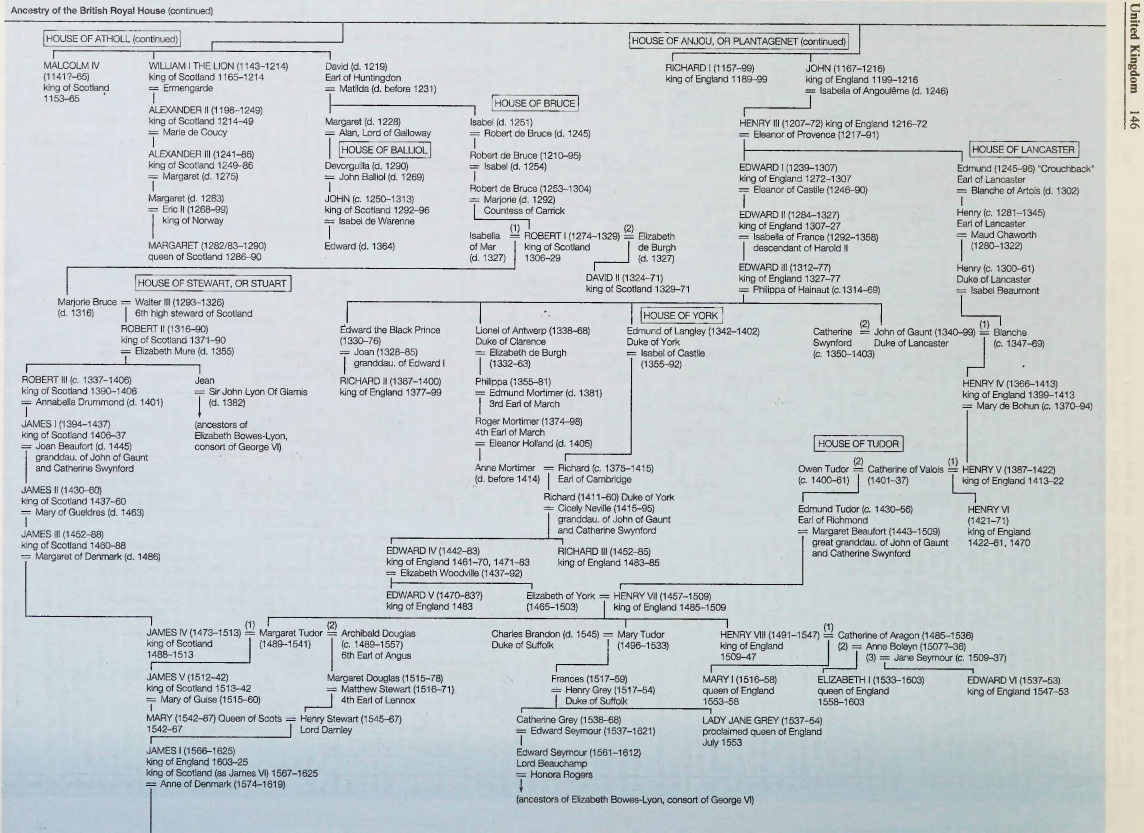
The United Kingdom entered World War II in 1939 and battled German and Japanese forces in Europe, Africa, and Asia. Following the war the Irish Free State became the republic of Ireland and left the Commonwealth. India also gained independence from the United Kingdom after the war. Throughout the postwar period and into the 1970s, the United Kingdom continued to grant independence to its overseas colonies and dependencies. The status of Northern Ireland became controversial as British troops were brought in to maintain order from the 1970s on. Violence and terrorist acts occurred between Roman Catholics seeking union with the republic of Ireland and Protestants wishing to remain part of the United Kingdom, but a peace accord in 1998 brought hope of an end to the conflict.

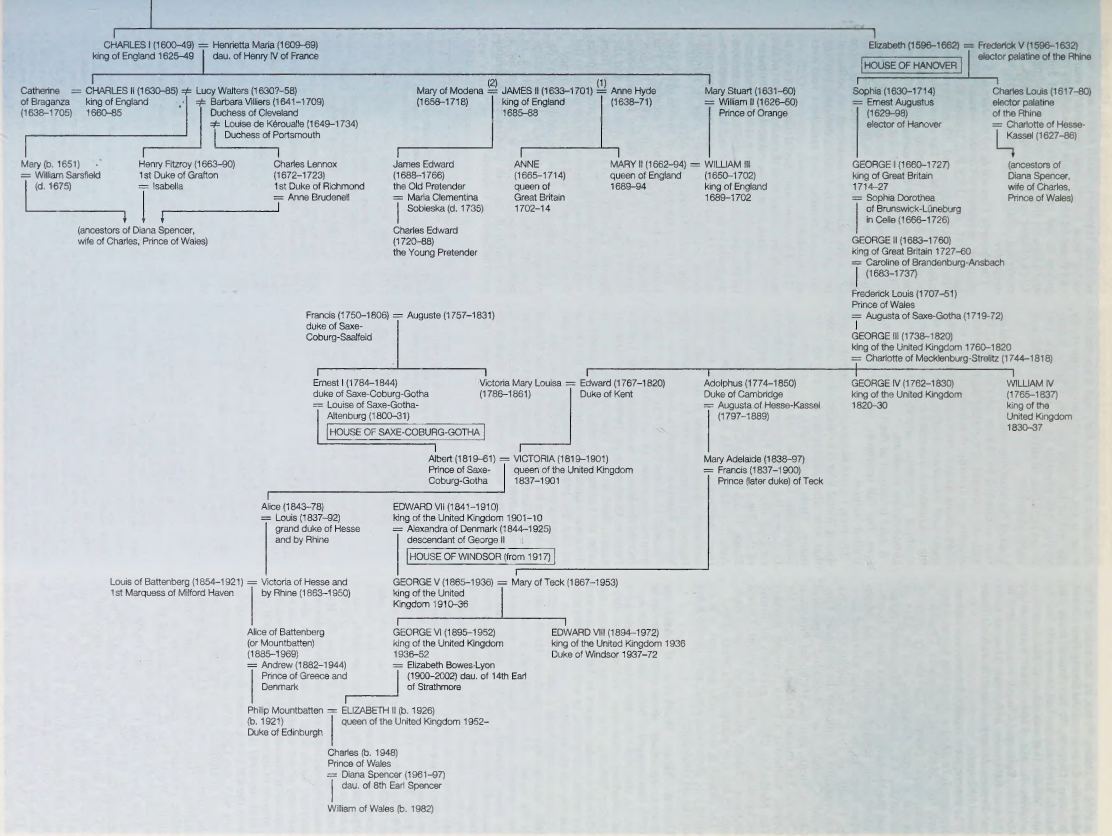
Domestically, during the 20th century, the United Kingdom underwent a quiet revolution with the advent of the Labour Party and the creation of a welfare state. The first Labour ministry was established in 1924 under Ramsay MacDonald, and in the 1945 elections, the party, espousing a socialist platform, won an overwhelming majority in Parliament and at once embarked on a nationalization program. The state acquired the Bank of England, the coal mines, all inland mass transport, aviation, gas, and electricity. It put through a "cradle-to-grave" social-insurance plan and set up a National Health Service to provide free medical care. Subsequent Conservative governments denationalized some sectors, but the basic welfare state remained. In 1973 Britain joined the European Economic Community (now part of the European Union). Conservative prime minister Margaret Thatcher sponsored major changes during the 1980s that favoured private enterprise and discouraged governmental involvement in the economy. At the turn of the 21st century, Tony Blair's Labour government introduced constitutional reforms including the establishment of regional governments in Northern Ireland, Scotland, and Wales.

United Methodist Church, in the United States, a major Protestant church formed


= marriage
≠ liaison
dau. daughter
HOUSE OF WESSEX, OR CERDIC
EGBERT (d. 839) king of Wessex 802–825 = Raedburh
(descendant of Cerdic [d. 534] 1st king of Wessex)
AETHELWULF (d. 858) = Osburh (d. c. 853) king of Wessex 839–856 dau. of ealdorman Oslac
AETHELBALD (d. 860) king of Wessex 855/856–860
AETHELBERHT (d. 865/866) king of Wessex 860–865/866
AETHELRED I (d. 871) king of Wessex 865/866–871
ALFRED THE GREAT (849–899) king of Wessex 871–899 = Ealhswith
EDWARD THE ELDER (d. 924) king of Wessex 899–924 (1) = Ecgwyn (2) = Aelflaed (3) = Eadgifu
Aelfthryth = Baldwin II (d. 918) count of Flanders
(ancestors of Matilda, wife of William I [see below right])
ATHELSTAN (d. 939) king of England 924–939
EDMUND I (921–946) = Aelfgifu (d. 944)
EADRED (d. 955) king of England 946–955
EADWIG (d. 959) king of England 955–959
EDGAR (943/944–975) king of England 957–975 (1) = Aethelflaed (2) = Aelfthryth
EDWARD THE MARTYR (c. 963–978) king of England 975–978
ETHELRED II THE UNREADY (968?–1016) king of England 978–1013, 1014–16 (1) = Aelfgifu (2) = Emma, dau. of Richard I, duke of Normandy (see right)
EDMUND II IRONSIDE (c. 993–1016) king of England 1016 = Ealdgyth
EDWARD THE CONFESSOR = Edith (c. 1003–66) king of England 1042–66
Gytha (descendant of Harald I of Denmark) = Godwine (d. 1053) Earl of Wessex (alleged descendant of Aethelred I)
HAROLD II (c. 1020–66) king of England 1066
HOUSE OF ATHOLL
DUNCAN I (d. 1040) = Sybil king of Scotland 1034–40
Edward the Aetheling = Agatha (d. 1057)
DONALD BANE (c. 1033–after 1097) king of Scotland 1093–94, 1094–97
Ingibiorg (1) MALCOLM III (c. 1031–93) king of Scotland 1058–93 (2) Margaret (d. 1093)
Edgar the Aetheling (d. c. 1125)
DUNCAN II (d. 1094) king of Scotland 1094
EDGAR (c. 1075–1107) king of Scotland 1098–1107
ALEXANDER I (c. 1080–1124) king of Scotland 1107–24
DAVID I (c. 1082–1153) king of Scotland 1124–53 = Matilda (d. 1131)
Henry (d. 1152) = Ada de Warenne Earl of Huntingdon (d. 1178)
HOUSE OF DENMARK
Harald I (c. 910–c. 985) king of Denmark = ?
SWEYN (d. 1014) = Gunhild king of England 1013–14 king of Denmark
Aelfgifu of Northampton (1) CANUTE (d. 1035) = (2) Emma widow of Ethelred II (see left) king of England 1016–35 king of Denmark
HAROLD I HAREFOOT (d. 1040) king of England 1035–40
HARDECANUTE (c. 1019–42) king of England 1040–42 king of Denmark
HOUSE OF NORMANDY
Rollo (c. 860–c. 932) 1st duke of Normandy ≠ Poppa
William I Longsword (d. 942) duke of Normandy = Sprota
Richard I (c. 932–996) duke of Normandy = Gunnor
Richard II (d. 1026/27) duke of Normandy = Judith of Brittany
Richard III (d. 1027) duke of Normandy
Robert I (d. 1035) duke of Normandy ≠ Herleva
WILLIAM I THE CONQUEROR (c. 1028–87) = Matilda (d. 1083) king of England 1066–87 duke of Normandy (as William II) dau. of Baldwin V, count of Flanders (descendant of Alfred the Great)
WILLIAM II (c. 1056–1100) king of England 1087–1100
HENRY I (1068–1135) = Matilda (d. 1118) king of England 1100–35 dau. of Malcolm III of Scotland
HOUSE OF BLOIS
Adela (d. 1137) = Stephen (d. 1102) count of Blois
STEPHEN (c. 1097–1154) king of England 1135–54
HOUSE OF ANJOU, OR PLANTAGENET
Henry V (1086–1125) Holy Roman emperor
(1) Matilda (1102–68) Lady of the English (never crowned) = (2) Geoffrey IV Plantagenet (1113–51) count of Anjou
HENRY II (1133–89) = Eleanor of Aquitaine (c. 1122–1204) king of England 1154–89

Ancestry of the British Royal House (continued)




CHARLES I (1600–49) = Henrietta Maria (1609–69)
king of England 1625–49 | dau. of Henry IV of France
Elizabeth (1596–1662) = Frederick V (1596–1632)
elector palatine of the Rhine
HOUSE OF HANOVER
Catherine of Braganza (1638–1705)
CHARLES II (1630–85) = Lucy Walters (1630?–58)
king of England 1660–85 = Barbara Villiers (1641–1709) Duchess of Cleveland
= Louise de Kéroualle (1649–1734) Duchess of Portsmouth
Mary of Modena (1658–1718)
(2) JAMES II (1633–1701) = (1) Anne Hyde (1638–71)
king of England 1685–88
Mary Stuart (1631–60) = William II (1626–50) Prince of Orange
Sophia (1630–1714) = Ernest Augustus (1629–98) elector of Hanover
Charles Louis (1617–80) elector palatine of the Rhine = Charlotte of Hesse-Kassel (1627–86)
Mary (b. 1651) = William Sarsfield (d. 1675)
Henry Fitzroy (1663–90) 1st Duke of Grafton = Isabella
Charles Lennox (1672–1723) 1st Duke of Richmond = Anne Brudenell
James Edward (1688–1766) the Old Pretender = Maria Clementina Sobieska (d. 1735)
ANNE (1665–1714) queen of Great Britain 1702–14
MARY II (1662–94) = WILLIAM III (1650–1702) king of England 1689–1702
GEORGE I (1660–1727) king of Great Britain 1714–27 = Sophia Dorothea of Brunswick-Lüneburg in Celle (1666–1726)
(ancestors of Diana Spencer, wife of Charles, Prince of Wales)
(ancestors of Diana Spencer, wife of Charles, Prince of Wales)
Charles Edward (1720–88) the Young Pretender
GEORGE II (1683–1760) king of Great Britain 1727–60 = Caroline of Brandenburg-Ansbach (1683–1737)
Frederick Louis (1707–51) Prince of Wales = Augusta of Saxe-Gotha (1719–72)
GEORGE III (1738–1820) king of the United Kingdom 1760–1820 = Charlotte of Mecklenburg-Strelitz (1744–1818)
Francis (1750–1806) = Auguste (1757–1831) duke of Saxe-Coburg-Saalfeld
Ernest I (1784–1844) duke of Saxe-Coburg-Gotha = Louise of Saxe-Gotha-Altenburg (1800–31)
Victoria Mary Louisa (1786–1861)
Edward (1767–1820) Duke of Kent
Adolphus (1774–1850) Duke of Cambridge = Augusta of Hesse-Kassel (1797–1889)
GEORGE IV (1762–1830) king of the United Kingdom 1820–30
WILLIAM IV (1765–1837) king of the United Kingdom 1830–37
HOUSE OF SAXE-COBURG-GOTHA
Albert (1819–61) = VICTORIA (1819–1901) queen of the United Kingdom 1837–1901
Prince of Saxe-Coburg-Gotha
Mary Adelaide (1838–97) = Francis (1837–1900) Prince (later duke) of Teck
Alice (1843–78) = Louis (1837–92) grand duke of Hesse and by Rhine
EDWARD VII (1841–1910) king of the United Kingdom 1901–10 = Alexandra of Denmark (1844–1925) descendant of George II
HOUSE OF WINDSOR (from 1917)
Louis of Battenberg (1854–1921) = Victoria of Hesse and by Rhine (1863–1950)
1st Marquess of Milford Haven
GEORGE V (1865–1936) = Mary of Teck (1867–1953) king of the United Kingdom 1910–36
Alice of Battenberg (or Mountbatten) (1885–1969) = Andrew (1882–1944) Prince of Greece and Denmark
GEORGE VI (1895–1952) king of the United Kingdom 1936–52 = Elizabeth Bowes-Lyon (1900–2002) dau. of 14th Earl of Strathmore
EDWARD VIII (1894–1972) king of the United Kingdom 1936 Duke of Windsor 1937–72
Philip Mountbatten (b. 1921) Duke of Edinburgh = ELIZABETH II (b. 1926) queen of the United Kingdom 1952–
Charles (b. 1948) Prince of Wales = Diana Spencer (1961–97) dau. of 8th Earl Spencer
William of Wales (b. 1982)

in 1968 in Dallas, Texas, by the union of The Methodist Church and the Evangelical United Brethren Church. It developed from the British Methodist revival movement led by John Wesley that was taken to the American colonies in the 1760s. The autonomous Methodist Episcopal Church was organized in 1784 in Baltimore, Md., with Thomas Coke and Francis Asbury as superintendents (later called bishops).

The church grew rapidly, but various schisms developed. In 1830 a dissenting group organized the Methodist Protestant Church, a nonepiscopal church. The slavery question caused a larger disruption, and in 1845 in Louisville, Ky., southern Methodists organized the Methodist Episcopal Church, South.

Movements toward reunion of the Methodists began in the 1870s but advanced slowly. Finally, in 1939, The Methodist Church was organized by union of the Methodist Episcopal Church; the Methodist Episcopal Church, South; and the Methodist Protestant Church. The merger in 1968 that formed the United Methodist Church brought together The Methodist Church, primarily of British background, and the Evangelical United Brethren Church, primarily of German background but very similar to the Methodists.

The church is episcopally governed. It is divided into geographic areas, each of which has an annual conference.

United Mine Workers of America (UMWA), American labour union, founded in 1890, that engaged in bitter, though often successful, disputes with coal mine operators for safe working conditions, fair pay, and other worker benefits. An industrial union, the UMWA includes miners in bituminous and anthracite coal mines, as well as workers outside the mining industry.

After a successful coal miners' strike in 1897, John Mitchell became president (1898–1908) of the union and led it through a period of rapid growth, despite determined opposition by mine operators. Workers staged another successful strike in 1902. By 1920 the UMWA had gained about 500,000 members. Later in the decade the union lost members, strength, and influence because of the era's antiunion climate and the emergence of newer, unorganized coalfields in West Virginia and Kentucky.

From 1920 to 1960 the UMWA was led by John L. Lewis, a persuasive labour organizer. In 1933 Lewis took advantage of the prolabour sentiment created by the New Deal by organizing the Appalachian coalfields. As a consequence of his success, the UMWA formed the backbone of Franklin D. Roosevelt's labour support in the 1936 presidential election. Lewis and the union were also a mainstay of the Committee for Industrial Organization (founded in 1935 and renamed the Congress of Industrial Organizations [CIO] in 1938). In 1942 Lewis withdrew the miners from the CIO, and, except for a brief reaffiliation with the CIO (1946–47), the union remained unaffiliated until 1989, when it joined the American Federation of Labor-Congress of Industrial Organizations. The union earned public criticism for calling a strike in 1943, during World War II. The action led to the government's seizure of the mines.

After Lewis retired in 1960, the UMWA experienced unstable and erratic leadership through the early 1980s. One president, W.A. ("Tony") Boyle (1963–72), was convicted of conspiracy in the 1969 murder of the insurgent union leader Joseph Yablonski and his wife and daughter. Richard Trumka restored a degree of order and democracy to the UMWA upon his election to the presidency in 1982.

The UMWA's efforts through the first half of the 20th century made American miners among the best-paid and best-insured in the world. The union subsequently lost influence as a result of automation, the development of alternative sources of fuel, and a general decline in the American labour movement. By the end of the 20th century, UMWA membership had dropped to about 130,000. The union continues to advocate for the health and safety of miners.

United Nations (UN), international organization established by charter on Oct. 24, 1945, with the purposes of maintaining international peace and security, developing friendly relations among nations on the principle of equal rights and self-determination, and encouraging international cooperation in solving international economic, social, cultural, and humanitarian problems.

A brief treatment of the United Nations follows. For full treatment, *see* MACROPAEDIA: United Nations.

The term United Nations was originally used during World War II to denote those countries that were allied against the Axis powers (Germany, Japan, and Italy). A conference at Dumbarton Oaks, an estate in Washington, D.C., was the earliest attempt to permanently establish this United Nations. Representatives of the "Big Four" (United Kingdom, United States, U.S.S.R., and China) met there from Aug. 21 to Oct. 7, 1944, to draft some preliminary proposals, which were later discussed and more clearly outlined at the Yalta Conference in February 1945 by the Allied war leaders Winston Churchill, Joseph Stalin, and Franklin D. Roosevelt. The proposals, supplemented by these three leaders' decisions, formed the basis of negotiations at the United Nations Conference on International Organization, held in San Francisco two months later; the resultant Charter of the United Nations was signed in June and came into force on Oct. 24, 1945. The United Nations' headquarters is now located in New York City.

There are six principal organs of the United Nations. The General Assembly (*q.v.*) includes representatives of all members of the UN. Each has one vote. Decisions are reached either by majority or by two-thirds vote, depending upon the subject matter. The General Assembly works through the committee system and receives reports from the various councils. It performs such functions as supervising trust agreements, budgetary matters, and financial assessments. The assembly elects judges to the International Court of Justice and plays an important role in amending the UN's charter and proposing conferences. It is convened yearly or by special session when necessary.

The Security Council (*q.v.*) consists of 5 permanent members—United States, Russia (until 1991, the U.S.S.R.), United Kingdom, France, and China—and 10 nonpermanent members (6 until 1965). The council functions continuously and is mainly concerned with the maintenance of international security. The presidency is rotated among members each month. Nonpermanent members are chosen from groups and regions in the most equitable fashion possible. Nine votes (including those of all five permanent members) are sufficient to carry a Security Council decision, but any permanent member may exercise a veto over any substantive proposal.

The Economic and Social Council (*q.v.*) is mainly concerned with the management of the UN's social, economic, cultural, and humanitarian activities. Convening at least twice yearly, this council conducts studies and proposes suggestions for economic and social improvements. The council oversees many commissions, including four major ones in Europe, Asia, Latin America, and Africa.

The International Court of Justice (*q.v.*), also known as the World Court, is located in The Hague. It is the UN's main judicial branch, consisting of 15 judges elected for nine-year terms by both the General Assembly and the Security Council. Each judge must come from a different country. The court settles disputes and hands down decisions and opinions to the General Assembly and the Security Council.

The Secretariat (*q.v.*) is the administrative department of the UN, headed by the secretary-general, who functions in a position of political importance and is appointed for a five-year term by both the General Assembly and the Security Council.

United Nations membership

1945	Argentina, Australia, Belgium, Bolivia, Brazil, Belarus (Belorussia), Canada, Chile, China, Colombia, Costa Rica, Cuba, Czechoslovakia, Denmark, Dominican Republic, Ecuador, Egypt, El Salvador, Ethiopia, France, Greece, Guatemala, Haiti, Honduras, India, Iran, Iraq, Lebanon, Liberia, Luxembourg, Mexico, The Netherlands, New Zealand, Nicaragua, Norway, Panama, Paraguay, Peru, Philippines, Poland, Russia (U.S.S.R.)*, Saudi Arabia, South Africa, Syria, Turkey, Ukraine, United Kingdom, United States, Uruguay, Venezuela, Yugoslavia†
1946	Afghanistan, Iceland, Sweden, Thailand
1947	Pakistan, Yemen‡
1948	Myanmar (Burma)
1949	Israel
1950	Indonesia
1955	Albania, Austria, Bulgaria, Finland, Hungary, Ireland, Italy, Jordan, Cambodia, Laos, Libya, Nepal, Portugal, Romania, Spain, Sri Lanka (Ceylon)
1956	Japan, Morocco, The Sudan, Tunisia
1957	Ghana, Malaysia
1958	Guinea
1960	Benin (Dahomey), Burkina Faso (Upper Volta), Cameroon, Central African Republic, Chad, Congo (capital at Brazzaville), Congo (Zaire; capital at Kinshasa), Côte d'Ivoire (Ivory Coast), Cyprus, Gabon, Madagascar, Mali, Niger, Nigeria, Senegal, Somalia, Togo
1961	Mauritania, Mongolia, Sierra Leone, Tanzania§
1962	Algeria, Burundi, Jamaica, Rwanda, Trinidad and Tobago, Uganda
1963	Kenya, Kuwait
1964	Malawi, Malta, Zambia
1965	The Gambia, Maldives, Singapore
1966	Barbados, Botswana, Guyana, Lesotho
1968	Equatorial Guinea, Mauritius, Swaziland
1970	Fiji
1971	Bahrain, Bhutan, Oman, Qatar, United Arab Emirates
1973	The Bahamas, Germany‖
1974	Bangladesh, Grenada, Guinea-Bissau
1975	Cape Verde, Comoros, Mozambique, Papua New Guinea, São Tomé and Principe, Suriname
1976	Angola, Samoa, Seychelles
1977	Djibouti, Vietnam
1978	Dominica, Solomon Islands
1979	Saint Lucia
1980	Saint Vincent and the Grenadines, Zimbabwe
1981	Antigua and Barbuda, Belize, Vanuatu
1983	Saint Kitts and Nevis
1984	Brunei
1990	Liechtenstein, Namibia
1991	Estonia, Latvia, Lithuania, Marshall Islands, Micronesia, North Korea, South Korea
1992	Armenia, Azerbaijan, Bosnia and Herzegovina, Croatia, Georgia, Kazakhstan, Kyrgyzstan, Moldova, San Marino, Slovenia, Tajikistan, Turkmenistan, Uzbekistan
1993	Andorra, Czech Republic#, Eritrea, Macedonia, Monaco, Slovakia#
1994	Palau
1999	Kiribati, Nauru, Tonga
2000	Tuvalu
2002	East Timor (Timor-Leste), Switzerland

*The seat held by the U.S.S.R. was assumed by Russia in 1991. †The Socialist Federal Republic of Yugoslavia was a member from 1945 until its dissolution following the establishment and admission of the new member states of Bosnia and Herzegovina, Croatia, Slovenia (1992), Macedonia (1993), and the Federal Republic of Yugoslavia (2000), the last reconstituted as Serbia and Montenegro in 2003. ‡North Yemen (capital at San'a') merged in 1990 with South Yemen (capital at Aden). Upon unification, there was one membership. §Tanganyika merged in 1964 with Zanzibar. The country's name after merger became Tanzania, with a single UN membership. ‖East Germany and West Germany were admitted as separate members in 1973. Upon unification of the two countries in 1990, there was one membership. #Czechoslovakia, a member from 1945, split into two countries, the Czech Republic and Slovakia, in 1993.

The United Nations attempts to promote harmonious interaction among the countries of the world. The UN has sometimes used peacekeeping forces to halt fighting in or between various countries. (The UN peacekeeping forces were awarded the Nobel Peace Prize in 1988.) Other programs and agencies under the UN's supervision include the International Bank for Reconstruction and Development (World Bank); International Monetary Fund (IMF); International Labour Organisation (ILO; recipient of the 1969 Nobel Peace Prize); Food and Agriculture Organization (FAO); World Health Organization (WHO); United Nations Educational, Scientific and Cultural Organization (UNESCO); and United Nations Children's Fund (UNICEF; recipient of the 1965 Nobel Peace Prize).

Secretaries-general of the United Nations

name	country of origin	period of service
Trygve Lie	Norway	Feb. 1, 1946–April 10, 1953
Dag Hammarskjöld	Sweden	April 10, 1953–Sept. 18, 1961
U Thant*	Myanmar (Burma)	Nov. 30, 1962–Dec. 31, 1971
Kurt Waldheim	Austria	Jan. 1, 1972–Dec. 31, 1981
Javier Pérez de Cuellar	Peru	Jan. 1, 1982–Dec. 31, 1991
Boutros Boutros-Ghali	Egypt	Jan. 1, 1992–Dec. 31, 1996
Kofi Annan	Ghana	Jan. 1, 1997–

*Acting secretary-general from Nov. 3, 1961.

United Nations Children's Fund (UNICEF), formerly (1946–53) UNITED NATIONS INTERNATIONAL CHILDREN'S EMERGENCY FUND, special UN program devoted to aiding national efforts to improve the health, nutrition, education, and general welfare of children. UNICEF was created in 1946 to provide relief to children in countries devastated by World War II. After 1950 the fund directed its efforts toward general programs for the improvement of children's welfare, particularly in less-developed countries and in various emergency situations. The organization's broader mission was reflected in the name it adopted in 1953, the United Nations Children's Fund. UNICEF was awarded the Nobel Prize for Peace in 1965. It is headquartered in New York City.

UNICEF supports immunization programs for childhood diseases and programs to prevent the spread of HIV/AIDS; it also provides funding for health services, educational facilities, and other welfare services. Since 1996 UNICEF has been guided by the Convention on the Rights of the Child (1989), which affirms the right of all children to "the enjoyment of the highest attainable standard of health and to facilities for the treatment of illness and rehabilitation of health." UNICEF's activities are financed by government and private contributions.

United Nations Conference on Environment and Development (UNCED), byname EARTH SUMMIT, conference held at Rio de Janeiro, Braz. (June 3–14, 1992), to reconcile worldwide economic development with protection of the environment. The Earth Summit was the largest gathering of world leaders in history, with 117 heads of state and representatives of 178 nations in attendance. By means of treaties and other documents signed at the conference, most of the world's nations nominally committed themselves to the pursuit of economic development in ways that would protect the Earth's environment and nonrenewable resources.

The Earth Summit was hampered by disputes between the wealthy industrialized nations of the North (*i.e.*, western Europe and North America) and the poorer developing countries of the South (*i.e.*, Africa, Latin America, the Middle East, and parts of Asia). In general, the countries of the South were reluctant to adopt the environmental policies urged upon them by the North, believing that they would impede economic growth, unless the North would agree to appropriate increase in financial assistance.

United Nations Conference on Trade and Development (UNCTAD), permanent organ of the UN General Assembly, established in 1964 to promote trade, investment, and development in developing countries. UNCTAD is headquartered in Geneva, Switz.

Negotiations at UNCTAD's meetings resulted in the Global System of Trade Preferences (1988), an agreement that reduced tariffs and removed or reduced nontariff trade barriers among developing countries; the Common Fund for Commodities (1989), an intergovernmental financial institution that provides assistance to developing countries that are heavily dependent on commodity exports; and various agreements for debt relief. In the 1990s attention was focused on measures to help the poorest and least developed countries become integrated into the world economy.

UNCTAD's highest policy-making body is the Conference, which meets every four years to set policy guidelines. The UNCTAD Secretariat, whose members form part of the UN Secretariat, performs policy analysis, monitors and implements the decisions of UNCTAD's intergovernmental bodies, and provides for technical cooperation and exchanges of information. It comprises four divisions—on globalization and development strategies; international trade; investment, technology, and enterprise development; and services infrastructure—as well as the Office of the Special Co-ordinator for Least Developed, Land-locked, and Island Developing Countries. The Trade and Development Board, UNCTAD's executive body, functions when the Conference is not in session.

United Nations Development Programme (UNDP), UN organization formed in 1965 to help countries eliminate poverty and achieve sustainable human development, an approach to economic growth that emphasizes improving the quality of life of all citizens while conserving the environment and natural resources for future generations. Headquartered in New York City, the UNDP is the largest UN development assistance program.

The UNDP administers aid through five-year Country Programmes, which fund projects aimed at attracting investment capital, training skilled employees, and implementing modern technologies. The UNDP also makes experts available to help developing countries increase their capacity for good governance—by building political and legal institutions that are equitable, responsive, and open to public participation—and to expand the private sector of their economies in order to provide more jobs. UNDP resident representatives in more than 125 developing countries help to coordinate the local activities of other UN agencies and programs, as well as those of nongovernmental organizations.

United Nations Disaster Relief Co-ordinator, Office of the (UNDRO), UN office established in 1972 to coordinate international relief activities. It is headed by a disaster relief coordinator who reports directly to the UN secretary-general and works closely with the United Nations Development Programme (UNDP). Responding to requests from stricken states for disaster assistance, UNDRO not only directs UN assistance but also mobilizes aid from nongovernmental organizations such as the International Red Cross. Beginning in the 1980s UNDRO placed greater emphasis on disaster preparedness and prevention and on implementing UNDP-assisted projects.

United Nations Educational, Scientific and Cultural Organization (UNESCO), UN specialized agency created in 1946 to promote collaboration in education, science, and culture. It is headquartered in Paris.

UNESCO initially emphasized rebuilding the schools, libraries, and museums destroyed in Europe during World War II. Since then its activities have been mainly facilitative, aimed at assisting, supporting, and complementing national efforts to eliminate illiteracy and to extend free education. UNESCO also organizes conferences in order to encourage the free exchange of ideas and knowledge.

As many less-developed countries joined the UN beginning in the 1950s, UNESCO began to devote more resources to their problems. During the 1980s UNESCO was criticized by the United States and other countries for its alleged anti-Western approach to cultural issues and for the sustained expansion of its budget. These issues prompted the United States to withdraw in 1984; the United Kingdom and Singapore withdrew the following year. The United Kingdom rejoined UNESCO in 1997, and the United States followed suit in 2003.

Besides its support of educational and science programs, UNESCO is involved in efforts to protect the natural environment and humanity's common cultural heritage. For example, in the 1960s UNESCO helped sponsor efforts to save ancient Egyptian monuments from the waters of the Aswān High Dam, and in 1972 it sponsored an international agreement to establish a World Heritage List of cultural sites and natural areas that would enjoy government protection. In the 1980s a controversial UNESCO study proposed a New World Information and Communication Order that would treat communication and freedom of information as basic human rights and seek to eliminate the gap in communications capabilities between developing and developed countries.

Each member has one vote in UNESCO's General Conference, which meets every two years to set the agency's budget, its program of activities, and the level of contributions made by member states. The 58-member Executive Board, which is elected by the General Conference, generally meets twice each year to give advice and direction to the agency's work. National commissions, composed of local experts, have been set up by about 180 UNESCO members and serve as governmental advisory bodies in their respective states.

United Nations High Commissioner for Refugees, Office of the (UNHCR), organization established as the successor to the International Refugee Organization (IRO; 1946–52) by the UN General Assembly in 1951 to provide legal and political protection for refugees until they could acquire nationality in new countries of residence. International refugee assistance was first provided by the League of Nations in 1921. In 1943 the United Nations Relief and Rehabilitation Administration, which was succeeded by the IRO in 1946, was established to assist those who were displaced by World War II. A humanitarian and nonpolitical organization, the UNHCR was awarded the Nobel Prize for Peace in 1954 and 1981.

With its headquarters in Geneva, Switz., the UNHCR cooperates with various national

governments in order to ensure such minimal rights as freedom from arbitrary expulsion, access to the courts, work and educational opportunities, and possession of identity and travel documents. The UNHCR initially focused its efforts on aiding the more than one million refugees and displaced persons in Europe after World War II. Since then the UNHCR's efforts have shifted to resettling refugees from war, political turmoil, or natural disasters in Africa and parts of Asia and Latin America. It also works with other UN agencies—including the World Food Programme and the World Health Organization—nongovernmental organizations, and regional organizations to provide housing, food, and material assistance and aid in repatriation and resettlement. The High Commissioner, who reports annually to the General Assembly through the Economic and Social Council, has become a key public figure in efforts to rally international support for refugee programs.

United Nations Monetary and Financial Conference: *see* Bretton Woods Conference.

United Nations Peacekeeping Forces, international armed forces first used in 1948 to observe cease-fires in Kashmir and Palestine. Although not specifically mentioned in the UN Charter, the use of international forces as a buffer between warring parties pending troop withdrawals and negotiations—a practice that became known as peacekeeping—was formalized in 1956 during the Suez Crisis between Egypt, Israel, France, and the United Kingdom. Although peacekeeping missions have taken many forms, they have in common the fact that they are designed to be peaceful, that they involve troops from several countries, and that the troops serve under the authority of the UN Security Council. The UN Peacekeeping Forces were awarded the 1988 Nobel Prize for Peace.

During the Cold War, so-called first-generation, or "classic," UN peacekeeping was used in conflicts in the Middle East and Africa and in conflicts stemming from decolonization in Asia. Between 1948 and 1988 the UN undertook 13 peacekeeping missions involving generally lightly armed troops from neutral countries other than the five permanent members of the Security Council. Troops in these missions were allowed to use force only in self-defense. The missions were given and enjoyed the consent of the parties to the conflict and the support of the Security Council and the troop-contributing countries.

After the Cold War, the challenges of peacekeeping became more complex. Developed as a response to crises in which internal order has broken down and in which the civilian population is suffering, second-generation peacekeeping involves soldiers, civilian experts, and relief specialists working to achieve multiple political and social objectives. Because these goals are often difficult to define, controversy has accompanied the use of peacekeeping troops in this fashion. For example, missions in Cambodia (1991–1995), the former Yugoslavia (1992–1993), Somalia (1992–1995), and elsewhere included troops from the permanent members of the Security Council and employed force for reasons other than self-defense, sometimes jeopardizing UN neutrality. Between 1988 and 2000 more than 30 peacekeeping efforts were authorized, and at their peak in 1993 more than 80,000 peacekeeping troops representing 77 countries were deployed on peacekeeping missions.

In the 1990s, UN Secretary-General Boutros Boutros-Ghali argued that peacekeeping was an important instrument for restoring peace to troubled areas and for reducing the likelihood of long-term conflicts. Since then, however, peacekeeping missions have been confronted with serious logistical and financial difficulties. As more missions were undertaken, the costs and controversies associated with peacekeeping multiplied dramatically. Although the UN reimburses countries for equipment, these payments have been limited because of the failure of many countries to pay their UN dues. (K.A.Mi.)

United Nations Population Fund (UNFPA), formerly (1969–87) known as UNITED NATIONS FUND FOR POPULATION ACTIVITIES, trust fund under the jurisdiction of the United Nations Development Programme. Established in 1969, the UNFPA is the largest international source of assistance for population programs and the leading UN organization for the implementation of the 1994 Programme of Action of the International Conference on Population and Development. It funds assistance, research, and advocacy programs in three major areas: (1) reproductive health, including family planning and the prevention and treatment of sexually transmitted diseases, (2) population problems and possible strategies for addressing them, and (3) issues related to the status of women, including the gender gap in education. UNFPA programs are undertaken only in response to government requests.

United Nations Relief and Works Agency for Palestine Refugees in the Near East (UNRWA), subsidiary agency created by the UN General Assembly in 1949 to provide relief, health, and education services for Palestinians who lost both their homes and means of livelihood during the Arab-Israeli wars following the establishment of the state of Israel in 1948. Beginning operations in 1950, UNRWA was originally headquartered in Beirut, Leb., but was moved to Vienna in 1978. In 1996 the General Assembly moved the agency to the Gaza Strip to demonstrate its commitment to the Arab-Israeli peace process. UNRWA's members are Belgium, Egypt, France, Japan, Jordan, Lebanon, Syria, Turkey, the United Kingdom, and the United States; the Palestine Liberation Organization has observer status.

Approximately 500,000 Palestinians initially qualified for relief, but by the end of the 20th century there were nearly four million registered Palestinian refugees. As the largest UN operation in the Middle East and one of the biggest employers in the region—with service operations in Jordan, Lebanon, Syria, the West Bank, and the Gaza Strip—UNRWA provides camps, food, clothing, schools, vocational training, and health clinics, often working in cooperation with the World Health Organization, the United Nations Children's Fund, the United Nations Population Fund, and the United Nations Educational, Scientific and Cultural Organization.

UNRWA is financed by voluntary contributions of member governments. Like its predecessor organization, the UN Relief for Palestine Refugees in the Near East, it was originally designed as a temporary agency, though its mandate has been continuously renewed by the General Assembly. Its chief officer, the commissioner-general—the only leader of a UN agency to report directly to the General Assembly—is appointed by the UN secretary-general with the approval of an Advisory Commission.

United Pentecostal Church, Inc., Protestant denomination organized in St. Louis, Mo., U.S., in 1945 by merger of the Pentecostal Assemblies of Jesus Christ and the Pentecostal Church, Inc. The largest of the Jesus Only groups (a movement for which the sacrament of baptism is given in the name of Jesus only, rather than in the name of the Trinity), it emphasizes justification and baptism of the Holy Spirit (demonstrated by speaking in tongues) and practices foot washing, healing, and conscientious objection. It has a rigid code of behaviour and dress. *See* Pentecostalism.

United Presbyterian Church, denomination that flourished in Scotland from 1847 to 1900. It was formed through the union of the United Secession Church and the Relief Church, which had developed from groups that left the Church of Scotland in the 18th century. The United Presbyterian Church, the Church of Scotland, and the Free Church of Scotland each claimed to represent the standest tradition of Scottish Presbyterianism. While the three were barely distinguishable in doctrine, polity, and worship, the United Presbyterian Church was marked by a special zeal for foreign missions and by its constant opposition to all state aid to the church, holding that this led inevitably to state control. Intermittent negotiations, renewed in 1897, resulted in the formation of the United Free Church of Scotland in 1900, which reunited with the Church of Scotland in 1929.

United Press International (UPI), American-based news agency, one of the largest proprietary news wire services in the world. It was created in 1958 upon the merger of the United Press (UP; 1907) with the International News Service (INS). UPI and its precursor agencies pioneered in some key areas of news coverage, including the wired transmission of news photographs in 1925.

By the late 20th century, UPI served newspaper and telecommunications clients in the United States and other countries, transmitting in many languages over radio and leased wire facilities. From 1982, UPI underwent a series of changes of ownership.

United Provinces of Central America. Spanish PROVINCIAS UNIDAS DE CENTROAMÉRICA (1823–40), union of what are now the states of Guatemala, Honduras, El Salvador, Costa Rica, and Nicaragua.

Since the 1520s these regions, along with the Mexican state of Chiapas, had composed the captaincy general of Guatemala, part of the viceroyalty of New Spain (Mexico). In 1821 they became independent from Spain, and in 1822 they were joined to the ephemeral empire of Mexico, ruled by Agustín de Iturbide. Following Iturbide's abdication in March 1823, delegates from the Central American provinces, representing mostly upper-class creoles, assembled at Guatemala City in July to declare themselves completely independent and to form a federal republic—the United Provinces of Central America. They drew up a constitution that provided for a federal capital in Guatemala City and a president for each of the five constituent states, which were to enjoy complete local autonomy; suffrage was restricted to the upper classes, slavery was abolished, and the privileges of the Roman Catholic church were maintained. Manuel José Arce was elected first president in 1825.

Liberal-Conservative dissensions developed and soon erupted into civil war; the Liberals gained control in 1830, when Francisco Morazán was elected president. His administration quickly disestablished the church and passed a series of anticlerical laws; other measures were enacted to promote trade and industry. In 1834 Morazán moved the capital of the foundering federation from Guatemala City, a Conservative stronghold, to San Salvador.

After an outbreak of cholera in 1837, which the clergy blamed on the "godless" Liberals, the Conservatives incited an Indian revolt. A mestizo rebel leader, Rafael Carrera, seized Guatemala City in 1838, whereupon most of the member states went their own ways. By April 1839, only El Salvador remained loyal. Morazán, after a disastrous defeat at the hands of Carrera in March 1840, resigned his office.

About 25 abortive attempts were made to restore the union. In the 19th century the Guatemalan government tried many times

to gain hegemony over the other Central American states by force. Carrera, who controlled the Guatemalan government until his death in 1865, interfered frequently in El Salvador, Honduras, and Nicaragua by installing conservative regimes. Justo Rufino Barrios, Guatemalan president from 1873 to 1885, urged in 1882 that the old federation be revived; in 1885 he declared himself its ruler and marched his army into El Salvador, where he was defeated and killed at the Battle of Chalchuapa (April 2).

United Provinces of the Netherlands: *see* Dutch Republic.

United Service Organizations, Inc. (USO), formerly (1941–51) UNITED SERVICE ORGANIZATIONS FOR NATIONAL DEFENSE, INC., private, nonprofit social-service agency first chartered on Feb. 4, 1941, to provide social, welfare, and recreational services for members of the U.S. armed forces and their families.

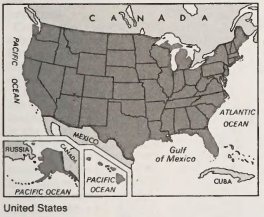
First proposed by General George C. Marshall in 1940 to enhance the quality of life and morale of servicemen, the USO was established, at his urging, by representatives of the Salvation Army, the YMCA, the National Board of the YWCA, the National Jewish Welfare Board, the National Catholic Community Service, and (from March 1941) the Travelers Aid Association of America. USO service clubs and recreational centres began appearing in the summer of 1941, and USO Camp Shows, Inc., was incorporated in November 1941 to provide celebrity entertainment for military commands overseas and at home (especially, later, at veterans' hospitals). In June 1943 the USO had its peak number of volunteers (739,000) and in March 1944 its peak number of recreational clubs (3,035); in July 1944 it handled 661,000 cases of travelers' aid.

After the war, early in 1948, the old USO dissolved, but it was revived the following year and largely reorganized on March 27, 1951, after the outbreak of the Korean War. It expanded significantly in the 1950s and again in the 1960s, during the Vietnam War. In later years, it greatly enlarged its counseling services, offering housing information, drug-abuse programs, training services for war brides, and other human services. Among the USO's entertainment services, Bob Hope's Christmas Shows were especially popular.

United Society of Believers in Christ's Second Appearing: *see* Shaker.

United South African Nationalist Party: *see* United Party.

United States, officially UNITED STATES OF AMERICA, abbreviations U.S., or U.S.A., byname AMERICA, country of North America with 48 contiguous states occupying the midlatitudes of the continent, together with the state of Alaska at the northwest extreme of



United States

North America and the island state of Hawaii lying in the mid-Pacific Ocean. The coterminous United States is bounded to the north by Canada; to the west by the Pacific Ocean; to the south by Mexico, the Gulf of Mexico, and the Straits of Florida; and to the east by the Atlantic Ocean. Its capital is Washington, D.C. Area, including the U.S. share of the Great Lakes, 3,679,192 square miles (9,529,063 square km). Pop. (1993 est.) 258,233,000.

A brief treatment of the United States follows. For full treatment, *see* MACROPAEDIA: United States of America.

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

The land. The continental United States may be divided into five major physiographic regions. They include the Atlantic Coastal Plain and the Appalachian Mountains in the east and the southeast; the Interior Lowlands, covering the nation's vast midsection; and the Western Cordillera and, contained within its branches, the Western Intermontane Plateaus.

The Atlantic Coastal Plain is part of North America's larger eastern-coastal plains, which extend from New England in the United States to Mexico's Yucatán Peninsula. Narrow in the northeastern United States, the plain widens southward, as flooded river valleys such as Chesapeake Bay form major estuaries. Offshore sandbars and barrier beaches stretch intermittently along the length of the eastern seaboard. Turning westward, the plain includes the Florida Peninsula, and the entire Gulf Coast; it extends as much as 500 miles (800 km) inland along the Mississippi River before turning southward into Mexico.

The Appalachian Mountains, trending from south-southwest to north-northeast for about 1,500 miles (2,400 km), rise abruptly to the west of the coastal plain along the Blue Ridge escarpment from the Piedmont. The latter is a well-drained, rolling landscape, contrasting markedly with the low and often swampy Atlantic Plain. The Appalachians are very old, consisting of the eroded stumps of much greater ranges but today rising to only 6,684 feet (2,037 m), at Mount Mitchell. They generally do not exceed 3,500 feet (1,100 m) in elevation and are almost entirely forested.

The Interior Lowlands and their upland fringes, widest in the north, stretch along the Canadian border from Lake Ontario (the easternmost of the Great Lakes) westward to the Rocky Mountains (roughly 400 miles [650 km] from the Pacific Coast). The region narrows to the south, eventually reaching the Atlantic Plain near the Rio Grande. The Interior Lowlands may be further divided into two major subregions: the eastern and more humid Central Lowland corresponds roughly with the country's "Corn Belt"; the western and drier Great Plains continue northward far into Canada and comprise the continent's major wheat-growing region. The Central Lowland is bounded by the Great Lakes and the Canadian Shield to the north and by the Ohio River and the Ozark Plateau (the westernmost extension of the Appalachian system) to the east and south. The Central Lowland merges into the Great Plains roughly 300 miles (500 km) west of the Mississippi River. The Great Plains, though seemingly flat, actually rise continuously from about 2,000 feet elevation in the east to more than 6,000 feet as they approach the Rocky Mountain front, the easternmost limit of the Western Cordillera.

The western United States is dominated by the two branches of the Western Cordillera: the eastern ranges form the Pacific–Gulf of Mexico drainage divide along the Rocky Mountains; the western ranges consist of two smaller systems, with the Sierra Nevada and the Cascades forming one interior chain of mountains and the Coastal Ranges the other. The country's highest peaks lie within the western branches of the Cordillera. Mount McKinley, the continent's highest peak, at 20,320 feet (6,194 m), lies within the Alaska Range (an extension of the Western Cordillera), and Mount Whitney, the highest peak within the coterminous United States, at 14,494 feet (4,418 m), is in the Sierra Nevada.

The western Intermontane Plateau's region is dominated by the Great Basin (a vast interior drainage system), which contains the Great Salt Lake. The west coast of the country is among the most geologically active regions in the world; the explosive eruption of Mount St. Helens during the spring of 1980 was a dramatic reminder of this fact. The Hawaiian Islands, of which the islands of Hawaii and Maui are the largest, were formed almost entirely by volcanic action. Alaska, another geologically active region, consists of an insular and cordilleran area in the south: interior basins, plains, and tablelands; the Brooks Range in the north; and the tundra-covered Arctic Plains in the far north.

The hydrology of the central and east-central United States is dominated by the Mississippi River basin (including its two major tributaries, the Missouri and the Ohio rivers), the waters of which drain southward into the Gulf of Mexico. The Mississippi basin is roughly coincident with the Interior Lowlands region and covers about two-fifths of the coterminous United States. The Mississippi and several of its tributaries make up one of the world's great navigable inland-waterway systems. The country's other major network of inland waterways consists of the Great Lakes (constituting by far the largest freshwater-lake group in the world) and the St. Lawrence River. West of the Rockies, nearly all of the rivers are strongly affected by aridity. In the deserts and steppes of the intermontane basins, most of the scanty runoff disappears into interior basins, only one of which, the Great Salt Lake, holds any substantial volume of surface water. Aside from lesser coastal streams, only three large river systems reach the Pacific Ocean—the Columbia, the Colorado, and the San Joaquin–Sacramento system of California's Central Valley.

Although the United States experiences wide climatic variation, the precipitation pattern may be depicted as two comparatively humid coasts separated by a progressively more humid (west to east) interior. Rainfall generally declines westward from the humid eastern zone (lying roughly along and southeastward of the Appalachians), where precipitation is usually greater than 40 inches (1,000 mm). It ranges between 30 and 40 inches (760 to 1,000 mm) throughout much of the Central Lowland and between 10 and 30 inches (250 and 760 mm) westward in the Great Plains. The Great Plains are separated from the Pacific coast by the extremely arid landscape of the intermontane basins, much of which receives less than 4 inches (100 mm) of precipitation annually. The far northwest coast (or Pacific Northwest) is the wettest part of the country, often receiving 70 inches (1,780 mm) or more of rainfall annually. Both Alaska and Hawaii are very humid, precipitation ranging from 60 to 200 inches (1,500 to 5,100 mm) in Alaska and from as little as 10 to more than 480 inches (12,200 mm; at Mount Waialeale) in Hawaii.

Temperatures throughout the coterminous United States vary seasonally. The greatest extremes occur in the vast north-central plains; Chicago's average temperature ranges from 27° F (−3° C) in January to 75° F (24° C) in July, while along the Gulf of Mexico, Mobile's average January and July temperatures are 52° F (11° C) and 82° F (28° C), respectively. The frost-free period decreases northward, from more than 240 days along the Gulf of Mexico to less than 120 days along most of the country's border with Canada. The climate is generally milder along both oceanic coasts than it is in the interior.

About one-fifth of the territory of the United

States is arable; the area sown to cereal grains by itself is approximately equivalent to the combined areas of France and the United Kingdom. The Central Lowland and the Great Plains, now largely devoted to agriculture, originally supported tall grasslands (prairie) and short grasslands (steppe), respectively. The country also possesses vast rangelands and pasturelands, and forests (covering roughly one-fourth and one-third of total land area, respectively). Prior to modern settlement, forests of such hardwoods as oak, hickory, and walnut, interspersed with softwood species, stretched unbroken through much of the east and north-central United States. The western-coastal forests are known for their enormous redwoods and Douglas firs. The western mountains support typically alpine vegetation, while the intermontane region, for the most part, contains desert shrub and a variety of cactus species.

Animal life in the United States is composed of both a range of indigenous wildlife and an extensive list of introduced species, such as the English sparrow. Among the best-known species of indigenous wildlife are the American bison, black bear, puma (mountain lion), white-tailed deer, pronghorn antelope, coyote, beaver, bobcat, porcupine, skunk, opossum, and prairie dog.

The United States is rich in both metallic and energy minerals and is among the leading producers of many: two-fifths of the world's molybdenum reserves; about one-fifth of its lead; one-sixth of its copper, silver, and zinc; one-tenth of its gold; and somewhat smaller amounts of its iron ore and cobalt, to mention a few of the more important. The country's extensive energy resources include about one-fifth of the world's recoverable reserves of high-quality coal (anthracite and bituminous), more than one-eighth of the world's recoverable reserves of lignite, and substantial reserves of petroleum and natural gas. Such critical metals as chromium, manganese, and platinum, however, supply only a fraction of domestic needs.

The people. American society has often been characterized as a great "melting pot" in which people from many nations and cultures have blended into what are called "Americans."

What is now the United States was originally settled by peoples who came from Asia between 35,000 and 20,000 years ago and whose descendants became known as American Indians to later European colonists. The Spaniards established the first European settlements in North America in the 16th century, but it was English settlements from the early 17th century that eventually provided the great bulk of the population, with African blacks transported to the New World as slaves forming a sizable minority.

Of 5,000,000 European immigrants between 1820 and 1860, 9 of 10 were from England, Ireland, or Germany. After the American Civil War, however, larger numbers of immigrants began to arrive from Italy, Poland, Russia, Sweden, the Balkans, and Austria, among other countries. This shift in immigration enlarged the proportion of Roman Catholics in the population and also introduced a significant Jewish minority. Legislative restrictions slowed immigration to a trickle in the 1920s, but its volume gradually increased in the decades after World War II. By the late 20th century the character of the immigrant stream had changed once again; Hispanics from Mexico, Central and South America, and the Caribbean were the single largest ethnic group among recent immigrants, followed by East Asians (Chinese, Koreans, Filipinoes) and South Asians (Indians and Pakistanis).

At the turn of the 21st century, the people of the United States comprised a large white non-Hispanic majority (about three-fourths of the total), black and Hispanic minorities (about 12 per cent each), and smaller numbers of Asians, American Indians, Pacific islanders, and others. It is projected that sometime in the century non-European Americans will out number Euro-Americans. Linguistically, English predominates, but most members of the Hispanic minority also speak Spanish.

Protestants make up more than half the total American population, with the largest denominations and sects being the Baptists, Methodists, Lutherans, Pentecostals, Presbyte-

Presidents and Vice Presidents of the United States

no.	president	birthplace	political party	term	vice president	birthplace	term
1	George Washington	Va.	Federalist	1789–97	John Adams	Mass.	1789–97
2	John Adams	Mass.	Federalist	1797–1801	Thomas Jefferson	Va.	1797–1801
3	Thomas Jefferson	Va.	Republican (Jeffersonian)	1801–09	Aaron Burr	N.J.	1801–05
					George Clinton	N.Y.	1805–09
4	James Madison	Va.	Republican (Jeffersonian)	1809–17	George Clinton	N.Y.	1809–12*
					Elbridge Gerry	Mass.	1813–14*
5	James Monroe	Va.	Republican (Jeffersonian)	1817–25	Daniel D. Tompkins	N.Y.	1817–25
6	John Quncy Adams	Mass.	National Republican	1825–29	John C. Calhoun	S.C.	1825–29
7	Andrew Jackson	S.C.	Democratic	1829–37	John C. Calhoun	S.C.	1829–32†
					Martin Van Buren	N.Y.	1833–37
8	Martin Van Buren	N.Y.	Democratic	1837–41	Richard M. Johnson	Ky.	1837–41
9	William Henry Harrison	Va.	Whig	1841*	John Tyler	Va.	1841
10	John Tyler	Va.	Whig	1841–45			
11	James K. Polk	N.C.	Democratic	1845–49	George Mifflin Dallas	Pa.	1845–49
12	Zachary Taylor	Va.	Whig	1849–50*	Millard Fillmore	N.Y.	1849–50
13	Millard Fillmore	N.Y.	Whig	1850–53			
14	Franklin Pierce	N.H.	Democratic	1853–57	William Rufus de Vane King	N.C.	1853*
15	James Buchanan	Pa.	Democratic	1857–61	John C. Breckinridge	Ky.	1857–61
16	Abraham Lincoln	Ky.	Republican	1861–65*	Hannibal Hamlin	Maine	1861–65
					Andrew Johnson	N.C.	1865
17	Andrew Johnson	N.C.	Democratic (Union)	1865–69			
18	Ulysses S. Grant	Ohio	Republican	1869–77	Schuyler Colfax	N.Y.	1869–73
					Henry Wilson	N.H.	1873–75*
19	Rutherford B. Hayes	Ohio	Republican	1877–81	William A. Wheeler	N.Y.	1877–81
20	James A. Garfield	Ohio	Republican	1881*	Chester A. Arthur	Vt.	1881
21	Chester A. Arthur	Vt.	Republican	1881–85			
22	Grover Cleveland	N.J.	Democratic	1885–89	Thomas A. Hendricks	Ohio	1885*
23	Benjamin Harrison	Ohio	Republican	1889–93	Levi Parsons Morton	Vt.	1889–93
24	Grover Cleveland	N.J.	Democratic	1893–97	Adlai E. Stevenson	Ky.	1893–97
25	William McKinley	Ohio	Republican	1897–1901*	Garret A. Hobart	N.J.	1897–99*
					Theodore Roosevelt	N.Y.	1901
26	Theodore Roosevelt	N.Y.	Republican	1901–09	Charles Warren Fairbanks	Ohio	1905–09
27	William Howard Taft	Ohio	Republican	1909–13	James Schoolcraft Sherman	N.Y.	1909–12*
28	Woodrow Wilson	Va.	Democratic	1913–21	Thomas R. Marshall	Ind.	1913–21
29	Warren G. Harding	Ohio	Republican	1921–23*	Calvin Coolidge	Vt.	1921–23
30	Calvin Coolidge	Vt.	Republican	1923–29	Charles G. Dawes	Ohio	1925–29
31	Herbert Hoover	Iowa	Republican	1929–33	Charles Curtis	Kan.	1929–33
32	Franklin D. Roosevelt	N.Y.	Democratic	1933–45*	John Nance Garner	Texas	1933–41
					Henry A. Wallace	Iowa	1941–45
					Harry S. Truman	Mo.	1945
33	Harry S. Truman	Mo.	Democratic	1945–53	Alben W. Barkley	Ky.	1949–53
34	Dwight D. Eisenhower	Texas	Republican	1953–61	Richard M. Nixon	Calif.	1953–61
35	John F. Kennedy	Mass.	Democratic	1961–63*	Lyndon B. Johnson	Texas	1961–63
36	Lyndon B. Johnson	Texas	Democratic	1963–69	Hubert H. Humphrey	S.D.	1965–69
37	Richard M. Nixon	Calif.	Republican	1969–74†	Spiro T. Agnew	Md.	1969–73†
					Gerald R. Ford	Neb.	1973–74
38	Gerald R. Ford	Neb.	Republican	1974–77	Nelson A. Rockefeller	Maine	1974–77
39	Jimmy Carter	Ga.	Democratic	1977–81	Walter F. Mondale	Minn.	1977–81
40	Ronald Reagan	Ill.	Republican	1981–89	George Bush	Mass.	1981–89
41	George Bush	Mass.	Republican	1989–93	Dan Quayle	Ind.	1989–93
42	William J. Clinton	Ark.	Democratic	1993–2001	Albert Gore	Washington, D.C.	1993–2001
43	George W. Bush	Conn.	Republican	2001–	Dick Cheney	Neb.	2001–

*Died in office. †Resigned from office.

rians, Disciples of Christ, and Congregationalists. About one-fifth of the total population is Roman Catholic, with Jews, Muslims, and Eastern Orthodox each comprising about 2 percent. More than one-twelfth are nonreligious or atheist.

The United States has a gross birth rate that is somewhat higher than Europe's but much lower than those of most other regions of the world. In general, as family income and educational levels rise, the number of children declines. About one-fifth of the total population of the United States is less than 15 years of age.

The average life expectancy is about 73 years for males and 79 years for females. The life expectancy for blacks in the United States was nearly five years short of that for whites, and comparative mortality rates at various ages for nonwhite males were generally much higher than those for whites. Major causes of death are chronic diseases associated with old age—*i.e.,* heart disease, cancer, and cerebrovascular disorders.

Few populations in the world are as mobile as that of the United States, where every year 10 percent of the people move. In the late 20th century the United States was a suburban nation, with about 45 percent of the people living in the suburbs, about 30 percent in the central cities, and 25 percent in rural areas. The declining farm population, representing 3 percent of the total, was the smallest proportionately in the history of the nation.

The economy. The United States has a developed, largely free-enterprise economy, with services and manufacturing being the primary components of the gross domestic product (GDP). The country's GDP is the largest in the world, and its per capita GDP is among the world's highest.

Agriculture generates about 2 percent of the GDP and employs about 3 percent of the labour force. Farming is largely mechanized and scientifically controlled, and the production of most cash crops substantially exceeds domestic needs, making the United States the world's leading exporter of food. About one-tenth of the arable land is irrigated, mostly in the southwest and west. The principal crops grown include corn (maize), soybeans, hay, wheat, cotton, potatoes, tomatoes, peanuts (groundnuts), sorghum, rice, sugarcane and sugar beets, and barley. Fruits include oranges, grapes, apples, grapefruits, and lemons and limes. The country also ranks high worldwide in the production of tobacco, avocados, pineapples, strawberries, almonds, walnuts, and hops. Raw and refined sugar, wine, beer, and honey are produced in large quantities.

The principal livestock of the United States include cattle, pigs, sheep, and horses. Dairying is well developed; milk, cheese, and butter production exceed domestic needs—some is exported and some stored under government subsidy. Cattle hide and wool production supports leather and textile industries. Poultry is important.

Commercial forestry is well developed, with substantial areas harvested periodically and reforested. The United States is the world's leading producer of roundwood (logs, poles, and posts).

The United States ranks among the world's top fishing nations, and almost all of the commercial catch is marine. Fishing fleets operate in the Atlantic and Pacific oceans, the Arctic and Caribbean seas, and the Gulf of Mexico.

Mining is well developed and highly mechanized. Coal leads in energy-mineral production, and, of metals, iron ore, copper, bauxite, lead, zinc, molybdenum, mercury, tungsten, titanium ore, and silver are the most important. Phosphate rock and potash, salt, limestone, gypsum, lime, marl, pumice, boron, and talc are also extracted, and the country is among the world leaders in mica, barite, sulfur, and feldspar production.

Manufacturing, which accounts for about one-fifth of the GDP and employs less than one-fifth of the workforce, is well diversified. Aluminum, steel and iron metals and manufactured wares, cement and building materials, machinery, motor vehicles and other transport equipment and parts, electrical and electronics wares, processed food and tobacco, chemicals, textiles and clothing, and rubber and plastics are the leading products. Nearly three-fourths of the country's electrical energy is produced by thermal-power (coal-burning) plants and the remainder by nuclear and hydroelectric plants. Manufacturing began to shift from heavy durable goods to electronics, computers, and software in the 1970s and '80s as the older industries became less competitive with foreign producers.

Tourism centres on such subtropical and tropical areas as Florida, southern California, and Hawaii, with fine beaches and fishing, and upon such winter-sports resorts as those in the Rocky Mountains, the Sierra Nevada, and northern New England. The large metropolitan areas are also attractions with their museums and cultural events, as are historic sites of the eastern seaboard states. The natural wonders and national parks of the western states also figure importantly among the attractions that appeal to American and foreign tourists.

The labour force is about two-thirds of the population aged 16 years and over. Unemployment became an increasingly serious problem late in the 20th century and was aggravated by the shift from high-wage manufacturing to lower-paying jobs in various service industries. At the turn of the 21st century, trade unions represent less than one-fifth of the American workforce. The American Federation of Labor–Congress of Industrial Organizations (AFL–CIO) is the principal labour federation with which most unions are affiliated.

Government plays only a small direct part in economic production, although it does regulate the economy through fiscal and monetary policy. Competition is fostered by the enforcement of antitrust laws. Moreover, the government also exerts considerable leverage on certain sectors of the economy as a purchaser of goods, especially in the aerospace and defense industries.

The government regulates the economy through taxation, exemptions, allowances, subsidies, and deductions; interest rates are controlled by the politically independent Federal Reserve Bank. The Department of Commerce and various regulatory agencies are authorized to guarantee open competition, and the Department of Justice is legally committed to enforce legislation against restraint of trade. Industries considered to be in the national interest receive research and development aid channeled primarily through the departments of Energy and Defense, the National Aeronautics and Space Administration, and the National Science Foundation.

Federal revenue is generated mainly through individual income taxes, social-security taxes, corporate income taxes, and excise taxes. Expenditures are mainly for social security and Medicare, defense, income security, interest on the national debt, and health. The Department of the Treasury and the Federal Reserve System regulate monetary policy. Escalating

States of the United States

state	date of admission	order of admission	capital
United States	—	—	Washington, D.C.
Alabama	Dec.14, 1819	22	Montgomery
Alaska	Jan. 3, 1959	49	Juneau
Arizona	Feb. 14, 1912	48	Phoenix
Arkansas	June 15, 1836	25	Little Rock
California	Sept. 9, 1850	31	Sacramento
Colorado	Aug. 1, 1876	38	Denver
Connecticut	Jan. 9, 1788*	5	Hartford
Delaware	Dec. 7, 1787*	1	Dover
Florida	March 3, 1845	27	Tallahassee
Georgia	Jan. 2, 1788	4	Atlanta
Hawaii	Aug. 21, 1959	50	Honolulu
Idaho	July 3, 1890	43	Boise
Illinois	Dec. 3, 1818	21	Springfield
Indiana	Dec. 11, 1816	19	Indianapolis
Iowa	Dec. 28, 1846	29	Des Moines
Kansas	Jan. 29, 1861	34	Topeka
Kentucky	June 1, 1792	15	Frankfort
Louisiana	April 30, 1812	18	Baton Rouge
Maine	March 15, 1820	23	Augusta
Maryland	April 28, 1788*	7	Annapolis
Massachusetts	Feb. 6, 1788*	6	Boston
Michigan	Jan. 26, 1837	26	Lansing
Minnesota	May 11, 1858	32	St. Paul
Mississippi	Dec. 10, 1817	20	Jackson
Missouri	Aug. 10, 1821	24	Jefferson City
Montana	Nov. 8, 1889	41	Helena
Nebraska	March 1, 1867	37	Lincoln
Nevada	Oct. 31, 1864	36	Carson City
New Hampshire	June 21, 1788*	9	Concord
New Jersey	Dec. 18, 1787*	3	Trenton
New Mexico	Jan. 6, 1912	47	Santa Fe
New York	July 26, 1788*	11	Albany
North Carolina	Nov. 21, 1789*	12	Raleigh
North Dakota	Nov. 2, 1889	39	Bismarck
Ohio	March 1, 1803	17	Columbus
Oklahoma	Nov. 16, 1907	46	Oklahoma City
Oregon	Feb. 14, 1859	33	Salem
Pennsylvania	Dec. 12, 1787*	2	Harrisburg
Rhode Island	May 29, 1790*	13	Providence
South Carolina	May 23, 1788*	8	Columbia
South Dakota	Nov. 2, 1889	40	Pierre
Tennessee	June 1, 1796	16	Nashville
Texas	Dec. 29, 1845	28	Austin
Utah	Jan. 4, 1896	45	Salt Lake City
Vermont	March 4, 1791	14	Montpelier
Virginia	June 25, 1788*	10	Richmond
Washington	Nov. 11, 1889	42	Olympia
West Virginia	June 20, 1863	35	Charleston
Wisconsin	May 29, 1848	30	Madison
Wyoming	July 10, 1890	44	Cheyenne

*Original state; date shown is that of ratification of Constitution.

military expenditures for technologically advanced systems and the rapid expansion of social and welfare services from the 1960s onward produced budgetary deficits that were aggravated by periodic economic recessions. The national debt thus continued to rise.

The national transportation network includes the largest railroad system (in terms of total length of track) and the largest road network (in terms of mileage) in the world. Railroads increasingly are used for long-distance large-volume freight hauling and truck-flatcar "piggyback" hauling. Nine-tenths of the nation's roads are paved, and about one-tenth of the total consists of limited-access interstate highways. The country's extensive inland waterways are served by more than 50 ports, with the Port of South Louisiana and Houston among the most prominent; the Mississippi River is the country's busiest inland waterway. Air service is well developed; Atlanta (Hartsfield), Chicago (O'Hare), Los Angeles, and Dallas-Ft. Worth are among the busiest airports in the world for passenger traffic.

The U.S. merchandise trade balance has consistently been in deficit since the mid-1970s. Leading exports include chemicals and related products, motor vehicles and parts, office machinery and computers, aircraft and parts, cereal grains, and general industrial and electrical machinery. Leading export markets include Canada, Mexico, Japan, the United Kingdom, and Germany. Major imports include motor vehicles and parts, crude petroleum and refined products, basic iron and steel manufactures, and raw materials (excluding fuels and food). Principal import sources include Canada, Japan, Mexico, China, and Germany.

Government and social conditions. The United States is a federal republic composed of a national government and 50 state governments. The country's Constitution, adopted in 1789, delegates certain powers to the national government and reserves all other powers to the states. Defense, foreign policy, the regulation of foreign trade, the national currency, the higher levels of law enforcement, regulation of interstate commerce, homeland security, and immigration are among the national government's most important areas of responsibility. The states' major functions include education, highway and motor vehicle supervision, public safety and correction, regulation of intrastate commerce, and the administration of some health and welfare programs.

The Constitution divides the national government's power among three coequal branches: the executive, the legislative, and the judicial; the states have governmental structures closely paralleling this arrangement. Highest executive authority rests with the president (*see* MACROPAEDIA: United States Presidency and First Lady), who is elected to a four-year term by democratically chosen electors from each of the 50 states and the District of Columbia. The president serves as head of state and commander in chief of the armed forces. He is also head of government, initiating legislation and formulating foreign policy. The president is assisted by a cabinet consisting of the heads of 15 executive-level departments; cabinet officials are appointed by the president and serve at his pleasure. Legislative power is vested in the 435-member House of Representatives and the 100-member Senate. There is universal suffrage for all adults at least age 18. Each state elects two senators to six-year terms. House members are elected to two-year terms by popular vote; the number of representatives granted to each state is based on population as adjusted by a decennial census. The judicial branch is headed by the Supreme Court, a nine-member body appointed by the president with the consent of the Senate. Using its powers of judicial review, the court can invalidate legislative, executive, and administrative acts that do not conform to the Constitution and is the court of last resort in appeals from lower court decisions.

The United States has a largely two-party system. Since the 1850s the two leading parties have been the Democrats (largely centre-left) and the Republicans (largely centre-right). Each party usually presents a moderate platform to appeal to as wide a spectrum of interests as possible. Minor parties and independent candidates generally garner few votes and win few elections, though some have done well at various times.

The United States is a global military power with forces stationed by various treaties in western Europe, Japan, and South Korea. The country has a large and sophisticated nuclear weapons force consisting of tactical missiles, strategic bombers, submarine-launched ballistic missiles, and intercontinental ballistic missiles.

Social welfare in the United States is financed and administered by both the federal and state governments and by private employers; benefits cover unemployment, work injury, sickness, maternity, old age, disability, and widowhood. The national and state governments, moreover, work together to provide cash payments and social services to indigent families with dependent children.

Health and sanitary conditions are excellent in the United States, except in areas with concentrations of rural or urban poor. The country, furthermore, has a high proportion of doctors for the size of its population. Health indicators for the African American population, however, are generally less favourable; the mortality rate for African American infants, for example, is almost twice as high as for white infants.

Education in most states is free and compulsory between the ages of 6 and 16 years. The great majority of American students remain in school until they complete secondary school at 17 or 18 years of age. While education is largely the province of the state and local governments, the national government plays a major role by supporting school lunch programs, making research grants to universities, underwriting loans to college students, and financing education for veterans. The United States has a number of the world's outstanding institutions of higher learning, including Harvard University (Massachusetts), Yale University (Connecticut), Princeton University (New Jersey), Massachusetts Institute of Technology, the University of Chicago (Illinois), Stanford University (California), and the University of California, among others.

Constitutional guarantees of press freedom (on both federal and state levels) give the nation's news media unparalleled freedom to both inform the public and act as a check on government action. Not even an official-secrets act restrains the press from adopting a virtual adversary role to government. The power of the media in America is enormous and ubiquitous.

Cultural life. American culture has produced many outstanding writers, filmmakers, and musicians. The country's 19th-century literature was dominated by such names as Mark Twain, Edgar Allan Poe, Herman Melville, Walt Whitman, and Henry James. Among the great American writers of the 20th century have been Ernest Hemingway, William Faulkner, John Steinbeck, F. Scott Fitzgerald, and Toni Morrison; the dramatists Eugene O'Neill and Tennessee Williams; and the poets Ezra Pound, T.S. Eliot, and Robert Frost.

One of the country's most popular and influential art forms has been the motion picture. American filmmakers such as Charlie Chaplin, Howard Hawks, Orson Welles, Frank Capra, John Ford, John Huston, Martin Scorsese, Steven Spielberg, Woody Allen, Spike Lee, and Quentin Tarantino have gained world renown.

The country also has developed highly influential types of popular music: jazz, the blues, country and western, and rock. Among the most important artists are Louis Armstrong, Duke Ellington, Charlie Parker, Miles Davis, and John Coltrane in jazz, Muddy Waters and Robert Johnson in the blues, Hank Williams and Jimmie Rodgers in country and western, and Elvis Presley, Chuck Berry, Bob Dylan, and James Brown in rock.

History. The territory now part of the United States has been inhabited for 15,000 to 40,000 years, as attested by local evidence. The aboriginal peoples, ancestral to today's American Indians, left no firm monuments on the scale of contemporaneous cultures elsewhere, but both the pueblos of the Southwest and the great mounds of the Mississippi River valley antedate the arrival of the European colonial powers. The original 13 British colonies that became the United States of America in 1776 were just one of several attempts by European powers to build empires in North America. All seized land from the native Indians, who then were usually either assimilated or driven off by superior European weapons. The Spaniards reached Florida as early as 1513 and New Mexico in 1540. The French began their exploration of the Mississippi River valley in 1673. The Russians reached Alaska in 1741.

Of all the colonizers, the British were the most successful. In 1607 Jamestown became the first permanent British settlement in North America and the foundation of the Virginia colony. It was followed 13 years later by the Pilgrim settlement at Plymouth, which was soon dwarfed by the Puritan colony of Massachusetts Bay. Most of New England was settled by Puritans fleeing either the harassment of Charles I or the orthodoxy of Massachusetts Bay. Pennsylvania was given to the Quaker William Penn as payment for a debt, and Maryland, a grant to the Roman Catholic George Calvert, was the first colony to establish religious freedom. New York, New Jersey, and Delaware were taken from the Dutch by the British in 1664, a year after the Carolinas had been granted to eight British noblemen. The 13th colony was Georgia, founded by James Oglethorpe in 1732 as a refuge for debtors and convicts.

When the British successfully evicted the French from North America in 1763, they embarked on a number of policies that the colonials found increasingly onerous. Settlement was prohibited west of the Appalachians and measures were passed to raise revenue in the colonies. These revenue-raising measures and Britain's generally exploitive mercantilist economic policy irked the colonials, who began to band together to oppose and subvert the measures. Britain increased its military presence to enforce compliance (a presence part of whose cost was exacted from the colonials), and fighting broke out in 1775. The Second Continental Congress, acting for the 13 colonies, declared independence on July 4, 1776, and created Articles of Confederation to govern the new nation. Victory over the British came in 1783, and the resulting Treaty of Paris established U.S. boundaries, except for Spanish Florida, west to the Mississippi River.

The Articles of Confederation provided a weak central government and proved inadequate to govern the growing nation. A new constitution was created in 1787, ratified in 1788, and took effect in 1789. George Washington was the first president, and his sober and reasoned judgments were instrumental in establishing both the tenor of the country and the precedents of the executive office. Under the new Constitution, the country began to grow almost immediately. By the Louisiana

State nicknames and symbols

state	state nickname(s)	motto	state tree	state bird	state flower
United States	—	In God We Trust	—	bald eagle*	rose
Alabama	Cotton State, Yellowhammer State, Heart of Dixie	We Dare Defend Our Rights	southern (longleaf) pine	yellowhammer	camellia
Alaska	The Last Frontier	North to the Future	Sitka spruce	willow ptarmigan	forget-me-not
Arizona	Grand Canyon State	*Ditat Deus* (God Enriches)	paloverde	cactus wren	saguaro cactus blossom
Arkansas	Land of Opportunity	*Regnat Populus* (The People Rule)	pine	mockingbird	apple blossom
California	Golden State	*Eureka* (I Have Found It)	California redwood	California valley quail	golden poppy
Colorado	Centennial State	*Nil Sine Numine* (Nothing Without Providence)	Colorado blue spruce	lark bunting	Rocky Mountain columbine
Connecticut	Nutmeg State, Constitution State	*Qui Transtulit Sustinet* (He Who Transplanted Still Sustains)	white oak	American robin	mountain laurel
Delaware	First State, Diamond State	Liberty and Independence	American holly	blue hen chicken	peach blossom
District of Columbia	—	*Justitia Omnibus* (Justice For All)	scarlet oak	woodthrush	American Beauty rose
Florida	Sunshine State	In God We Trust	Sabal palm (cabbage palmetto)	mockingbird	orange blossom
Georgia	Empire State of the South, Peach State	Wisdom, Justice and Moderation	live oak	brown thrasher	Cherokee rose
Hawaii	Aloha State	*Ua Mau Ke Ea O Ka Aina I Ka Pono* (The Life of the Land Is Perpetuated in Righteousness)	kukui (candlenut)	nene (Hawaiian goose)	hibiscus
Idaho	Gem State	*Esto Perpetua* (Let It Be Perpetual)	western white pine	mountain bluebird	syringa
Illinois	Prairie State, Land of Lincoln	State Sovereignty—National Union	white oak	cardinal	native violet
Indiana	Hoosier State	Crossroads of America	tulip tree (yellow poplar)	cardinal	peony
Iowa	Hawkeye State, Corn State	Our Liberties We Prize and Our Rights We Will Maintain	oak	eastern goldfinch	wild rose
Kansas	Sunflower State, Jayhawker State	*Ad Astra Per Aspera* (To the Stars Through Difficulties)	cottonwood	western meadowlark	native sunflower
Kentucky	Bluegrass State	United We Stand, Divided We Fall	Kentucky coffee tree	cardinal	goldenrod
Louisiana	Pelican State, Creole State, Sugar State	Union, Justice, and Confidence	bald cypress	eastern brown pelican	magnolia
Maine	Pine Tree State	*Dirigo* (I Direct)	eastern white pine	chickadee	white pine cone and tassel
Maryland	Free State, Old Line State	*Fatti Maschii, Parole Femine* (Manly Deeds, Womanly Words)	white oak	Baltimore oriole	black-eyed Susan
Massachusetts	Bay State, Old Colony State	*Ense Petit Placidam Sub Libertate Quietem* (By the Sword We Seek Peace, But Peace Only Under Liberty)	American elm	chickadee	mayflower (trailing arbutus)
Michigan	Wolverine State, Great Lake State	*Si Quaeris Peninsulam Amoenam Circumspice* (If You Seek a Pleasant Peninsula, Look About You)	white pine	robin	apple blossom
Minnesota	North Star State, Gopher State Land of 10,000 Lakes Land of Sky-blue Waters	*L'Étoile du Nord* (The North Star)	red, or Norway, pine	loon	pink and white lady's slipper
Mississippi	Magnolia State	*Virtute et Armis* (By Valor and Arms)	magnolia	mockingbird	magnolia
Missouri	Show Me State	*Salus Populi Suprema Lex Esto* (The Welfare of the People Shall Be the Supreme Law)	dogwood	bluebird	hawthorn
Montana	Treasure State, Big Sky Country	*Oro y Plata* (Gold and Silver)	ponderosa pine	western meadowlark	bitterroot
Nebraska	Cornhusker State, Beef State	Equality Before the Law	cottonwood	western meadowlark	goldenrod
Nevada	Sagebrush State, Silver State, Battle Born State	All For Our Country	single-leaf piñon	mountain bluebird	sagebrush
New Hampshire	Granite State	Live Free or Die	white birch	purple finch	purple lilac
New Jersey	Garden State	Liberty and Prosperity	red oak	eastern goldfinch	purple violet
New Mexico	Land of Enchantment, Sunshine State	*Crescit Eundo* (It Grows As It Goes)	piñon (nut pine)	roadrunner	yucca flower
New York	Empire State	*Excelsior* (Ever Upward)	sugar maple	bluebird	rose
North Carolina	Tar Heel State, Old North State	*Esse Quam Videri* (To Be Rather Than To Seem)	longleaf pine	cardinal	dogwood
North Dakota	Flickertail State, Sioux State, Peace Garden State	Liberty and Union, Now and Forever, One and Inseparable	American elm	western meadowlark	wild prairie rose
Ohio	Buckeye State	With God, All Things Are Possible	buckeye	cardinal	scarlet carnation
Oklahoma	Sooner State	*Labor Omnia Vincit* (Labor Conquers All Things)	redbud	scissor-tailed flycatcher	mistletoe
Oregon	Beaver State	The Union	Douglas fir	western meadowlark	Oregon grape
Pennsylvania	Keystone State	Virtue, Liberty, and Independence	hemlock	ruffed grouse	mountain laurel
Rhode Island	Little Rhody, Ocean State	Hope	red maple	Rhode Island red	violet
South Carolina	Palmetto State	*Animus Opibusque Parati* (Prepared in Mind and Resources)	cabbage palmetto	Carolina wren	yellow jessamine
South Dakota	Coyote State, Sunshine State	Under God the People Rule	Black Hills spruce	ring-necked pheasant	pasqueflower
Tennessee	Volunteer State	Agriculture and Commerce	tulip poplar	mockingbird	iris
Texas	Lone Star State	Friendship	pecan	mockingbird	bluebonnet
Utah	Beehive State	Industry	blue spruce	sea gull	sego lily
Vermont	Green Mountain State	Freedom and Unity	sugar maple	hermit thrush	red clover
Virginia	Mother of Presidents, The Old Dominion	*Sic Semper Tyrannis* (Thus Always To Tyrants)	flowering dogwood*	cardinal	dogwood
Washington	Evergreen State, Chinook State	*Alki* (By and By)	western hemlock	willow goldfinch	western rhododendron
West Virginia	Mountain State	*Montani Semper Liberi* (Mountaineers Are Always Free)	sugar maple	cardinal	big rhododendron
Wisconsin	Badger State, America's Dairyland	Forward	sugar maple	robin	wood violet
Wyoming	Equality State	Equal Rights	cottonwood	meadowlark	Indian paintbrush

*Unofficial.

Purchase of 1803, the United States acquired from France the entire western half of the Mississippi River basin, thereby nearly doubling the size of the national territory. The movement into the lands west of the Appalachians thenceforth became a flood. The United States' victory in the Mexican War (1846–48) brought all or part of the future territory of seven more states (including California and Texas) into American hands.

As the United States moved west, the issue of slavery intensified strains between the rapidly industrializing North and the slave-based agricultural South. The South was determined to maintain the institution of black slavery against the federal government's efforts to curtail its spread. Several compromises over the slavery issue held the Union together for more than a half-century, but the election as president in 1860 of Abraham Lincoln, whose Republican Party clearly advocated the prohibition of slavery in the Western territories, led South Carolina to secede, joined by 10 other Southern states by the next year.

The North's defeat of the South in the ensuing Civil War (1861–65) resulted in the preservation of the Union, the abolition of slavery, the establishment of citizenship for former slaves, and the institution of universal adult male suffrage. Lincoln's plans for magnanimity to the defeated South were cut short by his assassination, and Congress, dominated by northern Radical Republicans, implemented a punitive scheme of reconstruction. This system, which protected black civil rights in the South, came to an end with the withdrawal of federal troops by 1877. Thereafter, Southern blacks were gradually disenfranchised and forcibly segregated.

The post-Civil War United States was characterized by rapid industrialization, a continuing westward movement across the Great Plains, a massive influx of foreign immigrants, and the emergence of the United States into a position of world power. The westward movement, fueled by the desire for land, led to a long series of evictions of Plains Indians from their lands onto less desirable reservations. Immigration from Europe exceeded 13,000,000 between 1900 and 1914 and provided labour for the North's factories. When Cuba revolted against Spain in 1895, American sympathies and interests ultimately led to war with Spain (1898). Victory brought the United States overseas territories (the Philippines, Guam, Puerto Rico) and made it an international power. Though President Woodrow Wilson pledged neutrality in World War I, the United States was unable to remain outside the struggle. Its entry into the war in 1917 was decisive in bringing about an Allied victory.

The prosperity of the decade that followed World War I came to a sudden end in 1929 when the stock market crashed and the Great Depression began. President Franklin D. Roosevelt's New Deal legislation, which increased the federal role in the economy, inspired the country, but full economic recovery was still not achieved until war production became massive on the eve of World War II. The Japanese attack on Pearl Harbor brought the United States into World War II on the side of Britain and the Soviet Union against Germany, Japan, and Italy. The war effort galvanized the American economy's productive capacity, and after victory was achieved in 1945 the United States experienced three decades of unprecedented economic growth.

The Allied victory in 1945 left the United States the leader of the Western world, deeply involved in the reconstruction of Europe and Japan but embroiled in 40-year-long rivalry with the Soviet Union that became known as the Cold War. In 1949 the United States formed the North Atlantic Treaty Organization in an effort to counter the Soviet military presence in eastern Europe, and a Soviet-inspired attack on South Korea involved the United States in the Korean War (1950–53), which ended in stalemate. The United States subsequently became involved in the Vietnam War (1955–75) in an effort to prevent communist North Vietnam from taking over South Vietnam. The prolonged and unsuccessful American war effort ended in a withdrawal of the United States from the conflict in 1973 and the fall of South Vietnam to the communists two years later.

The civil rights movement of the 1950s and '60s led eventually to the end of legal racial segregation and discrimination and to full voting rights for African Americans. The Vietnam War drained resources away from liberal programs of social reform in the 1960s and early '70s, however, and the end of American involvement in the war was accompanied by the Watergate scandal, which forced the resignation of President Richard M. Nixon in 1974. The United States resumed an aggressively anti-communist foreign policy under President Ronald Reagan (1981–89), whose administration provided military, financial, and diplomatic support to guerilla movements in countries with leftist governments. After the breakup of the Soviet Union in 1991, the United States was the world's only superpower.

The economy grew continuously during President Bill Clinton's term (1993–2001), and in 1998 the country experienced its first budget surplus in nearly 30 years. In the same year Clinton became the second president to be impeached, though he was later acquitted by the Senate. In the presidential election of 2000, one of the closest and most controversial in the country's history, George W. Bush became the first person since 1888 to win the presidency despite losing the popular vote.

In 2001 the September 11 attacks against the United States killed some 3,000 people and raised the spectre of international terrorism, leading Bush later that year to topple the Taliban government in Afghanistan, which was harbouring the mastermind of the attacks, Osama bin Laden. The administration also overthrew the Iraqi regime of Saddam Hussein in 2003. Domestically, the United States suffered a faltering economy and a record deficit. Bush was reelected in 2004, narrowly defeating Democratic challenger John Kerry.

United States, Bank of the, central bank chartered in 1791 by the U.S. Congress at the urging of Alexander Hamilton and over the objections of Thomas Jefferson. Extended debate over its constitutionality contributed significantly to the evolution of pro- and anti-bank factions into the first American political parties—respectively, the Federalists and the Democratic-Republicans. Antagonism over the bank issue grew so heated that its charter could not be renewed in 1811. Reconstituted in 1816, the Bank of the United States continued to stir controversy and partisanship, with Henry Clay and the Whigs supporting it and Andrew Jackson and the Democrats opposing it.

The first Bank of the United States was a cornerstone of Hamilton's fiscal policy; it was a means to fund the public debt left from the Revolution, to facilitate the issuance of a stable national currency, and to provide a convenient means of exchange for all the people of the United States. It was capitalized at $10,000,000 and fully subscribed almost instantly, with the federal government holding the largest block of ownership, 20 percent. A substantial interest in the bank was also purchased by Europeans.

The bank accomplished all Hamilton had hoped for and also succeeded in an unforeseen role: the regulation of private banks chartered by the several states. At this time the issuance of notes was a more conspicuous feature of banking than were deposits. Bank notes entered circulation as the money banks lent to their borrowers, and these notes comprised most of the total currency in circulation.

The country's rapid growth generated powerful demand for loans and tended to stimulate the overextension of credit. It was in the general interest to restrain such overexpansion, and the bank imposed that restraint automatically. As the depository of the government, with offices in the chief seaports and commercial centres, it constantly received from collectors of revenue the notes of private banks by which monies due the government were paid. As fast as it received such notes, it called for their redemption in gold and silver by the banks of issue, thus automatically restricting the overextension of credit and protecting the economy from inflation. Conversely, in periods of panic and deflation, the bank could ease the pressure. It was engaged precisely in what came later to be called central banking.

Despite its successes, the bank met political opposition that gathered force with partisan changes taking place in the country. In good part, this opposition was based on the very restraints the bank imposed on private, state-chartered banks; this was also seen as an affront to states' rights, and the bank's federal charter was called unconstitutional. In 1811, when the 20-year charter expired, renewal was politically impossible. Its officers acknowledged reality and successfully sought a state charter in New York.

Within a few years, however, economic developments, chaotic conditions among the state banks, and changes in the composition of Congress combined to enable the chartering of a new Bank of the United States with wider powers than before and with closer links to the government. There was some early mismanagement, but in 1823 Nicholas Biddle of Philadelphia became its president and the bank began to flourish.

Under Biddle, the central banking responsibilities were recognized and developed as consciously as those of the Bank of England at the same time. But since these responsibilities usually had to be exercised as restraints, private banks resented them.

The rapid development of American industry and transportation was enhancing the richness of the country's resources, and the idea of democracy was beginning to connote to entrepreneurs the idea of free enterprise and laissez-faire. Hence, the very conditions that made credit restraint advisable also made it objectionable. Meanwhile, a developing agrarian population, especially in the South and West, and among the poor everywhere, was seeing in democracy opposition to privilege and aristocracy and wealth. The bank became known as "the monster," and the enemy of the common people. These incongruous strains against the bank united under the leadership of Andrew Jackson, who became president in 1829. His attacks on it were sustained and colourful and rallied wide support. Attacks on the bank's constitutionality continued, although a decade earlier the Supreme Court, in *McCulloch* v. *Maryland,* had found the charter constitutional under the doctrine of implied powers.

Henry Clay, leader of the Whigs in the Senate from 1831, championed the bank against the Jacksonian Democrats and in 1832 injected the bank question into the presidential campaign by bringing about the renewal, four years early, of the bank's charter, adopted by Congress on July 3. Jackson vetoed the bank renewal act as unconstitutional, disdaining the Supreme Court decision. In a demagogic veto message he depicted the bank as the "prostration of our Government to the advancement of the few at the expense of the many."

The bank issue dominated the campaign of 1832, in which Jackson decisively defeated Clay. The veto stood, but the bank's charter still had four years to run, so Jackson determined to scuttle it ahead of time by withdraw-

ing government funds from it. He shuffled his cabinet twice before finding in Roger B. Taney—who as attorney general had declared the move legal—a treasury secretary willing to withdraw U.S. deposits from the Bank of the United States and place them in various state-chartered private institutions, which quickly became known as "pet banks."

The Bank carried on as best it could until the expiry of its charter in 1836, when it sought and won a state charter as the Bank of the United States of Pennsylvania. The rancorous affair became known as the Bank War, and Jackson's victory in it precluded for almost 80 years—until the creation in 1913 of the Federal Reserve System—any effective regulation of private banks in the United States.

United States Air Force, The (USAF), one of the major components of the U.S. armed forces, with primary responsibility for air warfare, air defense, and the development of military space research. It also provides air services in coordination with the other military branches.

U.S. military activities in the air began with the use of balloons by the army for reconnaissance during the American Civil War and the Spanish-American War. The Aeronautical Division of the Signal Corps of the U.S. Army was created on Aug. 1, 1907. Congress passed the first appropriations for aeronautics in 1911 and on July 18, 1914, created the Aviation Section of the Signal Corps. (For the development of naval aviation, *see* United States Navy, The.)

The first use of military aircraft, in an action against Pancho Villa in Mexico in 1916, was a failure. The next year the United States entered World War I with one ill-equipped air unit, the 1st Aero Squadron. The Aviation Act of July 24, 1917, provided increased funds, and the Overman Act of May 20, 1918, removed aviation from the Signal Corps by establishing the Army Bureau of Aircraft Production and the Air Service, U.S. Army.

Much of the success of U.S. military air activity during World War I was attributable to William ("Billy") Mitchell, combat air commander (1917–18), who coordinated air attacks with a combined U.S.-French-British force and developed a strong conviction that the United States should establish a separate air force. Despite his efforts, however, the Army Reorganization Act of 1920 created the Air Service (after 1926, Air Corps) as a combatant unit within the Army.

The Air Corps was supplanted on June 20, 1941, by the Army Air Forces as an autonomous command within the Army. On July 26, 1947, the National Security Act created the independent U.S. Air Force, and Executive Order No. 9877 defined the roles and responsibilities of the new military branch. The National Security Act Amendments of 1949 reorganized the military services, with the Department of the Air Force included within the Department of Defense.

The headquarters of the Department of the Air Force are at the Pentagon, outside Washington, D.C. The department consists of the Office of the Secretary of the Air Force; the chief of staff of the Air Force; the Air Staff, which provides assistance to the secretary and the chief of staff; and the field organization, which, in the early 21st century, consisted of 9 major commands, more than 35 field operating agencies, and several other units.

The nine major commands of the Air Force are the Air Combat Command, which is responsible for all combat aircraft based in the continental United States; Air Force Material Command; Air Education and Training Command; Air Force Space Command; Air Mobility Command; Air Force Special Operations Command; Pacific Air Forces; the United States Air Forces in Europe; and the Air Force Reserve Command. In descending order, major commands are organized into air forces, wings, groups, squadrons, and flights. The field operating agencies of the Air Force perform specialized support, logistical, or administrative functions that are relatively narrow in scope. The United States Air Force Academy at Colorado Springs, Colo., trains officer cadets for the Air Force.

United States Air Force Academy, institution of higher education for the training of commissioned officers for the U.S. Air Force. It was created by act of Congress on April 1, 1954, formally opened on July 11, 1955, at temporary quarters at Lowry Air Force Base, Denver, Colo., and transferred to a permanent site 7 miles (11 km) north of Colorado Springs, Colo., in the latter part of 1958. This academy occupies an 18,000-acre (7,300-hectare) reservation.

The four-year curriculum, leading to a bachelor's degree and a second lieutenant's commission in the Air Force, covers traditional higher education as well as airmanship. Studies include subjects such as government, geography, history, and philosophy, and the science courses range from the fundamentals of mathematics, physics, and chemistry through the technical areas related to aeronautical engineering. The airmanship program includes military training, intramural athletics, leadership, and flight training. The flight training qualifies graduates in aerial navigation, entitling them to the position of an aircraft observer. During the sophomore year, the cadets receive pilot training; and, if physically qualified, most graduates go to Air Force pilot training schools.

Any U.S. citizen of good moral character who will be 17 years old but less than 22 on July 1 of the year that he plans to enter the academy, who has never been married, and who can meet the prescribed physical standards may compete for appointment to the Air Force Academy. Roughly 85 percent of the vacancies, allocated to the states on the basis of congressional representation, are filled by competitive examinations among candidates nominated by United States senators and representatives. The remainder are filled by competitive examinations among candidates nominated by the president and vice president, among members of the regular and reserve components of the Air Force and Army, and children of deceased veterans of the armed forces. Women were admitted to the academy beginning in 1976.

United States Amateur Championship, golf tournament conducted annually in the United States from 1895 for male amateur golfers with handicaps of three or less. The field of 150 golfers is determined by 36-hole sectional qualifying rounds. The championship is conducted by the United States Golf Association.

The championship, originally at match play (most winning holes), was changed to medal play (fewest strokes) in 1965 but returned to match play in 1973. From the 1960s on, the tournament had increasing difficulty in attracting top-flight contestants year after year because most promising young amateurs became professionals. Among amateur champions who later became outstanding professionals are Arnold Palmer (1954) and Jack Nicklaus (1959, 1961). Bobby Jones, one of the greatest American golfers, who first played in the 1916 tournament and won in 1924–25, 1927–28, and 1930, never turned professional. *See* Sporting Record: *Golf.*

United States Army, The, major branch of the U.S. armed forces, charged with the preservation of peace and security and the defense of the nation. The Army furnishes most of the ground forces in the U.S. military organization.

The first regular U.S. fighting force, the Continental Army, was organized by the Second Continental Congress on June 14, 1775, to supplement local militia forces in the imminent War of Independence. It was placed under the control of a five-member civilian board, and U.S. military forces have remained in civilian control ever since. The Constitution (1787) placed the military forces under the control of the president as commander in chief, and in 1789 the civilian Department of War was established to administer the military forces.

The Continental Army was officially disbanded on Nov. 2, 1783. Thereafter, the size of the army increased during times of crisis and decreased during times of peace. The conscription established during World War II was reinstituted in 1948 and was periodically renewed until 1973, when the army was returned to volunteer status.

The current administrative structure of the U.S. Army was established by the National Security Act of 1947 and amendments to it in 1949. The Department of the Army is organized as a military section of the Department of Defense. It is headed by the Office of the Secretary of the Army. The Army Staff gives advice and assistance to the secretary and administers civil functions, including the civil works program of the Corps of Engineers.

The major army field commands are: Forces Command, which is responsible for all army forces in the continental United States, the Army Reserve, and the Army National Guard; Training and Doctrine Command; Material Command, which is responsible for supply logistics and research, development, and evaluation of new material; Intelligence and Security Command; Medical Command; Criminal Investigation Command; Corps of Engineers, which oversees a variety of military and civil development projects; Special Operations Command; Military Traffic Management Command; Military District of Washington, which is charged with defense of the national capital; the Space and Missile Defense Command; U.S. Army Europe; U.S. Army Pacific; and the Eighth Army (stationed in Korea). The Army also administers the U.S. Military Academy at West Point, N.Y.

United States Coast Guard, The (USCG), military service within the U.S. armed forces that is charged with the enforcement of maritime laws. It consists of approximately 35,000 officers and enlisted personnel, in addition to civilians. It is under the jurisdiction of the Department of Homeland Security; in time of war, it functions as part of the U.S. Navy and is under the direction of the president. The USCG was established in 1790 by Secretary of the Treasury Alexander Hamilton as the Revenue Marine Service. It later became the Revenue Cutter Service and, in 1915, was combined with the U.S. Lifesaving Service (formed 1878) to become the Coast Guard. It was under the (peacetime) jurisdiction of the Treasury Department until 1967, when it was transferred to the Department of Transportation. In 2003 the Coast Guard was placed under the jurisdiction of the newly created Department of Homeland Security.

The Coast Guard enforces all applicable federal laws on the high seas and waters within the territorial jurisdiction of the United States. It administers laws and promulgates and enforces regulations for the promotion of safety of life and property along the entire U.S. coast (including Alaska and Hawaii). It develops and operates aids to navigation in order to maintain the safety of ports and vessels in U.S. territorial waters.

The peacetime duties of the Coast Guard involve the inspection of vessels and their equipment and the direction and operation of

lighthouses, lightships, buoys, and such electronic navigational aids as loran (long-range navigation) stations and radio beacons. The Coast Guard maintains an extensive network of lifeboat and search-and-rescue stations using surface vessels and aircraft. It also operates the International Ice Patrol, which maintains surveillance of icebergs in the North Atlantic shipping lanes. The USCG also gathers data for the National Weather Service and assists distressed ships and planes. Wartime duties include ship escort, port security, and manning transports. The Coast Guard also assists in the interdiction of illegal narcotics that enter the United States on or over coastal waters.

The Coast Guard's organization parallels that of the U.S. Navy, and its ranks and ratings are identical to those of the Navy. The two services' uniforms are also similar. The USCG is headed by a Coast Guard admiral who is appointed by the president. Coast Guard Reserve was established in 1939. Women have been permitted to serve in the regular Coast Guard since 1973. The U.S. Coast Guard Academy is located in New London, Conn.

United States Coast Guard Academy, institution of higher learning for the training of commissioned officers for the U.S. Coast Guard, founded by act of Congress in 1876. The academy since 1932 has occupied a 90-acre (36-hectare) site 1.5 miles (2.4 km) north of New London, Conn., overlooking the Thames River.

Entrance to the Coast Guard Academy is restricted to unmarried persons between the ages of 17 and 22 at the time of their appointment. Unlike the naval and military academies, appointment to the Coast Guard Academy is obtained exclusively through nationwide competitive examinations. There are no political nominations. Women were admitted to the academy beginning in 1975. The Coast Guard Academy confers on its graduates the bachelor of science degree and a commission as ensign in the U.S. Coast Guard.

United States Court of Appeals, any of 13 intermediate appellate courts within the United States federal judicial system, including 12 courts whose jurisdictions are geographically apportioned and the United States Court of Appeals for the Federal Circuit, whose jurisdiction is subject-oriented and nationwide.

Each regional Court of Appeals is empowered to review all final decisions and certain interlocutory decisions of district courts within its jurisdiction, except those few decisions that are appealable directly to the Supreme Court of the United States. A Court of Appeals may also review and enforce the orders of some federal regulatory agencies, such as the Federal Trade Commission, the Securities and Exchange Commission, and the National Labor Relations Board. The Courts of Appeals typically sit in panels of three judges, and cases are decided by majority vote. The courts conduct their reviews on the basis of the record of the trial proceedings and typically do not hear witnesses independently or otherwise receive evidence. Their reviews are mostly limited to points of law, not fact. All decisions of the courts of appeals are subject to discretionary review or appeal in the Supreme Court.

The United States has 94 judicial circuits, above which there are 12 regional Courts of Appeals: District of Columbia Circuit, for Washington, D.C.; 1st Circuit, for Maine, New Hampshire, Massachusetts, Rhode Island, and Puerto Rico; 2nd Circuit, for Vermont, Connecticut, and New York; 3rd Circuit, for New Jersey, Pennsylvania, Delaware, and the Virgin Islands; 4th Circuit, for Maryland, West Virginia, Virginia, North Carolina, and South Carolina; 5th Circuit, for Mississippi, Louisiana, and Texas; 6th Circuit, for Ohio, Michigan, Kentucky, and Tennessee; 7th Circuit, for Indiana, Illinois, and Wisconsin; 8th Circuit, for Minnesota, Iowa, Missouri, Arkansas, Nebraska, North Dakota, and South Dakota; 9th Circuit, for California, Oregon, Washington, Arizona, Nevada, Idaho, Montana, Alaska, Hawaii, and certain Pacific islands; 10th Circuit, for Colorado, Wyoming, Utah, New Mexico, Oklahoma, and Kansas; and the 11th Circuit, for Georgia, Florida, and Alabama.

The Court of Appeals for the Federal Circuit, created by an act of Congress in 1982, hears appeals from U.S. district and territorial courts primarily in patent and trademark cases, though it also appeals in cases in which the United States or its agencies is a defendant, as in alleged breaches of contract or in tax disputes. The Court of Appeals for the Federal Circuit is located in Washington, D.C.

United States Court of Appeals for the Armed Forces, formerly UNITED STATES COURT OF MILITARY APPEALS, court created by the Congress of the United States in 1950 as the highest court for military personnel. It hears appeals of cases originally adjudicated in military tribunals, which are presided over by commissioned officers or military judges.

Originally consisting of three civil judges, the court since 1990 has consisted of five judges appointed by the president and confirmed by the Senate for 15-year terms. In the late 20th century, Congress enacted legislation that made some of the court's decisions subject to review by the U.S. Supreme Court.

United States Court of Federal Claims, formerly UNITED STATES CLAIMS COURT, court established by act on Congress of Oct. 1, 1982, to handle cases in which the United States or any of its branches, departments, or agencies is a defendant. The court has jurisdiction over money claims against the United States based on the U.S. Constitution, federal laws, executive regulations, or express or implied contract with the government. The court assumed the original jurisdiction formerly exercised by the United States Court of Claims, concurrently abolished in 1982. The present name was adopted in 1992.

Among the cases handled by this trial court are those arising from supply and construction contracts, those involving compensation for property taken, those arising from claims to back pay or to tax refunds, and those involving alleged government infringement or misinterpretation of private patents, trademarks, copyrights, or licenses. Judges are appointed by the president of the United States and confirmed by the Senate. They serve 15-year terms. Judgments of the court are final on both the claimant and the United States, subject to right of appeal to the United States Court of Appeals for the Federal Circuit (*see* United States Court of Appeals).

United States District Court, in the United States, any of the basic trial-level courts of the federal judicial system. The courts, which exercise both criminal and civil jurisdiction, are based in 94 judicial districts throughout the United States. Each state has at least one judicial district, as do the District of Columbia and Puerto Rico, and a populous state may have as many as four districts. The number of judges varies widely from district to district.

As of 2003, Congress had authorized some 650 district court judgeships. As required by Article III of the U.S. Constitution, the judges of district courts are nominated by the president and confirmed by the Senate and hold their offices "during good Behaviour." Magistrate judges, who are appointed by federal district judges on a full-time basis for eight-year terms or on a part-time basis for four-year terms, play an increasingly important role in assisting district judges. Indeed, with the consent of the parties to the case, they may conduct trials and enter decisions themselves.

Decisions of the district courts are normally subject to appeal, typically to the United States Court of Appeals for the region in which the district court is located.

United States Marine Corps, The (USMC), separate military service within the U.S. Department of the Navy, charged with the provision of marine troops for seizure and defense of advanced bases and with conducting operations on land and in the air incident to naval campaigns. It is also responsible for providing detachments for service aboard certain types of naval vessels, as well as security forces for naval shore installations and U.S. diplomatic missions in foreign countries. The corps specializes in amphibious landings, such as those undertaken against Japanese-held islands in the Pacific during World War II.

The Marine Corps was founded in 1775, when the Continental Congress ordered that two battalions of Marines be raised for service as landing forces with the fleet. Marines have participated in all wars of the United States, being in most instances first, or among the first, to fight. In addition, Marines have executed more than 300 landings on foreign shores and served in every major U.S. naval action since 1775.

The U.S. Marine Corps is structured according to the National Security Act of 1947 and its amendments of 1952. The commandant of the corps has coequal status with members of the Joint Chiefs of Staff in all matters pertaining to the corps. The corps is composed of two operating forces, the Fleet Marine Force, Pacific (FMFPAC) and the Fleet Marine Force, Atlantic (FMFLANT); a supporting establishment for recruitment, training, supply logistics, and maintenance of bases, installations, and schools; and the Marine Corps Reserve.

The Marine Corps emblem is the Western Hemisphere superimposed on a foul anchor and surmounted by a spread eagle. The Corps motto is *Semper Fidelis* (Latin: "Always Faithful"), which is also the title of the Corps march, composed by John Philip Sousa. Perhaps even more familiar is "The Marines' Hymn." The Marine Band, the oldest musical organization in the U.S. armed forces, is known as "The President's Own" because of its privilege of performing at all state functions at the White House. The official colours of the Corps are scarlet and gold, but forest green enjoys semiofficial recognition. From the dress uniform's standing collar—descended from the tall leather neckpiece of the 18th- and 19th-century uniform—comes the traditional nickname for Marines of "leathernecks." In naval formations, Marines have the privilege of forming on the right of line or at the head of column, the traditional places of honour and seniority.

United States Merchant Marine Academy, institution of higher education that prepares cadets to serve as officers in the United States merchant marine. The U.S. Merchant Marine Corps was established in 1938; the academy, occupying 68 acres (27.5 hectares) at Kings Point on the north shore of Long Island, N.Y., was dedicated on Sept. 30, 1943.

Graduates are licensed as either deck or engineer officers and receive the degree of bachelor of science. They are also eligible to apply for commissions as ensign in the U.S. Naval Reserve. Candidates for admission to the academy must be unmarried U.S. citizens, have reached their 17th but not 22nd birthday by July 1 of the year in which they plan to enter the academy, be nominated by a congressman, take a competitive examination held annually, and meet rigid physical requirements.

United States Military Academy, byname WEST POINT ACADEMY, institution of higher



Cadets on parade at the United States Military Academy, West Point, N.Y.
Milton and Joan Mann—CAMERAMANN INTERNATIONAL

education for the training of commissioned officers for the U.S. Army. It was originally founded as a school for the U.S. Corps of Engineers on March 16, 1802, and is one of the oldest service academies in the world. Framed by the Hudson Highlands and poised above the Hudson River, the academy currently occupies about 16,000 acres (6,000 hectares) of Orange county, N.Y., 50 miles (80 km) north of New York City.

Although the site of West Point had been occupied continuously by troops since 1778, it did not become U.S. government property until 1790, when at the request of its owner, Stephen Moore, Congress appropriated the money for its purchase. Subsequent acquisitions were made from time to time.

At the outbreak of the Revolutionary War, both the colonists and the British had recognized the importance of gaining possession of the Hudson River valley, and West Point became the strategic key to its defense. General George Washington established his headquarters there in 1779. In 1780 Major General Benedict Arnold, who was then in command at West Point, attempted to betray it to the British; but his treason was discovered and he fled to the enemy.

The founding of an American military school had been proposed by General Henry Knox in 1776, and Washington and Alexander Hamilton had repeatedly urged adoption of the plan, but it was not until March 16, 1802, that Congress passed the act establishing the United States Military Academy at West Point. The academy opened on July 4, 1802. Before 1812 it was conducted as an apprentice school for military engineers and, in effect, as the first U.S. school of engineering. During its early years, however, the institution suffered from lack of proper organization and discipline.

An act of Congress of April 29, 1812, reorganized the academy and increased the authorized strength of the corps of cadets to 250, expanded the staff of the academy, and established a four-year curriculum. This legislative goal was not effective until the superintendency of Colonel Sylvanus Thayer (1817–33), who became known as the "father of the military academy" because of his lasting influence upon the West Point physical plant, the library, the curriculum, and the pedagogical method. Under Thayer's leadership the academy produced military technicians whose skills were adaptable to meet the civil-engineering needs for the program of internal improvement that accompanied America's westward expansion. An act of Congress of July 13, 1866, allowed the selection of a military academy superintendent from branches of the Army other than the Corps of Engineers.

The academy is under the immediate supervision and control of the Department of the Army, exercised through the superintendent, in whom is vested the immediate military command of the academy and the military post. The goal of the educational program is to instruct and train the corps of cadets so that each graduate will have the qualities and attributes essential to continued development through a lifetime career as an officer in the Army. The four-year course of college-level education and training leads to a bachelor of science degree and a commission as second lieutenant in the Army. The curriculum is balanced between mathematics and basic and engineering sciences, the humanities and social sciences, military science, and physical education.

Cadets must be at least 17 years of age but not yet 22, as well as unmarried, at the time of their appointment. They must have a high-school education or its equivalent and must take scholastic-aptitude tests and a medical examination before admission. Enrollment is 4,417. The great majority of appointments to the academy are made by U.S. senators and representatives. Citizens of the Philippines, the various Latin-American republics, Canada, and certain other countries, if fully qualified, may also be admitted to the academy. Women were first admitted to the academy in 1976.

The academic year lasts from August to May, inclusive. The third class (sophomores) receives extensive field training at the training areas on the academy reservation. The second and first classes (juniors and seniors) obtain supplementary instruction at other Army training centres. The second class also takes part in joint amphibious maneuvers with the midshipmen from the United States Naval Academy, Annapolis, Md. First classmen serve as instructors for the new fourth class (freshmen), which enters the academy in July; they also assist in training the third class.

West Point has trained most of the great American military commanders since the first half of the 19th century. Among its graduates have been Ulysses S. Grant, William T. Sherman, Robert E. Lee, Thomas ("Stonewall") Jackson, Jefferson Davis, John J. Pershing, Dwight D. Eisenhower, Douglas MacArthur, Omar Bradley, and George Patton.

United States National Arboretum, arboretum in Washington, D.C., operated by the U.S. Department of Agriculture, occupying 415 acres (168 hectares) on the west bank of the Anacostia River. Among the more than 7,000 kinds of plants are special collections of camellias, hollies, apple trees, and slow-growing conifers. The arboretum was established in 1937.

United States Naval Academy, byname ANNAPOLIS ACADEMY, institution of higher education conducted by the U.S. Department of the Navy and located at Annapolis, Md., for the purpose of preparing young men and women to enter the lowest commissioned ranks of the U.S. Navy and Marine Corps.

The academy was founded as a Naval School on Oct. 10, 1845, by George Bancroft, historian, educator, and secretary of the Navy, to improve the then-unsatisfactory methods of instructing midshipmen. At first the course was five years, of which only the first and last were spent at the school, the intervening three years being spent on board ships on active service. The school was reorganized in 1850–51 as the U.S. Naval Academy, with a course of study of four consecutive years. A summer practice cruise replaced the omitted sea service and permitted intensive training.

During the American Civil War the academy was moved to Newport, R.I., but was brought back to Annapolis in 1865. In the following years great improvements were effected in the organization and curriculum. During the American Civil War, Spanish-American War, and World Wars I and II, the course was shortened to provide more officers for the fleets.

Under the superintendent, the academy is organized into an executive department, headed by the commandant of midshipmen, who is charged with interior discipline, drills, and all military and professional training; and an academic department, headed by the dean in charge of the faculty and academic programs. Candidates must be U.S. citizens who are between the ages of 17 and 22 and are unmarried. Candidates are appointed upon nomination by the president, the vice president, and the senators, representatives, and territorial delegates in Congress. Also, 170 enlisted personnel each year may be appointed from the Navy and Marine Corps and 170 more from the Naval and Marine Corps Reserve by the president, as well as 65 candidates from among the children of military personnel who died in wartime. Women were admitted to the academy beginning in 1976.

Entrance examinations are designed to admit competent graduates of first-class secondary



Dress parade at the United States Naval Academy, Annapolis, Md.
Eric Carle—Shostal Assoc./EB Inc.

schools. The physical requirements are rigid. The core academic curriculum consists of courses in engineering, the physical sciences, social sciences, and humanities. Professional training is given in such subjects as small arms, drill, seamanship and navigation, tactics, naval engineering, naval weapons, military law, naval electricity and electronics, and leadership. Graduates are awarded the degree of bachelor of science and a commission as ensign in the Navy or as second lieutenant in the Marine Corps. The U.S. Naval postgraduate school was moved from Annapolis to Monterey, Calif., in 1951.

United States Naval Observatory (USNO), in Washington, D.C., an official source, with the U.S. National Institute of Standards and Technology (NIST; formerly the National Bureau of Standards), for standard time in the United States. The positional measurement of celestial objects for purposes of timekeeping and navigation has been the main work of the observatory since its beginning. In 1833 the first small observatory building was constructed near the Capitol. Time signals for the public were first given (1844) by the dropping of a ball from a staff on an observatory building. In 1904 the observatory broadcast the world's first radio time signals.

The observatory has been enlarged and moved several times. A 40-inch (102-centimetre) reflecting telescope acquired in 1934 was moved in 1955 to Flagstaff, Ariz., to obtain better atmospheric conditions, and a 61-inch (155-centimetre) reflector has been in use at Flagstaff since 1964. Other stations are maintained in Florida and in Argentina.

Statutory responsibility for "standard time" (*i.e.*, establishment of time zones in the United States) is currently lodged with the Department of Transportation. The Naval Observatory is specifically responsible for standard time, time interval, and radio-frequency standards for use by the U.S. Department of

Defense and its contractors. Both the USNO and the NIST maintain independent time standards, but since October 1968 they have been coordinated to maintain synchronization to approximately one microsecond. USNO broadcasts time and frequency information at intervals (as the NIST does on a 24-hour basis). Both agencies cooperate with the Bureau International de l'Heure in Paris.

United States Navy, The (USN), major branch of the U.S. military organization, charged with the defense of the nation at sea, the seaborne support of the other U.S. military services, and the maintenance of security on the seas wherever the interests of the United States extend.

The Continental Navy was established by the Second Continental Congress on Oct. 13, 1775, to supply and support the Continental Army during the War of Independence. The Navy was disbanded in 1784, and until 1798 U.S. merchant ships sailed unprotected. To counter the harassment of French and Barbary pirates, the U.S. Congress established the Department of the Navy on April 30, 1798. The U.S. Navy gained valuable experience against the Royal Navy of Great Britain in the War of 1812 and was important in the Union victory in the American Civil War (1861–65).

Sea victories during the Spanish-American War (1898) led to a period of steady growth. Naval aviation was inaugurated in 1910 when a civilian pilot, Eugene Ely, flew an airplane off a cruiser at Hampton Roads, Va.; the next year he landed on and took off from a cruiser in San Francisco Bay. The Office of the Chief of Naval Operations was set up in 1915, and an important shipbuilding program was begun in 1916.

Although the U.S. Navy did not engage in sea battles during World War I, it nevertheless grew eightfold in size. Its chief activities were the transport of about 2,000,000 U.S. troops to France, the patrolling of the North Atlantic sea lanes to protect Allied commerce shipping from German U-boats, and the laying of a large antisubmarine minefield in the North Sea. During the interwar years, the first U.S. aircraft carrier, the USS *Langley,* was launched (1922), a naval patrol was placed in the Atlantic (1939), and the escort of Allied convoys was begun (1941).

The United States entered World War II after the Japanese attack on the U.S. naval base at Pearl Harbor, Hawaii, on Dec. 7, 1941. During the war the U.S. Navy undertook a huge building program that made it larger than all the other combatant nations' navies combined. It expanded from a force of about 300,000 officers and men in mid-1941 to more than 3,000,000 by war's end. The Navy played a more important role in American military operations during World War II than in any previous war in the nation's history. In addtion to antisubmarine operations and troop transport duties, it conducted several major series of amphibious assaults in the Pacific theatre and along the European coast for which it developed new landing craft and tactics. U.S. naval forces fought many major battles with Japanese forces in the Pacific in which aircraft carriers proved decisive. Aircraft carriers have since formed the backbone of the U.S. Navy's fleets.

Since World War II the U.S. Navy has remained the largest and most powerful navy in the world. It built the *Nautilus* (1954), the world's first nuclear-powered submarine, and the *Enterprise* (1961), the first nuclear-powered aircraft carrier. The navy also led in adapting cruisers and submarines for the firing of guided missiles.

The Department of the Navy was placed within the Department of Defense by the 1949 amendments to the National Security Act of 1947. The navy includes the U.S. Marine Corps and, during wartime, the U.S. Coast Guard. The department is headed by a civilian secretary of the navy, who is appointed by the president acting as commander in chief. The chief of naval operations, the senior military officer, advises the president and the secretary, is a member of the Joint Chiefs of Staff, is commander of the navy's operating forces (except the Marine Corps), and directs the Naval Reserve.

The U.S. Navy's four operating forces are the Pacific Fleet, which operates in the Pacific and Indian oceans; the Atlantic Fleet, which operates in the Atlantic Ocean and the Mediterranean Sea; the Naval Forces, Europe; and the Military Sealift Command, which provides ocean transport on government or commercial vessels for the Department of Defense and other federal agencies, provides at-sea logistic support to the armed forces, and conducts scientific and other projects for federal agencies.

The U.S. Naval Academy, established in 1845, is located at Annapolis, Md.

United States Open Championship, one of the world's major golf tournaments, open to both amateur and professional golfers (hence the name). It has been held annually since 1895 under supervision of the United States Golf Association. Since 1898 the competition has been 72 holes of stroke play (the player with the lowest total number of strokes is the winner). Regional qualifying tournaments have been held since 1924 to keep the number of players manageable, although golfers become eligible to compete in the Open by winning specified tournaments. For winners, *see* Sporting Record: *Golf.*

United States Open Tennis Championships, byname U.S. OPEN, international tennis tournament, one of four major annual events in tennis.

The championships, established in 1881 as a national men's singles and doubles contest, were organized by the U.S. National Lawn Tennis Association (USLTA; now the U.S. Tennis Association) and held in Newport, R.I. Women's singles competition was first played in 1887 (officially added in 1889), women's doubles in 1890, and mixed doubles in 1892. Venues for the men's and women's championships were different until 1942; from 1978 all of the U.S. Open championships were played on the hard courts of the USTA's National Tennis Center in Flushing Meadows, N.Y. The U.S. tournament—like the other "Big Four," or "Grand Slam," tennis championships—was opened to professional players as well as to amateurs in 1968. For winners of the U.S. Open, *see* Sporting Record: *Tennis.*

United States Steel Corporation, subsidiary of USX Corporation (*q.v.*).

United States v. E.C. Knight Company, byname SUGAR TRUST CASE (1895), legal case in which the U.S. Supreme Court first interpreted the Sherman Antitrust Act of 1890. The case began when the E.C. Knight Company gained control of the American Sugar Refining Company. By 1892 American Sugar enjoyed a virtual monopoly of sugar refining in the United States, controlling 98 percent of the industry.

President Grover Cleveland ordered the government to sue the Knight Company under the provisions of the Sherman Act, and the case reached the Supreme Court in 1895. The court ruled 8 to 1 against the government, declaring that manufacturing (*i.e.,* refining) was a local activity not subject to congressional regulation of interstate commerce.

The decision, permitting combinations of manufacturers, put most monopolies beyond the reach of the Sherman Antitrust Act. Not until serious trust-busting began under presidents Theodore Roosevelt and William Howard Taft were teeth put into the antitrust laws and the power of monopolies somewhat curtailed.

Consult the INDEX *first*

United States War of Independence, also called AMERICAN REVOLUTION, or AMERICAN REVOLUTIONARY WAR (1775–83), insurrection by which 13 of Great Britain's North American colonies won political independence and went on to form the United States of America.

A brief treatment of the United States War of Independence follows. For full treatment, *see* MACROPAEDIA: United States of America.

After the successful conclusion of the French and Indian War in 1763, the British government decided to make its North American colonies pay more of the costs of governing and defending them. Over the next 12 years Britain imposed a series of new taxes and other revenue-raising measures on the colonies that aroused heated opposition. The American colonists resented the trade regulations by which Britain utilized American economic resources to its own advantage, and they likewise resented their lack of representation in the British Parliament. British intransigence to these grievances spurred a growing desire for independence on the Americans' part. Open fighting broke out between the British and Americans in 1775, and the next year the American colonies declared their independence from Britain.

The conflict thus began as a civil war within the British Empire over colonial affairs, but, with America being joined by France in 1778, Spain in 1779, and the Netherlands in 1780, it became an international war. On land the Americans assembled both state militias and the Continental (national) Army, with approximately 20,000 men, mostly farmers, fighting at any given time. By contrast, the British army was composed of reliable and well-trained professionals, numbering about 42,000 regulars, supplemented by about 30,000 German mercenaries.

The war began when the British general Thomas Gage sent a force from Boston to destroy American rebel military stores at Concord, Mass. After fighting broke out at Lexington and Concord on April 19, 1775, rebel forces began a siege of Boston that ended when the American general Henry Knox arrived with artillery captured from Fort Ticonderoga, forcing General William Howe, Gage's replacement, to evacuate Boston on March 17, 1776. An American force under General Richard Montgomery invaded Canada in the fall of 1775, captured Montreal, and launched an unsuccessful attack on Quebec, in which Montgomery was killed. The Americans maintained a siege on the city until the arrival of British reinforcements in the spring and then retreated to Fort Ticonderoga.

The British government sent General Howe's brother, Richard, Admiral Lord Howe, with a large fleet to join his brother in New York, authorizing them to treat with the Americans and assure them pardon should they submit. When the Americans, who declared themselves independent on July 4, 1776, refused this offer of peace, General Howe landed on Long Island and on August 27 defeated the army of General George Washington, the commander in chief of the American forces. When Washington retreated into Manhattan, Howe drew him north, defeated his army at Chatterton Hill near White Plains on October 28, and then stormed the garrison Washington had left behind on Manhattan, seizing prisoners and supplies. Lord Cornwallis, having taken Washington's other garrison at Fort Lee, drove the American army across New Jersey to the western bank of the Delaware

River and then quartered his troops for the winter at outposts in New Jersey. On Christmas night, Washington crossed the Delaware and attacked Cornwallis' garrison at Trenton, taking nearly 1,000 prisoners. Though Cornwallis soon recaptured Trenton, Washington escaped and went on to defeat British reinforcements at Princeton. Washington's Trenton-Princeton campaign roused the country and kept the struggle for independence alive.

In 1777 a British army under General John Burgoyne moved south from Canada with Albany in New York as its goal. Burgoyne captured Fort Ticonderoga on July 5, but as he approached Albany he was twice defeated by an American force led by Generals Horatio Gates and Benedict Arnold, and on Oct. 17, 1777, at Saratoga, he was forced to surrender his army. Earlier that fall, Howe had sailed from New York to Chesapeake Bay, and once ashore he had defeated Washington's forces at Brandywine Creek on September 11 and occupied the American capital of Philadelphia on September 25.

After a mildly successful attack at Germantown on October 4, Washington quartered his 11,000 troops for the winter at Valley Forge. Though the conditions at Valley Forge were bleak and food was scarce, a Prussian officer, Baron Friedrich Wilhelm von Steuben, was able to give the American troops valuable training in maneuvers and in the more efficient use of their weapons. Von Steuben's aid contributed greatly to Washington's success at Monmouth (now Freehold), N.J., on June 28, 1778. After that battle British forces in the north remained chiefly in and around the city of New York.

While the French had been secretly furnishing financial and material aid to the Americans since 1776, in 1778 they began to prepare fleets and armies and in June finally declared war on Britain. With action in the north largely a stalemate, their primary contribution was in the south, where they participated in such undertakings as the siege of British-held Savannah and the decisive siege of Yorktown. Cornwallis destroyed an army under Gates at Camden, S.C., on Aug. 16, 1780, but suffered heavy setbacks at Kings Mountain on October 7 and at Cowpens on Jan. 17, 1781. After Cornwallis won a costly victory at Guilford Court House, N.C., on March 15, 1781, he entered Virginia to join other British forces there, setting up a base at Yorktown. Washington's army and a force under the French Count de Rochambeau placed Yorktown under siege, and Cornwallis surrendered his army of more than 7,000 men on Oct. 19, 1781.

Thereafter, land action in America died out, though war continued on the high seas. Although a Continental Navy was created in 1775, the American sea effort lapsed largely into privateering, and after 1780 the war at sea was fought chiefly among Britain and America's European allies. American privateers swarmed around the British Isles, and by the end of the war they had captured 1,500 British merchant ships and 12,000 sailors. After 1780 Spain and the Netherlands were able to control much of the water around the British Isles, thus keeping the bulk of British naval forces tied down in Europe.

The Treaty of Paris (Sept. 3, 1783) ended the U.S. War of Independence. Great Britain recognized the independence of the United States (with western boundaries to the Mississippi River) and ceded Florida to Spain. Other provisions called for payment of U.S. private debts to British citizens, U.S. use of the Newfoundland fisheries, and fair treatment for American colonials loyal to Britain.

In explaining the outcome of the war, scholars point out that Britain seemed never to have an overall strategy for winning and often displayed a lack of understanding and cooperation among their armies. The Americans, on the other hand, were by no means inept even before von Steuben's training at Valley Forge, and the state militias performed admirably alongside the Continental Army in crises. French supplies and funds from 1776 to 1778, and direct military and naval support after 1778, enabled the American forces to take advantage of British disorganization, to defeat entire British armies at Saratoga and Yorktown, and to secure the independence of the 13 American states.

United States Women's Amateur Championship, golf tournament conducted annually in the United States for female golfers with handicaps of five or less. A field of 150 players, chosen by sectional qualifying tournaments, plays 36 holes of medal play (fewest strokes), and the 32 lowest scores compete in four rounds of match play (most holes won).

The first championship in 1895 was at medal play but after that at match play in the final rounds. The tournament was conducted until 1926 by the United States Golf Association and thereafter by its Women's Committee. *See* Sporting Record: *Golf.*

United Steelworkers of America (USWA), American union of workers in the steel industry, along with aluminum and other metallurgical workers. The union grew out of an agreement reached in 1936 between the newly formed Committee for Industrial Organization (CIO; later the Congress of Industrial Organizations) and the Amalgamated Association of Iron, Steel, and Tin Workers, an older union that was unable to organize most American steelworkers. Under the agreement, the Steel Workers Organizing Committee (SWOC) was formed with CIO financing and the right to organize on behalf of the Amalgamated Association. Under Philip Murray's leadership it quickly developed into a strong organization, and in 1937 the giant United States Steel Corporation recognized it as a bargaining agent. A group of independent steel firms, known as "little steel," held out against the union until 1941, when, under pressure from the federal government, they too recognized it.

In 1942 SWOC was officially transformed into the United Steelworkers of America, with Murray as president until his death in 1952. The USWA absorbed the Aluminum Workers of America in 1944 and had more than one million members by the mid-1950s, having achieved industry-wide bargaining power in steelmaking. It achieved unprecedented benefits for its members in the decades after World War II. From the mid-1970s into the '90s, however, the USWA saw both its membership and its bargaining power decline as the American steel industry shrank dramatically in response to increased foreign competition.

United Synagogue of America (USA), central federation of some 835 Conservative Jewish congregations located in the United States and Canada. It was organized in 1913 by Solomon Schechter, a Talmudic scholar and spokesman for the Conservative movement.

To assist and increase individual participation in a fuller Jewish life, the United Synagogue has administrative divisions for youth activities, Jewish education, adult studies, music, social action, dietary laws, and congregational standards. The USA is affiliated with the National Federation of Jewish Men's Clubs, The Rabbinical Assembly, and the Women's League for Conservative Judaism.

United Technologies Corporation (UTC), American multi-industry company with significant business concentrations in aerospace products and services. Headquarters are in Hartford, Conn.

UTC's Pratt & Whitney unit makes turbofan and turboprop engines for civil and military aircraft, space propulsion systems, and industrial gas turbines. Its Sikorsky unit supplies military and civil helicopters. Its Hamilton Sundstrand unit makes propellers; controls and systems for aircraft, spacecraft, and submarines; and space life-support systems. Other major units are International Fuel Cells (fuel cells for space and commercial uses), Otis Elevator Company (elevators and escalators), and Carrier Corporation (heating and air-conditioning systems).

UTC was formed in 1934 as United Aircraft Corporation, one of three firms (with Boeing and United Airlines) to emerge from the breakup of United Aircraft and Transport Corporation (formed 1928) owing to U.S. antitrust legislation. Retained by United Aircraft were a number of its antecedent's divisions, among them Pratt & Whitney, Sikorsky, and Hamilton Standard (later Hamilton Sundstrand).

Pratt & Whitney's piston engines were in great demand during World War II. After the war the division successfully expanded into jet engines and then rocket engines for spacecraft, launch vehicles, and missiles. Originally specializing in propellers, Hamilton Standard diversified in the postwar years, starting with aircraft fuel controls and moving on to life-support systems for the U.S. Apollo and space shuttle programs. Sikorsky, founded in 1923 as an independent firm by the aeronautical pioneer Igor Sikorsky, established its future as a leading helicopter maker with the flight of the first practical helicopter, the VS-300, in 1939.

UTC adopted its present name in 1975 to reflect its expansion into non-aerospace businesses. It acquired Otis and Carrier in 1976 and 1979, respectively.

United Workers' Party (Israel): *see* Mapam.

Uniti, Compagnia degli (Italian: "Company of the United"), company of actors performing commedia dell'arte (improvised popular comedy) in Italy in the late 16th and early 17th centuries. This period is acknowledged as the golden age of the genre. The performers were noted for their skills, culture, wit, and sophistication. Leadership was provided by Drusiano Martinelli and his wife, Angelica.

Documents of the company's activities exist from 1578 to 1640, including performances in Genoa, Padua, and the court at Mantua. One of the most noted actors to perform with the Uniti was Silvio Fiorelli, known for the innovations he made in the characters of the cowardly braggart Capitano Mattamoros and the eccentric curmudgeon Pulcinella.

unities, in drama, the three principles governing time, place, and action. Rigid observation of the unities implies that a play should be confined to a single action occurring in a single place and occupying no more than a single day's time.

The three unities evolved and were redefined in 1570 by the Italian humanist Lodovico Castelvetro in his interpretation of Aristotle's *Poetics* and are usually referred to as "Aristotelian rules" for dramatic structure. Actually, Aristotle's observations on tragedy are descriptive rather than prescriptive, and he emphasizes only one unity, that of plot, or action.

In the French Classical tragedy, the unities were adhered to literally and became the source of endless critical polemics. Disputes arose over such problems as whether a single day meant 12 or 24 hours and whether a single place meant one room or one city. Some believed that the action represented in the play should occupy no more time than that required for the play's performance—about two hours. In spite of such severe restrictions, the great 17th-century French dramatists Pierre Corneille and Jean Racine, confining the crises of their characters' lives to a single setting and a brief span of hours, produced a unique form of tragedy that derives its austere power from

its singleness of concentration. The prestige of the unities continued to dominate French drama until the Romantic era, when it was destroyed, in an evening of catcalls and violence, with the opening of Victor Hugo's Romantic tragedy *Hernani* (1830).

In England, where playwrights often had two or more plots in a play, they mixed comedy and tragedy and switched to "another part of the forest" freely; the unities were esteemed in theory but ignored in practice.

Unity of Brethren: *see* Unitas Fratrum.

Unity of Science movement, movement within Logical Positivism that held that propositions in science should describe objectively existing, directly observable states of affairs or events and that there should be a unitary set of physical premises from which the regularities of all of reality could be derived. Thus, it is reductionist in its physicalist observationism and in its proposal for the unity of explanatory principles of science. *See also* unified science.

Unity School of Christianity, also called UNITY, religious movement founded in Kansas City, Mo., in 1889 by Charles Fillmore (1854–1948), a real-estate agent, and his wife, Myrtle (1845–1931). Mrs. Fillmore believed that spiritual healing had cured her of tuberculosis. As a result, the Fillmores began studying spiritual healing. They were deeply influenced by Emma Curtis Hopkins, a former follower of Mary Baker Eddy, who founded Christian Science. Unity, however, is closer to New Thought, which in general emphasizes the primacy of mind and spiritual healing, than it is to Christian Science. Until 1922 it was a member of the International New Thought Alliance.

Unity developed gradually as the Fillmores attempted to share their insights concerning religion and spiritual healing. They began publishing magazines, books, and pamphlets and started the service known as Silent Unity, which, through prayer and counselling, helps people by telephone and by mail. As the work and the number of employees increased, Unity moved several times within Kansas City. After World War I, the Fillmores began developing Unity Village, 15 miles from Kansas City and eventually covering 1,400 acres, and by 1949 all departments of Unity were located there. After Charles Fillmore's death, Unity was led by the Fillmores' sons and grandchildren.

From Unity Village a variety of activities are carried on. The publishing operation produces books, pamphlets, and periodicals, including *Unity, Daily Word,* and *Wee Wisdom.* The staff of Silent Unity is available day and night to aid people through counselling and prayer. It has been reported that as many as 2,500,000 requests for aid are received by Silent Unity each year. All are answered by mail or by telephone free of charge, but many persons who make requests give a contribution. Unity also conducts classes for interested individuals and a course of study for those who wish to become Unity ministers and teachers in the approximately 300 Unity centres, which are located in many states in the U.S. and in other countries.

Although Unity prefers to consider itself a nonsectarian educational institution that attempts to teach religious truth, it has essentially become a denomination. Unity ministers must complete a prescribed course of study and be approved by the Unity School of Christianity. Ministers are organized into the Unity Ministers Association; they hold an annual conference.

Unity emphasizes spiritual healing, prosperity, and practical Christianity. Unlike some New Thought groups, it stresses its agreements with traditional Christianity. Sin, illness, the world, and matter are considered real and material, in contrast to the doctrines of Christian Science, but illnesses are considered unnatural and curable by spiritual means. The practice of medicine, however, is not rejected. There is no definite creed, although a statement written by Charles Fillmore, the *Unity Statement of Faith,* is available in a pamphlet. Unity is tolerant of the beliefs and practices of others.

Official statistics are difficult to interpret, since the movement is interdenominational, but the Unity movement is thought to reach some 6,000,000 persons, most of whom, however, are not members. Its influence extends far beyond the membership.

universal, in epistemology and logic, a general term or common noun representing a recurrence or a principle of grouping or classifying, which is considered as an entity and thus as posing the problem of what sort of being should be ascribed to the referents of general terms. It raises the question, for instance, of whether there is any redness apart from particular red things.

The debate over the status of universals stems from the ancient Greek theory of Forms or Ideas, which Plato held to have a real existence distinct from their manifestations in individual objects; ideal beauty must exist, he thought, as a precondition of its manifesting itself, albeit imperfectly, in certain things recognized as beautiful. Aristotle was rather less positive, arguing that Forms or universals exist but only "in" the particulars in which they are discerned. Although both Plato and Aristotle were Realists in holding that universals are real, there was a difference between them, later summed up in the phrases *universalia ante rem* (Plato's belief in "universals before the thing") and *universalia in re* (Aristotle's belief in "universals in the thing").

Christian Scholastic philosophers of the Middle Ages were influenced on the one hand by Augustine's identification of the Platonic Forms with archetypes in the mind of God and on the other by a passing reference by Boethius, a late Roman scholar, in his commentary on Porphyry's *Isagoge,* to the questions "whether genera and species are substances or are set in the mind alone; whether they are corporeal or incorporeal substances; and whether they are separate from the things perceived by the senses or set in them." The Platonic-Augustinian position, extreme Realism, is reflected in the works of the Pseudo-Dionysius the Areopagite, of John Scotus Erigena, of Anselm, of Guillaume de Champeaux, and of Gilbert de La Porrée; the Aristotelian position, moderate Realism, in those of Albertus Magnus and of Thomas Aquinas.

The medieval minority's opposition to Realism granted existence to universals only as mental concepts. Conceptualist arguments were put forward by Roscelin, by Abelard, and by William of Ockham; but Roscelin and Ockham were so uncompromising that their antagonists equated their conceptualism with Nominalism (*i.e.,* with the contention that universals are merely words or names arbitrarily applied to similar things for convenience). Modern scholars, however, doubt that there were any medieval Nominalists, for extreme Nominalism cannot explain man's perception of similarities.

In the 17th century, however, the Materialist philosopher Thomas Hobbes defended a moderate Nominalism based on the close connection between thought and speech. Later philosophers, divided between those who upheld the validity of ontology (the theory of Being) and those concerned only with logic and with linguistic analysis, shifted the perennial debate about universals into fields of epistemology barely explored by the Scholastics. Thus, modified forms of all four views—Platonic, Aristotelian, Conceptualist, and Nominalist—are still defended.

Universal Copyright Convention (1952), convention adopted at Geneva by an international conference convened under the auspices of UNESCO, which for several years had been consulting with copyright experts from various countries. The convention came into force in 1955.

Its main features are the following: (1) no signatory nation should accord its domestic authors more favourable copyright treatment than the authors of other signatory nations, though no minimum protection for either domestic or foreign authors is stipulated; (2) a formal copyright notice must appear in all copies of a work and consist of the symbol ©, the name of the copyright owner, and the year of first publication; a signatory nation, however, might require further formalities, provided such formalities do not favour domestic over foreign works; (3) the minimum term of copyright in member nations must be the life of the author plus 25 years (except for photographic works and works of applied art, which have a 10-year term); (4) all adhering nations are required to grant an exclusive right of translation for a seven-year period, subject to a compulsory license under certain circumstances for the balance of the term of copyright.

The convention did not abrogate any other multilateral or bilateral conventions or arrangements between two or more member states. Where there are any differences, the provisions of the Universal Copyright Convention are to prevail except as regards the Berne Convention (*q.v.*), which takes priority over the UCC, and conventions or arrangements between two or more American republics.

Both the Universal Copyright Convention and the Berne Convention were revised at a Paris conference in 1971 to take into consideration the special needs of developing countries, especially with regard to translations, reproductions, public performances, and broadcasting. The liberalized regulations were to apply only to teaching, scholarship, and research.

Universal Decimal Classification, also called BRUSSELS CLASSIFICATION, system of library organization. It is distinguished from the Dewey Decimal Classification (*q.v.*) by expansions using various symbols in addition to Arabic numerals, resulting in exceedingly long notations. This system grew out of the international subject index of the Institut Internationale du Bibliographie at Brussels, which in 1895 adopted the Dewey Decimal Classification as the basis for its index. First published in 1905, it was later translated into several languages.

Despite differences, the Dewey and Universal Decimal Classifications are fundamentally the same. In its ability to create a hybrid notation (*i.e.,* Arabic number plus symbol), Universal Decimal parallels the Colon Classification (*q.v.*). Its decimal basis and attempts at hierarchical range underscore its theoretical origin in Dewey. Revision has been continuous.

In particular, it is intended mainly for use with classified cards rather than books. It is, however, used in libraries, notably in Europe and in the United Nations library. Its application has been heavily weighted in the areas of science and technology. The Universal Decimal's Relative Index, for consultation by the public, is arranged alphabetically for access to the number under which a subject or book is classed.

Universal Declaration of Human Rights, declaration completed by the United Nations Commission on Human Rights in June 1948 and adopted, after a few changes, by the General Assembly at its Paris session on Dec. 10, 1948, by unanimous vote (with the six members of the Soviet bloc, Saudi Arabia, and the Union of South Africa abstaining). The declaration contained general definitions

Universal Declaration of Human Rights [1948]

Preamble

Whereas recognition of the inherent dignity and of the equal and inalienable rights of all members of the human family is the foundation of freedom, justice and peace in the world,

Whereas disregard and contempt for human rights have resulted in barbarous acts which have outraged the conscience of mankind, and the advent of a world in which human beings shall enjoy freedom of speech and belief and freedom from fear and want has been proclaimed as the highest aspiration of the common people,

Whereas it is essential, if man is not to be compelled to have recourse, as a last resort, to rebellion against tyranny and oppression, that human rights should be protected by the rule of law,

Whereas it is essential to promote the development of friendly relations between nations,

Whereas the peoples of the United Nations have in the Charter reaffirmed their faith in fundamental human rights, in the dignity and worth of the human person and in the equal rights of men and women and have determined to promote social progress and better standards of life in larger freedom,

Whereas Member States have pledged themselves to achieve, in co-operation with the United Nations, the promotion of universal respect for and observance of human rights and fundamental freedoms,

Whereas a common understanding of these rights and freedoms is of the greatest importance for the full realization of this pledge,

Now, therefore,

The General Assembly

Proclaims this Universal Declaration of Human Rights as a common standard of achievement for all peoples and all nations, to the end that every individual and every organ of society, keeping this Declaration constantly in mind, shall strive by teaching and education to promote respect for these rights and freedoms and by progressive measures, national and international, to secure their universal and effective recognition and observance, both among the peoples of Member States themselves and among the peoples of territories under their jurisdiction.

Article 1

All human beings are born free and equal in dignity and rights. They are endowed with reason and conscience and should act towards one another in a spirit of brotherhood.

Article 2

Everyone is entitled to all the rights and freedoms set forth in this Declaration, without distinction of any kind, such as race, colour, sex, language, religion, political or other opinion, national or social origin, property, birth or other status.

Furthermore, no distinction shall be made on the basis of the political, jurisdictional or international status of the country or territory to which a person belongs, whether it be independent, trust, non-self-governing or under any other limitation of sovereignty.

Article 3

Everyone has the right to life, liberty and the security of person.

Article 4

No one shall be held in slavery or servitude; slavery and the slave trade shall be prohibited in all their forms.

Article 5

No one shall be subjected to torture or to cruel, inhuman or degrading treatment or punishment.

Article 6

Everyone has the right to recognition everywhere as a person before the law.

Article 7

All are equal before the law and are entitled without any discrimination to equal protection of the law. All are entitled to equal protection against any discrimination in violation of this Declaration and against any incitement to such discrimination.

Article 8

Everyone has the right to an effective remedy by the competent national tribunals for acts violating the fundamental rights granted him by the constitution or by law.

Article 9

No one shall be subjected to arbitrary arrest, detention or exile.

Article 10

Everyone is entitled in full equality to a fair, and public hearing by an independent and impartial tribunal, in the determination of his rights and obligations and of any criminal charge against him.

Article 11

1. Everyone charged with a penal offence has the right to be presumed innocent until proved guilty according to law in a public trial at which he has had all the guarantees necessary for his defence.

2. No one shall be held guilty of any penal offence on account of any act or omission which did not consitute a penal offence, under national or international law, at the time when it was committed. Nor shall a heavier penalty be imposed than the one that was applicable at the time the penal offence was committed.

Article 12

No one shall be subjected to arbitrary interference with his privacy, family, home or correspondence, nor to attacks upon his honour and reputation. Everyone has the right to the protection of the law against such interference or attacks.

Article 13

1. Everyone has the right to freedom of movement and residence within the borders of each State.

2. Everyone has the right to leave any country, including his own, and to return to his country.

Article 14

1. Everyone has the right to seek and to enjoy in other countries asylum from persecution.

2. This right may not be invoked in the case of prosecutions genuinely arising from non-political crimes or from acts contrary to the purposes and principles of the United Nations.

Article 15

1. Everyone has the right to a nationality.

2. No one shall be arbitrarily deprived of his nationality nor denied the right to change his nationality.

Article 16

1. Men and women of full age, without any limitation due to race, nationality or religion, have the right to marry and to found a family. They are entitled to equal rights as to marriage, during marriage and at its dissolution.

2. Marriage shall be entered into only with the free and full consent of the intending spouses.

3. The family is the natural and fundamental group unit of society and is entitled to protection by society and the State.

Article 17

1. Everyone has the right to own property alone as well as in association with others.

2. No one shall be arbitrarily deprived of his property.

Article 18

Everyone has the right to freedom of thought, conscience and religion; this right includes freedom to change his religion or belief, and freedom, either alone or in community with others and in public or private, to manifest his religion or belief in teaching, practice, worship and observance.

Article 19

Everyone has the right to freedom of opinion and expression; this right includes freedom to hold opinions without interference and to seek, receive and impart information and ideas through any media and regardless of frontiers.

Article 20

1. Everyone has the right to freedom of peaceful assembly and association.

2. No one may be compelled to belong to an association.

Article 21

1. Everyone has the right to take part in the government of his country, directly or through freely chosen representatives.

2. Everyone has the right of equal access to public service in his country.

3. The will of the people shall be the basis of the authority of government; this will shall be expressed in periodic and genuine elections which shall be by universal and equal suffrage and shall be held by secret vote or by equivalent free voting procedures.

Article 22

Everyone, as a member of society, has the right to social security and is entitled to realization, through national effort and international co-operation and in accordance with the organization and resources of each State, of the economic, social and cultural rights indispensable for his dignity and the free development of his personality.

Article 23

1. Everyone has the right to work, to free choice of employment, to just and favourable conditions of work and to protection against unemployment.

2. Everyone, without any discrimination, has the right to equal pay for equal work.

3. Everyone who works has the right to just and favourable remuneration ensuring for himself and his family an existence worthy of human dignity, and supplemented, if necessary, by other means of social protection.

4. Everyone has the right to form and to join trade unions for the protection of his interests.

Article 24

Everyone has the right to rest and leisure, including reasonable limitation of working hours and periodic holidays with pay.

Article 25

1. Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing and medical care and necessary social services, and the right to security in the event of unemployment, sickness, disability, widowhood, old age or other lack of livelihood in circumstances beyond his control.

2. Motherhood and childhood are entitled to special care and assistance. All children, whether born in or out of wedlock, shall enjoy the same social protection.

Article 26

1. Everyone has the right to education. Education shall be free, at least in the elementary and fundamental stages. Elementary education shall be compulsory. Technical and professional education shall be made generally available and higher education shall be equally accessible to all on the basis of merit.

2. Education shall be directed to the full development of the human personality and to the strengthening of respect for human rights and fundamental freedoms. It shall promote understanding, tolerance and friendship among all nations, racial or religious groups, and shall further the activities of the United Nations for the maintenance of peace.

3. Parents have a prior right to choose the kind of education that shall be given to their children.

Article 27

1. Everyone has the right freely to participate in the cultural life of the community, to enjoy the arts and to share in scientific advancement and its benefits.

2. Everyone has the right to the protection of the moral and material interests resulting from any scientific, literary or artistic production of which he is the author.

Article 28

Everyone is entitled to a social and international order in which the rights and freedoms set forth in this Declaration can be fully realized.

Article 29

1. Everyone has duties to the community in which alone the free and full development of his personality is possible.

2. In the exercise of his rights and freedoms, everyone shall be subject only to such limitations as are determined by law solely for the purpose of securing due recognition and respect for the rights and freedoms of others and of meeting the just requirements of morality, public order and the general welfare in a democratic society.

3. These rights and freedoms may in no case be exercised contrary to the purposes and principles of the United Nations.

Article 30

Nothing in this Declaration may be interpreted as implying for any State, group or person any right to engage in any activity or to perform any act aimed at the destruction of any of the rights and freedoms set forth herein.

not only of those principal civil and political rights recognized in democratic constitutions but also of several so-called economic, social, and cultural rights. To the first group belong such rights as life, liberty, and security of person; freedom from arbitrary arrest, detention, or exile; right to a fair and public hearing by an independent and impartial tribunal; freedom of thought, conscience, and religion; and freedom of peaceful assembly and association. Among the new items in the declaration were the right to social security; right to work; right to education; right to participate in the cultural life of the community; and right to enjoy the arts and to share in scientific advancement and its benefits.

universal man (Humanist ideal): *see* Renaissance man.

Universal Negro Improvement Association (UNIA), primarily in the United States, organization founded by the Marcus Garvey (*q.v.*), dedicated to racial pride, economic self-sufficiency, and the formation of an independent black nation in Africa. Though Garvey had founded the UNIA in Jamaica in 1914, its main influence was felt in the principal urban black neighbourhoods of the U.S. North after his arrival in Harlem, in New York City, in 1916.

Garvey had a strong appeal to poor blacks in urban ghettos, but most black leaders in the U.S. criticized him as an imposter, particularly after he announced, in New York, the founding of the Empire of Africa, with himself as provisional president. In turn, Garvey denounced the NAACP and many black leaders, asserting that they sought only assimilation into white society. Garvey's leadership was cut short in 1923 when he was indicted and convicted of fraud in his handling of funds raised to establish a black steamship line. In 1927, Pres. Calvin Coolidge pardoned Garvey but ordered him deported as an undesirable alien.

The UNIA never revived. Although the organization did not transport a single person to Africa, its influence reached multitudes on both sides of the Atlantic, and it proved to be a forerunner of black nationalism, which emerged in the U.S. after World War II.

Universal Pictures Company, U.S. motion-picture studio that was one of the leading producers of film serials in the 1920s and of popular horror films in the '30s. Carl Laemmle, a film exhibitor turned producer, formed the company in 1912. In its early days it was a top producer of popular, low-budget serials and also presented many of the films of Erich von Stroheim (1885–1957), who was a pioneer in realistic film direction.

For many years after the award-winning film *All Quiet on the Western Front* (1930), the studio presented its characteristic low-budget films, which included the well-known horror films *Frankenstein* (1931) and *Dracula* (1931). In the 1960s it regained much box-office success through the comedies of Doris Day and Rock Hudson. It was known as Universal-International for a time and since the early 1970s has been owned by the Music Corporation of America, which turned it into the largest and most profitable packager of films for television in the world.

Universal Postal Union (UPU), specialized agency of the United Nations that aims to organize and improve postal service throughout the world and to ensure international collaboration in this area. Among the principles governing its operation as set forth in the Universal Postal Convention and the General Regulations, two of the most important

were the formation of a single territory by all signatory nations for the purposes of postal communication and uniformity of postal rates and units of weight. The original agreement adopted in 1875 applied only to letter mail; other postal services, such as parcel post and international money orders, have been regulated by supplementary agreements that are binding only on signing members.

A first attempt to establish some general principles governing international postal service was made at an international conference in Paris in 1863; previously, international postal exchange had been regulated by a plethora of bilateral agreements. At the first International Postal Congress 11 years later, representatives of 22 countries adopted the Bern Treaty, creating the General Postal Union. The union actually came into effect on July 1, 1875; the name was changed to Universal Postal Union at the second congress in 1878. In 1948 the UPU became a specialized agency of the United Nations.

The Universal Postal Congress is the legislative body and meets every five years. The Executive Council, which consists of 40 representative countries elected by the congress, ensures the continuity of the work of the UPU and meets annually. The International Bureau is maintained at Bern and acts as a secretariat in carrying out the daily operations.

Universal Product Code (UPC), a standard bar code (*q.v.*) used to identify grocery and other retail merchandise.

Universal Time (UT), the mean solar time of the Greenwich meridian (0° longitude). Universal Time replaced the designation Greenwich Mean Time in 1928; it is now used to denote the solar time (*q.v.*) when an accuracy of about one second suffices. In 1955 the International Astronomical Union defined several categories of Universal Time of successively increasing accuracy. UT0 represents the initial values of Universal Time obtained by optical observations of star transits at various astronomical observatories. These values differ slightly from each other because of the effects of polar motion (*q.v.*). UT1, which gives the precise angular coordinate of the Earth about its spin axis, is obtained by correcting UT0 for the effects of polar motion. Finally, an empirical correction to take account of annual changes in the Earth's speed of rotation is added to UT1 to convert it into UT2. Coordinated Universal Time (*q.v.*), the international basis of civil and scientific time, is obtained from an atomic clock that is adjusted in epoch so as to remain close to UT1; in this way, the solar time that is indicated by Universal Time is kept in close coordination with atomic time.

Universalism, belief in the salvation of all souls. Although Universalism has appeared at various times in Christian history, most notably in the works of Origen of Alexandria in the 3rd century, as an organized movement it had its beginnings in the United States in the middle of the 18th century. The Enlightenment was responsible for mitigating the sterner aspects of Calvinistic theology and preparing the way for the reemergence of the doctrine of universal salvation. The Universalists believed it impossible that a loving God would elect only a portion of mankind to salvation and doom the rest to eternal punishment. They insisted that punishment in the afterlife was for a limited period during which the soul was purified and prepared for eternity in the presence of God.

The forerunner of Universalism in the United States was George De Benneville (1703–93), who in 1741 migrated from Europe to Pennsylvania, where he preached and practiced medicine. The early Universalist movement was given its greatest impetus by the preaching of John Murray (1741–1815), who moved from England to colonial America in 1770. He propagated the doctrine throughout most of the colonies, often against much opposition from orthodox Christians who believed that Universalism would lead to immorality.

The Universalism of Murray was a modified Calvinism. Near the close of the 18th century Universalists were to follow Hosea Ballou in rejecting Calvinistic tenets. Ballou introduced a Unitarian conception of God and reinterpreted the atonement: the death of Jesus was not a vicarious atonement for the sins of mankind but rather a demonstration of God's infinite and unchangeable love for his children. Ballou also put great stress on the use of reason in religion.

From the 19th century, Urniversalists felt a close kinship with Unitarians, since the two groups shared many views and practices. Various attempts to unite the national bodies of the two denominations, the Universalist Church of America and the American Unitarian Association, culminated in the formation of the Unitarian Universalist Association in 1960 and formal merger in 1961.

Universalist churches are congregational in polity. Each church manages its own affairs but joins with other churches in district or regional groupings. The Church has Universalist Association consists of representatives of the local churches and the districts and seeks to give a continental voice to the movement. Each Universalist church is free to choose its own form of worship. Simple, nonliturgical services are most common, with great emphasis put on the sermon.

From the beginning, Universalists have differed widely in matters of belief. Attempts to write statements of faith, one as late as 1935, met with only partial success. Liberalism, freedom of individual interpretation, tolerance of diversity, agreement on methods of approaching theological and church issues, and belief in the inherent dignity of man have been the strongest elements keeping the movement together. Universalists generally stress the use of reason in religion and modification of belief in the light of the discoveries of science. Thus, the miraculous elements of traditional Christianity are rejected as incompatible with modern knowledge. Jesus is considered a great teacher and an example worthy of imitation, but he is not held to be divine. A broader conception of Universalism began to emerge in the 20th century. Although stressing their ties to the Christian tradition, Universalists were exploring the universal elements of religion and seeking closer relationships with non-Christian religions. *See also* Unitarianism.

universe, the whole cosmic system of matter and energy of which the Earth is a part. *See* Cosmos.

university, institution of higher education, usually comprising a liberal arts and sciences college and graduate and professional schools and having the authority to confer degrees in various fields of study. A university differs from a college in that it is usually larger, has a broader curriculum, and offers graduate and professional degrees in addition to undergraduate degrees. (*See also* higher education.)

The modern university evolved from the medieval schools known as studia generalia (singular, studium generale); they were generally recognized places of study open to students from all parts of Europe. The earliest studia arose out of efforts to educate clerks and monks beyond the level of the cathedral and monastic schools. The inclusion of scholars from foreign countries constituted the primary difference between the studia and the schools from which they grew.

The earliest Western institution that can be called a university was a famous medical school that arose at Salerno, Italy, in the 9th century and drew students from all over Europe. It remained merely a medical school, however. The first true university was founded at Bologna late in the 11th century. It became a widely respected school of canon and civil law. The first university to arise in northern Europe was the University of Paris, founded between 1150 and 1170. It became noted for its teaching of theology, and it served as a model for other universities in northern Europe such as the University of Oxford in England, which was well established by the end of the 12th century. The universities of Paris and Oxford were composed of colleges, which were actually endowed residence halls for scholars. (*See* college.)

These early universities were corporations of students and masters, and they received their charters from popes, emperors, and kings. These universities were free to govern themselves, provided they taught neither atheism nor heresy. Students and masters together elected their own rectors (presidents). As the price of independence, however, universities had to finance themselves. So teachers charged fees, and, to assure themselves of a livelihood, they had to please their students. These early universities had no permanent buildings and little corporate property, and they were subject to the loss of dissatisfied students who could migrate to another city and establish a place of study there. The history of the University of Cambridge began in 1209 when a number of disaffected students moved there from Oxford; and 20 years later Oxford profited by a migration of students from the University of Paris.

From the 13th century on universities were established in many of the principal cities of Europe. Universities were founded at Montpellier (1220) and Aix-en-Provence (1409) in France, at Padua (1222), Rome (1303), and Florence (1321) in Italy, at Salamanca (1218) in Spain, at Prague (1348) and Vienna (1365) in central Europe, at Heidelberg (1386), Leipzig (1409), Freiburg (1457), and Tübingen (1477) in what is now Germany, at Louvain (1425) in present-day Belgium, and at Saint Andrews (1411) and Glasgow (1451) in Scotland.

Until the end of the 18th century, most universities offered a core curriculum based on the seven liberal arts: grammar, logic, rhetoric, geometry, arithmetic, astronomy, and music. Students then proceeded to study under one of the professional faculties of medicine, law, and theology. Final examinations were grueling, and many students failed.

The Protestant Reformation of the 16th century and the ensuing Counter-Reformation affected the universities of Europe in different ways. In the German states, new Protestant universities were founded and older schools were taken over by Protestants, while many Roman Catholic universities became staunch defenders of the traditional learning associated with the Catholic church. By the 17th century, both Protestant and Catholic universities had become overly devoted to defending correct religious doctrines and hence remained resistant to the new interest in science that had begun to sweep through Europe. The new learning was discouraged, and thus many universities underwent a period of relative decline. New schools continued to be founded during this time, however, including ones at Edinburgh (1583), Leiden (1575), and Strasbourg (university status, 1621).

The first modern university was that of Halle, founded by Lutherans in 1694. This progressive-minded school was one of the first to renounce religious orthodoxy of any kind in favour of rational and objective intellectual inquiry, and it was the first where teachers lectured in German (*i.e.*, a vernacular language) rather than in Latin. Halle's innovations were adopted by the University of

Major world universities and colleges

country	name	location	founding date	language of instruction	students*
Afghanistan	Kābul University	Kābul	1932	Persian, Pashtu, English	6,700
Albania	University of Tiranë	Tiranë	1957	Albanian	12,000
Algeria	Algiers, University of	Algiers	1879	Arabic, French	30,000
	Constantine, University of	Constantine	1969	Arabic, French	20,000
	Oran, University of	Oran	1965	Arabic, French	11,000
Angola	University Agostinho Neto	Luanda	1962	Portuguese	4,500
Argentina	Argentina, Catholic University of	Buenos Aires	1958	Spanish	10,000
	Argentine University of Administration Sciences	Buenos Aires	1962	Spanish	5,400
	Buenos Aires, University of	Buenos Aires	1821	Spanish	248,000
	Córdoba, National University of	Córdoba	1613	Spanish	*c.* 75,000
	Cuyo, National University of	Mendoza	1939	Spanish	22,000
	La Plata, National University of	La Plata	1905	Spanish	30,000
	Litoral, National University of the	Santa Fe	1919	Spanish	8,500
	Morón, University of	Morón	1960	Spanish	12,500
	National Technical University	Buenos Aires	1959	Spanish	61,000
	Northeast, National University of the	Corrientes	1957	Spanish	25,000
	Rosario, National University of	Rosario	1968	Spanish	35,000
	Saviour, University of the	Buenos Aires	1956	Spanish	12,000
	Tucumán, National University of	San Miguel de Tucumán	1914	Spanish	36,700
Armenia	Yerevan State University	Yerevan	1920	Armenian, Russian	8,200
Australia	Adelaide, University of	Adelaide	1874	English	9,400
	Australian National University	Canberra	1946	English	5,900
	Bond University	Gold Coast	1987	English	300
	Deakin University	Victoria	1974	English	3,900
	La Trobe University	Bundoora	1964	English	13,200
	Macquarie University	North Ryde	1964	English	11,500
	Melbourne, University of	Parkville (Melbourne)	1853	English	22,400
	Monash University	Clayton	1958	English	15,000
	New England, University of	Armidale	1954	English	9,700
	New South Wales, University of	Kensington (Sydney)	1948	English	19,800
	North Queensland, James Cook University of	Townsville	1970	English	4,700
	Queensland, University of	St. Lucia (Brisbane)	1910	English	18,200
	South Australia, Flinders University of	Bedford Park (Adelaide)	1966	English	6,300
	Sydney, University of	Sydney	1850	English	19,200
	Tasmania, University of	Hobart	1890	English	5,400
	Western Australia, University of	Nedlands (Perth)	1911	English	10,100
	Wollongong, University of	Wollongong	1975	English	8,000
Austria	Graz Technical University	Graz	1811	German	10,000
	Graz University	Graz	1585	German	26,700
	Innsbruck University	Innsbruck	1669	German	24,900
	Johannes Kepler University	Linz	1966	German	11,900
	Klagenfurt University	Klagenfurt	1970	German	4,000
	Salzburg University	Salzburg	1622	German	*c.* 12,100
	Vienna Technical University	Vienna	1815	German	18,500
	Vienna University	Vienna	1365	German	72,000
	Vienna University of Commerce	Vienna	1898	German	*c.* 18,000
Azerbaijan	Azerbaijan State University	Baku	1919	Azerbaijan, Russian	12,400
Bahrain	University of Bahrain	Madīnah 'Īsā	1986	Arabic	4,100
Bangladesh	Bangladesh Agricultural University	Mymensingh	1961	English, Bengali	3,600
	Bangladesh University of Engineering and Technology	Dhākā	1962	English, Bengali	3,800
	Chittagong, University of	Chittagong	1966	Bengali, English	74,500
	Dhākā, University of	Dhākā	1921	English, Bengali	142,000†
	Jahangirnagar University	Dhākā	1970	Bengali, English	2,200
	Rājshāhi, University of	Rājshāhi	1953	English	11,700
Barbados	West Indies, University of the	Bridgetown	1963	English	2,200
Belarus	Belarus State University	Minsk	1921	Belorussian, Russian	18,600
	Gomel State University	Gomel	1969	. . .	7,000
Belgium	Antwerp State University Centre	Antwerp	1965	Dutch	3,000
	Brussels, Free University of	Brussels	1834	Dutch	7,500
	Brussels, Free University of	Brussels	1834	French	14,900
	Ghent, State University of	Ghent (Gent)	1817	Dutch	14,200
	Liège, University of	Liège	1817	French	10,100
	Louvain, Catholic University of	Louvain (Leuven)	1425	Dutch, English	24,000
	Louvain, Catholic University of	Louvain (Leuven)	1425	French	17,700
	Notre-Dame de la Paix University Faculties	Namur	1831	French	4,100

Major world universities and colleges (continued)

country	name	location	founding date	language of instruction	students*
	St. Ignatius University Faculties of Antwerp	Antwerp	1852	Dutch	3,800
Benin	Benin, National University of	Cotonou	1970	French	8,900
Bolivia	Oruro, Technical University of	Oruro	1892	Spanish	c. 13,000
	San Andrés, University of	La Paz	1830	Spanish	37,000
	San Francisco Xavier of Chuquisaca, Royal and Pontifical University of	Sucre	1624	Spanish	10,200
	San Simón, University of	Cochabamba	1832	Spanish	16,000
Bosnia and Hercegovina	Sarajevo, University of	Sarajevo	1949	Serbo-Croatian	33,000
Botswana	Botswana, University of	Gaborone	1976	English	1,900
Brazil	Alagoas, Federal University of	Maceió	1961	Portuguese	6,100
	Amazon, University of the	Manaus	1962	Portuguese	7,600
	Bahia, Federal University of	Salvador	1946	Portuguese	18,400
	Campinas, Catholic University of	Campinas	1941	Portuguese	19,800
	Campinas, State University of	Campinas	1962	Portuguese	10,300
	Ceará, State University of	Fortaleza	1975	Portuguese	10,400
	Fluminense Federal University	Niterói	1960	Portuguese	19,400
	MacKenzie University	São Paulo	1952	Portuguese	14,000
	Maranhão, Federal University of	São Luís	1966	Portuguese	7,400
	Minas Gerais, Federal University of	Belo Horizonte	1927	Portuguese	21,900
	Pará, Federal University of	Belém	1957	Portuguese	21,700
	Paraná, Federal University of	Curitiba	1912	Portuguese	18,200
	Pelotas, Federal University of	Pelotas	1883	Portuguese	6,700
	Pernambuco, Catholic University of	Recife	1951	Portuguese	14,000
	Pernambuco, Federal University of	Recife	1946	Portuguese	c. 18,500
	Rio de Janeiro, Federal University of	Rio de Janeiro	1920	Portuguese	30,000
	Rio de Janeiro, Pontifical Catholic University of	Rio de Janeiro	1941	Portuguese	8,800
	Rio Grande do Sul, Federal University of	Pôrto Alegre	1933	Portuguese	19,900
	Rio Grande do Sul, Pontifical Catholic University of	Pôrto Alegre	1948	Portuguese	25,600
	Santa Maria, Federal University of	Santa Maria	1960	Portuguese	8,600
	São Paulo, Pontifical Catholic University of	São Paulo	1946	Portuguese	15,400
	São Paulo, University of	São Paulo	1934	Portuguese	54,200
	Sinos Valley University	São Leopoldo	1969	Portuguese	21,200
	Uberlândia, Federal University of	Uberlândia	1969	Portuguese	6,300
Bulgaria	"D.A. Cenov" Institute of Economics and Finance	Svishtov	1936	Bulgarian, Russian, French, German, English	4,000
	"Dimitŭr Blagoev" Institute of National Economy	Varna	1920	Bulgarian	5,300
	Institute of Chemical Technology	Sofia	1953	Bulgarian	3,700
	Karl Marx Institute of Economics	Sofia	1920	Bulgarian	7,100
	Lenin Institute of Mechanical and Electrical Engineering	Sofia	1945	Bulgarian	13,000
	Sofia, "Kliment Ohridsky" University of	Sofia	1888	Bulgarian	14,700
Burkina Faso	Ouagadougou, University of	Ouagadougou	1969	French	4,800
Burundi	Burundi, University of	Bujumbura	1960	French	2,200
Cameroon	Yaoundé, University of	Yaoundé	1962	English, French	13,100
Canada	Acadia University	Wolfville, N.S.	1838	English	3,400
	Alberta, University of	Edmonton, Alta.	1906	English, French	25,000
	Athabasca University	Athabasca, Alta.	1970	English	11,000
	Bishop's University	Lennoxville, Que.	1843	English	2,200
	Brandon University	Brandon, Man.	1899	English	3,100
	British Columbia, University of	Vancouver, B.C.	1908	English	26,600
	Brock University	St. Catharines, Ont.	1964	English	9,200
	Calgary, University of	Calgary, Alta.	1945	English	20,900
	Carleton University	Ottawa, Ont.	1942	English	18,500
	Concordia University	Montreal, Que.	1974	English, French	25,900
	Dalhousie University	Halifax, N.S.	1818	English	10,000
	Guelph, University of	Guelph, Ont.	1964	English	11,000
	Kingston, Queen's University at	Kingston, Ont.	1841	English	11,500
	Lakehead University	Thunder Bay, Ont.	1965	English	6,000
	Laval University	Quebec City, Que.	1852	French	34,300
	Lethbridge, University of	Lethbridge, Alta.	1957	English	2,000
	McGill University	Montreal, Que.	1821	English	30,400
	McMaster University	Hamilton, Ont.	1887	English	16,100
	Manitoba, University of	Winnipeg, Man.	1877	English	23,100
	Moncton, University of	Moncton, N.B.	1864	French	10,300
	Montreal, University of	Montreal, Que.	1878	French	48,000
	Mount Allison University	Sackville, N.B.	1840	English	1,800
	Mount St. Vincent University	Halifax, N.S.	1925	English	4,100
	New Brunswick, University of	Fredericton, N.B.	1785	English	8,000

Major world universities and colleges (continued)

country	name	location	founding date	language of instruction	students*
	Newfoundland, Memorial University of	St. John's, Nfld.	1925	English	16,000
	Nova Scotia, Technical University of	Halifax, N.S.	1907	English	1,200
	Ottawa, University of	Ottawa, Ont.	1848	French, English	20,900
	Prince Edward Island, University of	Charlottetown, P.E.I.	1969	English	3,000
	Quebec, University of	Chicoutimi, Que.	1969	French	7,300
		Hull, Que.	1970	French	5,300
		Montreal, Que.	1969	French	36,300
		Rimouski, Que.	1969	French	5,900
		Trois-Rivières, Que.	1969	French	10,400
	Regina, University of	Regina, Sask.	1911	English	9,400
	Royal Military College of Canada	Kingston, Ont.	1876	English, French	800
	Ryerson Polytechnical Institute	Toronto, Ont.	1963	English	31,000
	St. Francis Xavier University	Antigonish, N.S.	1853	English	2,600
	St. Mary's University	Halifax, N.S.	1802	English	6,300
	Saskatchewan, University of	Saskatoon, Sask.	1907	English	17,200
	Sherbrooke, University of	Sherbrooke, Que.	1954	French	15,900
	Simon Fraser University	Burnaby, B.C.	1963	English	13,900
	Toronto, University of	Toronto, Ont.	1827	English	51,000
	Trent University	Peterborough, Ont.	1963	English	3,400
	Trinity Western University	Langley, B.C.	1962	English	1,600
	Victoria, University of	Victoria, B.C.	1963	English	12,500
	Waterloo, University of	Waterloo, Ont.	1957	English	25,000
	Western Ontario, University of	London, Ont.	1878	English	27,400
	Wilfred Laurier University	Waterloo, Ont.	1911	English	10,300
	Windsor, University of	Windsor, Ont.	1857	English	14,000
	Winnipeg, University of	Winnipeg, Man.	1871	English	7,300
	York University	North York, Ont.	1959	English, French	35,100
Central African Republic	Bangui, University of	Bangui	1969	French	2,500
Chad	Chad, University of	N'Djamena	1971	French	1,600
Chile	Chile, Catholic University of	Santiago	1888	Spanish	16,200
	Chile, Northern University of	Antofagasta	1957	Spanish	4,600
	Chile, Southern University of	Valdivia	1954	Spanish	4,900
	Chile, University of	Santiago	1738	Spanish	16,600
	Concepción, University of	Concepción	1919	Spanish	11,500
	Valparaíso, Catholic University of	Valparaíso	1928	Spanish	7,000
China	Amoy University	Amoy, Fukien	1921	Chinese	10,100
	China, People's University of	Peking	1937	Chinese	9,100
	Ch'ing-hua University	Peking	1911	Chinese	14,100
	Fu-tan University	Shanghai	1905	Chinese, English	11,100
	Inner Mongolia University	Hu-ho-hao-t'e, Inner Mongolia	1957	Chinese, Mongolian, English, Japanese	*c.* 2,500
	Kirin University	Ch'ang-ch'un, Kirin	1946	Chinese	8,000
	Kwangtung University	Canton, Kwantung	1906	Chinese	6,300
	Lan-chou University	Lan-chou, Kansu	1909	Chinese	8,000
	Nan-k'ai University	Tientsin	1919	Chinese	10,200
	Nanking University	Nanking, Kiangsu	1902	Chinese, English, French	10,700
	Northwestern University	Sian, Shantung	1912	Chinese, English, Japanese	6,800
	Peking University	Peking	1898	Chinese, English	20,400
	Shantung University	Tsingtao, Shantung	1901	Chinese, English	8,000
	Szechwan University	Cheng-tu, Szechwan	1905	Chinese	11,000
	Wu-han University	Wu-ch'ang, Hupeh	1913	Chinese	9,000
	Yunnan University	K'un-ming, Yunnan	1923	Chinese	5,000
Colombia	Andes, University of the	Bogotá	1948	Spanish	6,000
	Antioquia, University of	Medellín	1822	Spanish	19,000
	Atlantic, University of the	Barranquilla	1941	Spanish	8,800
	Bogotá, "Jorge Tadeo Lozano" University of	Bogotá	1954	Spanish	6,900
	Bolívar Pontifical University	Medellín	1936	Spanish	5,000
	Colombia, National University of	Bogotá	1867	Spanish	*c.* 28,000
	"La Gran Colombia" University	Bogotá	1951	Spanish	*c.* 7,300‡
	Medellín, University of	Medellín	1950	Spanish	*c.* 4,500
	Santander, Industrial University of	Bucaramanga	1947	Spanish	8,200
	Valley, University of the	Cali	1945	Spanish	12,400
Congo	Marien Ngouabi University	Brazzaville	1961	French	10,600
Costa Rica	Costa Rica, University of	San Pedro de Montes de Oca	1843	Spanish	28,200
Côte d'Ivoire	Côte d'Ivoire, National University of	Abidjan	1958	French	12,800
Croatia	Osijek, University of	Osijek	1975	Serbo-Croatian	6,900
	Split, University of	Split	1974	Serbo-Croatian	11,600
	Zagreb, University of	Zagreb	1669	Serbo-Croatian	41,200

Major world universities and colleges (continued)

country	name	location	founding date	language of instruction	students*
Cuba	Havana, University of	Havana	1728	Spanish	16,000
	Las Villas, Central University of	Santa Clara	1952	Spanish, Russian, English	8,200
	Oriente, University of	Santiago de Cuba	1947	Spanish	6,000
Czech Republic	Charles (Karlova) University	Prague	1348	Czech	24,000
	Palacký University	Olomouc	1573	Czech	7,200
	Prague, Technical University of	Prague	1707	Czech	17,200
	University of Agriculture	Brno	1919	Czech	4,500
Denmark	Aarhus University	Århus	1928	Danish	13,000
	Academia Faeroensis	Torshavn	1965	Faroese	70
	Ålborg University	Ålborg	1974	Danish	6,500
	Århus School of Economics and Business Administration	Århus	1939	Danish	6,500
	Copenhagen, University of	Copenhagen	1479	Danish	26,400
	Copenhagen School of Economics and Business Administration	Copenhagen	1917	Danish	14,600
	Denmark, Technical University of	Copenhagen	1829	Danish	5,500
	Odense, University of	Odense	1964	Danish	5,500
Dominican Republic	"Pedro Henríques Ureña" National University	Santo Domingo	1966	Spanish	9,300
	Santo Domingo, Autonomous University of	Santo Domingo	1538	Spanish	c. 52,200
Ecuador	Cuenca, University of	Cuenca	1868	Spanish	21,600
	Ecuador, Central University of	Quito	1769	Spanish	60,000
	Ecuador, Pontifical Catholic University of	Quito	1946	Spanish	8,100
	Guayaquil, University of	Guayaquil	1867	Spanish	60,000
Egypt	'Ain Shams University	Cairo	1950	Arabic	100,200
	Al-Azhar University	Cairo	970	Arabic	90,000
	Al-Manṣūrah University	Al-Manṣūrah	1972	Arabic, English	44,800
	Alexandria, University of	Alexandria	1942	Arabic, English	92,000
	American University in Cairo	Cairo	1919	English	2,700
	Asyūṭ, University of	Asyūṭ	1957	Arabic, English	42,500
	Cairo University	Cairo	1908	Arabic, English	76,800
El Salvador	El Salvador, University of	San Salvador	1841	Spanish	c. 37,000
	"José Simeón Cañas" Central American University	San Salvador	1965	Spanish	7,000
Eritrea	Asmera, University of	Asmera	1958	English	2,900
Estonia	Tartu State University	Tartu	1632	Estonian, Russian	7,700
Ethiopia	Addis Ababa University	Addis Ababa	1950	English	16,100
Fiji	South Pacific, University of	Suva	1968	English	9,000
Finland	Åbo, Swedish University of	Åbo	1917	Swedish	4,500
	Helsinki, University of	Helsinki	1640	Finnish, Swedish	26,900
	Helsinki School of Economics	Helsinki	1911	Finnish	3,600
	Joensuu, University of	Joensuu	1969	Finnish	4,500
	Jyväskylä, University of	Jyväskylä	1863	Finnish	7,700
	Oulu, University of	Oulu	1958	Finnish	8,700
	Tampere, University of	Tampere	1925	Finnish	13,000
	Technology, University of	Espoo	1908	Finnish, Swedish	9,700
	Turku, University of	Turku	1920	Finnish	10,400
France	Aix-Marseille I, University of (University of Provence)	Marseille	1413	French	18,700
	Aix-Marseille II, University of	Marseille	1413	French	19,200
	Aix-Marseille III, University of	Aix-en-Provence	1413	French	16,400
	Angers, University of	Angers	1971	French	9,500
	Besançon, University of	Besançon	1691	French	16,000
	Bordeaux I, University of	Talence	1441	French	18,600
	Bordeaux II, University of	Bordeaux	1441	French	c. 14,200‡
	Bordeaux III, University of	Talence	1441	French	13,800
	Brest (Bretagne-Occidentale), University of	Brest	1970	French	12,200
	Caen, University of	Caen	1432	French	21,000
	Catholic University of the West	Angers	1876	French	5,200
	Clermont-Ferrand I, University of	Clermont-Ferrand	1854	French	8,300
	Clermont-Ferrand II, University of	Clermont-Ferrand	1854	French	11,200
	Dijon, University of	Dijon	1722	French	17,500
	Grenoble I, University of	Grenoble	1339	French	11,600
	Grenoble II, University of	Grenoble	1339	French	14,000
	Grenoble III, University of	Grenoble	1339	French	5,100
	Lille, Catholic University of	Lille	1875	French	11,000
	Lille I, University of	Villeneuve d'Ascq	1560	French	17,000
	Lille II and III, University of	Lille	1560	French	35,900
	Limoges, University of	Limoges	1808	French	10,000
	Lyon, Catholic Faculties of	Lyon	1875	French	5,000
	Lyon I, University of	Lyon	1970	French	23,000

Major world universities and colleges (continued)

country	name	location	founding date	language of instruction	students*
	Lyon II, University of	Lyon	1970	French	15,600
	Maine, University of	Le Mans	1969	French	6,200
	Metz, University of	Metz	1971	French	8,000
	Montpellier I, University of	Montpellier	1220	French	17,900
	Montpellier II, University of	Montpellier	1220	French	7,500
	Montpellier III, University of	Montpellier	1220	French	13,000
	Nancy I and II, University of	Nancy	1572	French	27,500
	Nantes, University of	Nantes	1460	French	19,500‡
	Nice, University of	Nice	1971	French	19,000
	Orléans, University of	Orléans	1306	French	9,200
	Paris, Catholic Institute of	Paris	1875	French	15,000
	Paris I, University of (Panthéon-Sorbonne)	Paris	1100s	French	35,300
	Paris II, University of (University of Law, Economics, and Social Sciences)	Paris	1100s	French	17,800
	Paris III, University of (Sorbonne-Nouvelle)	Paris	1100s	French	17,100‡
	Paris IV, University of (Paris-Sorbonne)	Paris	1100s	French	21,600
	Paris V, University of (René Descartes)	Paris	1100s	French	30,000
	Paris VI, University of (Pierre and Marie Curie)	Paris	1100s	French	*c.* 33,900‡
	Paris VII, University of	Paris	1100s	French	35,000
	Paris VIII, University of (Paris-Vincennes)	Paris	1100s	French	18,800
	Paris IX, University of (Paris-Dauphine)	Paris	1100s	French	5,600
	Paris X, University of (Paris-Nanterre)	Nanterre	1100s	French	26,500
	Paris XI, University of (Paris-Sud)	Orsay	1100s	French	25,000
	Paris XII, University of (Paris-Val-de-Marne)	Créteil	1100s	French	15,000
	Paris XIII, University of (Paris-Nord)	Villetaneuse	1100s	French	13,500
	Pau, University of	Pau	1970	French	9,200
	Perpignan, University of	Perpignan	1971	French	4,000
	Picardie, University of	Amiens	1965	French, English	10,000
	Poitiers, University of	Poitiers	1432	French	17,500
	Reims, University of	Reims	1548	French	17,000
	Rennes I, University of	Rennes	1461	French	18,300
	Rennes II, University of (Haute-Bretagne)	Rennes	1461	French	13,000
	Rouen, University of	Mont-Saint-Aignan	1966	French	16,000
	Saint-Étienne, University of	Saint-Étienne	1969	French	9,900
	Strasbourg I, II, and III, University of	Strasbourg	1538	French	32,400
	Toulon and Var, University of	La Garde	1970	French	3,800
	Toulouse, Catholic Institute of	Toulouse	1877	French	3,700
	Toulouse I, University of (University of Social Sciences)	Toulouse	1229	French	13,300
	Toulouse II, University of (Le Mirail)	Toulouse	1229	French	17,200
	Toulouse III, University of (Paul Sabatier)	Toulouse	1229	French	22,800‡
	Tours, University of (François Rabelais)	Tours	1306	French	18,000
Gabon	Omar Bongo University	Libreville	1970	French	2,400
Georgia	Tbilisi State University	Tbilisi	1918	Georgian, Russian	*c.* 14,500‡
Germany	Augsburg, University of	Augsburg	1970	German	8,700
	Bayreuth, University of	Bayreuth	1972	German	6,500
	Berlin, Free University of	Berlin	1948	German	60,000
	Berlin, Humboldt University of	Berlin	1809	German	*c.* 19,000
	Berlin, Technical University of	Berlin	1799	German	*c.* 31,000
	Bonn, Rhenish Friedrich Wilhelm University of	Bonn	1786	German	40,200
	Braunschweig, Carolo-Wilhelmina Technical University of	Braunschweig	1745	German	15,000
	Bremen, University of	Bremen	1971	German	11,600
	Carl Schorlemmer Technical College of Chemistry	Merseburg	1954	German	3,000
	Clausthal, Technical University of	Clausthal-Zellerfeld	1775	German	3,700
	Cologne, University of	Cologne	1388	German	57,000
	Darmstadt, Technical University of	Darmstadt	1836	German	16,500
	Dortmund, University of	Dortmund	1966	German	19,300
	Dresden, Technical University of	Dresden	1828	German	14,700
	Düsseldorf, Heinrich-Heine University of	Düsseldorf	1907	German	16,000
	Erlangen-Nuremberg, Friedrich Alexander University of	Erlangen	1743	German	27,000

Major world universities and colleges (continued)

country	name	location	founding date	language of instruction	students*
	Ernst-Moritz-Arndt University	Greifswald	1456	German	*c.* 3,500
	Frankfurt, Johann Wolfgang Goethe University of	Frankfurt am Main	1914	German	*c.* 34,000
	Freiburg, Albert Ludwig University of	Freiburg im Breisgau	1457	German	22,600
	Freiberg Mining Academy	Freiberg	1765	German	2,500
	Giessen, Justus Liebig University of	Giessen	1607	German	*c.* 19,000
	Göttingen, Georg August University of	Göttingen	1737	German	30,000
	Halle-Wittenberg, Martin Luther University of	Halle	1502	German	8,600
	Hamburg, University of	Hamburg	1919	German	43,100
	Hannover, University of	Hannover	1831	German	27,700
	Heidelberg, Ruprecht Karl University of	Heidelberg	1386	German	26,900
	Hohenheim, University of	Stuttgart-Hohenheim	1818	German	5,600
	Ilmenau, Technical University of	Ilmenau	1953	German	2,300
	Jena, Friedrich Schiller University of	Jena	1548	German	6,700
	Karlsruhe, University of	Karlsruhe	1825	German	20,100
	Kiel, Christian-Albrechts University of	Kiel	1665	German	18,000
	Leipzig, University of	Leipzig	1409	German	*c.* 14,800
	Mainz, Johannes Gutenberg University of	Mainz	1477	German	26,000
	Mannheim, University of	Mannheim	1907	German	*c.* 9,800
	Marburg, Philipps University of	Marburg/Lahn	1527	German	15,200
	Munich, Ludwig Maximilian University of	Munich	1472	German	60,000
	Munich, Technical University of	Munich	1868	German	23,300
	Münster, Westphalian Wilhelm University of	Münster	1780	German	45,600
	Otto von Guericke Technical College	Magdeburg	1953	German	4,400
	Regensburg, University of	Regensburg	1962	German	*c.* 13,000
	Rhenish-Westphalian Technical University	Aachen	1870	German	36,500
	Rostock, University of	Rostock	1419	German	6,600
	Ruhr, University of the	Bochum	1961	German	34,500
	Saar, University of the	Saarbrücken	1948	German	20,000
	Stuttgart, University of	Stuttgart	1829	German	21,200
	Tübingen, Eberhard-Karl University of	Tübingen	1477	German	23,600
	Würzburg, Bavarian Julius Maximilian University of	Würzburg	1582	German	17,500
Ghana	Cape Coast, University of	Cape Coast	1962	English	1,500
	Ghana, University of	Accra	1948	English	3,400
	University of Science and Technology	Kumasi	1951	English	3,100
Greece	Athens, National Capodistrian University of	Athens	1837	Greek	45,000
	Athens, National Technical University of	Athens	1836	Greek	8,000
	Thessaloniki, Aristotelian University of	Thessaloniki	1925	Greek	56,000
Guam	Guam, University of	Mangilao	1952	English	2,400
Guatemala	Guatemala, University of San Carlos of	Guatemala City	1676	Spanish	50,000
	Rafael Landivar University	Guatemala City	1961	Spanish	7,400
Guinea	Conakry, University of	Conakry	1962	French	4,400‡
	Kankan, University of	Kankan	1963	French	1,000
Guyana	Guyana, University of	Georgetown	1963	English	2,300
Haiti	Haiti, State University of	Port-au-Prince	1920	French	*c.* 4,600
Honduras	Honduras, National University of	Tegucigalpa	1847	Spanish	26,900
Hong Kong	Hong Kong, Chinese University of	Shatin	1963	Chinese, English	7,700
	Hong Kong, University of	Victoria	1911	Chinese, English	8,900
	Hong Kong Polytechnic	Hung Hom	1972	English	11,900
Hungary	Attila József University	Szeged	1872	Hungarian	3,700
	Budapest, Technical University of	Budapest	1782	Hungarian	9,100
	Karl Marx University of Economic Sciences	Budapest	1948	Hungarian	4,300
	Lajos Kossuth University	Debrecen	1912	Hungarian, Russian	2,200
	Loránd Eötvös University	Budapest	1635	Hungarian	8,700
	Pécs, Janus Pannonius University of	Pécs	1922	Hungarian	4,000
	Semmelweis University of Medicine	Budapest	1769	Hungarian, German	3,300
Iceland	Iceland, University of	Reykjavik	1911	Icelandic	4,500
India[a]	Āgra University	Āgra, U.P.	1927	English, Hindi	80,000
	Aligarh Muslim University	Aligarh, U.P.	1875	English	12,700
	Andhra University	Waltair, A.P.	1926	English, Telugu	53,100
	Anna University	Madras, T.N.	1978	English	4,400
	Assam Agricultural University	Jorhāt, Assam	1969	English	1,600
	Banaras Hindu University	Vārānasi, U.P.	1915	Hindi, English	13,200

[a] In the location of Indian cities by political divisions, the following abbreviations are used: A.P., Andhra Pradesh; Chan. U.T., Chandigarh Union Territory; Guj., Gujarāt; Har., Haryāna; J.K., Jammu and Kashmir; Kar., Karnātaka; Ker., Kerala; Mah., Mahārāshtra; M.P., Madhya Pradesh; Or., Orissa; Raj., Rājasthān; T.N., Tamil Nadu; U.P., Uttar Pradesh; W.B., West Bengal.

Major world universities and colleges (continued)

country	name	location	founding date	language of instruction	students*
	Bangalore University	Bangalore, Kar.	1964	English, Kannada	93,400
	Baroda, Maharaja Sayajirao University of	Vadodara, Guj.	1949	English	24,600
	Bhāgalpur University	Bhāgalpur, Bihār	1960	English, Hindi	43,500
	Bihār, University of	Muzaffarpur, Bihār	1952	English, Hindi	84,000
	Bombay, University of	Bombay, Mah.	1857	English	162,000
	Burdwān, University of	Burdwān, W.B.	1960	English, Bengali	70,600
	Calcutta, University of	Calcutta, W.B.	1857	English	235,200
	Cochin, University of	Cochin, Ker.	1971	English	1,000
	Delhi, University of	Delhi	1922	English, Hindi	128,700
	Dibrugarh University	Dibrugarh, Assam	1965	Assamese, English	47,900
	Gauhāti University	Gauhāti, Assam	1948	English	113,400
	Gorakhpur, University of	Gorakhpur, U.P.	1957	Hindi, English	115,000
	Gujarāt University	Ahmadābād, Guj.	1950	Gujarati, Hindi, English	67,400
	Guru Nanak Dev University	Amritsar, Punjab	1969	English, Punjabi, Hindi	64,900
	Haryana Agricultural University	Hissār, Har.	1970	English, Hindi	2,000
	Indian Institute of Technology	Bombay, Mah.	1958	English	1,600
		Delhi	1961	English	2,900
		Kānpur, U.P.	1960	English, Hindi	2,100
		Kharagpur, W.B.	1950	English	2,600
		Madras, T.N.	1959	English	2,300
	Jammu, University of	Jammu, J.K.	1969	English	8,100
	Kānpur University	Kānpur, U.P.	1966	English, Hindi	185,500
	Karnatak University	Dhārwār-Hubli, Kar.	1949	English	51,000†
	Kashmir, University of	Srīnagar, J.K.	1969	English, Urdu	11,900
	Kerala, University of	Trivandrum, Ker.	1937	English	112,700
	Kurukshetra University	Kurukshetra, Har.	1956	English, Hindi	59,000
	Lucknow, University of	Lucknow, U.P.	1921	English, Hindi	45,600
	Madras, University of	Madras, T.N.	1857	English, Tamil	87,000
	Madurai-Kamaraj University	Madurai, T.N.	1966	English, Tamil	132,000
	Magadh University	Buddh Gaya, Bihār	1962	Hindi, English	170,500
	Maharshi Dayanand University	Rohtak, Har.	1976	English	55,100
	Marāthwādā University	Aurangābād, Mah.	1958	English, Marathi	54,100
	Mysore, University of	Mysore, Kar.	1916	English	99,100
	Nāgpur, University of	Nāgpur, Mah.	1923	English, Hindi, Marathi	72,400
	North Bengal, University of	Rājā Rāmmohanpur, W.B.	1962	English, Bengali, Nepali	24,000
	Osmania University	Hyderābād, A.P.	1918	English, Hindi, Urdu, Telugu, Marathi	68,200
	Panjab University	Chandigarh, Chan. U.T.	1947	English, Punjabi, Urdu, Hindi	52,200
	Patna, University of	Patna, Bihār	1917	Hindi, English	17,900
	Poona, University of	Pune, Mah.	1949	English, Marathi	96,000†
	Punjab Agricultural University	Ludhiāna, Punjab	1962	English, Punjabi	2,800
	Punjabi University	Patiāla, Punjab	1962	English, Punjabi	35,000
	Rājasthān, University of	Jaipur, Raj.	1947	English, Hindi	192,000
	Rānchī University	Rānchī, Bihār	1960	English, Hindi	67,500
	Saurāshtra University	Rājkot, Guj.	1967	Gujarati, Hindi, English	37,200†
	Shivaji University	Kolhāpur, Mah.	1962	English, Marathi	56,700
	Utkal University	Bhubaneswar, Or.	1943	English	95,300
	Visva-Bharati University	Sāntiniketan, W.B.	1921	English, Bengali	3,200
Indonesia	Airlangga University	Surabaya	1954	Indonesian	12,000
	Andalas University	Padang	1956	Indonesian	6,100
	Bandung Institute of Technology	Bandung	1920	Indonesian	11,800
	Brawigaya University	Malang	1963	Indonesian	12,000
	Diponegoro University	Semarang	1956	Indonesian, English	14,100
	Gadjah Mada University	Yogyakarta	1949	Indonesian	28,100
	Hasanuddin University	Ujung Pandang	1956	Indonesian, English	14,500
	Indonesian University	Jakarta	1950	Indonesian	13,100
	Jayabaya University	Jakarta	1958	Indonesian	15,000
	Padjadjaran University	Bandung	1957	Indonesian	5,100
	Udayana University	Denpasar	1962	Indonesian	3,100‡
Iran	Eṣfahān, University of	Eṣfahān	1950	Persian	10,200
	Iran University of Science and Technology	Tehrān	1928	Persian	6,000
	Mashad University	Mashad	1956	Persian	8,500‡
	Shirāz, University of	Shirāz	1945	Persian, English	11,500
	Tabriz, University of	Tabriz	1946	Persian	5,300
	Tehrān, University of	Tehrān	1932	Persian	28,600
Iraq	al-Mustansiriya University	Baghdad	1963	Arabic, English	11,000
	Baghdad, University of	Baghdad	1957	Arabic, English	c. 19,300
	Mosul, University of	Mosul	1967	Arabic, English	21,500
Ireland	Dublin, University of (Trinity College)	Dublin	1592	English	8,200

Major world universities and colleges (continued)

country	name	location	founding date	language of instruction	students[a]
	Dublin City University	Dublin	1975	English	3,000
	Ireland, National University of		1908		
	University College, Cork	Cork	1845	English, Irish	5,800
	University College, Dublin	Dublin	1909	English, Irish	10,700
	University College, Galway	Galway	1845	English, Irish	5,000
	Limerick, University of	Limerick	1970	English	4,600
Israel	Bar-Ilan University	Ramat Gan	1953	Hebrew	12,000
	Haifa, University of	Haifa	1963	Hebrew	6,200
	Israel Institute of Technology (the Technion)	Haifa	1912	Hebrew	8,200
	Jerusalem, Hebrew University of	Jerusalem	1918	Hebrew	c. 17,000
	Negev, Ben Gurion University of the	Beersheva	1965	Hebrew	5,800
	Tel Aviv University	Tel Aviv–Yafo	1953	Hebrew	20,000
Italy	Bari, University of	Bari	1924	Italian	42,400
	Bologna, University of	Bologna	1000s	Italian	59,100
	Cagliari, University of	Cagliari	1606	Italian	c. 18,000
	Catania, University of	Catania	1434	Italian	31,600
	Ferrara, University of	Ferrara	1391	Italian	5,500
	Florence, University of	Florence	1321	Italian	46,400
	Genoa, University of	Genoa	1471	Italian	30,400
	Lecce, University of	Lecce	1956	Italian	c. 7,000
	Macerata, University of	Macerata	1290	Italian	c. 5,400
	Messina, University of	Messina	1548	Italian	28,600
	Milan, Polytechnic Institute of	Milan	1863	Italian	34,300
	Milan, University of	Milan	1924	Italian	78,800
	Modena, University of	Modena	1175	Italian	8,200
	Naples, University of	Naples	1224	Italian	c. 100,000
	Padua, University of	Padua	1222	Italian	c. 49,900
	Palermo, University of	Palermo	1777	Italian	c. 20,000
	Parma, University of	Parma	1064	Italian	c. 17,000
	Pavia, University of	Pavia	1361	Italian	21,900
	Perugia, University of	Perugia	1200	Italian	19,300
	Pisa, University of	Pisa	1343	Italian	28,000
	Rome, University of	Rome	1303	Italian	180,000
	Sacred Heart, Catholic University of the	Milan	1920	Italian	28,200
	Sassari, University of	Sassari	1562	Italian	c. 8,500
	Siena, University of	Siena	1240	Italian	11,000
	Trieste, University of	Trieste	1938	Italian	15,100
	Turin, Polytechnic Institute of	Turin	1859	Italian	11,000
	Turin, University of	Turin	1404	Italian	50,100
	Urbino, University of	Urbino	1506	Italian	13,500
	Venice, University of	Venice	1868	Italian	15,100
Jamaica	West Indies, University of the	Kingston	1948	English	5,200
Japan	Chiba University[b]	Chiba	1949	Japanese	12,600
	Chubu Institute of Technology	Kasugai	1964	Japanese	5,600
	Chūō University	Tokyo	1885	Japanese	29,900
	Dōshisha University	Kyōto	1875	Japanese	21,000
	Fukuoka University	Fukuoka	1934	Japanese	21,600
	Gakushuin University	Tokyo	1949	Japanese	7,800
	Hiroshima University[b]	Hiroshima	1949	Japanese	14,300
	Hitotsubashi University[b]	Tokyo	1875	Japanese	4,800
	Hokkai Gakuen Kitami University	Sapporo	1952	Japanese	7,200
	Hokkaidō University[b]	Sapporo	1876	Japanese, English	13,100
	Hōsei University	Tokyo	1880	Japanese	27,300
	Ibaraki University[b]	Mito	1949	Japanese	6,800
	International Christian University	Mitaka	1953	Japanese, English	2,200
	Kagoshima University[b]	Kagoshima	1949	Japanese	8,800
	Kanazawa University	Kanazawa	1949	Japanese	8,300
	Kansai University	Ōsaka	1886	Japanese	21,900
	Keiō University	Tokyo	1858	Japanese	40,200
	Kinki University	Ōsaka	1925	Japanese	23,600
	Kōbe-Gakuin University	Kōbe	1966	Japanese, English	8,100
	Kōbe University	Kōbe	1949	Japanese	12,300
	Kokugakuin University	Tokyo	1882	Japanese	11,200
	Komazawa University	Tokyo	1882	Japanese, English	18,400
	Kumamoto University[b]	Kumamoto	1949	Japanese	7,700
	Kwansei Gakuin University	Nishinomiya	1889	Japanese	14,000
	Kyōto University[b]	Kyōto	1897	Japanese, English	16,300
	Kyūshū University[b]	Fukuoka	1911	Japanese	12,900
	Matsuyama University	Matsuyama	1923	Japanese	5,700
	Meiji Gakuin University	Minato	1877	Japanese	11,700
	Meiji University	Tokyo	1881	Japanese	33,400
	Meisei University	Tokyo	1964	Japanese, English	14,000
	Nagasaki University[b]	Nagasaki	1949	Japanese	c. 8,000

[b] University within the Japanese national university system.

Major world universities and colleges (continued)

country	name	location	founding date	language of instruction	students*
	Nagoya Institute of Technology[b]	Nagoya	1949	Japanese	5,700
	Nagoya University[b]	Nagoya	1939	Japanese	11,900
	Nanzan University	Nagoya	1949	Japanese	5,600
	Nara Women's University[b]	Nara	1908	Japanese	3,200
	Nihon University	Tokyo	1889	Japanese	82,800
	Niigata University[b]	Niigata	1949	Japanese	9,300
	Ochanomizu University[b]	Tokyo	1874	Japanese	2,000
	Okayama University	Okayama	1949	Japanese	11,100
	Ōsaka University[b]	Suita	1931	Japanese, English	14,200
	Rikkyō (St. Paul's) University	Tokyo	1874	Japanese	12,400
	Ritsumeikan University	Kyōto	1900	Japanese	20,700
	Ryukoku University	Kyōto	1639	Japanese	8,400
	Ryukyus, University of the	Okinawa	1950	Japanese	7,000
	Sapporo University	Sapporo	1967	Japanese	5,100
	Senshu University	Tokyo	1880	Japanese	21,200
	Shizuoka University[b]	Shizuoka	1949	Japanese	7,700
	Sophia (Jochi) University	Tokyo	1913	Japanese, English	10,900
	Tamagawa University	Tokyo	1929	Japanese	17,200
	Tōhoku University[b]	Sendai	1907	Japanese	13,800
	Tokai University	Tokyo	1942	Japanese, English	31,800
	Tokyo, University of	Tokyo	1877	Japanese	20,800
	Tokyo Institute of Technology[b]	Tokyo	1881	Japanese	6,500
	Tsukuba, University of[b]	Sakura	1973	Japanese	10,300
	Utsunomiya University[b]	Utsunomiya	1949	Japanese	4,100
	Waseda University	Tokyo	1882	Japanese, English	45,700
	Yokohama National University[b]	Yokohama	1949	Japanese	8,100
Jordan	Jordan, University of	Amman	1962	Arabic, English	12,700
	Yarmūk University	Irbid	1976	Arabic, English	11,500
Kazakhstan	Kazakh State University	Alma-Ata	1934	Russian, Kazakh	12,700
Kenya	Nairobi, University of	Nairobi	1956	English	11,200
Korea, North	Kim Il-sung University	P'yŏngyang	1946	Korean	*c.* 16,000
Korea, South	Chungang University	Seoul	1918	Korean	19,500
	Hanyang University	Seoul	1939	Korean	*c.* 27,000
	Kon-kuk University	Seoul	1946	Korean	19,000
	Korea University	Seoul	1905	Korean	21,700
	Kyongbuk National University	Taegu	1946	Korean	21,300
	Pusan National University	Pusan	1946	Korean	29,000
	Seoul National University	Seoul	1946	Korean	24,500
	Tong-A University	Pusan	1946	Korean	19,500
	Tongguk University	Seoul	1906	Korean	16,000
	Yŏnse University	Seoul	1885	Korean, English	32,300
Kuwait	Kuwait University	Safat	1962	Arabic, English	18,000
Kyrgyzstan	Kyrgyz	Frunze	1951	. . .	12,000
Laos	Sisavangvong University	Vientiane	1958	Lao, French	*c.* 1,600
Latvia	Latvian State University	Riga	1919	Latvian, Russian	11,500
Lebanon	Beirut, American University of	Beirut	1866	English	5,600
	Beirut Arab University	Beirut	1960	Arabic, English	22,000
	Lebanese University	Beirut	1951	Arabic, French, English	27,000
	St. Joseph University	Beirut	1881	French, Arabic, English	6,200
Lesotho	Lesotho, National University of	Roma	1966	English	1,100
Liberia	Liberia, University of	Monrovia	1851	English	3,300
Libya	Al-Fatah University	Tripoli	1973	Arabic	*c.* 24,000
	Gar Younis University	Benghāzī	1955	Arabic	*c.* 1,000
Lithuania	Vilnius State University	Vilnius	1579	Lithuanian	15,800
Madagascar	Madagascar, University of	Antananarivo	1955	French, Malagasy	40,000
Malawi	Malawi, University of	Zomba	1964	English	2,300
Malaysia	Malaya, University of	Kuala Lumpur	1962	Malay, English	11,900
	Malaysia, National University of	Selangor	1970	Malay	10,000
	Malaysia, Technological University of	Kuala Lumpur	1925	Malay, English	7,900
	Malaysia, University of Science of	Penang	1969	Malay, English	9,400
Malta	Malta, University of	Msida	1592	English	2,500
Mauritania	Nouakchott, University of	Nouakchott	1981	Arabic, French, English	2,900
Mauritius	Mauritius, University of	Réduit	1965	English	800
Mexico	Americas, University of the	Santa Catarina Mártir	1940	Spanish, English	4,900
	Coahuila, Autonomous University of	Saltillo	1867	Spanish	13,900
	Guadalajara, Autonomous University of	Guadalajara	1935	Spanish	19,100
	Guadalajara, University of	Guadalajara	1792	Spanish	217,000

[b] University within the Japanese national university system.

Major world universities and colleges (continued)

country	name	location	founding date	language of instruction	students*
	Guanajuato, University of	Guanajuato	1732	Spanish	16,800
	Ibero-American University	Mexico City	1943	Spanish	8,900
	Mexico, Autonomous University of the State of	Toluca	1828	Spanish	20,000
	Mexico, National Autonomous University of	Mexico City	1551	Spanish	327,000
	Mexico, University of the Valley of	Mexico City	1960	Spanish, English, French	21,700
	Michoacán University of San Nicolás of Hidalgo	Morelia	1540	Spanish	45,000
	Monterrey Institute of Technology	Monterrey	1943	Spanish	22,700‡
	National Polytechnic Institute	Mexico City	1936	Spanish	167,300
	Nuevo León, Autonomous University of	San Nicolás de los Garza	1826	Spanish	102,600‡
	Oaxaca, "Benito Juárez" Autonomous University of	Oaxaca	1827	Spanish	15,000
	Puebla, Autonomous University of	Puebla	1937	Spanish	76,700
	San Luis Potosí, Autonomous University of	San Luis Potosí	1826	Spanish	24,500
	Sinaloa, Autonomous University of	Culiacán	1873	Spanish	*c.* 6,000
	Sonora, University of	Hermosillo	1938	Spanish	18,000
	Tamaulipas, Autonomous University of	Ciudad Victoria	1950	Spanish	22,200
	Veracruz, University of	Jalapa	1944	Spanish	64,700
	Yucatán, University of	Mérida	1624	Spanish	10,100
Moldova	Kishinyov State University	Kishinyov	1945	Moldavian, Russian	12,900
Mongolia	Mongolian State University	Ulaanbaatar	1942	Mongolian	4,000
Morocco	al-Qarawīyīn University	Fès	859	Arabic	3,600
	Mohammed Ben Abdellah University	Fès	1974	Arabic, French	23,200
	Mohammed V University	Rabat	1957	Arabic, French	27,300
Mozambique	Eduardo Mondlane University	Maputo	1962	Portuguese	2,300
Myanmar (Burma)	Mandalay, University of	Mandalay	1925	Burmese	22,700
	Yangon, University of	Yangon	1920	Burmese	*c.* 12,500
Nepal	Tribhuvan University	Kāthmāndu	1959	Nepali, English	65,100
Netherlands, The	Amsterdam, University of	Amsterdam	1632	Dutch	27,000
	Delft University of Technology	Delft	1842	Dutch	14,500
	Eindhoven University of Technology	Eindhoven	1956	Dutch	6,500
	Free University of Amsterdam	Amsterdam	1880	Dutch	12,000
	Groningen, State University of	Groningen	1614	Dutch	17,500
	Institute of Social Studies	The Hague	1952	English	*c.* 200
	Leiden, State University of	Leiden	1575	Dutch	17,900
	Nijmegen, Catholic University of	Nijmegen	1923	Dutch, English	*c.* 13,000
	Rotterdam, Erasmus University of	Rotterdam	1973	Dutch	15,000
	State Agricultural University	Wageningen	1918	Dutch	6,000
	Tilburg University	Tilburg	1927	Dutch	8,000
	Twente University of Technology	Enschede	1961	Dutch	6,000
	Utrecht, State University of	Utrecht	1636	Dutch	23,000
Netherlands Antilles	Netherlands Antilles, University of	Willemstad	1970	Dutch	650
New Zealand	Auckland, University of	Auckland	1882	English	15,800
	Canterbury, University of	Christchurch	1873	English	9,800
	Massey University	Palmerston North	1926	English	22,200
	Otago, University of	Dunedin	1869	English	9,700
	Waikato, University of	Hamilton	1964	English	7,000
	Wellington, Victoria University of	Wellington	1899	English	9,700
Nicaragua	Central American University	Managua	1961	Spanish	4,000
	Nicaragua, National Autonomous University of	León	1812	Spanish	22,000
Niger	Niamey, University of	Niamey	1971	French	3,500
Nigeria	Ahmadu Bello University	Zaria	1962	English	15,100
	Calabar, University of	Calabar	1975	English	5,100
	Ibadan, University of	Ibadan	1948	English	12,000
	Jos, University of	Jos	1975	English	*c.* 6,300
	Lagos, University of	Lagos	1962	English	*c.* 10,000
	Nigeria, University of	Nsukka	1960	English	20,900
	Obafemi Awolowo University	Ile-Ife	1961	English	13,200
	Port Harcourt, University of	Choba, Port Harcourt	1975	English	4,100
Norway	Bergen, University of	Bergen	1948	Norwegian	8,400
	Oslo, University of	Oslo	1811	Norwegian	22,000
	Trondheim, University of	Trondheim	1900	Norwegian	9,700
Pakistan	Baluchistan, University of	Quetta	1970	English, Urdu	3,200
	Faisal Shaheed University of Engineering and Technology	Lahore	1961	English	3,600
	Karāchi, University of	Karāchi	1951	English, Urdu	10,200
	Peshāwar, University of	Peshāwar	1950	Urdu, Pushto, English, Persian, Arabic	10,300

Major world universities and colleges (continued)

country	name	location	founding date	language of instruction	students*
	Punjab, University of the	Lahore	1882	Urdu, English	8,400
	Sind, University of	Jām Shoro	1947	Urdu, Sindhi, English	4,600
Panama	Panama, University of	Panama City	1935	Spanish	41,700
Papua New Guinea	Papua New Guinea, University of	Port Moresby	1965	English	3,900
Paraguay	Asunción, National University of	Asunción	1890	Spanish	19,400
	Catholic University "Our Lady of the Assumption"	Asunción	1960	Spanish	10,700
Peru	"Federico Villarreal" National University	Lima	1963	Spanish	25,000
	Lima, University of	Lima	1962	Spanish	9,700
	National Agrarian University	Lima	1902	Spanish	4,200
	National University of Engineering	Lima	1896	Spanish	12,200
	Peru, Pontifical Catholic University of	Lima	1917	Spanish	10,200
	San Agustín, National University of	Arequipa	1828	Spanish	18,400
	San Marcos, National University of	Lima	1551	Spanish	34,200
	Trujillo, National University of	Trujillo	1824	Spanish	11,000
Philippines	Adamson University	Manila	1932	English	22,000
	Arellano University	Manila	1938	English	10,300
	Ateneo de Manila University	Manila	1859	English, Pilipino	11,400
	Central Philippine University	Iloilo	1905	English	10,500
	Centro Escolar (Women's) University	Manila	1907	English, Pilipino	21,300
	East, University of the	Manila	1946	English, Pilipino	34,300
	Far Eastern University	Manila	1928	English	33,400
	Feati University	Manila	1946	English	*c.* 30,000
	Manila Central University	Manila	1904	English	8,100
	Manila, University of	Manila	1913	English	12,000
	Manuel L. Quezon University	Manila	1947	English	22,700
	Mindanao, University of	Davao	1946	English	16,800
	Negros Occidental-Recoletos, University of	Bacolod	1941	English	9,600
	Nueva Caceres, University of	Naga	1948	English	6,700
	Philippines, University of the	Quezon City	1908	English	30,400
	Philippine Women's University	Manila	1919	English	6,200
	St. Louis University	Baguio	1911	English	16,800
	San Agustin, University of	Iloilo	1904	English	12,500
	San Carlos, University of	Cebu	1595	English	19,600
	Santo Tomas, University of	Manila	1611	English, Pilipino	45,200
	Silliman University	Dumaguete	1901	English	7,300
Poland	Adam Mickiewicz University in Poznań	Poznań	1919	Polish	11,900
	Copernicus University	Toruń	1945	Polish	7,900
	Gdańsk Technical University	Gdańsk	1945	Polish	5,000
	Jagiellonian University	Kraków	1364	Polish	9,300
	Kraków Technical University	Kraków	1945	Polish	4,300
	Łódź, Technical University of	Łódź	1945	Polish	5,700
	Łódź, University of	Łódź	1945	Polish	10,600
	Lublin, Catholic University of	Lublin	1918	Polish	4,500
	Marie Curie-Skłodowska University	Lublin	1944	Polish	12,800
	Mining and Metallurgy, Stanislaw Staszic Academy of	Kraków	1919	Polish, English	6,400
	Poznań, Technical University of	Poznań	1919	Polish	3,800
	Silesia, Technical University of	Gliwice	1945	Polish	8,000
	Silesian University	Katowice	1968	Polish	12,000
	Warsaw, Technical University of	Warsaw	1826	Polish	13,500
	Warsaw, University of	Warsaw	1818	Polish	23,000
	Wrocław, Bolesław Bierut University of	Wrocław	1702	Polish	11,300
	Wrocław, Technical University of	Wrocław	1945	Polish	6,900
Portugal	Coimbra, University of	Coimbra	1290	Portuguese	13,100
	Lisbon, Technical University of	Lisbon	1930	Portuguese	14,200
	Lisbon, University of	Lisbon	1288	Portuguese	17,200
	Porto, University of	Porto	1911	Portuguese	17,000
	Portugal, Catholic University of	Lisbon	1968	Portuguese	6,600
Puerto Rico	Puerto Rico, Catholic University of	Ponce	1948	Spanish, English	11,600
	Puerto Rico, Inter-American University of	San Juan	1912	Spanish, English	38,400
	Puerto Rico, University of	Rio Piedras	1903	Spanish, English	22,100
	Sacred Heart, University of the	Santurce	1935	Spanish	*c.* 6,500
Romania	"Alexandri Ion Cuza" University	Iaşi	1860	Romanian	4,500
	Braşov, University of	Braşov	1948	Romanian	8,000
	Bucharest, Technical Institute of ("Gheorghe Gheorghiu-Dej")	Bucharest	1819	Romanian	26,000
	Bucharest, University of	Bucharest	1694	Romanian	13,700
	Cluj-Napoca, University of	Cluj-Napoca	1919	Romanian, Hungarian	6,000

Major world universities and colleges (continued)

country	name	location	founding date	language of instruction	students[a]
	Craiova, University of	Craiova	1966	Romanian	10,000
	Iaşi, Polytechnic Institute of ("Gheorghe Asachi")	Iaşi	1912	Romanian	14,900
	Timişoara, Technical Institute of	Timişoara	1920	Romanian	12,600
Russia	Bashkir State University	Ufa	1957	Bashkir, Russian, Tatar	c. 8,500
	Chuvash State University	Cheboksary	1967	...	8,000
	Dagestan State University	Makhachkala	1957	...	8,000
	Far Eastern State University	Vladivostok	1920	Russian	10,000
	Irkutsk State University	Irkutsk	1918	Russian	9,000
	Kazan State University	Kazan	1804	...	11,000
	Mordovian State University	Saransk	1957	...	16,000
	Moscow State University	Moscow	1755	Russian	28,000
	Novosibirsk State University	Novosibirsk	1959	Russian	3,500
	Perm State University	Perm	1817	...	9,300
	Petrozavodsk State University	Petrozavodsk	1940	...	7,000
	Rostov State University	Rostov-na-Donu	1917	...	9,600
	St. Petersburg State University	St. Petersburg	1819	Russian	20,000
	Saratov State University	Saratov	1909	...	c. 10,000
	Tomsk State University	Tomsk	1888	...	c. 8,000
	Ural State University	Sverdlovsk	1920	Russian	c. 10,000
	Voronezh State University	Voronezh	1918	...	12,000
	Yakutsk State University	Yakutsk	1934	Russian	8,000
Rwanda	Rwanda, National University of	Butare	1963	French	1,700
Saudi Arabia	Islāmic University	Medina	1961	Arabic	2,700
	Islāmic University of Imam Muhammad Ibn Saud	Riyadh	1974	Arabic	12,400
	King Saud University	Riyadh	1957	Arabic, English	32,000
Senegal	Dakar, University of	Dakar	1949	French	11,500
Sierra Leone	Sierra Leone, University of§				
	Fourah Bay College	Freetown	1827	English	1,400
	Njala University College	Njala	1963	English	900
Singapore	Singapore, National University of	Singapore	1946	English	15,000
Slovakia	Bratislava, Slovak Technical University in	Bratislava	1938	Slovak	15,000
	Comenius (Komenského) University	Bratislava	1919	Slovak	12,800
	Šafárik University	Košice	1959	Slovak	3,500
Slovenia	Ljubljana, University of	Ljubljana	1595	Slovene	17,000
	Maribor, University of	Maribor	1975	Slovene	11,200
Somalia	Somalia National University	Mogadishu	1954	Somali, Arabic, Italian, English	4,600
South Africa	Cape Town, University of	Cape Town	1829	English	13,400
	Durban-Westville, University of[c]	Durban	1961	English	7,400
	Natal, University of	Durban	1910	English	11,500
	North, University of the[d]	Pietersburg	1959	English	6,600
	Orange Free State, University of	Bloemfontein	1855	Afrikaans	8,900
	Port Elizabeth, University of	Port Elizabeth	1964	Afrikaans, English	4,500
	Potchefstroom University	Potchefstroom	1869	Afrikaans	9,200
	Pretoria, University of	Pretoria	1908	Afrikaans	23,000
	Rand Afrikaans University	Johannesburg	1966	Afrikaans	8,500
	Rhodes University	Grahamstown	1904	English	3,700
	South Africa, University of	Pretoria	1873	English, Afrikaans	99,400
	Stellenbosch, University of	Stellenbosch	1881	Afrikaans	14,000
	Western Cape, University of	Bellville	1960	English, Afrikaans	10,600
	Witwatersrand, University of the	Johannesburg	1922	English	18,700
Spain	Barcelona, Autonomous University of	Barcelona	1968	Spanish, Catalan	33,800
	Barcelona, University of	Barcelona	1450	Spanish, Catalan	83,500
	Comillas Pontifical University	Madrid	1892	Spanish	12,100
	Deusto, University of	Bilbao	1886	Spanish, Basque	14,400
	Granada, University of	Granada	1526	Spanish	37,700
	La Laguna, University of	Tenerife	1701	Spanish	16,000
	Madrid, Autonomous University of	Madrid	1968	Spanish	28,000
	Madrid, University of	Madrid	1508	Spanish	105,000
	Málaga, University of	Málaga	1972	Spanish	15,800
	Murcia, University of	Murcia	1915	Spanish	c. 23,000
	Navarre, University of	Pamplona	1952	Spanish	15,900
	Polytechnical University of Cataluña	Barcelona	1971	Spanish, Catalan	16,500
	Salamanca, University of	Salamanca	1218	Spanish	c. 24,000
	Santiago de Compostela, University of	Santiago de Compostela	1501	Spanish, Galician	53,000

[c] For Indian students (also open to whites since 1978). [d] For Tsonga, Sotho, Venda, and Tswana students.

Major world universities and colleges (continued)

country	name	location	founding date	language of instruction	students*
	Saragossa, University of	Zaragoza	1474	Spanish	35,400
	Seville, University of	Seville (Sevilla)	1502	Spanish	46,700
	Valencia, University of	Valencia	1500	Spanish	44,400
	Valladolid University	Valladolid	1293	Spanish	*c.* 30,500
Sri Lanka	Colombo, University of	Colombo	1921	Sinhalese, Tamil, English	3,400
Sudan, The	Cairo University (Khartoum Branch)	Khartoum	1955	. . .	*c.* 20,000
	Khartoum, University of	Khartoum	1902	Arabic	14,000
	Omdurman Islamic University	Omdurman	1965	Arabic	2,000
Suriname	Suriname, University of	Paramaribo	1968	Dutch, English	600
Swaziland	Swaziland, University of	Kwaluseni	1964	English	1,500
Sweden	Chalmers University of Technology	Göteborg	1829	Swedish	5,500
	Göteborg University	Göteborg	1891	Swedish	22,000
	Lund, University of	Lund	1666	Swedish	*c.* 23,000
	Royal Institute of Technology	Stockholm	1827	Swedish	8,500
	Stockholm University	Stockholm	1877	Swedish	28,000
	Umeå University	Umeå	1963	Swedish	*c.* 10,000
	Uppsala, University of	Uppsala	1477	Swedish	18,000
Switzerland	Basel, University of	Basel	1460	German	6,600
	Bern, University of	Bern	1528	German	8,400
	Fribourg, University of	Fribourg	1889	French, German	5,400
	Geneva, University of	Geneva	1559	French	11,500
	Lausanne, University of	Lausanne	1537	French	6,700
	Neuchâtel, University of	Neuchâtel	1909	French	2,400
	Swiss Federal Institute of Technology	Zürich	1855	German, French	11,000
	Zürich, University of	Zürich	1523	German	19,300
Syria	Aleppo, University of	Aleppo	1960	Arabic, French, English	47,200
	Damascus, University of	Damascus	1903	Arabic	82,500
Taiwan	Fu-Jen Catholic University	Hsin-chuang	1961	Chinese, English	16,600
	National Cheng Kung University	T'ai-nan	1931	Chinese, English	11,400
	National Chengchi University	Taipei	1927	Chinese, English	6,900
	National Chung Hsing University	T'ai-chung	1961	Chinese, English	10,000
	National Institute of Technology	Taipei	1974	Chinese	2,600
	National Taiwan Normal University	Taipei	1946	Chinese	7,500
	National Taiwan University	Taipei	1928	Chinese	16,500
	National Tsing Hua University	Hsin-chu	1911	Chinese	4,000
	Soochow University	Taipei	1900	Chinese, English	10,500
	Tunghai University	T'ai-chung	1955	Chinese, English	7,200
Tajikistan	Tajik State University	Dushanbe	1948	Tajik	*c.* 12,300
Tanzania	Dar es Salaam, University of	Dar es Salaam	1961	English	3,100
Thailand	Chiengmai University	Chiengmai	1964	Thai, English	10,400
	Chulalongkorn University	Bangkok	1917	Thai	19,000
	Kasetsart University	Bangkok	1943	Thai, English	11,900
	Mahidol University	Bangkok	1943	Thai, English	9,500
	Sri Nakharinwirot University	Bangkok	1954	Thai	24,500
	Thammasat University	Bangkok	1934	Thai	1,800
Togo	Benin, University of	Lomé	1965	French	5,200
Trinidad and Tobago	West Indies, University of the	St. Augustine	1946	English	4,200
Tunisia	Tunis, University of	Tunis	1960	Arabic, French	29,600‡
Turkey	Aegean University	İzmir	1955	Turkish, English	18,000
	Ankara, University of	Ankara	1946	Turkish	*c.* 30,000
	Atatürk University	Erzurum	1957	Turkish	17,900
	Hacettepe University	Ankara	1206	Turkish, English	25,800
	Istanbul, Technical University of	Istanbul	1773	Turkish	18,700
	Istanbul, University of	Istanbul	1453	Turkish	31,700
	Karadeniz University	Trabzon	1963	Turkish	10,200
	Middle East Technical University	Ankara	1956	English	17,800
	Uludağ University	Bursa	1975	Turkish	18,200
Turkmenistan	Turkmen State University	Ashkhabad	1950	. . .	11,000
Uganda	Makerere University	Kampala	1922	English	7,000
Ukraine	Chernovtsy State University	Chernovtsy	1875	. . .	10,000
	Dnepropetrovsk State University	Dnepropetrovsk	1918	Russian	12,300
	Donetsk State University	Donetsk	1965	Russian	*c.* 12,000
	Kharkov State University	Kharkov	1805	Ukrainian, Russian	12,000
	Kiev State University	Kiev	1834	Ukrainian	20,000
	Lviv State University	Lviv	1661	Ukrainian	13,000
	Odessa State University	Odessa	1865	. . .	12,000
	Uzhgorod State University	Uzhgorod	1945	Ukrainian	*c.* 10,000

Major world universities and colleges (continued)

country	name	location	founding date	language of instruction	students
United Kingdom	Aberdeen, University of	Aberdeen, Scot.	1495	English	9,000
	Aston University	Birmingham, Eng.	1895	English	4,900
	Bath, University of	Bath, Eng.	1856	English	5,000
	Belfast, Queen's University of	Belfast, N.Ire.	1845	English	11,800
	Birmingham, University of	Birmingham, Eng.	1900	English	14,400
	Bradford, University of	Bradford, Eng.	1957	English	6,700
	Bristol, University of	Bristol, Eng.	1876	English	11,400
	Brunel University	Uxbridge, Eng.	1957	English	12,100
	Cambridge, University of	Cambridge, Eng.	1200s	English	14,500
	City University	London	1894	English	6,800
	Dundee, University of	Dundee, Scot.	1881	English	6,600
	Durham, University of	Durham, Eng.	1832	English	9,800
	East Anglia, University of	Norwich, Eng.	1964	English	7,500
	Edinburgh, University of	Edinburgh	1583	English	17,100
	Essex, University of	Colchester, Eng.	1961	English	5,400
	Exeter, University of	Exeter, Eng.	1922	English	9,100
	Glasgow, University of	Glasgow, Scot.	1451	English	16,500
	Heriot-Watt University	Edinburgh	1821	English	9,500
	Hull, University of	Hull, Eng.	1927	English	10,300
	Keele, University of	Staffordshire, Eng.	1949	English	5,400
	Kent at Canterbury, University of	Canterbury, Eng.	1965	English	8,200
	Lancaster, University of	Lancaster, Eng.	1964	English	9,300
	Leeds, University of	Leeds, Eng.	1874	English	19,600
	Leicester, University of	Leicester, Eng.	1918	English	8,200
	Liverpool, University of	Liverpool, Eng.	1881	English	12,200
	London, University of	London	1836	English	75,900
	Loughborough University of Technology	Loughborough, Eng.	1952	English	10,000
	Manchester, Victoria University of	Manchester, Eng.	1851	English	16,500
	Newcastle upon Tyne, University of	Newcastle upon Tyne, Eng.	1834	English	12,900
	Nottingham, University of	Nottingham, Eng.	1881	English	10,500
	Open University	Milton Keynes, Eng.	1969	English	195,200
	Oxford, University of	Oxford, Eng.	1100s	English	14,500
	Reading, University of	Reading, Eng.	1892	English	11,200
	Royal College of Art	London	1837	English	700
	St. Andrews, University of	St. Andrews, Scot.	1411	English	5,000
	Salford, University of	Salford, Eng.	1896	English	15,700
	Sheffield, University of	Sheffield, Eng.	1897	English	14,400
	Southampton, University of	Southampton, Eng.	1862	English	11,900
	Stirling, University of	Stirling, Eng.	1967	English	6,000
	Strathclyde, University of	Glasgow	1796	English	12,200
	Surrey, University of	Guildford, Eng.	1891	English	6,700
	Sussex, University of	Brighton, Eng.	1961	English	8,900
	Ulster, University of	Londonderry, N.Ire.	1984	English	18,400
	Wales, University of	Cardiff, Wales	1893	English, Welsh	33,800
	Warwick, University of	Coventry, Eng.	1965	English	13,300
	York, University of	Heslington, Eng.	1963	English	5,500
United States	Adelphi University	Garden City, N.Y.	1896	English	9,000
	Akron, University of	Akron, Ohio	1870	English	24,800 ‖
	Alabama, University of	Tuscaloosa, Ala.	1818	English	19,500
		Birmingham, Ala.	1966	English	16,300
		Huntsville, Ala.	1950	English	7,500
	Alabama State University	Montgomery, Ala.	1874	English	5,600
	Alaska, University of	Fairbanks, Alaska	1917	English	9,400 ‖
		Anchorage, Alaska	1954	English	17,800 ‖
		Juneau, Alaska (Southeast)	1972	English	4,600 ‖
	American University	Washington, D.C.	1893	English	11,300
	Amherst College	Amherst, Mass.	1821	English	1,600
	Antioch University	Yellow Springs, Ohio	1852	English	3,800
	Appalachian State University	Boone, N.C.	1899	English	11,600
	Arizona, University of	Tucson, Ariz.	1885	English	30,900
	Arizona State University	Tempe, Ariz.	1885	English	43,000
	Arkansas, University of	Fayetteville, Ark.	1871	English	14,700
		Little Rock, Ark.	1927	English	11,500
		Monticello, Ark.	1909	English	1,900
		Pine Bluff, Ark.	1873	English	3,700
	Arkansas State University	Jonesboro, Ark.	1909	English	10,200
	Auburn University	Auburn, Ala.	1856	English	21,400
	Augustana College	Rock Island, Ill.	1860	English	2,100
	Ball State University	Muncie, Ind.	1918	English	19,500
	Bard College	Annandale-on-Hudson, N.Y.	1860	English	1,000
	Baylor University	Waco, Texas	1845	English	12,000
	Bennington College	Bennington, Vt.	1925	English	600
	Boise State University	Boise, Idaho	1932	English	14,900
	Boston College	Chestnut Hill, Mass.	1863	English	14,000
	Boston University	Boston, Mass.	1839	English	29,800

Major world universities and colleges (continued)

country	name	location	founding date	language of instruction	students[a]
	Bowdoin College	Brunswick, Maine	1794	English	1,400
	Bowling Green State University	Bowling Green, Ohio	1910	English	17,200
	Bradley University	Peoria, Ill.	1897	English	6,200
	Brandeis University	Waltham, Mass.	1948	English	3,500
	Brigham Young University	Provo, Utah	1875	English	27,000
	Brown University	Providence, R.I.	1764	English	7,300
	Bryn Mawr College	Bryn Mawr, Pa.	1885	English	1,800
	Bucknell University	Lewisburg, Pa.	1846	English	3,600
	Butler University	Indianapolis, Ind.	1855	English	4,700
	California, University of	Berkeley, Calif.	1855	English	31,100
		Davis, Calif.	1905	English	21,800
		Irvine, Calif.	1965	English	16,800
		Los Angeles, Calif.	1919	English	35,300
		Riverside, Calif.	1907	English	8,900
		San Diego (at La Jolla), Calif.	1912	English	17,800
		San Francisco, Calif.	1873	English	3,700
		Santa Barbara, Calif.	1891	English	17,800
		Santa Cruz, Calif.	1965	English	10,000
	California Institute of Technology	Pasadena, Calif.	1891	English	1,900
	California Institute of the Arts	Valencia, Calif.	1961	English	1,100
	California Polytechnic State University	San Luis Obispo, Calif.	1901	English	15,400
	California State Polytechnic University, Pomona	Pomona, Calif.	1938	English	18,900
	California State University	Bakersfield, Calif.	1965	English	5,300
		Chico, Calif.	1887	English	14,000
		Dominguez Hills, Calif.	1960	English	10,000
		Fresno, Calif.	1911	English	17,300
		Fullerton, Calif.	1957	English	24,000
		Hayward, Calif.	1957	English	12,800
		Long Beach, Calif.	1949	English	32,900
		Los Angeles, Calif.	1947	English	18,000
		Northridge, Calif.	1958	English	30,000
		Sacramento, Calif.	1947	English	23,300
		San Bernardino, Calif.	1960	English	11,900
		San Marcos, Calif.	1990	English	2,400 ‖
		Turlock, Calif. (Stanislaus)	1957	English	5,900
	Carleton College	Northfield, Minn.	1866	English	1,800
	Carnegie Mellon University	Pittsburgh, Pa.	1900	English	7,000
	Case Western Reserve University	Cleveland, Ohio	1826	English	9,600
	Catholic University of America	Washington, D.C.	1887	English	*c.* 7,000
	Central Connecticut State University	New Britain, Conn.	1849	English	12,000
	Central Florida, University of	Orlando, Fla.	1963	English	23,300
	Central Michigan University	Mt. Pleasant, Mich.	1892	English	16,100
	Central Oklahoma, University of	Edmond, Okla.	1890	English	14,100
	Central Washington University	Ellensburg, Wash.	1891	English	7,400
	Chicago, University of	Chicago, Ill.	1891	English	11,800
	Chicago State University	Chicago, Ill.	1867	English	9,500
	Cincinnati, University of	Cincinnati, Ohio	1819	English	34,500
	Citadel, The	Charleston, S.C.	1842	English	7,500
	Clemson University	Clemson, S.C.	1889	English	16,300
	Cleveland State University	Cleveland, Ohio	1964	English	17,100
	Colgate University	Hamilton, N.Y.	1819	English	2,700
	Colorado School of Mines	Golden, Colo.	1874	English	2,300
	Colorado, University of	Boulder, Colo.	1861	English	25,600
		Colorado Springs, Colo.	1965	English	6,100
		Denver, Colo.	1912	English	10,900
	Colorado State University	Fort Collins, Colo.	1870	English	21,500
	Columbia University	New York, N.Y.	1754	English	19,900
	Barnard College	New York, N.Y.	1889	English	2,300 ‖
	Connecticut, University of	Storrs, Conn.	1881	English	24,500
	Cornell University	Ithaca, N.Y.	1865	English	19,000
	Creighton University	Omaha, Neb.	1878	English	6,400
	Dartmouth College	Hanover, N.H.	1769	English	4,700
	Dayton, University of	Dayton, Ohio	1850	English	10,200
	De Paul University	Chicago, Ill.	1898	English	16,500
	Delaware, University of	Newark, Del.	1743	English	20,900
	Denver, University of	Denver, Colo.	1864	English	8,500
	DePauw University	Greencastle, Ind.	1837	English	2,100
	Detroit Mercy, University of	Detroit, Mich.	1877	English	7,800
	Drake University	Des Moines, Iowa	1881	English	6,300
	Drexel University	Philadelphia, Pa.	1891	English	10,200
	Duke University	Durham, N.C.	1838	English	11,400
	Duquesne University	Pittsburgh, Pa.	1878	English	9,000
	East Carolina University	Greenville, N.C.	1907	English	17,700
	East Tennessee State University	Johnson City, Tenn.	1911	English	11,700
	East Texas State University	Commerce, Texas	1889	English	8,100

Major world universities and colleges (continued)

country	name	location	founding date	language of instruction	students
	Eastern Illinois University	Charleston, Ill.	1895	English	10,500
	Eastern Kentucky University	Richmond, Ky.	1906	English	15,400
	Eastern Michigan University	Ypsilanti, Mich.	1849	English	26,000
	Emory University	Atlanta, Ga.	1836	English	10,400
	Emporia State University	Emporia, Kan.	1863	English	6,000
	Fairleigh Dickinson University	Teaneck, N.J.	1942	English	11,000
	Ferris State University	Big Rapids, Mich.	1884	English	10,300
	Florida, University of	Gainesville, Fla.	1853	English	35,800
	Florida Agricultural and Mechanical University	Tallahassee, Fla.	1887	English	9,900
	Florida Atlantic University	Boca Raton, Fla.	1961	English	17,500
	Florida State University	Tallahassee, Fla.	1851	English	29,600
	Fordham University	Bronx, N.Y.	1841	English	14,000
	Gallaudet University	Washington, D.C.	1857	English	1,900 ‖
	George Mason University	Fairfax, Va.	1957	English	22,000
	George Washington University	Washington, D.C.	1821	English	19,300
	Georgetown University	Washington, D.C.	1789	English	11,800
	Georgia, University of	Athens, Ga.	1785	English	29,500
	Georgia Institute of Technology	Atlanta, Ga.	1885	English	12,900
	Georgia Southern University	Statesboro, Ga.	1906	English	14,100
	Georgia State University	Atlanta, Ga.	1913	English	24,000
	Grambling State University	Grambling, La.	1901	English	7,400 ‖
	Grinnell College	Grinnell, Iowa	1846	English	1,300
	Hartford, University of	West Hartford, Conn.	1877	English	7,200
	Harvard University	Cambridge, Mass.	1636	English	18,500
	Hawaii, University of	Honolulu, Hawaii (Manoa)	1907	English	17,800 ‖
		Hilo, Hawaii	1970	English	2,900 ‖
		Pearl City, Hawaii (West Oahu)	1976	English	700 ‖
	Hofstra University	Hempstead, N.Y.	1935	English	12,300
	Houston, University of	Houston, Texas	1927	English	33,100
	Howard University	Washington, D.C.	1867	English	11,000
	Idaho, University of	Moscow, Idaho	1889	English	12,000
	Idaho State University	Pocatello, Idaho	1901	English	10,200
	Illinois, University of	Champaign-Urbana, Ill.	1867	English	36,200 ‖
		Chicago, Ill.	1894	English	24,600 ‖
	Illinois Institute of Technology	Chicago, Ill.	1890	English	7,200
	Illinois State University	Normal, Ill.	1857	English	21,100
	Indiana State University	Terre Haute, Ind.	1865	English	12,200
	Indiana University	Bloomington, Ind.	1820	English	32,400
		Gary, Ind. (Northwest)	1922	English	5,600 ‖
		Kokomo, Ind.	1945	English	2,700 ‖
		New Albany, Ind. (Southeast)	1941	English	5,100 ‖
		South Bend, Ind.	1940	English	5,400 ‖
		Richmond, Ind. (East)	1971	English	2,400 ‖
	Indiana University of Pennsylvania	Indiana, Pa.	1875	English	13,900
	Indiana University–Purdue University at Fort Wayne	Fort Wayne, Ind.	1964	English	10,200
	Indiana University–Purdue University at Indianapolis	Indianapolis, Ind.	1969	English	23,500
	Iowa, University of	Iowa City, Iowa	1847	English	27,300
	Iowa State University	Ames, Iowa	1858	English	25,300
	Ithaca College	Ithaca, N.Y.	1892	English	5,700
	Johns Hopkins University	Baltimore, Md.	1876	English	14,700
	Kansas, University of	Lawrence, Kan.	1866	English	24,600 ‖
	Kansas State University	Manhattan, Kan.	1863	English	21,000
	Kent State University	Kent, Ohio	1910	English	24,600 ‖
	Kentucky, University of	Lexington, Ky.	1865	English	22,400 ‖
	Kentucky State University	Frankfort, Ky.	1886	English	2,600
	Kenyon College	Gambier, Ohio	1824	English	1,600
	Lamar University	Beaumont, Texas	1923	English	10,700
	Lehigh University	Bethlehem, Pa.	1865	English	6,500
	Louisiana State University	Baton Rouge, La.	1860	English	27,000
		Shreveport, La.	1965	English	4,400
	New Orleans, University of	New Orleans, La.	1956	English	16,000
	Louisiana Tech University	Ruston, La.	1894	English	10,000
	Louisville, University of	Louisville, Ky.	1798	English	21,400
	Loyola Marymount University	Los Angeles, Calif.	1911	English	5,200
	Loyola University	Chicago, Ill.	1870	English	13,800
	Macalester College	St. Paul, Minn.	1874	English	1,800
	Maine, University of	Farmington, Maine	1863	English	2,000
		Augusta, Maine	1965	English	3,200 ‖
		Fort Kent, Maine	1878	English	600 ‖
		Machias, Maine	1909	English	900 ‖
		Orono, Maine	1865	English	11,300
		Presque Isle, Maine	1903	English	1,300 ‖
	Marquette University	Milwaukee, Wis.	1864	English	10,800
	Marshall University	Huntington, W.Va.	1837	English	12,700

Major world universities and colleges (continued)

country	name	location	founding date	language of instruction	students?
	Maryland System, University of	College Park, Md.	1859	English	33,900
		(University College)	1947	English	14,100
		Baltimore, Md.	1807	English	5,000
		(Baltimore County)	1963	English	10,300
		Princess Anne, Md. (Eastern Shore)	1886	English	2,900
	Baltimore, University of	Baltimore, Md.	1925	English	5,700
	Bowie State University	Bowie, Md.	1865	English	4,900
	Coppin State College	Baltimore, Md.	1900	English	3,200
	Frostburg State University	Frostburg, Md.	1898	English	5,300
	Salisbury State University	Salisbury, Md.	1925	English	5,300
	Towson State University	Towson, Md.	1866	English	13,700
	Massachusetts, University of	Amherst, Mass.	1863	English	23,600
		Boston, Mass.	1964	English	12,100
		Lowell, Mass.	1894	English	9,600
		North Dartmouth, Mass. (Dartmouth)	1895	English	5,600
	Massachusetts Institute of Technology	Cambridge, Mass.	1861	English	9,800
	Memphis, University of	Memphis, Tenn.	1912	English	20,400
	Miami, University of	Coral Gables, Fla.	1925	English	13,700
	Miami University	Oxford, Ohio	1809	English	19,600
	Michigan, University of	Ann Arbor, Mich.	1817	English	36,500
		Dearborn, Mich.	1956	English	8,100
		Flint, Mich.	1956	English	6,200
	Michigan State University	East Lansing, Mich.	1855	English	40,300
	Middlebury College	Middlebury, Vt.	1800	English	2,000
	Minnesota, University of	Minneapolis, Minn. (Twin Cities)	1851	English	32,600 ‖
		Crookston, Minn.	1965	English	1,600 ‖
		Duluth, Minn.	1947	English	7,400 ‖
		Morris, Minn.	1959	English	1,900 ‖
	Minnesota State University System				
	Bemidji State University	Bemidji, Minn.	1919	English	5,000
	Mankato State University	Mankato, Minn.	1867	English	14,000
	Metropolitan State University	St. Paul, Minn.	1971	English	8,600
	Moorhead State University	Moorhead, Minn.	1887	English	7,100
	St. Cloud State University	St. Cloud, Minn.	1869	English	16,000
	Southwest State University	Marshall, Minn.	1963	English	3,000
	Winona State University	Winona, Minn.	1858	English	7,300
	Mississippi, University of	University, Miss.	1844	English	10,100
	Mississippi State University	Mississippi State, Miss.	1878	English	14,200
	Missouri, University of	Columbia, Mo.	1839	English	22,200
		Kansas City, Mo.	1929	English	10,000
		Rolla, Mo.	1870	English	5,500
		St. Louis, Mo.	1963	English	13,200
	Montana, University of	Missoula, Mont.	1893	English	10,800
	Montana State University	Bozeman, Mont.	1893	English	10,700
		Billings, Mont.	1927	English	4,000
		Havre, Mont. (Northern)	1929	English	1,900
	Montclair State University	Upper Montclair, N.J.	1908	English	13,200
	Morehouse College	Atlanta, Ga.	1867	English	3,000
	Mount Holyoke College	South Hadley, Mass.	1837	English	1,900
	Murray State University	Murray, Ky.	1922	English	8,000
	Nebraska, University of	Lincoln, Neb.	1869	English	24,500
		Kearney, Neb.	1903	English	8,000
		Omaha, Neb.	1908	English	15,900
	Nevada, University of	Las Vegas, Nev.	1957	English	20,000
		Reno, Nev.	1874	English	12,300
	New England Conservatory of Music	Boston, Mass.	1867	English	800
	New Hampshire, University of	Durham, N.H.	1866	English	11,500
		Manchester, N.H.	1967	English	700 ‖
	New Mexico, University of	Albuquerque, N.M.	1892	English	25,000
	New Mexico State University	Las Cruces, N.M.	1888	English	15,600
	New York, City University of				
	Bernard M. Baruch College	New York, N.Y.	1919	English	15,600
	Brooklyn College	Brooklyn, N.Y.	1930	English	16,800
	City College	New York, N.Y.	1847	English	13,700
	Medgar Evers College	Brooklyn, N.Y.	1969	English	4,500 ‖
	Graduate School and University Center	New York, N.Y.	1961	English	4,000
	Hunter College	New York, N.Y.	1870	English	19,600
	John Jay College of Criminal Justice	New York, N.Y.	1964	English	8,700
	Herbert H. Lehman College	Bronx, N.Y.	1931	English	9,800
	New York City Technical College	Brooklyn, N.Y.	1946	English	10,900
	Queens College	Flushing, N.Y.	1937	English	18,000
	Staten Island, College of	Staten Island, N.Y.	1955	English	12,200
	York College	Jamaica, N.Y.	1966	English	5,600
	New York, Colleges of the State University of	Brockport, N.Y.	1867	English	7,700 ‖
		Buffalo, N.Y.	1867	English	11,300 ‖

Major world universities and colleges (continued)

country	name	location	founding date	language of instruction	students
		Cortland, N.Y.	1868	English	6,200 ‖
		Farmingdale, N.Y. (College of Technology)	1912	English	6,700 ‖
		Fredonia, N.Y.	1826	English	4,800 ‖
		Geneseo, N.Y.	1867	English	5,800 ‖
		New Paltz, N.Y.	1828	English	7,900 ‖
		Old Westbury, N.Y.	1968	English	4,000 ‖
		Oneonta, N.Y.	1887	English	5,600 ‖
		Oswego, N.Y.	1861	English	8,900 ‖
		Plattsburgh, N.Y.	1889	English	5,800 ‖
		Potsdam, N.Y.	1816	English	4,300 ‖
		Purchase, N.Y.	1967	English	2,500 ‖
		Saratoga Springs, N.Y. (Empire State College)	1971	English	7,000 ‖
	New York, State University of	Albany, N.Y.	1844	English	15,600 ‖
		Binghamton, N.Y.	1946	English	11,600 ‖
		Buffalo, N.Y.	1846	English	21,600 ‖
		Stony Brook, N.Y.	1957	English	14,400 ‖
	New York University	New York, N.Y.	1831	English	48,300
	North Carolina, University of	Chapel Hill, N.C.	1789	English	23,900
		Asheville, N.C.	1927	English	3,200
		Charlotte, N.C.	1946	English	15,500
		Greensboro, N.C.	1891	English	12,100
		Wilmington, N.C.	1947	English	8,400
	North Carolina State University	Raleigh, N.C.	1887	English	27,600
	North Dakota, University of	Grand Forks, N.D.	1883	English	11,500
	North Dakota State University	Fargo, N.D.	1890	English	8,700
	North Texas, University of	Denton, Texas	1890	English	25,600
	Northeast Louisiana University	Monroe, La.	1931	English	11,400
	Northeastern State University	Tahlequah, Okla.	1846	English	9,300
	Northeastern University	Boston, Mass.	1898	English	24,500
	Northern Arizona University	Flagstaff, Ariz.	1899	English	18,500
	Northern Colorado, University of	Greeley, Colo.	1889	English	10,200
	Northern Illinois University	De Kalb, Ill.	1895	English	24,900
	Northern Iowa, University of	Cedar Falls, Iowa	1876	English	12,700
	Northern Michigan University	Marquette, Mich.	1899	English	8,100
	Northwestern University	Evanston, Ill.	1851	English	14,000
	Norwich University	Northfield, Vt.	1819	English	2,700
	Notre Dame, University of	Notre Dame, Ind.	1842	English	10,100
	Oberlin College	Oberlin, Ohio	1833	English	2,700
	Ohio State University	Columbus, Ohio	1870	English	46,900 ‖
		Marion, Ohio	1957	English	1,100 ‖
	Ohio University	Athens, Ohio	1804	English	26,700
	Oklahoma, University of	Norman, Okla.	1890	English	24,900
	Oklahoma State University	Stillwater, Okla.	1890	English	18,300
	Old Dominion University	Norfolk, Va.	1930	English	16,500
	Oral Roberts University	Tulsa, Okla.	1965	English	4,500
	Oregon, University of	Eugene, Ore.	1872	English	16,700
	Oregon State University	Corvallis, Ore.	1868	English	14,300
	Pace University	New York, N.Y.	1906	English	15,000
	Pacific, University of the	Stockton, Calif.	1851	English	5,400
	Pennsylvania, University of	Philadelphia, Pa.	1740	English	22,500
	Pennsylvania State University	University Park, Pa.	1855	English	37,600 ‖
	Erie Behrend College	Erie, Pa.	1926	English	3,100 ‖
	Harrisburg Capital College	Middletown, Pa.	1966	English	3,300 ‖
	Pittsburgh, University of	Pittsburgh, Pa.	1787	English	26,300
	Pomona College	Claremont, Calif.	1887	English	1,400
	Portland State University	Portland, Ore.	1946	English	14,500
	Pratt Institute	New York, N.Y.	1887	English	3,400
	Princeton University	Princeton, N.J.	1746	English	6,300
	Purdue University	West Lafayette, Ind.	1869	English	33,400 ‖
		Hammond, Ind. (Calumet)	1943	English	9,400 ‖
		Westville, Ind. (North Central)	1943	English	3,500 ‖
	Radcliffe College	Cambridge, Mass.	1879	English	2,700
	Redlands, University of	Redlands, Calif.	1907	English	1,400
	Reed College	Portland, Ore.	1909	English	1,200
	Rensselaer Polytechnic Institute	Troy, N.Y.	1824	English	6,600
	Rhode Island, University of	Kingston, R.I.	1892	English	14,200
	Rice University	Houston, Texas	1891	English	4,000
	Richmond, University of	Richmond, Va.	1830	English	4,700
	Rochester, University of	Rochester, N.Y.	1850	English	8,400
	Rochester Institute of Technology	Rochester, N.Y.	1829	English	12,300
	Roosevelt University	Chicago, Ill.	1945	English	6,300
	Rowan College of New Jersey	Glassboro, N.J.	1923	English	9,400
	Rutgers, The State University of New Jersey	New Brunswick, N.J.	1766	English	48,100
	St. John's College	Annapolis, Md.	1696	English	400
	St. John's University	Jamaica, N.Y.	1870	English	19,000

Major world universities and colleges (continued)

country	name	location	founding date	language of instruction	students
	St. Joseph's University	Philadelphia, Pa.	1851	English	6,600
	St. Louis University	St. Louis, Mo.	1818	English	11,400
	St. Olaf College	Northfield, Minn.	1874	English	2,900
	St. Peter's College	Jersey City, N.J.	1872	English	3,600
	Sam Houston State University	Huntsville, Texas	1879	English	12,900
	San Diego State University	San Diego, Calif.	1897	English	28,500
	San Francisco, University of	San Francisco, Calif.	1855	English	7,700
	San Francisco State University	San Francisco, Calif.	1899	English	26,300
	San Jose State University	San Jose, Calif.	1857	English	29,000
	Santa Clara University	Santa Clara, Calif.	1851	English	7,800
	Sarah Lawrence College	Bronxville, N.Y.	1926	English	1,000
	Seattle University	Seattle, Wash.	1891	English	4,800
	Seton Hall University	South Orange, N.J.	1856	English	9,700
	Slippery Rock University of Pennsylvania	Slippery Rock, Pa.	1889	English	7,700
	Smith College	Northampton, Mass.	1871	English	3,000
	South Carolina, University of	Columbia, S.C.	1801	English	25,700 ‖
		Aiken, S.C.	1961	English	3,300 ‖
		Spartanburg, S.C.	1967	English	3,400 ‖
	South Carolina State University	Orangeburg, S.C.	1896	English	4,700
	South Dakota, University of	Vermillion, S.D.	1862	English	7,700
	South Dakota State University	Brookings, S.D.	1881	English	9,100
	Southern California, University of	Los Angeles, Calif.	1880	English	28,000
	Southern Connecticut State University	New Haven, Conn.	1893	English	13,000
	Southern Illinois University	Carbondale, Ill.	1869	English	23,900
		Edwardsville, Ill.	1957	English	11,300
	Southern Maine, University of	Portland, Maine	1878	English	9,600
	Southern Methodist University	Dallas, Texas	1911	English	8,900
	Southern Mississippi, University of	Hattiesburg, Miss.	1910	English	11,600
	Southwest Missouri State University	Springfield, Mo.	1905	English	18,300
	Southwest Texas State University	San Marcos, Texas	1899	English	20,900
	Spelman College	Atlanta, Ga.	1881	English	2,000
	Stanford University	Stanford, Calif.	1885	English	13,400
	Stephen F. Austin State University	Nacogdoches, Texas	1923	English	12,500
	Swarthmore College	Swarthmore, Pa.	1864	English	1,400
	Syracuse University	Syracuse, N.Y.	1870	English	18,600
	Temple University	Philadelphia, Pa.	1884	English	31,000
	Tennessee System, University of	Knoxville, Tenn.	1794	English	28,300 ‖
		Chattanooga, Tenn.	1886	English	8,200 ‖
		Martin, Tenn.	1900	English	5,600 ‖
	Tennessee State University	Nashville, Tenn.	1912	English	7,000
	Texas System, University of	Austin, Texas	1881	English	48,000
		Arlington, Texas	1895	English	25,000
		Brownsville, Texas	1977	English	2,100 ‖
		Edinburg, Texas (Pan American)	1927	English	13,600 ‖
		El Paso, Texas	1913	English	17,200
		Odessa, Texas (Permian Basin)	1969	English	1,900
		Richardson, Texas (Dallas)	1969	English	7,100 ‖
		San Antonio, Texas	1969	English	17,600 ‖
		Tyler, Texas	1971	English	4,100 ‖
	Texas A & M University System	College Station, Texas	1876	English	43,300
		Corpus Christi, Texas	1947	English	4,500 ‖
		Galveston, Texas	1962	English	1,200 ‖
		Kingsville, Texas[4]	1917	English	5,900
		Laredo, Texas (International)	1969	English	1,800 ‖
		Prairie View, Texas	1876	English	5,600
	Tarleton State University	Stephenville, Texas	1899	English	6,500 ‖
	West Texas A & M University	Canyon, Texas	1909	English	6,600
	Texas Christian University	Fort Worth, Texas	1873	English	6,700
	Texas Southern University	Houston, Texas	1947	English	11,000
	Texas Tech University	Lubbock, Texas	1923	English	24,000
	Toledo, University of	Toledo, Ohio	1872	English	25,000
	Tufts University	Medford, Mass.	1852	English	8,400
	Tulane University	New Orleans, La.	1834	English	11,200
	Tulsa, University of	Tulsa, Okla.	1894	English	4,600
	Tuskegee University	Tuskegee, Ala.	1881	English	3,300
	U.S. Air Force Academy	Colorado Springs, Colo.	1954	English	4,100 ‖
	U.S. Coast Guard Academy	New London, Conn.	1876	English	900
	U.S. Military Academy	West Point, N.Y.	1802	English	4,300
	U.S. Naval Academy	Annapolis, Md.	1845	English	4,100
	Utah, University of	Salt Lake City, Utah	1850	English	27,100
	Utah State University	Logan, Utah	1888	English	20,400
	Valparaiso University	Valparaiso, Ind.	1859	English	3,500
	Vanderbilt University	Nashville, Tenn.	1873	English	9,200
	Vassar College	Poughkeepsie, N.Y.	1861	English	2,300
	Vermont, University of	Burlington, Vt.	1791	English	11,300
	Villanova University	Villanova, Pa.	1842	English	10,300

Major world universities and colleges (continued)

country	name	location	founding date	language of instruction	students§
	Virginia, University of	Charlottesville, Va.	1819	English	18,000
	Virginia Commonwealth University	Richmond, Va.	1838	English	21,500
	Virginia Polytechnic Institute and State University	Blacksburg, Va.	1872	English	22,700
	Wake Forest University	Winston-Salem, N.C.	1834	English	5,600
	Washington, University of	Seattle, Wash.	1861	English	30,200
	Washington and Lee University	Lexington, Va.	1749	English	2,000
	Washington State University	Pullman, Wash.	1890	English	18,000
	Washington University	St. Louis, Mo.	1853	English	11,700
	Wayne State University	Detroit, Mich.	1868	English	32,700
	Weber State University	Ogden, Utah	1889	English	15,000
	Wellesley College	Wellesley, Mass.	1870	English	2,300
	Wesleyan University	Middletown, Conn.	1831	English	2,700
	West Chester University	West Chester, Pa.	1871	English	11,300
	West Virginia University	Morgantown, W.Va.	1867	English	22,500
	Western Illinois University	Macomb, Ill.	1899	English	12,600
	Western Kentucky University	Bowling Green, Ky.	1906	English	15,800
	Western Michigan University	Kalamazoo, Mich.	1903	English	26,000
	Western Washington University	Bellingham, Wash.	1893	English	10,300
	Wheaton College	Wheaton, Ill.	1860	English	2,500
	Wichita State University	Wichita, Kan.	1895	English	16,700
	William and Mary, College of	Williamsburg, Va.	1693	English	7,500
	Williams College	Williamstown, Mass.	1793	English	2,000
	Wisconsin System, University of	Madison, Wis.	1849	English	40,300
		Eau Claire, Wis.	1916	English	10,300
		Green Bay, Wis.	1968	English	5,500
		Kenosha, Wis. (Parkside)	1968	English	5,500
		La Crosse, Wis.	1909	English	8,500
		Menomonie, Wis. (Stout)	1891	English	7,500
		Milwaukee, Wis.	1885	English	23,800
		Oshkosh, Wis.	1871	English	10,600
		Platteville, Wis.	1866	English	5,300
		River Falls, Wis.	1874	English	5,400
		Stevens Point, Wis.	1894	English	8,700 ‖
		Superior, Wis.	1893	English	2,600
		Whitewater, Wis.	1868	English	9,900
	Wyoming, University of	Laramie, Wyo.	1886	English	12,200
	Xavier University	Cincinnati, Ohio	1831	English	6,200
	Yale University	New Haven, Conn.	1701	English	11,000
	Yeshiva University	New York, N.Y.	1886	English, Hebrew	7,000
	Youngstown State University	Youngstown, Ohio	1908	English	14,500
Uruguay	Republic, University of the	Montevideo	1849	Spanish	59,400
Uzbekistan	Samarkand State University	Samarkand	1933	Uzbek, Russian, Tajik	16,000
	Tashkent State University	Tashkent	1920	. . .	19,300
Vatican City	Pontifical Biblical Institute	Rome	1909	Italian, English, French	400
	Pontifical Gregorian University	Rome	1553	Italian, English, French German, Spanish	3,600
	Pontifical Lateran University	Rome	1773	Latin, Italian	1,600
	Pontifical "Urbaniana" University	Rome	1627	Italian	1,300
	St. Thomas Aquinas, Pontifical University of	Rome	1580	Italian, English	1,500
	Salesian Pontifical University	Rome	1940	Italian	1,500
Venezuela	Andes, University of the	Mérida	1785	Spanish	34,300
	Andrés Bello Catholic University	Caracas	1953	Spanish	11,600
	Carabobo, University of	Valencia	1852	Spanish	44,700
	East, University of the	Cumaná	1958	Spanish	23,100
	Santa Maria University	Caracas	1953	Spanish	*c.* 4,500
	Simón Bolívar University	Caracas	1970	Spanish	10,000
	Venezuela, Central University of	Caracas	1721	Spanish	45,000
	Zulia, University of	Maracaibo	1891	Spanish	47,600
Vietnam	Hanoi University	Hanoi	1956	Vietnamese	10,000
Yugoslavia	Belgrade, University of	Belgrade	1863	Serbo-Croatian	49,900
	Belgrade University of Arts	Belgrade	1957	Serbo-Croatian	1,800
	Niš, University of	Niš	1965	Serbo-Croatian	14,300
	Novi Sad, University of	Novi Sad	1960	Serbo-Croatian	19,000
	Priština, University of	Priština	1970	Serbo-Croatian, Albanian	10,300
Zaire	Kinshasa, University of	Kinshasa	1954	French	5,800
	Kisangani, University of	Kisangani	1963	French	2,400
	Lubumbashi, University of	Lubumbashi	1955	French	13,200
Zambia	Zambia, University of	Lusaka	1965	English	5,000
Zimbabwe	Zimbabwe, University of	Harare	1955	English	9,100

*Source (unless otherwise noted): *World of Learning 1990*. Figures are rounded. †Includes affiliated colleges. ‡Source: *International Handbook of Universities*, 11th ed. (1989). §Source: *Commonwealth Universities Yearbook 1990*. ‖ Source: *The College Handbook 1996*. ¶Colleges listed separately below. #Source: *World of Learning 1996*. Figures are rounded.

Göttingen (founded 1737) a generation later and subsequently by most German and many American universities.

In the later 18th and 19th centuries religion was gradually displaced as the dominant force as European universities became institutions of modern learning and research and were secularized in their curriculum and administration. These trends were typified by the University of Berlin (1809), in which laboratory experimentation replaced conjecture; theological, philosophical, and other traditional doctrines were examined with a new rigour and objectivity; and modern standards of academic freedom (*q.v.*) were pioneered. The German model of the university as a complex of graduate schools performing advanced research and experimentation proved to have a worldwide influence.

The first universities in the Western Hemisphere were established by the Spaniards: the University of Santo Domingo (1538) in what is now the Dominican Republic and the University of Michoacán (1540) in Mexico. The earliest American institutions of higher learning were the four-year colleges of Harvard (1636), William and Mary (1693), Yale (1701), Princeton (1746), and King's College (1754; now Columbia). Most early American colleges were established by religious denominations, and most eventually evolved into full-fledged universities. One of the oldest universities in Canada is that at Toronto, chartered as King's College in 1827.

As the frontier of the United States moved westward, hundreds of new colleges were founded. American colleges and universities tended to imitate German models, seeking to combine the Prussian ideal of academic freedom with the native tradition of educational opportunity for the many. The growth of such schools in the United States was greatly spurred by the Morrill Act of 1862, which granted each state tracts of land with which to finance new agricultural and mechanical schools. Many "land-grant colleges" arose from this act, and there developed among these the Massachusetts Institute of Technology, Cornell University, and the state universities of Illinois, Wisconsin, and Minnesota. (*See* land-grant college.)

Several European nations in the 19th century reorganized and secularized their universities, notably Italy (1870), Spain (1876), and France (1896). Universities in these and other European countries became mostly state-financed. Women began to be admitted to universities in the second half of the 19th century. Meanwhile, universities' curricula also continued to evolve. The study of modern languages and literatures was added to, and in many cases supplanted, the traditional study of Latin, Greek, and theology. Such sciences as physics, chemistry, biology, and engineering achieved a recognized place in curricula, and by the early 20th century the newer disciplines of economics, psychology, and sociology were also taught.

In the late 19th and 20th centuries Great Britain and France established universities in many of their colonies in South and Southeast Asia and Africa. The independent nations that emerged from these colonies in the mid-20th century expanded their university systems along the lines of their European (or American) models and achieved varying degrees of success. Universities in Japan, China, and the Soviet Union underwent a parallel evolution. The state universities of Moscow (1755) and St. Petersburg (1819) are long-established institutions that have retained their preeminence in Russia. Tokyo (1877) and Kyōto (1897) universities are the most prestigious ones in Japan, as is Peking University (1898) in China.

Modern universities may be financed by a national government or by state or provincial ones, or they may depend largely on tuition fees paid by their students. The typical modern university may enroll 10,000 or more students and educate both undergraduates and graduate students in the entire range of the arts and humanities, mathematics, the social sciences, the physical, biological, and earth sciences, and various fields of technology. Universities are the main source of graduate-level training in such fields as medicine, law, business administration, and veterinary medicine.

university college, in British and formerly British educational systems, an institution of higher learning that does not have the authority to award its own degrees. Students enrolled at a university college ordinarily receive their degrees from a recognized university—in England, usually the University of London. In due course, a university college may be granted university status. The University College of Bristol, for example, was founded in 1876 and became the University of Bristol in 1909; the University College of Ghana, founded in 1948, became the University of Ghana in 1961.

university extension, division of an institution of higher learning that conducts educational activities for persons (usually adults) who are generally not full-time students. These activities are sometimes called extramural studies, continuing education, higher adult education, or university adult education. Since its inception, group instruction in the form of formal lectures, discussion groups, seminars, and workshops has remained the core of extension courses. One important consequence of the extension movement was that it helped to establish higher education for women.

In 1867 an extension course was being offered by a University of Cambridge professor, and by the 1880s such courses were flourishing in centres throughout England. About 1885 university leaders in the United States became aware of the programs at British universities. The most significant development came at the University of Chicago when extension was included as an integral part of the design for the new university, incorporating provisions for off-campus centres, correspondence instruction, and various other programs.

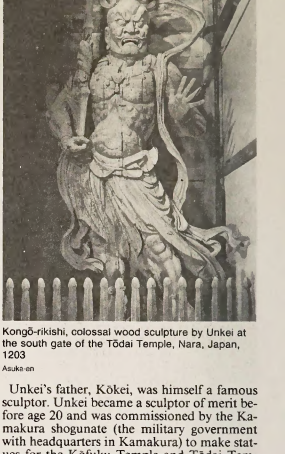
At many American universities the number of adults engaged in extension programs has become greater than the number of full-time students enrolled on campus, and specialized units offering such programs have proliferated rapidly. Some universities reorganized themselves to give extension an important place as an all-institutional function paralleling that of resident teaching and research.

Elsewhere in the world, university extension has developed most fully in English-speaking countries. In some instances, following British practice, the term extramural studies is used.

University of ——— : *see under* substantive word or words (*e.g.,* London, University of), except as below.

University wit, any of a notable group of pioneer English dramatists writing during the last 15 years of the 16th century, who, taking hold of the native dramatic inheritance of interlude and chronicle play, transformed it into a potentially great drama by writing plays of quality and diversity. They thus prepared the ground for the genius of William Shakespeare. Their forerunner was John Lyly, an Oxford man, and they included Christopher Marlowe, Robert Greene, Thomas Nashe (all graduates of Cambridge), and Thomas Lodge and George Peele (both of Oxford). Another of the wits, though not university-trained, was Thomas Kyd. The greatest poetic dramatist was Marlowe, whose handling of blank verse gave the theatre its characteristic voice for the next 50 years.

Unkei (b. 1148?—d. 1223), Japanese sculptor of the Late Heian (897–1185) and early Kamakura (1192–1333) periods, who established a style of Buddhist sculpture that had an immense impact on Japanese art for centuries.



Kongō-rikishi, colossal wood sculpture by Unkei at the south gate of the Tōdai Temple, Nara, Japan, 1203
Asuka-en

Unkei's father, Kōkei, was himself a famous sculptor. Unkei became a sculptor of merit before age 20 and was commissioned by the Kamakura shogunate (the military government with headquarters in Kamakura) to make statues for the Kofuku Temple and Tōdai Temple in Nara. He undertook the task with the help of Kaikei, his father's best pupil, and over 20 assistants. Of their joint products, the nearly 26-foot- (8-metre-) tall statues of the Niō (two giant protector gods of temples) at the Nandai-mon (Great South Gate) of Tōdai Temple (completed in 1203) are best known. The realistic and dynamic style of these statues is typical of Unkei's art. In his later years he chiefly worked for the Kamakura shogunate, producing many portrait sculptures.

Unkiar Skelessi, Treaty of (1833): *see* Hünkâr İskelesi, Treaty of.

Unkoku Tōgan (b. 1547—d. 1618, Japan), Japanese painter best remembered as a *suiboku-ga* ("water-ink painting") artist. He worked in the manner of the 15th-century artist Sesshū at a time when the orthodox style of the Kanō school dominated painting.

Initially a student under a Kanō artist (probably Shōei), he became familiar with the style of Sesshū while a painter to the Mōri family in Suō province (now Yamaguchi prefecture). The Mōris owned the most famous of Sesshū's works: a 55-foot- (17-metre-) long landscape painting from 1486. He copied this scroll painting, modeled his own style after it, and used it to back his claim in the famous legal contest with Hasegawa Tōhaku over succession to the line of Sesshū. The case was won by Tōgan, who gained the right to call himself the "fifth generation of Sesshū." One of his Sesshū-style paintings, "Chinese Landscapes," is an ink landscape closely resembling the original Sesshū scroll, but it lacks the bold lines of the Sesshū landscape and has, instead, more variations in tones, creating a greater sense of atmospheric depth. A screen painting of Mount Yoshino, famous for its cherry blossoms, and "The Deer" are among Tōgan's well-known works. Most of his work is in the Daitoku Temple in Kyōto.

UNKRA: *see* United Nations Korean Reconstruction Agency.

unlawful assembly, gathering of persons for the purpose of committing either a crime involving force or a noncriminal act in a manner likely to terrify the public. The extent to which a government penalizes disorderly assemblies often reflects the political value that it places on the right of assembly.

In Anglo-American law an assembly of persons is unlawful if the participants share a common illegal purpose, regardless of whether steps are taken to effect that purpose. Thus, it is distinguishable from rout and riot, which require more than mere intent (*see* riot). In Canada an assembly is unlawful not if it has an unlawful purpose but, rather, if it causes persons in the vicinity to fear that the assembly will disturb the peace tumultuously or cause others to do so. In some U.S. jurisdictions two persons are enough to constitute an assembly. In India five persons are required.

The continental European codes usually subsume the offense of unlawful assembly under the heading of resistance to public authority. Some constitutions in code-law countries follow the U.S. Constitution in guaranteeing freedom of assembly. But the administrative authority vested in local police forces to control the use of public parks and roads and, if there is a danger of violence, to disperse crowds can be misused to justify interference in many public gatherings that are innocent in their purpose. *See also* disturbing the peace.

unnilennium (Une), also called ELEMENT 109, an artificially produced element belonging to the transuranium group. It is predicted to have chemical properties resembling those of iridium.

In 1982 West German physicists at the Institute for Heavy Ion Research (Gesellschaft für Schwerionenforschung [GSI]) in Darmstadt synthesized an isotope of element 109 with a mass number of 266. Using a high-energy linear accelerator, the GSI investigators, under the direction of Peter Armbruster, bombarded bismuth-209 targets with beams of iron-58 ions for roughly 10 days. The resultant fusion reaction between the bismuth and iron atoms yielded only a single nucleus of the new element; however, the sensitivity of the detection technique employed left little doubt as to the validity of the identification. Unnilennium has an estimated half-life between 2 and 20 milliseconds.

unnilhexium (Unh), also called ELEMENT 106, or SEABORGIUM, an artificially produced radioactive element in Group VIb of the periodic table. In June 1974, Georgy N. Flerov of the Joint Institute for Nuclear Research at Dubna, Russia, U.S.S.R., announced that his team of investigators had synthesized and identified element 106. In September of the same year, a group of American researchers headed by Albert Ghiorso at the Lawrence Radiation Laboratory (now Lawrence Berkeley Laboratory) of the University of California at Berkeley reported their synthesis of the identical element. Disagreement arose between the two groups over the results of their experiments, both having used different procedures to achieve the synthesis. The Soviet scientists had bombarded lead-207 and lead-208 with ions of chromium-54 to produce an isotope of element 106 having a mass number of 259 and decaying with a half-life of approximately 0.007 second. The American researchers, on the other hand, had bombarded a heavy radioactive target of californium-249 with projectile beams of oxygen-18 ions, which resulted in the creation of a different isotope of element 106—one with a mass number of 263 and a half-life of 0.9 second. Russian researchers at Dubna reported their synthesis of two isotopes of the element in 1993, and a team of researchers at Lawrence Berkeley duplicated the Ghiorso group's original experiment that same year. The International Union of Pure and Applied Chemistry recommended the element be named unnilhexium. American researchers tentatively named it seaborgium in honour of the American nuclear chemist Glenn T. Seaborg. Based on its position in the periodic table, unnilhexium is thought to have chemical properties akin to those of tungsten.

unnioctium (Uno), also called ELEMENT 108, an artificially produced element belonging to the transuranium group. It was synthesized and identified in 1984 by West German researchers at the Institute for Heavy Ion Research (Gesellschaft für Schwerionenforschung [GSI]) in Darmstadt. On the basis of its position in the periodic table of the elements, it is expected to have chemical properties similar to those of osmium.

The GSI research team, led by Peter Armbruster, produced an isotope of element 108 in a fusion reaction by irradiating lead-208 with ions of iron-58. The isotope, which has a mass number of 265, is exceedingly unstable and has a half-life of only 2 milliseconds. Experiments conducted by A.G. Demin and other researchers at the Joint Institute for Nuclear Research in Dubna, Russia, U.S.S.R., suggested the existence of two more isotopes of element 108 with mass numbers of 263 and 264.

unnilpentium (Unp), also called ELEMENT 105, HAHNIUM, OR NIELSBOHRIUM, an artificially produced radioactive transuranium element in Group Vb of the periodic table. The discovery of unnilpentium, like that of unniquadium (element 104), has been a matter of dispute between Soviet and American scientists. The Soviets may have synthesized a few atoms of element 105 in 1967 at the Joint Institute for Nuclear Research in Dubna, Russia, U.S.S.R., by bombarding americium-243 with neon-22 ions, producing isotopes of element 105 having mass numbers of 260 and 261 and half-lives of 0.1 second and 3 seconds, respectively. Because the Dubna group did not propose a name for the element at the time they announced their preliminary data—a practice that has been customary following the discovery of a new element—it was surmised by American scientists that the Soviets did not have strong experimental evidence to substantiate their claims. Soviet scientists contended, however, that they did not propose a name in 1967 because they preferred to accumulate more data about the chemical and physical properties of the element before doing so. After completing further experiments, they proposed the name nielsbohrium.

In 1970 a group of investigators at the Lawrence Radiation Laboratory of the University of California at Berkeley announced that they had synthesized isotope 260 of element 105, whereupon they proposed the name hahnium for the element, in honour of Otto Hahn, the discoverer of nuclear fission. The American team could not duplicate the Soviet experiment; but, when its members bombarded californium-249 with the nuclei of nitrogen-15 atoms, they produced hahnium-260, which had a half-life of about 1.6 seconds. As further evidence of their discovery, the scientists at Berkeley measured the amount of energy emitted by hahnium-260 as it decayed, as well as the elements produced in the process; these characteristics were quite different from those of previously known elements in the periodic system. The International Union of Pure and Applied Chemistry recommended that the element be named unnilpentium.

atomic number	105
mass of most stable isotope	260
electronic configuration	2-8-18-32-32-11-2 or $(Rn)5f^{14}6d^{3}7s^{2}$

unniquadium (Unq), also called ELEMENT 104, KURCHATOVIUM, OR RUTHERFORDIUM, an artificially produced radioactive transuranium element in Group IVb of the periodic table. Soviet scientists at the Joint Institute for Nuclear Research at Dubna, Russia, U.S.S.R., announced in 1964 the discovery of element 104, which they named kurchatovium, symbol Ku (for Igor Kurchatov, a Soviet nuclear physicist). In 1969, a group of American researchers at the Lawrence Radiation Laboratory of the University of California at Berkeley announced that they had identified isotopes of the element, different from the one identified by the Soviets; the Americans then proposed the name rutherfordium, in honour of the British physicist Ernest Rutherford. Because neither group has been able to verify the results of the other, both the name and the priority of discovery are still open to question. The International Union of Pure and Applied Chemistry has recommended that the element be named unniquadium.

In their experiment, the Soviets bombarded plutonium-242 with ions of neon-22, claiming to have obtained an isotope of element 104 that had a mass number of 260 and a half-life of 0.3 second. The Soviets then performed a series of chemical experiments with the isotope to demonstrate that it behaved in a manner that had been predicted for the element. When the workers at Dubna later used a more refined measuring technique, however, they found that the half-life of the isotope was 0.1 second, not 0.3 second as originally reported. This finding cast doubt on the chemical experiments with the element, because the results of those experiments could not have been obtained with atoms having a half-life of 0.1 second.

The American investigators did not follow the same procedure as the Dubna group, because the American equipment could not accelerate neon-22 ions to the necessary energies. Instead, they bombarded a target of californium-249 with ions of carbon-12 and carbon-13. Although unable to obtain the same isotope as the Soviet scientists, the Berkeley team did report positive identification of two, possibly three, isotopes of element 104. The bombardment of californium-249 with carbon-12 produced an isotope with a mass number of 257 and a half-life of 4–5 seconds; the carbon-13 bombardment produced an isotope with a mass number of 259 and a half-life of three to four seconds. The investigators at Berkeley subsequently, by bombarding curium-248 with oxygen-18, synthesized an isotope of element 104 that has a mass number of 261 and a half-life of 70 seconds.

Although the Soviets could make only a few atoms of their mass-260 isotope, the Berkeley group obtained thousands of the atoms having mass numbers of 257 and 259. Moreover, because the latter isotopes have longer half-lives, the Berkeley team was able to measure the energies of their emissions (alpha particles) and to detect their decay products (nobelium isotopes), thereby providing more extensive evidence of their discovery.

atomic number	104
mass of most stable isotope	261
electronic configuration	2-8-18-32-32-10-2 or $(Rn)5f^{14}6d^{2}7s^{2}$

unnilseptium (Uns), also called ELEMENT 107, a synthetic element in Group VIIb of the periodic table. It is thought to be chemically similar to the rare metal rhenium.

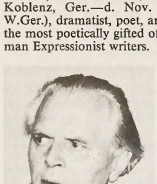
In 1976 Soviet scientists at the Joint Institute for Nuclear Research in Dubna, Russia, U.S.S.R., announced that they had synthesized element 107 by bombarding a target of

bismuth-209 with ions of chromium-54. The resultant collisions were reported to have produced an isotope of the element with a mass number of 261 and a half-life of 1–2 milliseconds. The existence of the element was confirmed by West German physicists at the Institute for Heavy Ion Research (Gesellschaft für Schwerionenforschung [GSI]) in Darmstadt.

Uno Sōsuke (b. Aug. 27, 1922, Shiga prefecture, Japan—d. May 19, 1998, Moriyama), prime minister of Japan for 68 days (June 2–Aug. 9, 1989). The son of a wealthy brewer, Uno attended the Kōbe University of Commerce, served in the army in World War II, and was first elected to the House of Representatives in 1960. He served in various ministerial posts before the Liberal-Democratic Party chose him to be prime minister; he was chosen largely by default, as one of the few politicians without links to the influence-peddling and bribery scandals that brought down the ministry of his predecessor, Takeshita Noboru. Ironically, Uno himself was compelled to resign, partly because of a sex scandal and partly because of severe Liberal-Democrat losses in the parliamentary elections of July 1989. He continued to serve in government posts until he retired from politics in 1996.

UNRRA: *see* United Nations Relief and Rehabilitation Administration.

Unruh, Fritz von (b. May 10, 1885, Koblenz, Ger.—d. Nov. 28, 1970, Diez, W.Ger.), dramatist, poet, and novelist, one of the most poetically gifted of the younger German Expressionist writers.



Unruh
Bavaria-Verlag

The son of a general, Unruh was an army officer in active service until 1912, when he resigned his commission to devote his time to writing. His critical reflections on the military establishment in his play *Offiziere* ("Officers"), staged by Max Reinhardt in 1911, and his antiwar sentiments expressed in the dramatic poem *Vor der Entscheidung* (1914; "Before the Decision") are early variations on the two themes basic to his entire work: the nature of the social order into which the individual has to be integrated, and the necessity to ground this order not in authority but in the integrity and responsibility of the individual toward humanity. Explorations of these themes through his war experiences—on a metaphysical plane, in his narrative *Der Opfergang* (written in 1916 at Verdun, published 1919; *Way of Sacrifice*) and, on a mythical level, in the tragedy *Ein Geschlecht* (1916; "A Family")—strengthened his antimilitaristic attitude and led to such later works as *Heinrich von Andernach* (1925), a festival play and a great plea for love among men. Unruh foresaw the coming Nazi dictatorship in his drama *Bonaparte* (1927) and continued to press his warnings in *Berlin in Monte Carlo* (1931) and *Zero* (1932).

Unruh left Germany in 1932, living in France and the United States, until he returned to Germany in 1962. He published a play, *Odysseus auf Ogygia* (*Odysseus on Ogygia*), in 1968.

UNRWA: *see* United Nations Relief and Works Agency for Palestine Refugees in the Near East.

Unser, Bobby; and Unser, Al, Bobby Unser in full ROBERT WILLIAM UNSER (respectively b. Feb. 20, 1934, Albuquerque, N.M., U.S.; b. May 29, 1939, Albuquerque), brothers, American automobile-racing drivers from a family of drivers, who each won the Indianapolis 500 race (Bobby: 1968, 1975, and 1981; Al: 1970, 1971, 1978, and 1987).

Both brothers drove early in their careers in the Pike's Peak hill climb and won; winning this event had been almost a family monopoly. Bobby first raced in 1949 and first competed in the Indianapolis 500 race in 1963. He won two United States Automobile Club (USAC) races in 1967 before winning his first Indianapolis 500 in 1968. His 1981 Indianapolis 500 victory was controversial: he crossed the finish line first, but he was placed second for advancing in position while the race was under the yellow (caution) flag. Mario Andretti was declared the winner. He appealed the decision to USAC as well as a $40,000 fine. Further appeal restored him as winner but let the fine stand. Bobby retired as a driver in 1982.

In 1968 Al won five USAC races, placing third in the season's rankings and second in 1969. In 1970 he won both the Indianapolis 500 and the USAC championship. He also raced in stock-car races from 1967. Al became the oldest driver to win the Indianapolis 500 in 1987, when he was almost 48 years old; Bobby had previously set the record when he won in 1981 at age 47. In 1994 Al retired from racing. His son Al Unser, Jr., was also a multiple winner of the Indianapolis 500.

Unter den Linden, avenue in Berlin, Germany, running eastward from the Brandenburg Gate for nearly a mile. The street is named for the linden trees that formerly grew along the central promenade.

The focus of Berlin's social and cultural life before World War II, Unter den Linden was lined with palaces and museums; many of the buildings were destroyed during the war. The remains of the former Imperial Palace (1538) were razed in 1951 to create a plaza. Present landmarks along the avenue include the State Library, the State Opera House, several ministries, the Russian Embassy (1951), and Humboldt University (formerly Berlin University). During the East German period, the area was often used for mass rallies.

Unterfranken, English LOWER FRANCONIA, *Regierungsbezirk* (administrative district), northwestern corner of Bavaria (*Land* (state), central Germany. Unterfranken is bordered by Thuringia *Land* to the northeast, the *Regierungsbezirke* of Oberfranken (Upper Franconia) and Mittelfranken (Middle Franconia) to the east, Baden-Württemberg *Land* to the south, and Hesse *Land* to the west. The district occupies an area within what was once the historical region of Franconia.

The Spessart and Rhön plateaus in western Unterfranken form a natural frontier with the *Land* of Hesse. The Spessart is bounded by the rectangular course of the Main River to the west, south, and east. The undulating plateau is broken into a series of ridges by deep winding valleys. The steep scarp of the western Spessart overlooks the city of Aschaffenburg, situated along the Main. To the east more gentle slopes merge with the Franconian Plateaus. The Spessart upland, being almost completely covered with beech and oak forests, is sparsely populated but attracts many recreationists from nearby urban centres. Much of the forested land lies within the 660-square-mile (1,710-square-km) area of the Bavarian Spessart Nature Park. The Sinn River separates the northern Spessart from the highlands of the Rhön plateau to the east and northeast. In the Rhön region, mixed forest interspersed with grassland dominates. Bad Kissingen, located in the Saale River valley, is one of Bavaria's leading health spas.

Central Unterfranken lies on the Franconian Plateaus, an undulating region covered by fertile loess and clay soils. Large farms and open cultivated fields dominate the landscape, which forms one of Bavaria's leading agricultural areas. The chief crops produced include sugar beets, wheat, barley, rye, and potatoes. Livestock are fattened on locally grown fodder crops. The plateau is dissected by steep-sided valleys whose slopes are covered with vineyards, orchards, and forests. The largest among these is the Main River valley. In its course across the Franconian Plateaus, the Main River passes through Würzburg, the largest city and administrative seat of Unterfranken, and Schweinfurt.

Industry in Unterfranken is concentrated in the cities of Schweinfurt, Würzburg, and Aschaffenburg. Schweinfurt, the chief industrial centre of the district, manufactures steel, ball bearings, small motors, and specialized machinery. Würzburg is famous for its beer and is the principal centre of wine production and marketing in the district. It is also noted for its splendid Baroque architecture and sculpture. Aschaffenburg, together with surrounding towns, forms an important centre of the German clothing industry.

The people of Unterfranken speak Franconian, one of three main German dialects in Bavaria. Higher education in the *Regierungsbezirk* is centred in Würzburg and includes the University of Würzburg (founded in 1582), the Music Academy, and a state technical college. The population of Unterfranken is predominantly Roman Catholic. Area 3,294 square miles (8,532 square km). Pop. (2002 est.) 1,340,912.

Unterwalden, former canton, central Switzerland; it occupied the basins of the Sarner Aa (river) and the Engelberger Aa. The former canton is divided (east and west) into two sovereign half cantons—Nidwalden and Obwalden—based on the medieval distinction between the upper and lower river valleys. Unterwalden was included in the Zürichgau (district) and was ruled after 1173 by the Habsburg counts, acting as the representatives of the German king. In 1291, with Uri and Schwyz, it formed the Everlasting League that became the nucleus of the Swiss Confederation. In 1340 Unterwalden divided itself into Nidwalden and Obwalden. Although continuing to maintain their distinct identities, Nidwalden and Obwalden usually acted in concert as Unterwalden canton. In 1803 they became half cantons having equal rights.

untouchable, also called HARIJAN, in traditional Indian society, any member of a wide range of low-caste Hindu groups and any person outside the caste (*q.v.*) system. The use of the term and the social disabilities associated with it were declared illegal in the constitutions adopted by the Constituent Assembly of India in 1949 and of Pakistan in 1953. Mahatma Gandhi, the great modern social leader, called untouchables Harijans ("Children of the God Hari Vishnu," or simply, "Children of God") and long worked for their emancipation.

Many different hereditary castes have been traditionally subsumed under the title of untouchable, each of which subscribes to the social rule of endogamy (marriage exclusively within the caste community) that governs the caste system in general.

Traditionally, the groups characterized as untouchable were those whose occupations and habits of life involved polluting activities, of which the most important were (1) taking life for a living, a category that included, for ex-

ample, fishermen; (2) killing or disposing of dead cattle or working with their hides for a living; (3) pursuing activities that brought the participant into contact with emissions of the human body, such as feces, urine, sweat, and spittle, a category that included such occupational groups as sweepers and washermen; and (4) eating the flesh of cattle or of domestic pigs and chickens, a category into which most of the primitive tribes of India fell.

Orthodox Hindus regarded the hill tribes of India as untouchables, not because they were primitive or pagan but because they were eaters of beef and of the scavenging village pigs and chickens. Much confusion had arisen on this issue because the unassimilated hill tribes never accepted their relegation to the ranks of the untouchables, nor did they seem to realize that their status was decided on a purely behavioral basis.

Until the adoption of the new constitutions in independent India and Pakistan, the untouchables were subjected to many social restrictions, which increased in severity from north to south in India. In many cases, they were segregated in hamlets outside the town or village boundary. They were forbidden entry to many temples, to most schools, and to wells from which higher castes drew water. Their touch was seen as seriously polluting to people of higher caste, involving much remedial ritual. In southern India, even the sight of some untouchable groups was once held to be polluting, and they were forced to live a nocturnal existence. These restrictions led many untouchables to seek some degree of emancipation through conversion to Christianity, Islām, or Buddhism.

The modern constitution of India formally recognized the plight of the untouchables by legally establishing their ethnic subgroups as scheduled castes (population about 80 million in the late 20th century) and scheduled tribes (about 38 million). Besides banning untouchability, the constitution provides these groups with specific educational and vocational privileges and grants them special representation in the Indian parliament. In support of these efforts, the Untouchability (Offenses) Act (1955) provides penalties for preventing anyone from enjoying a wide variety of religious, occupational, and social rights on the grounds that he is a Harijan, the name sometimes used in place of the term *untouchable.* Despite such measures, the traditional divisions between pure and polluted caste groups persist in some levels of Indian society, making full emancipation of these groups slow to come about.

Unzen, Mount, Japanese UNZEN-DAKE, volcano on central Shimabara Peninsula, western Kyushu, Japan. Mount Unzen is actually a group of composite volcanoes, the highest of which is Mount Fugen, at 4,462 feet (1,360 m). Mount Unzen underwent a major eruption in 1792 that killed as many as 15,000 people in what was probably the worst volcanic disaster in Japan's history. No major eruptions occurred subsequently until June 3, 1991, when an eruption forced the evacuation of thousands of nearby homes and killed 43 people. Unzen Hot Spring lies on Mount Unzen's slopes, and both form part of Unzen-Amakusa National Park.

upādhi (Sanskrit: "imposition"), in Indian philosophy, the concept of adventitious limiting conditions. In logic, *upādhi* operates as follows: a syllogism requires a ground (*hetu*) to prove the proposition; *e.g.,* that there is fire on the mountain to prove the presence of smoke. But this ground needs a qualification: there can be fire without smoke. An *upādhi* is recognized for the *hetu.* Since smoke is produced by fire in living wood, the *hetu* must be refined thus: smoke is present wherever there is fire in living wood.

In Bhedābheda philosophy, the concept of *upādhi* is used to account for the relationship between Brahman, the supreme being, and its product, the evolved world: Brahman and world are nondifferent in their essence but are different inasmuch as limiting conditions such as time and space, adventitious to this essence, are imposed on them.

upamāna (Sanskrit: "comparison"), the fourth of the five means of knowledge (*pramāṇa*) in Indian philosophy by which man can have valid cognitions of the world. *Upamāna* describes knowledge imparted by means of analogy. Thus, when the meaning of a word is unknown, for example, *gavaya* (Sanskrit: "wild ox"), the similarity of the name to the word *gaus* ("cow") will provide knowledge that *gavaya* is in the bovine family. *See also* pramāṇa.

upanayana, Hindu ritual of initiation, restricted to the three upper *varṇas,* or social classes; it marks the male child's entrance upon the life of a student (*brahmacārin*) and his acceptance as a full member of his religious community. The ceremony is performed between the ages of 5 and 24, the wide variance reflecting the classical notions of the different educational requirements of the three upper classes—Brahmans (priests and teachers), Kshatriyas (warriors and rulers), and Vaiśyas (merchants and tradesmen).

After a ritual bath the boy is dressed as an ascetic and brought before his guru (personal spiritual guide), who invests him with a deerskin to use as an upper garment, a staff, and the sacred thread (*upavīta,* or *yajñopavīta*). The thread, consisting of a loop made of three symbolically knotted and twisted strands of cotton cord, is replaced regularly so that it is worn throughout the lifetime of the owner, normally over the left shoulder and diagonally across the chest to the right hip. It identifies the wearer as *dvija,* or "twice-born," the second birth understood as having taken place with the imparting by the guru to the student of the "Gāyatrī" mantra, a sacred verse of the Rigveda. The initiation ceremony concludes with the student's kindling of the sacrificial fire and his begging of alms, symbolic of his dependence on others during his *brahmacārin* period.

The actual observance of *upanayana* is increasingly confined to more orthodox Hindus, particularly those of the Brahman caste. As a prerequisite to marriage it is sometimes replaced by a simpler ceremony, which takes place on the day of marriage; often both initiation ceremonies are omitted altogether.

A corresponding rite among Parsis (whose ancient homeland was Iran) is called *nawzād* (Persian: "new birth"); it invests both six-year-old boys and girls with a thread worn around the waist. Some scholars suggest that this indicates a common and ancient Indo-Iranian origin of the two ceremonies.

Upanishad, also spelled UPANISAD, Sanskrit UPANIṢAD ("session"), any of the speculative texts that contain elaborations in prose and verse of the Vedas, the most ancient Hindu sacred literature.

The name Upanishad implies sitting at the feet of the teacher, and the Upanishads, of which approximately 108 are known, record the views of a succession of Hindu teachers and sages who were active as early as 1000 BC and who flourished about 600 BC. The texts form the basis of much of later Indian philosophy. They represent the final stage in the tradition of the Vedas, so the teaching based on them is known as the Vedānta (Sanskrit: "Conclusion of the Veda"). The older Upanishads may be part of the Brāhmaṇas (commentaries) of their respective Vedas but are distinguished from them both by increased philosophical and mystical questioning and by their diminished concern with Vedic deities and sacrificial rites.

The special philosophical concern of the Upanishads is with the nature of reality. There is a development toward the concept of a single supreme being, and knowledge is directed toward reunion with it. Of fundamental importance to all Hindu thought is the equation in some of the Upanishads of atman (the self) with Brahman (ultimate reality). The nature of morality and of eternal life is discussed, as are such themes as the transmigration of souls and causality in creation.

The appearance in Europe in the early 19th century of second- and third-hand translations of the Upanishads had a profound effect on certain thinkers, notably in Germany; the philosopher Arthur Schopenhauer fully acknowledged their influence on his thought.

upāsaka, feminine UPĀSIKĀ (Sanskrit: "servant"), lay devotee of the Gautama Buddha. The term correctly refers to any Buddhist who is not a member of a monastic order, but its modern usage in Southeast Asia more often connotes the particularly pious person who visits the local monastery on the weekly holy days and who undertakes special vows.

Since its beginnings in India, Buddhism has accepted both men and women of any race, social class, or caste. All that is required of believers is the simple affirmation of the Triratna ("Threefold Refuge"), composed of the Buddha, the dharma (teachings), and the sangha (community of believers). The Buddhist layperson may observe in addition any combination of the five precepts (not to kill, steal, commit sexual misconduct, lie, or take intoxicants) and support the monastic community by giving alms.

The Theravāda ("Way of the Elders") Buddhist tradition of Southeast Asia distinguishes between the religious paths of the layperson and the monk; achievement of nirvana (spiritual emancipation) is normally considered possible only if a devotee renounces worldly life and joins a monastic order. The Mahāyāna ("Greater Vehicle") tradition of Tibet and East Asia, however, recognizes several celebrated spiritual masters who at the same time have been married householders.

upasaṃpadā, Buddhist rite of higher ordination, by which a novice becomes a monk, or bhikku (Pāli: *bhikkhu;* Sanskrit: *bhikṣu*). Ordination is not necessarily permanent and, in some countries, may be repeated in a monk's lifetime.

A candidate for ordination must be at least 20 years old, have the permission of his parents, be exempt from military service, be free from debt and from contagious disease, and have received at least some elementary instruction in Buddhism.

The ceremony may be performed on any day determined to be auspicious, except during *vassa* (*varṣa*), the rainy season retreat. It takes place within the sanctuary in the presence of monks already ordained. The *pabbajjā* (*q.v.*), or ceremony of lower ordination to the rank of novice, is repeated even if the candidate has undergone it previously. He dons the garments of a monk and repeats the Triratna ("Threefold Refuge") of the Buddha, the dharma (teaching), and the sangha (community of believers) and the 10 precepts (basic rules of ethical conduct for a monk); the candidate then stands before the assembly in the company of his sponsoring tutors and is questioned on his fitness to be received into the order. The assembly is questioned three times, and, if there is no objection to his ordination, the candidate is accepted into the priesthood. Female novices are ordained nuns (Pāli: *bhikkunīs*) in a similar rite.

Updike, Daniel Berkeley (b. Feb. 24, 1860, Providence, R.I., U.S.—d. Dec. 28, 1941,

Boston, Mass.), American printer and scholar, founder in 1893 of the distinguished Merrymount Press in Boston.

Between 1880 and 1893 Updike worked for the publisher Houghton Mifflin and from 1892 was at that company's Riverside Press. He then started his own commercial venture and published the Humanist Library, a series produced in a Renaissance style, in the early part of the 20th century. Selling books did not please Updike, however, and he dropped that portion of his business and concentrated on manufacturing books for others. Merrymount Press soon acquired a reputation for its superior designs and excellent printing, and trade publishers and book clubs became customers.

Updike's book designs combine the functional and the beautiful. They are noteworthy for their clarity of organization, easy readability, and excellent workmanship, based upon the use of a few carefully selected typefaces and immaculate presswork. His masterpieces are a complex folio edition of *The Book of Common Prayer* (1930) and an edition of Izaak Walton's *The Compleat Angler* (1928). He taught printing history at the Harvard Business School, and his *Printing Types: Their History, Forms, and Use* (1922) became an authoritative text.

Updike, John (Hoyer) (b. March 18, 1932, Shillington, Pa., U.S.), American writer of novels, short stories, and poetry, known for his careful craftsmanship and realistic but subtle depiction of "American, Protestant, small-town, middle-class" life.

Updike grew up in Shillington, Pa., and many of his early stories draw on his youthful experiences. He graduated from Harvard University in 1954. In 1955 he began an association with *The New Yorker* magazine, to which he contributed editorials, poetry, stories, and criticism throughout his prolific career. His poetry—intellectual, witty pieces on the absurdities of modern life—was gathered in his first book, *The Carpentered Hen and Other Tame Creatures* (1958), which was followed by his first novel, *The Poorhouse Fair* (1958). About this time, Updike devoted himself to writing fiction full-time, and several works followed. *Rabbit, Run* (1960), which is considered to be one of his best novels, concerns a former star athlete who is unable to recapture success when bound by marriage and small-town life and flees responsibility. Three subsequent novels, *Rabbit Redux* (1971), *Rabbit is Rich* (1981), and *Rabbit at Rest* (1990)—the latter two winning Pulitzer Prizes—follow the same character during later periods of his life. *The Centaur* (1963) and *Of the Farm* (1965) are notable among Updike's novels set in Pennsylvania. Most of his later fiction is set in New England, where (in Ipswich, Mass.) he lived from the 1960s.

Updike continued to explore the issues that confront middle-class America—issues such as fidelity, religion, and responsibility. His later novels include *Couples* (1968), *Bech: A Book* (1970), *Marry Me* (1976), *The Coup* (1976), *The Witches of Eastwick* (1984), and *Memories of the Ford Administration, A Novel* (1992). His several collections of short stories include *The Same Door* (1959), *Pigeon Feathers* (1962), *Museums and Women* (1972), *Problems* (1979), and *Trust Me* (1987). Updike also wrote nonfiction and criticism, much of it appearing in *The New Yorker* magazine. It has been collected in *Assorted Prose* (1965), *Picked-Up Pieces* (1975), *Hugging the Shore* (1983), and *Odd Jobs* (1991). He also continued to write poetry, usually light verse.

updraft and downdraft, in meteorology, upward-moving and downward-moving air currents, respectively, that result from a number of causes. Local daytime heating of the ground sometimes causes the surface air to become much warmer than the air above, and, because the warmer air is lighter, it rises; this vertical current, called a thermal, may reach an altitude of 3 km (2 miles). Updrafts and downdrafts also occur as part of the turbulence produced when air currents or air masses collide with one another or with topographic obstacles.

Strong updrafts and downdrafts occur in a thunderstorm. Updrafts characterize a storm's early development, during which warm air rises to the level where condensation and precipitation can begin. When a storm is fully developed, updrafts exist alongside downdrafts caused by the downward dragging of air by falling precipitation. These downdrafts, originating at high levels, contain cold, dense air that spreads out at the ground as a cold air wedge. Downdrafts encountered by aircraft are sometimes called air pockets because it was formerly thought that they were pockets of low pressure or vacuum.

upekṣa (Sanskrit), Pāli UPEKKHĀ, in Buddhism, the perfect virtue of equanimity. It is one of the four practices known as brahmavihāra (*q.v.*).

Upemba National Park, park in southeastern Zaire. It was created in 1939 and has an area of 4,529 square miles (11,730 square km). Its northern and western borders touch the Lualaba River and the surrounding lakes and marshlands of the Kamolondo plains. Lake Upemba, an expansion of the Lualaba River, lies largely within the park; it covers approximately 200 square miles (500 square km) and is swampy and overgrown with papyrus. The Lufira River flows from the southeast to join the Lualaba River north of the lake. The forested Kibara Mountains rise to 6,070 feet (1,850 m) in the northeast. The park's wildlife includes zebras, antelopes, elephants, buffalo, lions, and aquatic birds.

Upernavik, town, western Greenland. It is situated on a small island in Baffin Bay, about 100 miles (160 km) north of Nordost Bay. A



Upernavik island, Greenland
Art Resource

whaling and sealing base (founded 1771), it has a weather and radio station and a hospital. Graphite deposits are located nearby. On Kingittoq (Kingigtoq) Island to the northwest was found an early 14th-century runic stone, which tells of three men wintering there. Qaarsorsuaq Island to the south is known for its huge, vertical bird cliffs. Upernavik Fjord, a 30-mile- (48-kilometre-) long inlet of Baffin Bay, extends southeast to the inland ice cap, where it receives Upernavik Glacier. Pop. (1991 est.) 964.

Upfield, Arthur William (b. Sept. 1, 1888, Gosport, Hampshire, Eng.—d. Feb. 13, 1964, Bowral, N.S.W., Australia), English-born Australian popular novelist who wrote more than 30 novels featuring Detective Inspector Napoleon (Boney) Bonaparte, a half-Aboriginal Australian detective.

Upfield emigrated to Australia in 1911 and was a sheepherder, gold miner, cowhand, soldier, and fur trapper before turning to writing. While working in the Australian wilderness Upfield met a half-Aboriginal who became the prototype of his detective hero. His novels, all interspersed with lengthy descriptions of the colourful Australian landscape, include *The Barrakee Mystery* (1929), in which Bonaparte first appeared; *Murder Down Under* (1943); and *The Body at Madman's Bend* (1963). Upfield also wrote serious newspaper and magazine articles on Australian topography and history, as well as short stories.

upholstery, materials used in the craft of covering, padding, and stuffing seating and bedding. The earliest upholsterers, from early Egyptian times to the beginning of the Renaissance, nailed animal skins or dressed leather across a rigid framework. They slowly developed the craft to include cushions, padding, and pillows—stuffed with such materials as goose down and horsehair.

The medieval upholsterer, who was primarily concerned with fabrics, made mattresses and hangings. In the 17th century beds were draped with sumptuous fabrics and ornate trimmings; as these beddings became less fashionable, chairs and sofas were in turn elaborately upholstered with velvet, silks, and needlework.

Springs, which permitted soft, bulky shapes, were first used by upholsterers in the 18th century; helical by the mid-19th century, they were later flattened for maximum resiliency. Upholstery techniques were revolutionized in the 20th century with the introduction of molded sponge rubber, dirt and liquid retardants, plywood, naugahyde, and synthetic fibres, which created new springing, cushioning, and covering materials.

Upjohn, Richard (b. Jan. 22, 1802, Shaftesbury, Dorset, Eng.—d. Aug. 17, 1878, Garrison, N.Y., U.S.), British-American architect who was the most active exponent in his time of the Gothic Revival style in ecclesiastical architecture.

Although his parents wished him to enter one of the "learned professions," Upjohn became apprenticed to a British cabinetmaker. In 1829, having amassed debts in England, he went to the United States and settled in New Bedford, Mass. Soon afterward he became an architect, working from 1834 to 1839 in Boston, where he employed a variety of styles. His first Gothic church, St. John's, was built in Bangor, Maine (1837). In 1839 he moved to New York City, where he began to design in his mature style. His first example is Trinity Church, New York City (1839–46), a building that became renowned for the beauty and purity of its Perpendicular Gothic lines.

Upjohn's success with Trinity Church led to many other church commissions, as well as houses (Edward King residence, Newport, R.I., 1845) and offices (Trinity Building, New York City, 1852), both in Italian Renaissance style. The Gothic style soon became inseparable from his religious and moral convictions. Although most of his churches were Episcopalian, he accepted commissions for other denominations (Madison Square Presbyterian Church). But so strong was his belief that Gothic was the expression of Christian architecture that he refused to design a church for Unitarians, a sect he considered anti-Christian. He usually contributed designs for at least one mission church a year. For poor parishes he published in *Upjohn's Rural Architecture* (1852; reprinted 1975) an unpretentious design in wood, remarkable for its structural honesty and its liturgical character.

In 1853 Upjohn took his son Richard Mitchell into full partnership. The latter became more and more influential in the firm as public tastes changed from pure Gothic to picturesque eclecticism. In 1857 Upjohn helped found the American Institute of Ar-

chitects and served as its president until he resigned in 1876.

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uplift, in geology, vertical elevation of the earth's surface in response to natural causes. Broad, relatively slow and gentle uplift is termed warping, or epeirogeny, in contrast to the more concentrated and severe orogeny, the uplift associated with earthquakes and mountain building. Uplift of the earth's surface also has occurred in response to the removal of Pleistocene ice sheets through melting and wastage. Such elastic rebound is both measurable and ongoing in southern Canada and in the general Scandinavian area today.

Upolu, most populous island of Samoa, in the South Pacific Ocean. It lies across the Apolima Strait from the island of Savai'i to the west. Upolu is about 46 miles (74 km) long and 16 miles (26 km) across at its widest point, with an area of 432 square miles (1,119 square km). Its volcanic central mountain range reaches a maximum elevation of 3,608 feet (1,100 m) at Mount Fito, in O Le Pupu-Pu'e National Park (1978). The island has a densely forested interior, fertile coastal soils, and a wet tropical climate; the endangered flying fox and several types of tropical birds are found there. The port of Apia, the main commercial and political centre, is on the northern shore. The island's products include electrical components, beer, cigarettes, coconut creams and oils, copra, cacao, and taro. Pop. (1998 est.) 115,000.

uposatha, fortnightly meetings of the Buddhist monastic assembly, at the times of the full moon and the new moon, to reaffirm the rules of discipline. The *uposatha* observance, now confined almost entirely to the Theravāda ("Way of the Elders") tradition of Southeast Asia, can be traced back to pre-Buddhist ceremonies of ancient India. Later Buddhists added the quarter days in the lunar cycle, establishing four holy days each month (known as *poya* days in Sri Lanka and as *wan phra* in Thailand).

On the fortnightly *uposatha* days, all the monks of a monastery gather in the sanctuary (novices and laity are excluded) for mutual confession of offenses and recitation of the 227-rule monastic code, the *pāṭimokkha.* The four monthly holy days are also occasions for the more devout laity to visit a local monastery, take part in devotional services, and perhaps hear a sermon by a monk. A layman may vow to observe, for the duration of *uposatha,* the 10 precepts (*dasa-sīla*) ordinarily observed in their entirety only by monks.

Uppdal, Kristofer Oliver (b. Feb. 19, 1878, Beitstad, Nor.—d. Dec. 26, 1961, Olbu), proletarian Norwegian novelist whose major work is the 10-volume *Dansen gjenom skuggeheimen* (1911–24; "The Dance Through the World of Shadows"), which deals with the development of the Norwegian industrial working class from its peasant origin.

Uppdal's own life recapitulates the history of Norway's labour movement in his rise from farm boy to skilled worker and eventually labour leader. He published his first poems in 1905, then devoted his most productive years to his powerful and monumental study of the subtle class distinctions within the working class. His later years were unproductive as a result of mental illness.

Upper Austria: *see* Oberösterreich.

Upper Avon (river, England): *see* Avon, River.

Upper Burma, geographic and historical division of Burma (Myanmar), referring to the central and northern portion of the country. The division between Upper and Lower Burma was accentuated during 1852–85, when Lower Burma (comprising the extreme southern fringes of the country) became British Burma. In 1885 Upper Burma also fell under British domination. Unlike coastal Lower Burma, Upper Burma is considered the heartland of the country and corresponds roughly to Burma's dry zone, lying as it does in the rain shadow of the Arakan Mountain Range. It was the area of the earliest Burman settlement in the country and was the domain of the Burman kings. Upper Burma is bisected by the main course of the southward-flowing Irrawaddy River.

Upper Canada, from 1791 to 1841, the region in Canada now known as Ontario. With the Act of Union of 1841, it became known as Canada West (*q.v.*). *See also* Ontario.

Upper Egypt, Arabic QIBLĪ MIṢR, also called AṢ-ṢAʿĪD ("The Upland"), geographic and cultural division of Egypt, generally consisting of the Nile River valley south of the delta and the 30th parallel N. It thus consists of the entire Nile River valley from Cairo south to Lake Nasser (formed by the Aswān High Dam). This division also includes what some scholars term Middle Egypt (from Lisht to Panopolis).

In late predynastic times, Upper Egypt constituted a political entity separate from Lower Egypt (the delta region). But Menes (fl. 2900 BC) joined Upper and Lower Egypt, and each Egyptian king thenceforth had as one of his royal titles "King of Upper and Lower Egypt" (or "He of the Sut-Plant and the Bee"), thus signifying that he was the deified representation of those divisions' unification.

Upper Hutt, city, Wellington local government region, southern North Island, New Zealand. It lies in the Hutt River valley near Wellington. Founded in 1848, it is part of the larger Hutt area named for Sir William Hutt, an original shareholder in the New Zealand Company, which pioneered the region in 1840. Upper Hutt is for the most part residential, although it does have engineering works, tire- and vaccine-manufacturing plants, and some farming. It is known as a centre of veterinary practice. Pop. (2001) 36,684.

Upper Volta (western Africa): *see* Burkina Faso.

Uppland, *landskap* (province), east-central Sweden. It is bounded by the Gulf of Bothnia and the Baltic Sea on the east and by the traditional *landskaper* (provinces) of Södermanland, Västmanland, and Gästrikland on the south, west, and north, respectively. It is composed of the administrative *län* (county) of Uppsala, the northern part of Stockholm *län,* and the eastern part of Västmanland *län.* The province's terrain is generally flat, averaging less than 200 feet (60 m) in elevation. The southern part of Uppland, which borders on Mälaren (lake), and the coastal region (known as Roslagen) have a more varied landscape, with deep bays, wooded heights, and numerous islands. Forests and bogs predominate in the north.

Uppland was the principal settlement in central Sweden during the Bronze Age. During the Iron Age it extended its hegemony over neighbouring kingdoms, becoming the heart of the Swedish empire. With the advent of Christianity it became the seat of an archbishopric as well.

Grain and potatoes are grown on the *landskap*'s fertile plains, and there is some livestock raising. Industry is diversified, ranging from woodworking and sawmilling in the north, with its forests and iron-ore deposits, to the manufacture of chocolate, machinery, and electrical equipment in the industrial towns of the south, such as Enköping, Sundbyberg, and Solna. Djursholm and Lidingö are basically residential towns, and Norrtälje, Östhammar, Öregrund, and Vaxholm are popular resorts.

Uppland's principal city, Uppsala, is the historic cultural and religious centre of Sweden. Area 4,894 square miles (12,676 square km). Pop. (2000 est.) 1,313,757.

Uppsala, *län* (county) in east-central Sweden. It lies between Mälaren (lake) on the south and the Gulf of Bothnia on the north. It constitutes most of the western part of the *landskap* (province) of Uppland. The *län*'s low, level surface is drained by the Fyris River. Grain and potatoes are grown, and there is some stock raising and dairying. Major iron-ore deposits are found in the region around Dannemora, and there are several ironworks and steelworks. Sawmilling is predominant in the area near the mouth of the Dal River in the north, and there is a major hydroelectric plant located at Älvkarleby. The capital and largest city is Uppsala. Area 2,698 square miles (6,989 square km). Pop. (2001 est.) 294,196.

Uppsala, city and capital of the *län* (county) of Uppsala, east-central Sweden. It lies 40 miles (64 km) north-northwest of Stockholm. Originally known as Östra Aros, it was founded as a trading post at the head of navigation on the Fyris River at a point a few miles from Gamla (Old) Uppsala, which was the political and religious centre of the ancient kingdom of Svea. By the 13th century the new Uppsala had become a royal residence and an important commercial centre.

Although it later relinquished its political primacy to Stockholm, Uppsala has remained a religious centre as the seat of the archbishop of Sweden. The Gothic cathedral, the largest such structure in Sweden, dominates the city. Work began on this edifice in the late 13th century but progressed slowly, and not until 1435 was the church consecrated. The cathedral was ravaged by fire several times but was finally restored in the late 19th century. Opposite the cathedral is the Gustavianum, a medieval bishop's palace that is now a museum of archaeology and cultural history.

With its many schools, Uppsala is also a seat of Swedish learning and culture. Prestigious Uppsala University (1477) is the country's oldest, and the university's library, the Carolina Rediviva (1841), is one of the largest in Sweden. Other notable places in the city include a large castle that was begun by Gustav I Vasa in the mid-16th century and partly rebuilt in the 18th century. In 1654 it was the scene of Queen Christina's abdication; it is now the governor's residence. Additional points of interest in the city include the botanic garden and house of the botanist and explorer Carolus Linnaeus and the Victoria Museum, containing Egyptian antiquities.

With the coming of the railway in the 1860s, Uppsala developed rapidly from a university town and agrarian-trade centre to an industrial city. Its industries include printing and publishing, food processing, and the manufacture of pharmaceuticals and machinery. The city is an important rail hub and is also a military centre. Pop. (2000 est.) mun., 188,478.

Uppsala University, Swedish UPPSALA UNIVERSITET, state-sponsored coeducational university at Uppsala, the oldest institution of higher learning in Sweden. It was founded in 1477 but closed in 1510 owing to the religious disputes of the time. It was reopened in 1595 with faculties of theology and philosophy, and in 1624 King Gustav II Adolf granted it large landed estates, thus providing the school's future financial basis. The most famous figure associated with the university was the 18th-century Swedish botanist Carolus Linnaeus.

The university currently has faculties of theology, law, medicine, arts (containing historical-philosophical and linguistic divisions), pharmacy, social science, and science (which

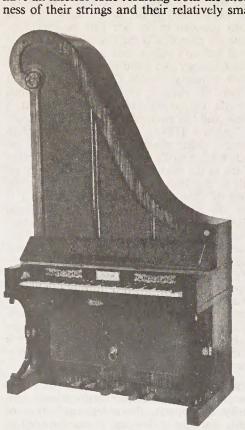
contains mathematical-physical, biology and earth science, and chemistry divisions). The university's library, the Carolina Rediviva, is one of Sweden's largest and contains the illu-



Dean's house at Uppsala University in Sweden
J. Allan Cash—EB Inc.

minated manuscript *Codex Argenteus,* which is the only extant manuscript of Bishop Ulfilas' 4th-century translation of the Gospels into the Gothic language. The main university building (1887) has a large art collection. In the late 20th century Uppsala University had an enrollment of about 15,000 students.

upright piano, musical instrument in which the soundboard and plane of the strings run vertically, perpendicular to the keyboard, thus taking up less floor space than the normal grand piano. Upright pianos are made in various heights; the shortest are called spinets or consoles, and these are generally considered to have an inferior tone resulting from the shortness of their strings and their relatively small



Giraffeklavier ("giraffe-style" upright piano) in Biedermeier style, by Gebroeders Muller, about 1820; in the Centraal Museum der Gemeente, Utrecht, The Netherlands
By courtesy of the Centraal Museum der Gemeente, Utrecht, The Netherlands

soundboards. The larger upright pianos were quite popular in the later 19th and early 20th centuries. The action (hammer and damper mechanism) of the upright differs from the grand-piano action mainly in that upright action is returned to a resting position by means of springs rather than by gravity alone, as in a grand. This, in part, accounts for the characteristic "touch" of uprights, which is distinct from that of grands. The chief advantages of upright pianos lie in their modest price and compactness; they are instruments for the home and school, not for the concert stage.

The majority of upright pianos have strings running upward from the bottom of the case, near the floor; this design is owed to John Isaac Hawkins, an Englishman who lived in the United States in about 1800 and became an important piano maker in Philadelphia. Earlier, the strings started upward from near the level of the keys; these instruments were necessarily much taller and lent themselves to various decorative designs, among them lyre-shaped; round; the "pyramid" model of the Saxon organ-builder Ernst Christian Friderici (1745), with both sides sloping upward to the top; and the "giraffe-style" design of Martin Seuffert (1804) of Vienna, with one side straight and one bent, as on a grand piano.

upslope wind: *see* anabatic wind.

Upton, Francis Robbins (b. 1852, Peabody, Mass., U.S.—d. March 10, 1921, Orange, N.J.), American mathematician and physicist who, as assistant to Thomas Edison, contributed to the development of the American electric industry.

Upton studied at Bowdoin College, Brunswick, Maine; Princeton University; and—with Hermann von Helmholtz—Berlin University. In 1878 he joined Edison at his laboratory in Menlo Park, N.J. There he worked out mathematical problems arising during the development of such devices as the incandescent lamp, the watt-hour meter, and large dynamos. He was a partner and general manager of the Edison Lamp Works, established in 1880.

Upton also helped Edison publicize his new inventions by writing descriptive articles for such popular magazines as *Scribner's Monthly* and *Scientific American.*

UPU: *see* Universal Postal Union.

'Uqāb, Battle of al-: *see* Navas de Tolosa, Battle of Las.

'Uqaylid DYNASTY, Muslim Arab dynasty whose various branches ruled Mosul (*c.* 992–1096) and Takrit (1036–*c.* 1057), in what is now Iraq.

The 'Uqaylids, descendants of the famous Bedouin tribe of 'Āmir ibn Ṣa'ṣa'ah, established themselves in Jazīrat ibn 'Umar, Niṣībīn (modern Nusaybin, Tur.), and Balad (northern Iraq) at the end of the 10th century. Abū adh-Dhawwūd Muḥammad (reigned *c.* 990–996), the first 'Uqaylid, was drawn into the struggle between the Ḥamdānids and Marwānids for possession of Mosul and eventually succeeded the Ḥamdānids as emir of Mosul, though remaining nominally subject to the Būyids of Baghdad.

The reign of Qirwāsh ibn al-Muqallad (1001–50), who assumed the emirate after many years of bitter family feuding, was troubled by the threat of Oğuz tribesmen invading his dominions from western Iran and southern Iraq, forcing him into defensive alliances with the Mazyadids, another Muslim Arab dynasty in al-Ḥillah, central Iraq.

Muslim ibn Quraysh (reigned 1061–85), however, was able to bring the 'Uqaylid dynasty to the height of its power. By allying himself with the Seljuq sultans Alp-Arslan and Malik-Shāh, Muslim annexed part of northern Syria and thus established 'Uqaylid rule over an area reaching from Aleppo to Baghdad. 'Uqaylid fortunes declined, however, when Muslim switched allegiance to his coreligionists, the Shī'ite Fāṭimids of Egypt. Seljuq armies invaded Mosul and routed Muslim, who was subsequently killed in battle with Seljuq forces. The 'Uqaylids were allowed to remain in Mosul as Seljuq governors but were finally subjugated by the Seljuq sultan Tutush in 1096.

Another 'Uqaylid line had been installed in Takrit, on the Tigris River, sometime before 1036. The governorship remained in their hands until they submitted to the Seljuq sultan Toghrïl Beg, who in 1055 took Baghdad and displaced the Büyids as overlord of Iraq.

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'uqqāl (Arabic: "the wise"), singular 'ĀQIL, in the Druze religion, an elite of initiates who alone know Druze doctrine (*ḥikmah,* literally "wisdom"), participate fully in the Druze religious services, and have access to Druze scripture. The religious system of the Druzes is kept secret from the rest of their own numbers, who are known as *juhhāl* ("the ignorant"), as well as from the outside world. Any Druze man or woman deemed worthy after serious scrutiny is eligible for admission into the *'uqqāl.*

Once initiated, the *'uqqāl* adopt distinctive dress and white turbans and must pursue lives of religious piety, sobriety, and virtue. They abstain from alcohol and tobacco and attend secret Thursday-evening services at the *khilwah,* an austere, unadorned house of worship usually located outside the village. The *'uqqāl* are further bound by the seven Druze principles of conduct: utter honesty under all circumstances but specifically avoidance of theft, murder, and adultery; Druze solidarity; renunciation of other religions; avoidance of unbelievers; belief in the oneness of God; acceptance of God's acts; and submission to God's will.

The *'uqqāl* may deepen their knowledge of Druze doctrine in progressive stages until some finally become "the generous," *ajāwid.* Any rise in the hierarchy brings with it greater obligations to live a blameless life. Any taint of evil, however remote, must be scrupulously avoided. The more learned or devout among the *'uqqāl* are distinguished as sheikhs and after special schooling devote themselves to the study and copying of the religious texts; they often retire completely to the *khilwah*s.

The *'uqqāl* bear responsibility for the *juhhāl,* who in their ignorance are denied the possibility of spiritual growth. The *juhhāl,* whose lives are not so restricted morally and sensually as those of the *'uqqāl,* are aware of the doctrine of the unity of God and possess detailed mythologies of creation and *tanāsukh,* transmigration of souls, in which Druze souls are always reborn as Druze souls.

The *juhhāl* generally live by the principle of *taqīyah,* or dissimulation of faith, and when living among Muslims or Christians they may superficially adopt their practices.

Uqṣur, al- (Egypt): *see* Luxor.

Ur, modern TALL AL-MUQAYYAR, OF TELL EL-MUQAYYAR, important city of ancient southern Mesopotamia (Sumer), situated about 140 miles (225 km) southeast of the site of Babylon and about 10 miles (16 km) west of the present bed of the Euphrates River. In antiquity the river ran much closer to the city; the change in its course has left the ruins in a desert that once was irrigated and fertile land. The first serious excavations at Ur were made after World War I by H.R. Hall of the British Museum, and as a result a joint expedition was formed by the British Museum and the University of Pennsylvania that carried on the excavations under Leonard Woolley's directorship from 1922 until 1934. Almost every period of the city's lifetime has been illustrated by the discoveries, and knowledge of Mesopotamian history has been greatly enlarged.

Foundation of the city. At some time in the 4th millennium BC, the city was founded by



Northeastern facade (the ascents partly restored) of the ziggurat at Ur
Hirmer Fotoarchiv, München

settlers thought to have been from northern Mesopotamia, farmers still in the Chalcolithic phase of culture. There is evidence that their occupation was ended by a flood, formerly thought to be the one described in Genesis. From the succeeding "Jamdat Nasr" (Late Protoliterate) phase a large cemetery produced valuable remains allied to more sensational discoveries made at Erech.

Ur in the early dynastic period, 29th–24th century BC. In the next (Early Dynastic) period Ur became the capital of the whole of southern Mesopotamia under the Sumerian kings of the 1st dynasty of Ur (25th century BC). Excavation of a vast cemetery from the period preceding that dynasty (26th century) produced royal tombs containing almost incredible treasures in gold, silver, bronze, and semiprecious stones, showing not only the wealth of the people of Ur but also their highly developed civilization and art. Not the least remarkable discovery was that of the custom whereby kings were buried along with a whole retinue of their court officials, servants, and women, privileged to continue their service in the next world. Musical instruments from the royal tombs, golden weapons, engraved shell plaques and mosaic pictures, statuary and carved cylinder seals, all are a collection of unique importance, illustrating a civilization previously unknown to the historian. A further development of it, or perhaps a different aspect, was shown by the excavation at al-'Ubayd, a suburb of Ur, of a small temple also of a type previously unsuspected, richly decorated with statuary, mosaics, and metal reliefs and having columns sheathed with coloured mosaic or polished copper. The inscribed foundation tablet of the temple, stating that it was the work of a king of the 1st dynasty of Ur, dated the building and proved the historical character of a dynasty that had been mentioned by ancient Sumerian historians but that modern scholars had previously dismissed as fictitious.

A few personal inscriptions confirmed the real existence of the almost legendary ruler Sargon I, king of Akkad, who reigned in the 24th century BC, and a cemetery illustrated the material culture of his time.

Third dynasty of Ur, 22nd–21st century BC. To the next period, that of the 3rd dynasty of Ur, when Ur was again the capital of an empire, belong some of the most important architectural monuments preserved on the site. Foremost among these is the ziggurat, a three-storied solid mass of mud brick faced with burnt bricks set in bitumen, rather like a stepped pyramid; on its summit was a small shrine, the bedchamber of the moon god Nanna (Sin), the patron deity and divine king of Ur. The lowest stage measures at its foot some 210 by 150 feet (64 by 46 metres), and its height was about 40 feet. On three sides the walls, relieved by shallow buttresses, rose sheer. On the northeast face were three great staircases, each of 100 steps, one projecting at right angles from the centre of the building, two leaning against its wall, and all three converging in a gateway between the first and the second terrace. From this a single flight of steps led upward to the top terrace and to the door of the god's little shrine. The lower part of the ziggurat, built by Ur-Nammu, the founder of the dynasty, was astonishingly well preserved; enough of the upper part survived to make the restoration certain.

The excavations showed that by the 3rd millennium BC Sumerian architects were acquainted with the column, the arch, the vault, and the dome—*i.e.*, with all the basic forms of architecture. The ziggurat exhibited its refinements. The walls all sloped inward, and their angle, together with the carefully calculated heights of the successive stages, leads the eye inward and upward; the sharper slope of the stairways accentuates that effect and fixes attention on the shrine, the religious focus of the whole huge structure. Surprisingly, there is not a single straight line in the structure. Each wall, from base to top and horizontally from corner to corner, is a convex curve, a curve so slight as not to be apparent but giving to the eye of the observer an illusion of strength where a straight line might have seemed to sag under the weight of the superstructure. The architect thus employed the principle of entasis, which was to be rediscovered by the builders of the Parthenon at Athens.

Succeeding dynasties, 21st–6th century BC. The great brick mausoleums of the 3rd-dynasty kings and the temples they built were sacked and destroyed by the Elamites, but the temples at least were restored by the kings of the succeeding dynasties of Isin and Larsa; and Ur, though it ceased to be the capital, retained its religious and its commercial importance. Having access by river and canal to the Persian Gulf, it was the natural headquarters of foreign trade. As early as the reign of Sargon of Akkad it had been in touch with India, at least indirectly. Personal seals of the Indus Valley type from the 3rd dynasty and the Larsa period have been found at Ur, while many hundreds of clay tablets show how the foreign trade was organized. The "sea kings" of Ur carried goods for export to the entrepôt at Dilmun (Bahrain) and there picked up the copper and ivory that came from the east.

The clay tablets were found in the residential quarter of the city, of which a considerable area was excavated. The houses of private citizens in the Larsa period and under Hammurabi of Babylon (*c.* 18th century BC, in which period Abraham is supposed to have lived at Ur) were comfortable and well built two-story houses with ample accommodation for the family, for servants, and for guests, of a type that ensured privacy and was suited to the climate. In some houses was a kind of chapel in which the family god was worshipped and under the pavement of which the members of the family were buried. Many large state temples were excavated as were also some small wayside shrines dedicated by private persons to minor deities, the latter throwing a new light upon Babylonian religious practices; but the domestic chapels with their provision for the worship of the nameless family gods are yet more interesting and have a possible relation to the religion of the Hebrew patriarchs.

After a long period of relative neglect, Ur experienced a revival in the Neo-Babylonian period, under Nebuchadrezzar II (605–562 BC), who practically rebuilt the city. Scarcely less active was Nabonidus, the last king of Babylon (556–539 BC), whose great work was the remodelling of the ziggurat, increasing its height to seven stages.

The last phase, 6th–4th century BC. The last king to build at Ur was the Achaemenian Cyrus the Great, whose inscription on bricks is similar to the "edict" quoted by the scribe Ezra regarding the restoration of the Temple at Jerusalem. The conqueror was clearly anxious to placate his new subjects by honouring their gods, whatever those gods might be. But Ur was now thoroughly decadent; it survived into the reign of Artaxerxes II, but only a single tablet (of Philip Arrhidaeus, 317 BC) carries on the story. It was perhaps at this time that the Euphrates changed its course; and with the breakdown of the whole irrigation system, Ur, its fields reduced to desert, was finally abandoned.

Discoveries made on other sites have supplemented the unusually full record obtained from the Ur excavations. Knowledge of the city's history and of the manner of life of its inhabitants, of their business, and of their art is now fairly complete and remarkably detailed. (L.Wy./Ed.)

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Ura-Tyube, also spelled URA-TIUBE, or URA-T'UBE, city, Khudzhand *oblast* (province), Tajikistan, in the northern foothills of the Turkistan Range. One of the most ancient cities of the republic, it may date from the 6th century AD, but it has borne its present name only since the 17th century. Famous in the past for its handicrafts, particularly carving, glazed pottery, embroidery, and gold and silver ornaments, it now has an economy based on fruit processing and wine making, though some crafts survive. In the centre of the city is the 16th-century tiled Kok-Gumbez Mosque. Pop. (1991 est.) 47,700.

'Urābī Pasha, 'Urābī also spelled ARABI, in full AḤMAD 'URĀBĪ PASHA AL-MIṢRĪ (b. 1839, near az-Zaqāziq, Egypt—d. Sept. 21, 1911, Cairo), Egyptian nationalist who led a social–political movement that expressed the discontent of the Egyptian educated classes, army officials, and peasantry with foreign control.

Born of peasant stock, 'Urābī studied in Cairo at al-Azhar, the leading institution of Islāmic learning in the Middle East. Conscripted into the army, he rose to the rank of colonel after serving as a commissariat officer during the Egyptian–Ethiopian war of 1875–76. In 1879 he participated in the officers' revolt against the khedive Ismā'īl Pasha.

Early in his career 'Urābī joined a secret society within the army with the object of eliminating the Turkish and Circassian officers who monopolized the highest ranks. In

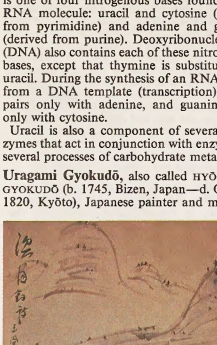
1881 he led a revolt against this dominance. The following year, intervention by the European powers and the dispute about the rights of the Egyptian Assembly concerning budget controls led to the formation of the nationalist ministry of Maḥmūd Sāmī al-Bārūdī, with ʿUrābī as minister of war. ʿUrābī emerged as the national hero under the slogan *Miṣr li'l Miṣriyyīn* ("Egypt for Egyptians"). Khedive Tawfīq, threatened by ʿUrābī's increasing popularity, requested the assistance of the French and British, who promptly staged a naval demonstration in the bay of Alexandria. Riots then broke out in Alexandria; when the British fleet bombarded the city (July 1882), ʿUrābī, who was commander in chief of the Egyptian army, organized the resistance and proclaimed the khedive a traitor. ʿUrābī's army was defeated at at-Tall al-Kabīr (Sept. 13, 1882) by British troops that had landed at Ismailia under the command of Sir Garnet Wolseley. ʿUrābī Pasha was captured, court-martialed, and sentenced to death, but, with British intervention, the sentence was changed to exile in Ceylon (Sri Lanka). He was permitted to return to Egypt in 1901.

Urabon (Japanese festival): *see* Bon.

uracil, a colourless, crystalline organic compound of the pyrimidine family that occurs as a component of ribonucleic acid (RNA), a molecule involved in the transmission of hereditary characteristics. The RNA molecule consists of a sequence of nucleotides, each containing a five-carbon sugar (ribose), a phosphate group, and a nitrogenous base. Uracil is one of four nitrogenous bases found in the RNA molecule: uracil and cytosine (derived from pyrimidine) and adenine and guanine (derived from purine). Deoxyribonucleic acid (DNA) also contains each of these nitrogenous bases, except that thymine is substituted for uracil. During the synthesis of an RNA strand from a DNA template (transcription), uracil pairs only with adenine, and guanine pairs only with cytosine.

Uracil is also a component of several coenzymes that act in conjunction with enzymes in several processes of carbohydrate metabolism.

Uragami Gyokudō, also called HYŌUEMON GYOKUDŌ (b. 1745, Bizen, Japan—d. Oct. 10, 1820, Kyōto), Japanese painter and musician



"An Idyll of an Old Angler," painting by Uragami Gyokudō, c. 1811, leaf from an album called "Enkacho" ("Haze and Mist"); in the collection of Hikotaro Umezawa, Tokyo

By courtesy of Hikotaro Umezawa, Tokyo; photograph, Kadokawa Shoten, Tokyo

who excelled in depicting scenes of nature realistically and in the art of playing the seven-stringed zither.

The son of a retainer of Lord Ikeda of Okayama, Uragami took zither lessons early in life and continued his musical training after he himself became a retainer. He also studied Confucianism and a southern school of Chinese art with emphasis on scholarly and literary themes. After abruptly resigning his retainership in 1795, he wandered through various parts of Japan and finally settled down in Edo (now Tokyo) to help revive *gagaku*, or imperial court music. Although self-taught, he became a first-rate painter, gifted enough to carry on the tradition of the school of painting called Nan-ga ("Southern Painting"). He had a keen appreciation of nature, reproducing scenes with an amazing degree of realism. His "Snow Sifted Through Frozen Clouds" is considered a masterpiece.

Ural-Altaic languages, hypothetical language grouping that includes all the languages of the Uralic and Altaic language families. Most of the evidence for including the Uralic and Altaic languages in one language family is based on similarities of language structure rather than on a common core of inherited vocabulary. Common Ural-Altaic linguistic features present in most of the languages include vowel harmony (*i.e.*, vowels in the same word must harmonize in method of articulation); grammatical traits typical of languages with a basic subject–object–verb sentence word order—*e.g.*, the complete absence of prefixes; the use of suffixes and postpositions to express the grammatical modifications that are expressed in English by prepositions; lack of adjectival declension and of grammatical gender; and similarity in form of nouns and verbs. These types of similarities frequently arise through language contact and are not considered a valid basis for establishing genetic relationship.

Ural Mountains, also called THE URALS, Russian URALSKY KHREBET, OT URAL, mountain range in west-central Russia, extending for about 1,300 miles (2,100 km) from the Kara Sea in the north to the Ural River in the south. The Urals' eastern slopes form part of the traditional physiographic boundary between Europe and Asia.

A brief treatment of the Ural Mountains follows. For full treatment, *see* MACROPAEDIA: Europe.

The north-south trend of the Urals divides western (European) Russia from Siberia to the east. The mountains may be divided into five major sections from north to south. The northernmost Polar Urals, extending in a 240-mile (390-kilometre) arc from northeast toward the southeast, are typically alpine. The next section southward is the highest segment of the range, the Nether-Polar Urals, rising to 6,217 feet (1,895 m) at Mount Narodnaya. Both of these sections are strewn with glaciers. The Northern Urals have peaks rising to between 3,000 and 5,000 feet (900 and 1,500 m). The summits, often flattened, are the remnants of ancient peneplains uplifted by recent tectonic movements. The lower Central Urals rarely exceed 1,600 feet (490 m), although the highest peak, Mount Sredny Baseg, rises above 3,000 feet. The Southern Urals continue southwestward, forming several parallel ridges and lying generally at an elevation of less than 4,000 feet (1,220 m).

The Urals are one of the richest mineral-bearing areas in the world. More than 1,000 types of minerals are known to occur, many of which were first discovered there, such as uralite, ilmenite, and the element ruthenium. They include almost every commercially useful mineral, with many occurring in very large deposits, including iron, copper, chromium, and bauxite. The great number of iron-ore deposits in the Urals include magnetite, hematite, limonite, and natural ferroalloys with titanium, chromium, and vanadium. Aside from copper and bauxite, the Urals' other nonferrous ores include lead, zinc, and beryllium, and the precious metals (gold, silver, and above all, platinum) are widespread. Many minerals used in the chemical industry—salts, potassium, magnesium, and arsenic—are also mined. On the southwestern flank of the Urals lies the Volga-Ural (Second Baku) oil field. The Urals' bituminous coal and lignite deposits are extensive but of poor quality.

A powerful industrial region developed around these mineral deposits. Large-scale industrialization beginning in the 1930s made the Urals the second largest concentration of heavy industry (after the Donets Basin) in the Soviet Union. The Urals also remain a principal site of mining and metallurgy in Russia, producing much of the nation's iron and steel and nonferrous metals. This base has in turn given rise to engineering industries and an important chemical industry has developed.

Ural River, Kazakh ZHAYYQ, river in Russia and Kazakhstan. The Ural is 1,509 miles (2,428 km) long and drains an area of 91,500 square miles (237,000 square km). It rises in the Ural Mountains near Mount Kruglaya and flows south along their eastern flank past Magnitogorsk. At Orsk it cuts westward across the southern end of the Urals, past Orenburg, and turns south again across a lowland of semidesert to enter the Caspian Sea at Atyraū. Its flow has a great spring maximum, and freeze-up lasts from late November to April. Navigation on the river is possible up to the city of Oral in Kazakhstan. A dam and hydroelectric station have been built at Iriklinsky, south of Magnitogorsk.

Uralian emerald, yellowish green or emerald-green andradite, a variety of garnet, not emerald. *See* andradite.

Uralian orogenic belt, a 3,500-kilometre-(2,175-mile-) long elongate mountain system that extends from the Aral Sea to the islands of Novaya Zemlya. It is 500 km wide in the south but only 100–150 km wide in the north. The belt formed as a result of the closure of the Uralian Sea by eastward subduction, and by collision of island arcs and small continental blocks to the east with an east European continent. During collision, a major thrust transported westward many slabs of Uralian ocean floor in the form of ophiolites, which host chromite deposits, and it led to formation of oil-bearing foreland basins along the western side of the Ural Mountains. Final compression took place in the Permian Period (286 to 245 million years ago) and the Early Triassic Epoch (245 to 240 million years ago). Post-orogenic extensional collapse helped the uplift and unroofing of high-pressure rocks such as eclogites and glaucophane schists in the west and to the formation in the northeast of a series of graben infilled with clastic sediments and lavas in the Triassic Period (245 to 208 million years ago). On the western side of the Urals near the city of Perm, red sandstones and thick evaporites containing economic potash deposits accumulated in the Permian. Sir Roderick Murchison named the Permian Period after the city in 1841.

(B.F.W.)

Uralic languages, family of more than 20 related languages, all descended from a Proto-Uralic language that existed 7,000 to 10,000 years ago. At its earliest stages, Uralic most probably included the ancestors of the Yukaghir language (*q.v.*). The Uralic languages are spread over a large area, from western Siberia in the east to Hungary and Finland in the west. They range from such well-established national languages as Hungarian and Finnish to tiny minority languages of Russia, representing only a few native speakers with little ethnic or political unity. Some of the smaller

groups are dying out as linguistic entities, particularly several minority languages whose speakers are assimilated.

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

The original homeland of the Uralic peoples is thought to have been in the vicinity of the central Ural Mountains. This assumption is based on extensive analysis of cognate words in Uralic languages for the names of flora and fauna, and of the geographic distribution of the present-day Uralic peoples. Because of their great geographic diversity, and consequently their lack of recent contact with each other, and because of the ancient breakup of Proto-Uralic, many of these languages are quite dissimilar.

The Uralic languages can be divided into two primary groups, Finno-Ugric and Samoyedic. This division reflects the earliest dialectal split from Proto-Uralic, and accordingly the languages in these two groups share the fewest similar features. Finno-Ugric is further divided into Finnic and Ugric. The Ugric group consists of Hungarian and two Ob-Ugric languages of western Siberia, Khanty (Ostyak) and Mansi (Vogul). The Hungarian tribes arrived at their present location in the Carpathian Basin more than a thousand years ago. Hungarian has the most speakers of any Uralic language and has had a rich literary tradition for several hundred years. The approximately 20,000 Khanty and Mansi speakers are dispersed around the Ob River and its tributaries in west-central Russia. Both groups have little ethnic identity and a weak literary tradition, with great dialectal divergence.

Within the Finnic group there are several subgroups. Of the Baltic-Finnic languages the most important is Finnish, spoken mostly in Finland. The Finnish tribes probably occupied their present location about 2,000 years ago. Estonian is very similar to Finnish. Most of its speakers live in Estonia.

There are five minor Baltic-Finnic languages: Karelian, Veps, Ingrian, Votic, and Livonian. The first four of these are spoken in Russia, mainly near the Gulf of Finland, and none has a literary form. Karelian and Veps have many speakers, but the other three languages are rapidly dying out.

Another Finnic subgroup consists of the Sami (Lapp) languages, which have about 30,000 speakers scattered from Sweden to Russia. They consist of several mutually unintelligible languages and dialects.

Another branch of Finnic consists of three closely related Permic languages, Udmurt (Votyak), Komi (Zyrian), and Permyak. The Udmurt live mostly in the republic of Udmurtia in Russia and the Permyak within the Komi-Permyak autonomous *okrug*, but Komi speakers spread beyond the borders of the Komi republic.

Two more separate Finnic languages are Mordvin and Mari (Cheremis). Fewer than half the Mordvin speakers are in Mordvinia in Russia. Mari speakers live mostly in the Mari El republic.

Of the three North Samoyedic languages of northern Siberia, only Nenets (formerly Yurak Samoyed) has a literary tradition. Enets (formerly Yenisey Samoyed) has only a few hundred speakers, and Nganasan (formerly Tavgy Samoyed) has fewer than a thousand. Only one South Samoyed language, Selkup (formerly Ostyak Samoyed), still exists, with speakers in western Siberia; six other languages are now extinct.

The Proto-Uralic language has been partially reconstructed by painstaking comparison of the modern Uralic languages. According to this analysis, it had a limited inventory of consonant sounds, and in particular there was no contrast between voiced and voiceless consonants (*i.e.,* the contrast that differentiates the English "bit" and "pit"). The vocalic system has not been reliably reconstructed, though it probably did contrast long and short vowels. Words were probably stressed on their first syllable, as in most modern Uralic languages. Both modern Uralic and Proto-Uralic languages were characterized by vowel harmony.

The Uralic languages are basically agglutinative; *i.e.,* stems and affixes (prefixes, suffixes, and endings) are combined unchanged, and each element expresses only one bit of meaning. Relations within a sentence are carried by suffixes and postpositions (equivalent to prepositions but following a noun instead of preceding it). Proto-Uralic probably had no marker to denote the plural of a noun, since today the forms for expressing the plural vary greatly from language to language. Possession is expressed by a suffix either on the possessor or on the item possessed.

A widespread characteristic of the modern Uralic verb is the distinction between subjective and objective conjugations. This distinction reflects an early Uralic system for singling out the subject or the object for emphasis (focus).

Uralsk (city, Kazakhstan): *see* Oral.

Urania, in Greek religion, one of the nine Muses, patron of astronomy. In some accounts she was the mother of Linus the musician (in other versions, his mother is the Muse Calliope); the father was either Hermes or Amphimarus, son of Poseidon. Urania was also occasionally used as a byname for Aphrodite. Her attributes were the globe and compass.

Uraniborg, observatory established in 1576 by the Danish astronomer Tycho Brahe. It was the last of the primitive observatories in that it antedated the invention of the telescope (*c.* 1608); and it was the first of the modern observatories in that it was completely supported by the state and produced the first organized, extensive array of dependable data in astronomical history, including a catalog of more than 1,000 stars.

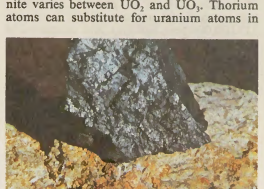
In 1576 Frederick II of Denmark granted the island of Ven (off the coast of southern Sweden, then under Danish hegemony) in fief to Tycho. A palatial three-story building was constructed in which student astronomers and staff were quartered and royalty was sometimes entertained. Instruments included quadrants, parallactic rulers, and armillary spheres, built to Tycho's demanding standards of accuracy. Johannes Kepler based his laws of planetary motion on computations with the precise data accumulated at Uraniborg. The observatory was abandoned when Tycho's fief was withdrawn in 1597.

uraninite, a major ore mineral of uranium, uranium dioxide (UO_2). Uraninite usually forms black, gray, or brown crystals that are moderately hard and generally opaque. A variety of uraninite ore that is dense and found in granular masses with a greasy lustre is called pitchblende. Uraninite is radioactive and is the chief source of uranium.

The element uranium was discovered by M.H. Klaproth in 1789 in uraninite from Joachimsthal (now Jáchymov, Czech Republic). Radium was first extracted from uraninite ore from the same locality by Pierre and Marie Curie and G. Bémont in 1898.

Uraninite has been obtained from hydrothermal vein deposits, such as those at Jáchymov and in adjacent places in the Ore Mountains (Erzgebirge) in Germany. Other vein deposits occur at Great Bear Lake in the Northwest Territories of Canada and in the Lake Athabasca district of Alberta and Saskatchewan. Uraninite is also recovered as a by-product from the conglomeratic gold ores of the Witwatersrand, S.Af., and from conglomerate rocks in the Elliot Lake area, Ont. Important deposits of fine-grained uraninite occur in sedimentary rocks, chiefly sandstones, in the Colorado Plateau area of the western United States. Deposits in sandstones often are extensively oxidized to carnotite and other secondary uranyl minerals, which may themselves constitute important uranium ores. Uraninite is widespread as a well-crystallized accessory mineral in pegmatites, but such occurrences are of little or no economic importance. Fine specimens have been found in pegmatites at Wilberforce, Ont.; the Spruce Pine district, N.C.; and Grafton, N.H.

Through oxidation the composition of uraninite varies between UO_2 and UO_3. Thorium atoms can substitute for uranium atoms in



Uraninite in pitchblende from Great Bear Lake, Northwest Territories, embedded (for display) in a larger mass of feldspar from Grafton Center, N.H.
By courtesy of the Field Museum of Natural History, Chicago; photograph, John H. Gerard

the crystal structure, so that a complete solid-solution series extends to thorianite. Some varieties in this series contain appreciable amounts of rare earths, particularly cerium. Types rich in thorium and rare earths occur principally in pegmatites; some have been designated by varietal names. Lead accumulates in uraninite as a product of the radioactive decay of uranium and thorium; the amount present can be used to calculate the geologic age of the mineral. Uraninite often alters to yellow or orange-red hydrated oxides (*e.g.,* gummite) and to greenish yellow silicates. It is not resistant to weathering, and the uranium may be leached and redeposited locally as autunite, torbernite, or other secondary minerals. For detailed physical properties, *see* oxide mineral (table).

uranium (U), radioactive chemical element of the actinide series in Group IIIb of the periodic table, atomic number 92; it is an important nuclear fuel.

Uranium constitutes about two parts per million of the Earth's crust. Some important uranium minerals are pitchblende, uraninite, carnotite, autunite, and torbernite. These and other recoverable uranium ores, as sources of nuclear fuels, contain many times more energy than all the known recoverable deposits of fossil fuels. One pound of uranium yields as much energy as 3 million pounds of coal.

For additional information about uranium ore deposits, as well as coverage of mining, refining, and recovery techniques, *see* MACROPAEDIA: Industries, Extraction and Processing. For comparative statistical data on uranium production, *see* MICROPAEDIA: mining (table).

Uranium is a dense, hard metallic element that is silvery-white in colour. It is ductile, malleable, and capable of taking a high polish. In air the metal tarnishes and when finely divided breaks into flames. It is a poor conductor of electricity. Though discovered (1789) by Martin Heinrich Klaproth, who named it after the then recently discovered planet Uranus, the metal itself was first isolated (1841) by Eugène-Melchior Péligot by the reduction of uranium tetrachloride (UCl_4) with potassium.

The formulation of the periodic system by the Russian chemist Dmitry Mendeleyev in 1869 focused attention on uranium as the heaviest of the elements, a position that it held until the discovery of the first transuranium element in 1940. In 1896 the French physicist Henri Becquerel discovered in uranium the phenomenon of radioactivity, a property that was later found in many other elements. It is now known that uranium, radioactive in all its isotopes, consists naturally of a mixture of uranium-238 (99.27 percent, 4,510,000,000-year half-life), uranium-235 (0.72 percent, 713,000,000-year half-life), and uranium-234 (0.006 percent, 247,000-year half-life). These long half-lives make possible determinations of the age of the Earth by measuring the amounts of lead, uranium's ultimate decay product, in certain uranium-containing rocks. Uranium-238 is the parent and uranium-234 one of the daughters in the radioactive uranium decay series; uranium-235 is the parent of the actinium decay series.

The element uranium became the subject of intense study and broad interest after Otto Hahn and Fritz Strassmann discovered in late 1938 the phenomenon of nuclear fission in uranium bombarded by slow neutrons. Enrico Fermi suggested (early 1939) that neutrons might be among the fission products and could thus continue the fission as a chain reaction. Leo Szilard, Herbert L. Anderson, Jean-Frédéric Joliot-Curie, and their coworkers confirmed (1939) this prediction; later investigation showed that an average of 2½ neutrons per atom are released during fission. Those discoveries led to the first self-sustaining nuclear chain reaction (Dec. 2, 1942), the first atomic bomb test (July 16, 1945), the first atomic bomb dropped in warfare (Aug. 6, 1945), the first atomic-powered submarine (1955), and the first full-scale nuclear-powered electrical generator (1957).

Fission occurs with slow neutrons in the relatively rare isotope uranium-235 (the only naturally occurring fissile material), which must be separated from the plentiful isotope uranium-238 for its various uses. Uranium-238, however, after absorbing neutrons and undergoing negative beta decay, becomes the synthetic element plutonium, which is fissile with slow neutrons. Natural uranium, therefore, can be used in converter and breeder reactors, in which fission is sustained by the rare uranium-235 and plutonium is manufactured at the same time by the transmutation of uranium-238. Fissile uranium-233 can be synthesized for use as a nuclear fuel from the nonfissile thorium isotope thorium-232, which is abundant in nature. Uranium is also important as the primary material from which the synthetic transuranium elements have been prepared by transmutation reactions.

Uranium, which is strongly electropositive, reacts with water; it dissolves in acids but not in alkalies. The important oxidation states are +4 (as in the oxide UO_2 and the green ion U^{4+}) and +6 (as in the oxide UO_3 and the yellow uranyl ion UO_2^{2+}). It also exhibits a +3 and a +5 state, but the respective ions are unstable (the red U^{3+} and the UO_2^{+} ion, which undergoes disproportionation to U^{4+} and UO_2^{2+}).

Uranium compounds are used as colouring agents for ceramics. Uranium hexafluoride (UF_6) in the vapour state is used in the gas-diffusion method of separating uranium-235 from uranium-238.

atomic number	92
atomic weight	238.03
melting point	1,132.3° C (2,070.1° F)
boiling point	3,818° C (6,904° F)
specific gravity	19.05
valence	3,4,5,6
electronic config.	2-8-18-32-21-9-2 or $(Rn)5f^3 6d^1 7s^2$

uranium-234–uranium-238 dating, method of age determination that makes use of the radioactive decay of uranium-238 to uranium-234; the method can be used for dating of sediments from either a marine or a playa lake environment. Because this method is useful for the period of time from about 100,000 years to 1,200,000 years before the present, it helps in bridging the gap between the carbon-14 dating method and the potassium-argon dating method.

Uranium City, municipal corporation, centre of the Beaverlodge Lake mining region in extreme northwestern Saskatchewan, Canada. It lies near the north shore of Lake Athabasca. The discovery in the early 1950s and the subsequent mining of uranium ore there by the Eldorado Mining and Refining Company (renamed Eldorado Nuclear Limited in 1968) were responsible for the relocation of nearby Goldfields, a former gold-mining town. The Eldorado ceased its operations in 1982, and most of the residents of Uranium City moved elsewhere. Pop. (1986) 171.

uranium series, set of unstable heavy nuclei constituting one of the four radioactive series (*q.v.*).

uranium-thorium-lead dating, also called COMMON-LEAD DATING, method of establishing the time of origin of a rock by means of the amount of common lead it contains; common lead is any lead from a rock or mineral that contains a large amount of lead and a small amount of the radioactive progenitors of lead—*i.e.,* the uranium isotopes uranium-235 and uranium-238 and the thorium isotope thorium-232.

The important characteristic of common lead is that it contains no significant proportion of radiogenic lead accumulated since the time that the mineral or rock phase was formed. Of the four isotopes of lead, two are formed from uranium isotopes and one is formed from the thorium isotope; only lead-204 is not known to have any long-lived radioactive progenitor. Primordial lead is thought to have been formed by stellar nuclear reactions, released to space by supernovae explosions, and incorporated within the dust cloud that constituted the primordial solar system; the troilite (iron sulfide) phase of iron meteorites contains lead that approximates the primordial composition. The lead incorporated within the Earth has been evolving continuously from primordial lead and from the radioactive decay of uranium and thorium isotopes. Thus, the lead isotopic composition of any mineral or rock depends upon its age and the environment from which it was formed; that is, it would depend upon the ratio of uranium plus thorium to lead in the parent material.

The Earth can be assumed to be a very large sample containing lead evolving from primordial lead by radiogenic increments. If modern lead, for example, from marine sediments or modern basalts has the composition of lead in the Earth and if the lead in the troilite phase of iron meteorites has the composition of primordial lead, then a simple model yields about 4.6 billion years for the age of the Earth. This age is in good agreement with the age of the meteorites and the age of the Moon as determined independently.

Uranus, in Greek mythology, the personification of heaven. According to Hesiod's *Theogony,* Gaea (Earth), emerging from primeval Chaos, produced Uranus, the Mountains, and the Sea. From Gaea's subsequent union with Uranus were born the Titans, the Cyclopes, and the Hecatoncheires.

Uranus hated his offspring and hid them in Gaea's body. She appealed to them for vengeance, but Cronus (a Titan) alone responded. With the *harpē* (a scimitar) he removed Uranus' testicles as he approached Gaea. From the drops of Uranus' blood that fell on her were born the Furies, the Giants, and the Meliai (ash-tree nymphs). The severed genitals floated on the sea, producing a white foam, from which sprang the goddess of love, Aphrodite. Cronus by his action had separated Heaven and Earth. Uranus also had other consorts: Hestia, Nyx, Hemera, and Clymene.

There was no cult of Uranus in classical Greece. This circumstance, together with other elements in the story, suggests pre-Greek origins. The use of the *harpē* points to an Oriental source, and the story bears a close resemblance to the Hittite myth of Kumarbi.

Uranus, in astronomy, seventh major planet from the Sun. It was discovered in 1781 by the English astronomer William Herschel during a telescopic survey of the sky.

A brief treatment of Uranus follows. For full treatment, *see* MACROPAEDIA: Solar System.

Uranus is almost 15 times as massive as the Earth, and its volume exceeds that of the latter by more than 50 times. Stellar occultation measurements conducted by James Elliot and other American investigators in 1977 revealed the existence of nine sharply defined, narrow, dark rings lying from 1.6 to 1.95 R_U (where R_U is Uranus' equatorial radius of 26,000 km [16,120 miles]). A tenth narrow ring and broad dust bands between the narrow rings were discovered in 1986 by the U.S. Voyager 2 space probe during its flyby of the planet. Three of the rings are circular, while the others have a large range in eccentricity and are variable (by up to a factor of five) in width. All of the rings consist primarily of boulder-sized chunks of dark matter about 1 m (3 feet) in diameter. The composition of the ring particles has not yet been determined, but investigators speculate that they are made up of rock fragments and water ice intermixed with a black, amorphous polymer, which might account for the coal-black colour of the particles. The gaps between the rings are filled with numerous bright dust particles.

In addition to its system of rings, Uranus has at least 15 satellites. The five major moons—Miranda, Umbriel, Ariel, Oberon, and Titania—have diameters ranging from 472 to 1,578 km (293 to 980 miles). The other moons are substantially smaller and lie inside the orbit of Miranda, the innermost of the major Uranian satellites. Two of the moonlets seem to act as "shepherds" of the ring dubbed Epsilon, gravitationally confining its constituent particles.

Data transmitted by Voyager 2 revealed that Uranus is surrounded by a magnetic field comparable in strength to those around the Earth and Saturn. Trapped within this field is a radiation belt more intense than the Earth's. The axis of the Uranian field is tilted 58.6° from the planet's axis of rotation. This is an exceedingly large inclination when compared with that of the magnetic fields of other planets (*e.g.,* the Earth's field is tilted a mere 11°). The magnetic field of Uranus is swept back into a long "tail" by the solar wind (outflow of charged particles from the Sun's corona). Because the field is inclined so sharply, the tail is twisted much like a corkscrew.

An analysis of radio emissions from Uranus' magnetic field has enabled investigators to estimate the rotation period of the planet to be about 17.24 hours. Uranus' axis of rotation is unusual in that it lies in the plane of its orbit, and so Uranus appears to spin on its side. The axes of all other planets in the solar system are roughly perpendicular to the plane of their orbits.

The interior of Uranus is thought to consist of a mixture of ice and gas. A rocky core appears to be small or nonexistent.

The atmosphere of Uranus appears to extend to an altitude of thousands of kilometres in successive layers. The innermost layer most likely consists of clouds of methane ice, while the upper reaches are composed principally

of hydrogen and helium. The atmospheric hydrogen and helium occur in proportions consistent with solar values. The average heat radiated by Uranus is equivalent to that of a blackbody—*i.e.,* an object that emits all radiation incident upon it—of the same cross-section radiating at 59.1 K. This is the so-called effective temperature of the planet and is equal to the actual temperature of the atmospheric gases at a pressure of about 0.4 bar (one bar is roughly equal to the Earth's sea-level pressure). Temperature decreases with altitude from this point, reaching a minimum of 52 K at the 70-millibar level, and then increases with height up to a maximum of 750 K at the very top of the atmosphere.

Like Jupiter and Saturn, Uranus has bands of clouds oriented parallel to circles of constant latitude. Zonal winds travel in a retrograde direction at low latitudes (near the equator) and in a prograde direction at higher latitudes; the wind velocities are several times greater than those of the Earth and appear to increase with latitude.

Urartian language, also called CHALDEAN, or VANNIC, ancient language spoken in northeastern Anatolia and used as the official language of Urartu in the 9th–6th century BC. Non-Indo-European in origin, it is thought to be descended from the same parent language as the older, Hurrian language. Surviving texts of the language are written in a variant of the cuneiform script called Neo-Assyrian. Two bilingual inscriptions in Assyrian and Urartian led to the deciphering of Urartian. In 1933 the German Orientalist Johannes Friedrich published the first reliable description of the language in his Urartian grammar.

Urartu, ancient country of southwest Asia centred in the mountainous region southeast of the Black Sea and southwest of the Caspian Sea. Today the region is divided among Armenia, eastern Turkey, and northwestern Iran. Mentioned in Assyrian sources from the early 13th century BC, Urartu enjoyed considerable political power in the Middle East in the 9th and 8th centuries BC. The Urartians were succeeded in the area in the 6th century BC by the Armenians.

"Urartu" is an Assyrian name. The Urartians themselves called their country Biainili and their capital, located at modern Van, Tushpa (Turushpa). Most remains of Urartian settlements are found between the four lakes Çildir and Van in Turkey, Urmia in Iran, and Sevan in Armenia, with a sparser extension westward to the Euphrates River.

The Urartians had a number of traits in common with the Hurrians, an earlier Middle Eastern people. Both nations spoke closely related languages and must have sprung from a common ancestor nation (perhaps 3000 BC or earlier). Although the Urartians owed much of their cultural heritage to the Hurrians, they were to a much greater degree indebted to the Assyrians, from whom they borrowed script and literary forms, military and diplomatic practices, and artistic motifs and styles.

The Assyrian influence was manifested in two phases: first, from about 1275 BC to 840, when the Assyrians campaigned in Urartian territory and met only scattered resistance; and second, from 840 to 612, during the heyday of the Urartian kingdom. In the first phase Assyrian influence was felt directly, and the local inhabitants were helplessly exposed to ruthless depredation at the hands of the Assyrians. During this time, the Urartians seem to have eagerly absorbed or imitated the amenities of Assyria's higher civilization. In the second phase, Urartu produced its own distinctive counterparts to all Assyrian achievements.

The first century of the new kingdom seems to have emphasized military operations in imitation of Assyria, and Urartu waged relentless warfare on its neighbours to the east, west, and north.

For the reign of Sarduri I (*c.* 840–830 BC) there remain only the inscriptions at Van. But for the reigns of his son Ishpuini (*c.* 830–810) and especially of Ishpuini's son Meinua (*c.* 810–781), Urartian conquests can be measured indirectly from widespread inscriptions ranging from the lower Murat River basin (around Elāzīg) in the west, to the Aras (Araks, Araxes) River (*i.e.,* from Erzurum to Mount Ararat) in the north, and to the south shore of Lake Urmia in the southeast. Ardini, or Musaṣir, once conquered by Tiglath-pileser I of Assyria about 1100, now became part of the Urartian sphere of influence. The temple of Haldi at Ardini was richly endowed by the Urartian kings but was open to Assyrian worshipers.

A number of Urartian inscriptions dealing with religious subjects date to the end of Ishpuini's reign. It seems that the state religion received its established form at this time, and the hierarchy of the many gods in the Urartian pantheon is expressed by a list of sacrifices due them.

The first evidence of engineering projects, designed to increase the productivity of the home country by irrigation, dates to the reign of Meinua. This is the "Canal of Meinua," which led and still leads fresh water over a distance of about 46 miles (28 km) from an abundant spring to the southern edge of Van.

From the reigns of Meinua's son Argishti I (*c.* 780–756) and grandson Sarduri II (*c.* 755–735) there is, in addition to inscriptions, a direct historical source in the form of annals carved into the rock of Van and into stelae that were displaced in later times to other locations in the vicinity. Under these kings Urartu thrust out westward to the great bend of the Euphrates River and intermittently beyond, toward Melitene (modern Malatya) and the ancient Syrian district of Commagene, thus cutting off one of the main supply roads by which Assyria obtained essential iron from the western Taurus Mountains. Argishti I subdued the Melitene Hilaruada (*c.* 777), as did Sarduri II in the 750s. King Kushtashpi of Commagene was subjugated by Sarduri II about 745. Part of the domain of King Tuate of Tabal in the Taurus Mountains had also fallen to Argishti I about 777. For a short time Urartu thus had a bridgehead west of the Euphrates from Malatya to Halfeti (ancient Halpa) in Commagene, and its empire reached to within 20 miles (32 km) of Aleppo in northern Syria.

Argishti and Sarduri also embarked on what was in the end to prove the most fruitful of all Urartian ventures: the conquest and subsequent agricultural exploitation of the regions across the Aras River. Under Argishti I, Diauehi ("the Land of the Sons of Diau"; Assyrian: Daiaeni) was finally defeated, and the upper and middle Aras River valley became a major centre of building, irrigation, and agricultural activity. Sarduri added Lakes Çildir and Sevan. Further advance to the northwest was checked by a new adversary, the kingdom of Qulha (Greek: Colchis). The tens of thousands of prisoners taken on the yearly military campaigns (in one year as many as 39,000) provided the manpower for intensive cultivation of the royal estates and processing of their crops.

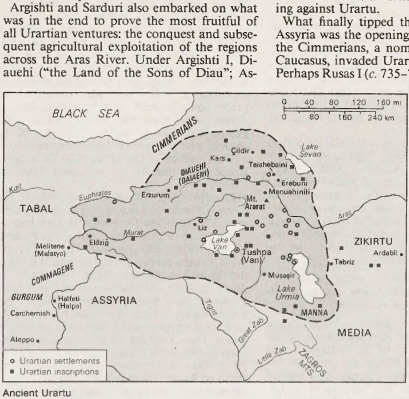
Several times the Urartian kings of this period claimed, probably with justification, to have defeated Assyrian armies: Argishti reported victories over the Assyrians in his sixth and seventh regnal years, when he operated in the Zab and Lake Urmia areas; and Sarduri II defeated the Assyrian king Ashur-nirari V in the upper basin of the Tigris River about 753.

The period 744–715 saw the renewal of Assyrian expansion. In spite of the support of a number of south Anatolian and north Syrian vassals, Sarduri II lost ground steadily, and in 743 Tiglath-pileser III of Assyria (744–727) defeated him and his allies in Commagene near Halfeti. When Tiglath-pileser in 735 advanced all the way to the gates of Tushpa, a palace revolt may have placed Sarduri's son Rusas I (*c.* 735–713) at the head of the state.

Tiglath-pileser's son, King Sargon II of Assyria (721–705), completed the elimination of Urartu as a rival for hegemony in the Middle East. Urartu's hopes of help from the northern Syrian principalities were dashed by their swift subjection, ending with the incorporation of Carchemish into the Assyrian empire in 717. In the metal-rich Taurus Mountains, the kingdom of Tabal remained a potential ally of Rusas I, as well as of the Phrygian king Midas of the legendary golden touch. After the latter's defeat, Tabal was annihilated and annexed to Assyria.

In the same year, Sargon began to close in on Urartu from the east. For two years operations were mostly limited to western Iran. There Assyria championed the interests of the kingdom of Manna, while Urartu aided and abetted Iranian tribes encroaching upon Manna from the east and north. But behind the Urartian lines Assyrian intelligence officers were collecting information with a view to a much more ambitious military undertaking against Urartu.

What finally tipped the scales in favour of Assyria was the opening up of a second front: the Cimmerians, a nomadic people from the Caucasus, invaded Urartu shortly before 714. Perhaps Rusas I (*c.* 735–713) himself provoked



Ancient Urartu

Adapted from B. Piotrovsky, *Urartu,* Coll. Archaeologia Mundi; Nagel Publishers, Geneva, Paris, Munich

the onslaught by unwisely destroying several buffer states to the north. In any case, Rusas soon found the Cimmerians at his borders. Undaunted, he proceeded to the attack but suffered a major disaster: the Assyrian crown prince Sennacherib, sent north by King Sargon II (721–705) to gather intelligence about Urartian affairs, reported to his father that Rusas' whole army had been defeated in Cimmerian territory and that Rusas himself had fled back to Urartu, having lost contact with his commanders. This encouraged Sargon to undertake the ambitious campaign of 714 that put an end to the aspirations of the Urartian kings outside of their mountain homeland. After unsuccessfully heading a coalition of his allies against Assyria, Rusas hastened back to Tuspha, which Sargon wisely did not try to besiege. Sargon avoided a clash with the Cimmerians and instead plundered the main sanctuary of the Urartians at Ardini and carried off the statue of Haldi. Hearing of this third calamity, Rusas committed suicide.

The military setbacks of Rusas I ended Urartu's political power. But his son Argishti II (*c.* 712–685) and successors continued the royal tradition of developing the country's natural resources, and Urartian culture not only survived but continued to flourish for a while, despite its political impotence. The Urartians were finally overcome by invading Armenians toward the end of the 7th century BC.

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Urawa, former city, Saitama *ken* (prefecture), east-central Honshu, Japan. In 2001 it merged with the neighbouring cities of Ōmiya and Yono to form the city of Saitama (*q.v.*).

Urayasu, city, northwestern Chiba *ken* (prefecture), east-central Honshu, Japan. Lying on a flat plain along Tokyo Bay, it is separated from Tokyo to the west by the Edo River. Urayasu was a thriving fishing village during the Tokugawa period (1603–1867) but grew only slowly until coastal land-reclamation projects in the 1960s expanded its area fourfold. In 1969 a subway line was built connecting the city with Tokyo, and its population grew rapidly thereafter. The completion of a rail line (1988) between Tokyo and Urayasu further stimulated the city's commercial and industrial development. The city is also served by the Wangan Expressway, part of a highway system encircling the bay.

In 1983 Urayasu became the site of Tokyo Disneyland, a theme park duplicating the original Disneyland in Anaheim, Calif. Tokyo DisneySea, with several ocean-themed "ports," opened next to the original park in 2001. One of the most popular recreational attractions in Japan, the park complex spurred the growth of nearby hotels and other accommodations, including several Disney-run resorts. Pop. (2000) 132,984.

Urban, Latin URBANUS, name of Roman Catholic popes, grouped below chronologically and indicated by the symbol •.

• Urban I, SAINT (b. Rome?—d. 230, Rome [Italy]; feast day May 25), pope from 222 to 230. Succeeding that of St. Calixtus I, his pontificate occurred within the reign of the Roman emperor Severus Alexander, a time of peace for the church. His baptism of St. Cecilia's husband, St. Valerian, is fictitious. He was buried in the cemetery of St. Calixtus, Rome.

• Urban II, original name ODO OF CHÂTILLON-SUR-MARNE, OF ODO OF LAGERY, OF OF LAGNY, French ODON, OF EUDES, DE CHÂTILLON-SUR-MARNE, OF DE LAGERY, OF DE LAGNY (b. *c.* 1035, Châtillon-sur-Marne, or Lagery, or Lagny, Champagne, France—d. July 29, 1099, Rome [Italy]), head of the Roman Catholic church (1088–99) who developed ecclesiastical reforms begun by Pope Gregory VII, launched the Crusade movement, and strengthened the papacy as a political entity.

Early life and career. Odo was born of noble parents about 1035 in the Champagne region of France. After studies in Soissons and Reims, he took the position of archdeacon in the diocese of Reims, at that time the most



Urban II (left), attended by Abbot Hugh of Cluny (right) and cardinals and monks, consecrating the third abbey church at Cluny, detail of a miniature from "Chronicon Cluniacense," late 12th century; in the Bibliothèque Nationale, Paris (lat. 17,716, fol. 91)
Courtesy of the Bibliotheque Nationale, Paris

important metropolis in France. An archdeacon was an ordained cleric appointed by the bishop to assist him in administration; in the Middle Ages it was an office of considerable power. Odo held the position probably from 1055 to 1067. Subsequently he became a monk and then (*c.* 1070–74) prior superior at Cluny, the most important centre of reform monasticism in Europe in the 11th century. At Reims and Cluny, Odo gained experience in ecclesiastical policy and administration and made contacts with two important reform groups of his time: the canons regular—clergymen dedicated to the active service of the church, who live a strict life in community—and the monks of Cluny. In 1079 he went to Rome on a mission for his abbot, Hugh of Cluny.

While in Rome he was created cardinal and bishop of Ostia (the seaport for Rome) by Gregory VII. In 1084 Gregory VII sent him as papal legate to Germany. During the crisis of Gregory VII's struggle with Henry IV, the Holy Roman emperor, Odo remained loyal to the legitimate papacy. After Gregory VII's death in 1085, he also served his successor, Victor III, who died in September 1087. After a long delay, during which the reform cardinals tried unsuccessfully to regain control of Rome from Guibert of Ravenna, who had been named Pope Clement III by Henry IV in 1080, Odo was elected pope in Terracina, south of Rome, on March 12, 1088.

Pontificate. As pope, Urban II found active support for his policies and reforms among several groups: the nobility, whose mentality and interests he knew; the monks; the canons regular, for whom he became patron and legislator; and also, increasingly, the bishops.

Urban felt that his most urgent task was to secure his position against the antipope Clement III and to establish his authority as legitimate pope throughout Christendom. He attempted, with moderation and tolerance, to reconcile the church-state traditions of his age with ecclesiastical notions of reform. In practice he pushed the controversial question of lay investiture—the act whereby a temporal ruler granted title and possession to a church office—more into the background while at the same time retaining reform legislation. He thus softened the conflict and permitted a more peaceful discussion of the problems at issue. At the Council of Clermont (France), in 1095, during which he eloquently called the First Crusade, Urban attempted, however, to prevent a further and complete feudalization of church-state relationships by prohibiting the clergy from taking oaths of fealty to laymen.

Despite Urban's attempts at reconciliation, it did not prove possible to come to terms with Henry IV or with a large part of the church within the empire. England also remained closed to papal policies of reform and centralization, although Urban had been recognized there since 1095; a conflict between Anselm, the theologian who was named archbishop of Canterbury, and King William II particularly strained the relations between Urban and the king. On the other hand, despite a long-standing conflict between Philip I of France and Urban (brought about by the king's scandalous marriage), France began under this French pope to become the most important support of the medieval papacy. Urban obtained special support in southern Europe: his particularly faithful allies were the Normans of southern Italy and Sicily. In Spain, Urban supported the Christian reconquest of the country from the Moors and carried out the ecclesiastical reorganization of the country. In southern Italy, southern France, and Spain, kings and princes became vassals of the Roman see and concluded treaties and concordats in feudal form with the pope: by this the temporal rulers sought to secure their independence from more powerful lords, and the pope for his part was able to carry out his reform aims in these territories.

From 1095 Urban was at the height of his success. From this time several important church councils took place: in 1095 at Piacenza, Italy, at which reform legislation was enacted; also in 1095 at Clermont, where Urban preached the First Crusade; in 1098 at Bari, Italy, where he worked for a reunion between Greek Christians and Rome; and in 1099 at Rome, where again reform legislation was passed. Urban's idea for a crusade and his attempt to reconcile the Latin and Greek churches sprang from his idea of the unity of all Christendom and from his experiences with the struggles against the Muslims in Spain and Sicily. He was, for a while, able to attract the Byzantine emperor Alexius I to his plans but never the Greek church. Whereas the First Crusade led to military success with the conquest of Jerusalem in 1099, the project for union failed. Urban's pontificate not only led to a further centralization of the Roman Catholic church but also to the expansion of papal administration; it contributed to the development of the Roman Curia, the administrative body of the papacy, and to the gradual formation of the College of Cardinals. The term Curia Romana first appeared in a bull written by Urban in 1089.

Urban died in Rome in 1099. Despite many problems that were still unsolved, the victory of medieval reform papacy was secured. Urban was beatified in 1881 by Pope Leo XIII. (Al.Be.)

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Urban IV, detail of the silver panel from the "Reliquary of the Corporal" by Ugolino di Vieri, 1338, in the cathedral at Orvieto, Italy

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• Urban III, original name UBERTO CRIVELLI (b. Milan—d. Oct. 19/20, 1187, Ferrara, Romagna), pope from 1185 to 1187.

Of noble birth, he was made cardinal and archbishop of Milan in 1182 by Pope Lucius III, whom he succeeded on Nov. 25, 1185, and from whom he inherited an imperial diplomatic crisis that harassed his entire pontificate.

On Jan. 27, 1186, Henry VI, son of the Holy Roman emperor Frederick I Barbarossa (of the Hohenstaufen dynasty), married Constance, the daughter and heiress of the late king Roger II of Sicily. Urban resented the marriage as an attempt to encircle the papacy, for it confronted him with the ominous prospect of Hohenstaufen domination of southern and northern Italy. The marriage was conducted at Milan by the Patriarch of Aquileia, who soon after crowned Henry as king of Italy, which Urban considered a deliberate offense to his authority. He excommunicated the Patriarch.

The Emperor and the Pope later clashed on ecclesiastical matters. Against the imperial candidate, Rudolph, Urban consecrated (June 1, 1186) Folman as archbishop of Trier, whereupon the Emperor dispatched Henry to invade the Papal States. In April/May 1187 Frederick convoked the Diet of Gelnhausen, which barred the papal legate Philip of Heinsberg, archbishop of Cologne, and whose bishops supported the Emperor. On hearing the results, Urban summoned the Emperor to Verona, whose citizens refused to allow the Pope to use their city as the place of Frederick's excommunication. Thus, Urban started for Venice to complete his plans, but he died en route. An open rupture resulted, and a long, disastrous struggle for southern Italy developed between the two factions. M.C. de Fischer-Reichenbach's *Urbain III et Barberousse* was published in 1940.

• Urban IV, original name JACQUES PANTALÉON (b. *c.* 1200, Troyes, Champagne—d. Oct. 2, 1264, Perugia, Papal States), pope from 1261 to 1264.

Of humble origin, he was first a priest at Lyon and then professor of canon law at Paris before being elevated to the bishopric of Verdun in 1253. Two years later he was made patriarch of Jerusalem by Pope Alexander IV, whom he succeeded on Aug. 29, 1261. Urban was faced with two tasks: freeing the Kingdom of Sicily, a papal fief, from Hohenstaufen domination and restoring papal influence in Italy, where it had diminished because of Alexander's vacillation in the Sicilian problem.

In 1263 Urban fatefully decided to offer the crown of Sicily to Charles of Anjou, the able and ambitious brother of King St. Louis IX of France, despite the claims of Manfred, illegitimate son of the late Hohenstaufen emperor Frederick II. By this time Urban had considered Manfred's power and the rise of the Ghibellines (anti-papal and pro-imperialistic political party) in Tuscany and Lombardy a critical threat to the church. Later negotiations between the Pope and Louis were tedious, menaced by both Manfred and the Ghibellines. Concurrent intrigue, including the suspicion of a plot to assassinate Urban, caused the Pope to leave for Perugia. He died, however, before Charles arrived, leaving the Sicilian problem to torment his successors.

Urban's bull of 1264 had ordered the whole church to observe the Feast of Corpus Christi, a festival in honour of the Real Presence of Christ in the Eucharist (observed on the Thursday after Trinity Sunday). Because of Urban's early death, the order was ignored in most countries until after its confirmation by Pope Clement V at the Council of Vienne in 1311–12. J. Guiraud's edition of *Les Registres d'Urbain IV, 1261–64* (2 vol.) was published in 1901–30.

• Urban V, BLESSED, original name GUILLAUME DE GRIMOARD (b. *c.* 1310, Languedoc, Fr.—d. Dec. 19, 1370, Avignon, Provence; beatified March 10, 1870; feast day December 19), pope from 1362 to 1370.

Of noble birth, he joined the Benedictines, later teaching law at Avignon. He became abbot of Saint-Germain, Auxerre, in 1352 and of Saint-Victor, Marseille, in 1361. On Sept. 28, 1362, he was elected successor to Innocent VI and was crowned at Avignon, seat of the papacy from 1309 to 1377.

As pope he helped to restore peace in Italy and began to reform the Avignonese Curia, which in 1365 he planned to reestablish at Rome, despite French opposition. In the same year, the Holy Roman emperor Charles IV visited Urban at Avignon and undertook to escort him to Rome; on June 4 the Pope crowned him king of Burgundy. Urban also felt the reunion of the Eastern and Western churches was urgently important and that negotiations with the patriarch of Constantinople would be facilitated if the papacy were back in Rome. Thus, on April 30, 1367, he left Avignon, arriving at Rome on the following October 15. He installed himself at the Vatican but was destined not to remain there long. Finding most of the churches in ruin, he initiated a program of restoration.

In October 1369 the Byzantine emperor John V Palaeologus met Urban at Rome, where he confessed the Roman faith and offered to submit the Byzantine Church to Roman supremacy. John's clergy and people, however, refused to support him, and so the Greek and Latin churches remained separated. Urban failed to achieve a compromise and refused to convoke an Eastern–Western council.

Meanwhile, the Anglo-French war resumed in 1369, and renewed strife in Rome and the Papal States led Urban to decide to return in September 1370 to Avignon.

Urban V was a man of austere life and great piety. As a patron of learning, he founded new universities at Orange, Kraków, and Vienna.

• Urban VI, original name BARTOLOMEO PRIGNANO (b. *c.* 1318, Naples—d. Oct. 15, 1389, Rome), pope from 1378 to 1389 whose election sparked the Western Schism (1378–1417).

Archbishop first of Acerenza (1363) and then of Bari (1377), he became papal chancellor for Pope Gregory XI, whom he was elected to succeed on April 8, 1378. This election of an Italian appeased the Romans, who were determined to end the French-dominated papacy at Avignon (1309–77).

Once made pope, however, Urban, a devout and competent official, became a harsh and ill-tempered reformer. He soon enraged the cardinals with his bitterness and hostility, and 13 French cardinals—fearing that the majority in the Sacred College would be turned against them by a new promotion of Italians—left Rome. At Anagni, four months later, they declared Urban's election as "null because it was not made freely but under fear." At Fondi, on Sept. 20, 1378, they elected the French cardinal Robert of Geneva, who became antipope Clement VII. Thus began the Western Schism that wracked the Roman Church for 40 years.

By the end of 1378 France favoured Clement, followed later by Scotland, Savoy, Portugal,



Urban VI, detail from the sarcophagus in his crypt, 1389; in the basilica of St. Peter's, Rome

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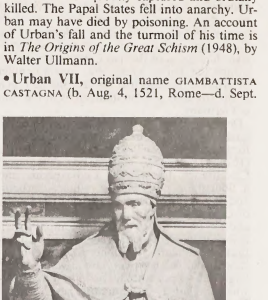
Castile, Aragon, and Navarre. England backed Urban, as did Bohemia, the Holy Roman Empire, Poland, Hungary, Flanders, and northern and central Italy. In 1381 Portugal switched to Urban's side. After failing to dislodge Urban from the Vatican, Clement returned to Naples, but the populace, recognizing Urban, effected his expulsion. Clement entered Avignon on June 20, 1379, and the divided papacy split the church.

For housing Clement, Queen Joan I of Naples was excommunicated by Urban, who placed her kingdom under interdict in 1385. The Neapolitan and papal armies clashed at the Battle of Nocera. The Bishop of Aquila and those cardinals implicated in plots against Urban were subsequently captured and brutally killed. The Papal States fell into anarchy. Urban may have died by poisoning. An account of Urban's fall and the turmoil of his time is in *The Origins of the Great Schism* (1948), by Walter Ullmann.

• Urban VII, original name GIAMBATTISTA CASTAGNA (b. Aug. 4, 1521, Rome—d. Sept.



Urban VII, detail from a monument by Ambroglo Buonvicino; in the church of Sta. Maria sopra Minerva, Rome

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27, 1590, Rome), pope from Sept. 15 to Sept. 27, 1590.

Of noble birth, he held several key church offices, including papal ambassador to Spain (until 1572), cardinal priest (1583), and inquisitor general (1586). Known for his charity and piety, he was elected pope on Sept. 15, 1590, but died of malaria 12 days later, before his consecration.

• **Urban VIII,** original name MAFFEO BARBERINI (baptized April 5, 1568, Florence—d. July 29, 1644, Rome), pope from 1623 to 1644.

The son of an aristocratic Florentine family, Barberini filled many distinguished church appointments. He served as papal legate in France (1601) and was simultaneously appointed (1604) archbishop of Nazareth and nuncio to Paris. Pope Paul V made him cardinal in 1606 and bishop of Spoleto in 1608. He became an astute politician during these years, acquiring many friends and making few enemies. He was elected Pope Gregory XV's successor on Aug. 6, 1623.

Urban's pontificate coincided with the ministry of Cardinal de Richelieu of France and



Urban VIII, detail from a monument by Gian Lorenzo Bernini; in the Basilica of St. Peter's, Rome

Alinari—Art Resource/EB Inc.

with the decisive period of the Thirty Years' War. His policy, when contrasted with that of his successor, Innocent X, appears to have been decidedly pro-French and hostile to the Roman Catholic cause in Germany. In fact, he desired the extinction of Protestantism everywhere, but, because he ultimately feared Habsburg domination in Italy, he withheld his support from them and allied with their enemy Richelieu. This alliance destroyed the Habsburgs' claim to be considered the exclusive champions of Roman Catholicism and so turned the Thirty Years' War into a conflict of dynastic interests that resulted not so much in the triumph of Protestantism as in the ruin of Germany.

Determined to strengthen the papacy's material resources and defense, Urban greatly fortified the Castel Sant'Angelo in Rome (1624–41). He also erected Fort Urbano at Castelfranco, transformed Civitavecchia into a flourishing port with a military harbour, and enlarged the arsenal at Tivoli. The Duchy of Urbino was acquired by the pope in 1626, and the Papal States became a compact, well-defended bloc dominating central Italy. Unfortunately, concurrent with his expensive fortifications and defense plan, Urban was guilty of large-scale nepotism. His building program—which included the grandiose papal villa at Castel Gandolfo and extravagant piazzas and fountains—combined with the enrichment of his family, tended to squander the financial resources of the papacy.

In an endeavour to establish supremacy over northern Italy, Urban began the War of Castro (1642–44) against Duke Odoardo I Farnese of Parma, whom he excommunicated in 1642, but the campaign ended in the pope's defeat and humiliation in March 1644. Venice, Tuscany, and Modena then formed an antipapal league to protect Parma, and France also intervened in Odoardo's favour. Peace was concluded at Venice on March 31, 1644, and Urban died soon afterward.

Urban's involvements in church affairs were multifarious. For the training of missionaries, he founded (1627) the Collegium Urbanum, and in 1633 he declared China and Japan (which had been closed to proselytization in 1585 by Pope Gregory XIII) open again for missionaries. Urban's bull *In eminenti* (published in June 1643) condemned the doctrines of Jansenism, a French movement that emphasized God's sovereignty and deemphasized man's free will. Conversely, he approved new orders, among them the Visitandines and the Lazarists, and promulgated several canonizations, including those of Saints Elizabeth of Portugal, Francis Borgia, and John of God. He also issued revisions of the breviary, missal, and pontifical.

A promoter of the arts, Urban VIII was the foremost patron of the important Baroque sculptor and architect Gian Lorenzo Bernini, some of whose finest works he commissioned, including the loggias of St. Peter's, Rome, and Urban's tomb in the basilica.

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urban climate, any set of climatic conditions that prevails in a large metropolitan area and that differs from the climate of its rural surroundings.

Urban climates are distinguished from those of less built-up areas by differences of air temperature, humidity, wind speed and direction, and amount of precipitation. These differences are attributable in large part to the altering of the natural terrain through the construction of artificial structures and surfaces. For example, tall buildings, paved streets, and parking lots affect wind flow, precipitation runoff, and the energy balance of a locale.

Also characteristic of the atmosphere over urban centres are substantially higher concentrations of pollutants such as carbon monoxide, the oxides of sulfur and nitrogen, hydrocarbons, oxidants, and particulate matter. Foreign matter of this kind is introduced into the air by industrial processes (*e.g.,* chemical discharges by oil refineries), fuel combustion (for the operation of motor vehicles and for the heating of offices and factories), and the burning of solid wastes. Urban pollution concentrations depend on the magnitude of local emissions sources and the prevailing meteorological ventilation of the area—*i.e.,* the height of the atmospheric layer through which the pollutants are being mixed and the average wind speed through that layer. Heavy concentrations of air pollutants have considerable impact on temperature, visibility, and precipitation in and around cities. Moreover, there occasionally arise weather conditions that allow the accumulation of pollutants over an urban area for several days. Such conditions, termed temperature inversions (increasing air temperature with increasing altitude), strongly inhibit atmospheric mixing and can cause acute distress in the population and even, under extremely severe conditions, loss of life. Atmospheric inversion caused an air-pollution disaster in London in December 1952 in which about 3,500 persons died from respiratory diseases.

The centre of a city is warmer than are outlying areas. Daily minimum temperature readings at related urban and rural sites frequently show that the urban site is 6° to 11° C (10° to 20° F) warmer than the rural site. Two primary processes influence the formation of this "heat island." During summer, urban masonry and asphalt absorb, store, and reradiate more solar energy per unit area than do the vegetation and soil typical of rural areas. Furthermore, less of this energy can be used for evaporation in urban areas, which characteristically exhibit greater precipitation runoff from streets and buildings. At night, radiative losses from urban building and street materials keep the city's air warmer than that of rural areas.

During winter the urban atmosphere is warmed slightly, but significantly, by energy from fuel combustion for home heating, power generation, industry, and transportation. Also contributing to the warmer urban atmosphere is the blanket of pollutants and water vapour that absorbs a portion of the thermal radiation emitted by the Earth's surface. Part of the absorbed radiation warms the surrounding air, a process that tends to stabilize the air over a city, which in turn increases the probability of higher pollutant concentrations.

The average relative humidity in cities is usually several percent lower than that of adjacent rural areas, primarily because of increased runoff of precipitation and the lack of evapotranspiration from vegetation in urban areas. Some moisture, however, is added to urban atmospheres by the many combustion sources.

The flow of wind through a city is characterized by mean speeds that are 20 to 30 percent lower than those of winds blowing across the adjacent countryside. This difference occurs as a result of the increased frictional drag on air flowing over built-up urban terrain, which is rougher than rural areas. Another difference between urban and rural wind flow is the convergence of low-level wind over a city (*i.e.,* air tends to flow into a city from all directions). This is caused primarily by the horizontal thermal gradients of the urban heat island.

The amount of solar radiation received by cities is reduced by the blanket of particulates in the overlying atmosphere. The higher particulate concentrations in urban atmospheres reduce visibility by both scattering and absorbing light. In addition, some particles provide opportunities for the condensation of water vapour to form water droplets, the ingredients of fog.

A city also influences precipitation patterns in its vicinity. Such city-generated or city-modified weather factors as wind turbulence, thermal convection, and high concentrations of condensation nuclei might be expected to increase precipitation. Although appropriate continuous, quantitative measurements have not been made for a sufficient length of time, there is some data to suggest that the amount of precipitation over many large cities is about 5 to 10 percent greater than that over nearby rural areas, with the greatest increases occurring downwind of the city centre.

urban planning, the programs pursued in most industrialized countries in an attempt to achieve certain social and economic objectives, in particular to shape and improve the urban environment in which increasing proportions of the world's population spend their lives.

A brief treatment of urban planning follows. For full treatment, *see* MACROPAEDIA: Cities.

Evidence of urban planning—such as orderly street systems; division of a city into specialized, functional districts, or quarters; fortifications; and conduits for the water supply and sewage disposal—can be found in the ancient ruins of cities in China, India, Egypt, Asia Minor, the Mediterranean region, and South and Central America. During the Renaissance, European city areas were consciously planned to achieve practical circulation and also to provide fortification against invasion. The radial boulevards of Paris were designed with military as well as aesthetic objectives.

The planning concepts of the European Renaissance were exported to the New World. William Penn developed the gridiron plan—the laying out of streets and plots of land adaptable to rapid change in land use—that dominated American urban planning as the society expanded westward. By dividing land into lots, the gridiron plan accommodates itself to urban expansion, but it uses land inefficiently and creates traffic-flow problems.

The modern urban planning and redevelopment movement arose in response to the disorder and squalor of the slum areas created by the Industrial Revolution in the 19th century. Reformation of these areas was the objective of the early city planners, who imposed regulatory laws establishing standards for housing, sanitation, water supply, sewage, and public health conditions. Urban planners also introduced parks and playgrounds into congested city neighbourhoods, providing places for recreation, as well as visual relief.

The chief new urban-planning concept of the early 20th century was zoning—the regulation of building activity to set limits of height and density and to protect established neighbourhoods. This arose in response to the sprawling, haphazard growth of industrial cities, where factories invaded residential areas, and where skyscrapers blocked out the sunlight of smaller buildings.

Urban territory expanded further as a result of improved public transportation. Workers could live far from their jobs, traveling back and forth by bus, subway, or car. The sprawling and crowded metropolis, especially its downtown and commercial areas, required well-planned circulation systems.

By the middle of the 20th century, urban planning changed its focus. Planners realized that factors of city living must be considered as a whole, so they aimed less at attacking specific problems than at the improvement of the entire urban milieu. This movement aimed at an ideal urban environment, which would give the city dweller maximum amenity.

Another aspect of urban planning has been the building of experimental new towns and cities. In Great Britain, India, Israel, and South America a few new cities were built entirely from plans. Urban planning was an important factor in Europe after World War II, when urban planners directed the reconstruction of war-shattered areas.

urban renewal, comprehensive scheme to redress a complex of urban problems, including unsanitary, deficient, or obsolete housing; inadequate transportation, sanitation, and other services and facilities; haphazard land use; and traffic congestion. Early efforts usually focused on housing reform and sanitary and public-health measures, followed by growing emphasis on slum clearance and the relocation of population and industry from congested areas to less-crowded sites, as in the garden-city and new-towns movements in Great Britain. Each country approaches urban renewal according to its means and its political and administrative systems.

The chief activities of urban renewal are redevelopment, the clearance and rebuilding of structures that are deteriorated or obsolete in themselves or are laid out in an unsatisfactory way or the reuse of the land for other purposes; rehabilitation, the improvement of structurally sound buildings that have deteriorated or lost their original functions; and conservation, a protective process designed to maintain the function and quality of an area, for instance, by requiring or assisting adequate maintenance and preventing inappropriate developments or changes in the use of land and buildings.

urban revolution, in anthropology and archaeology, the process by which small, kin-based, nonliterate agricultural villages are transformed into large, socially complex, civilized urban centres. The term urban revolution was introduced by V. Gordon Childe, an Australian archaeologist.

Although Childe equated civilization with urbanism, other social scientists, while admitting a considerable overlap, distinguished between the cultural phenomena characteristic of urban areas and those of "civilized" societies. Childe identified 10 formal criteria that, according to his system, indicate the arrival of urban civilization: increased settlement size, concentration of wealth, large-scale public works, writing, representational art, knowledge of exact sciences, foreign trade, full-time specialists in nonsubsistence activities, class-stratified society, and political organization based on residence rather than kinship. He saw the underlying causes of the urban revolution as the cumulative growth of technology and the increasing availability of food surpluses as capital.

Further archaeological evidence demonstrated that the formal criteria Childe proposed were, in reality, not universal. A core of basic structural trends, however, appeared to be essential as cities appeared in different areas at different times. The American anthropologist Robert McCormick Adams suggested that the essential transformation in the urban revolution was in the realm of social organization—an increase in the scale and complexity of society and the emergence of new political and religious institutions, which precipitated cultural and technological changes.

There is general agreement among scholars that one of the necessary—but not sufficient—preconditions for the urban revolution is the potential for production of storable food surpluses. Whether the actual production of surplus preceded the development of social institutions or whether these institutions induced or compelled farmers to produce a surplus is a matter for debate. Other features that may have been important include agencies for exchange and redistribution of goods between specialized and interdependent zones and differential control over productive resources. These conditions, in turn, would lead to concentration of wealth and class stratification. Population increases usually followed, rather than preceded, the core of the urban revolution.

The urban revolution seems to have occurred first in Mesopotamia about 3000 BC. Cities appeared somewhat later in Egypt, in the Indus Valley, and in northern China. In the New World the earliest-known urban centres are in Meso-America and Peru and date from about the 1st millennium AD.

Urbana, city, seat (1833) of Champaign county, east-central Illinois, U.S., contiguous on the west with Champaign. The cities are often called Champaign-Urbana. Settled in 1822 and named for Urbana, Ohio, it shares with Champaign the main campus of the University of Illinois (established in 1867 as the Illinois Industrial University). The economy is also dependent on agricultural activities, light manufacturing, and the Chanute Air Force Base at nearby Rantoul. A tablet in the Champaign County Court House commemorates the occasion when Abraham Lincoln spoke there against the Kansas–Nebraska Bill (1854). Lorado Taft's statue depicting Lincoln as a young lawyer is in Carle Park. Inc. 1855. Pop. (1990) city, 36,344; Champaign-Urbana-Rantoul MSA, 173,025.

Urbana, city, Champaign county, west-central Ohio, U.S., in a stock-raising and farming area, 40 miles (64 km) northeast of Dayton. Laid out in 1805 by Colonel William Ward of Virginia, it became the county seat in the same year and grew after a training camp was established there by General William Hull during the War of 1812. It was called Urbana, meaning "refinement," or "politeness." The coming after 1848 of the Pennsylvania, New York Central, and Erie railroads fostered industrial development. Manufactures now include plastic products, polishes, transportation lighting equipment, and farm machinery. Urbana College, based on the theology of Emanuel Swedenborg, was founded in 1850. Simon Kenton (1755–1836), the Indian fighter, is buried in Oakdale Cemetery, and Richard Stanhope, George Washington's valet (who is believed to have been 114 years old when he died), is buried in a cemetery at nearby Heathtown. The "Soldier's Monument" of sculptor John Quincy Adams Ward (1830–1910), born in Urbana, is in Monument Square. The home of the writer and politician Brand Whitlock (1869–1934) stands on Main Street. Inc. village, 1816; city, 1868. Pop. (1990) 11,353.

urbanization, the process by which large numbers of people become permanently concentrated in relatively small areas, forming cities.

The definition of what constitutes a city changes from time to time and place to place, but it is most usual to explain the term as a matter of demographics. The United Nations has recommended that countries regard all places with more than 20,000 inhabitants living close together as urban; but, in fact, nations compile their statistics on the basis of many different standards. The United States, for instance, uses "urban place" to mean any locality where more than 2,500 people live.

Whatever the numerical definition, it is clear that the course of human history has been marked by a process of accelerated urbanization. It was not until the Neolithic period, roughly 10,000 years ago, that humans were able to form permanent settlements. Even 5,000 years ago the only such settlements on the globe were small, semipermanent villages of peasant farmers, towns whose size was limited by the fact that they had to move whenever the soil nearby was exhausted. It was not until the time of classical antiquity that cities of more than 100,000 existed, and even these did not become common until the sustained population explosion of the last three centuries. In 1800 less than 3 percent of the world's population was living in cities of 20,000 or more; this had increased to about 25 percent by the mid-1960s and to about 40 percent by 1980. It is estimated that, by this measure, about half the world's population will be urban in the year 2000.

The little towns of ancient civilizations, both in the Old World and the New, were only possible because of improvements in agriculture and transportation. As farming became more productive, it produced a surplus of food. The development of means of transportation, dating from the invention of the wheel in about 3500 BC, made it possible for the surplus from the countryside to feed urban populations, a system that continues to the present day.

Despite the small size of these villages, the people in early towns lived quite close together. Distances could be no greater than an easy walk, and nobody could live out of the range of the water supply. In addition, because cities were constantly subject to attack, they were quite often walled, and it was difficult to extend barricades over a large area. Archaeological excavations have suggested that the population density in the cities of 2000 BC may have been as much as 128,000 per square mile (49,400 per square km); today Calcutta and Shanghai, with densities of more than 70,000 per square mile, are regarded as extremes of overcrowding.

With few exceptions, the elite—the aristocrats, government officials, clergy, and the wealthy—lived in the centre of ancient cities, which was usually located near the most important temple. Farther out were the poor,

who sometimes huddled outside the city walls altogether.

The greatest city of antiquity was Rome, which at its height in the 3rd century AD covered almost 4 square miles (10 square km) and had at least 800,000 inhabitants. To provide for this enormous population, the empire constructed a system of aqueducts that channeled drinking water from hills as far away as 44 miles (70 km). Inside the city itself, the water was pumped to individual homes through a remarkable network of conduits and lead pipes, the equal of which was not seen until the 20th century. As in most early cities, Roman housing was initially built from dried clay molded about wooden frameworks. As the city grew, it began to include structures made from mud, brick, concrete, and, eventually, finely carved marble.

This general model of city structure continued until the advent of the Industrial Revolution, although medieval towns were rarely as large as Rome. In the course of time, commerce became an increasingly important part of city life and one of the magnets that drew people from the countryside. With the invention of the mechanical clock, the windmill and water mill, and the printing press, the interconnection of city inhabitants continued apace. Cities became places where all classes and types of humanity mingled, creating a heterogeneity that became one of the most celebrated features of urban life. In 1777 Samuel Johnson cheered this aspect of cities in his famous apothegm, "When a man is tired of London, he is tired of life; for there is in London all that life can afford." At the time, it should be recalled, London had fewer than 100,000 citizens, and most of its streets were narrow, muddy paths.

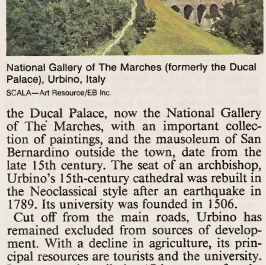
The technological explosion that was the Industrial Revolution led to a momentous increase in the process of urbanization. Larger populations in small areas meant that the new factories could draw on a big pool of workers and that the larger labour force could be ever more specialized. By the 19th century there were thousands of industrial workers in Europe, many of them living in the most miserable conditions. Attracted by the promise of paid work, immigrants from rural areas flooded into the city, only to find that they were forced to live in crowded, polluted slums awash with refuse, disease, and rodents. Designed for commerce, the streets of the newer cities were often arranged in grid patterns that took little account of human needs, such as privacy and recreation, but did allow these cities to expand indefinitely.

This they did in the 20th century, when most cities became surrounded by rings of suburbs. As in the past, these outer homes usually contained the poorest citizens, with the rich living in the vibrant city centre. An exception is the United States, where suburbs populated by the affluent and the middle class grew up around cities in the 1950s and '60s.

It is speculated that one result of the continuing population explosion will be the creation, in the next 100 years, of megalopolises, concentrations of urban centres that may extend for scores of miles. It is thought that the first such growth could occur in the east coast of the United States, where there may eventually be a single urban agglomeration stretching from Boston to Washington, D.C. Other emerging megalopolises include the Tokyo–Ōsaka–Kyōto complex in Japan, the region between London and the Midland cities in Great Britain, and the Netherlands–central Belgium area.

Urbino, Latin URBINUM HORTENSE, town, Pesaro e Urbino *provincia,* Marche (The Marches) *regione,* central Italy. Founded by the Umbrians, an ancient people of Italy, it was subsequently occupied by the Etruscans, Celts, and Gauls, and, in the 3rd century BC, by the Romans. It eventually fell under church rule in the 9th century but was ceded in the 12th century to the Montefeltro family. It became the seat of a duchy and reached its zenith as a centre of artistic and literary activity under the rule of Federico da Montefeltro (1444–82) and that of his son Guidobaldo (1482–1508). The artist Raphael was born in Urbino (1483). The dukedom extended its domain under the rule of the Della Rovere, who succeeded the Montefeltro, but the removal of the court to Pesaro marked the beginning of the town's decline. The dukedom and its subject towns were incorporated in the Papal States in 1626 and in the Kingdom of Italy in 1860.

The modern residential section, which developed outside the walls, is distinct from the ancient town, the street pattern and character of which are medieval, although most of its buildings were erected in the 17th and 18th centuries. The most notable landmarks,



National Gallery of The Marches (formerly the Ducal Palace), Urbino, Italy
SCALA—Art Resource/EB Inc.

the Ducal Palace, now the National Gallery of The Marches, with an important collection of paintings, and the mausoleum of San Bernardino outside the town, date from the late 15th century. The seat of an archbishop, Urbino's 15th-century cathedral was rebuilt in the Neoclassical style after an earthquake in 1789. Its university was founded in 1506.

Cut off from the main roads, Urbino has remained excluded from sources of development. With a decline in agriculture, its principal resources are tourists and the university. It was noted until the 17th century for the manufacture of maiolica (tin-glazed pottery). Pop. (1988 est.) mun., 15,582.

Urbino, Lorenzo di Piero de' Medici, duca (duke of): *see* Medici, Lorenzo di Piero de'.

Urbino maiolica, maiolica also spelled MAJOLICA, Italian tin-glazed earthenware made in the city of Urbino, which from around 1520 dominated the market. Early wares, mostly dishes, are decorated with narrative scenes that typically cover the entire surface. The narrative scenes are taken from the Bible, from classical mythology, from classical and contemporary history, and from poetry and are painted in a range of colours, in which brilliant yellow, orange, and brown predominate. This pictorial, or *istoriato,* style owed much to contemporary painting and to woodcuts and engravings published in the late 15th and early 16th centuries. Later wares were decorated in a style called grotesque, which consisted of motifs copied from the painter Raphael, who in turn adopted them from motifs found during excavations of Nero's Golden House in Rome in 1509. This purely decorative style was more suited to the intrinsic nature of pottery forms than the *istoriato* style, which was based on the conception of a dish or plate as the mere vehicle or support of a painting.



Urbino maiolica *istoriato* dish, *c.* 1533; in the Victoria and Albert Museum, London
By courtesy of the Victoria and Albert Museum, London

Several distinguished painters of pottery are known; of these Nicola Pellipario, who worked at Castel Durante originally and at Urbino from 1528, and Francesco Xanto Avelli di Rovigo (fl. 1529–42) are the most notable. Nicola Pellipario, who introduced and developed the *istoriato* style at Urbino, painted in the workshop of his son Guido (who took the name Fontana), drawing from engravings after the painter Raphael. Finely modeled figures, sometimes singly, sometimes in complex groups in architectural settings, were painted over the entire surface of the dish in an illusionist manner, with much of the drama and restless movement of Raphael's later work. Guido continued in this tradition, and in his workshop dishes, plates, roundels, and plaques were produced in large quantities between 1530 and 1580. Francesco Xanto Avelli di Rovigo favoured subjects from Ovid's *Metamorphoses,* an influential edition of which, illustrated with woodcuts, had appeared in 1497. He also took his themes from the Bible, from the poet Ludovico Ariosto (1474–1533), and from contemporary events.

The later style, grotesques, derived also from Raphael's paintings, was introduced by Guido Fontana's son Orazio around 1560–70. At first it consisted of little grotesques and arabesques painted in a continuous band in yellow, brown, blue, and green on a ground of white around the rim of the plate, with the narrative, or *istoriato,* portion shrunk to a roundel in the centre. Later, the *istoriato* style was totally supplanted by the grotesques. Maiolica production in Urbino declined in the late 17th century.

Urchard, Sir Thomas: *see* Urquhart, Sir Thomas.

urchin, any of several marine invertebrates of the class Echinoidea (phylum Echinodermata), including the cake urchin, heart urchin, and sea urchin (*qq.v.*).

Consult the INDEX *first*

Urdaneta, Andrés de (b. 1498, Villafranca de Oria, Spain—d. June 3, 1568, Mexico City), navigator and monk whose discovery of a favourable west-to-east route across the Pacific made possible colonization of the Philippines.

As a young man he spent eight adventurous years in the Spice Islands (Moluccas) and then, in 1553, entered the Augustinian order in Mexico City. Philip II of Spain asked him to guide an expedition from Mexico to the Philippines and to find a return route. Five earlier attempts had ended in disaster. In April 1565 Urdaneta reached the Philippine island of Cebu, where he established a mission, and on June 1 he embarked on the return voyage. By sailing at high latitudes, around 42° N, he took advantage of favourable winds, avoided typhoons, and reached the Isthmus of

Panama in 123 days. His "route of the Manila Galleon" helped the Spaniards to colonize the Philippines and to gain Eastern markets for the products of Peru and Mexico.

Urdu language, Indo-Aryan language originating in the region between the Ganges and Jamuna rivers near Delhi, now the official language of Pakistan. Numbering some 48,-980,000 speakers in the late 20th century, Urdu is the primary language of the Muslims of both Pakistan and northern India.

As a spoken language, Urdu originally derived from Hindustani, the lingua franca of northern India before the partition of 1947. Although Urdu and Hindi arose from the same or very similar colloquial bases, their literary forms are almost mutually unintelligible because of the strong influences of Sanskrit on Hindi and of Persian and Arabic on Urdu. Grammar in the two languages is still nearly the same, however, except in instances in which literary Urdu adopts Persian or Arabic constructions. Nouns and pronouns show only two cases, nominative and oblique; the place of inflectional endings is taken by postpositions (similar to English prepositions, but following the object) attached to the oblique case. Urdu is written in a modified form of the Persian Arabic alphabet.

Urdu literature, writings in the Urdu language of the Muslims of Pakistan and northern India. It is written in the Perso-Arabic script, and, with a few major exceptions, the literature is the work of Muslim writers who take their themes from the life of the Indian subcontinent. Poetry written in Urdu flourished from the 16th century, but no real prose literature developed until the 19th century, despite the fact that histories and religious prose treatises are known from the 14th century. More colloquial forms of writing gradually displaced the classically ornate literary Urdu in the 19th century; in the 20th century, Urdu literature was stimulated by nationalist, pan-Islāmic, and socialist feeling, and writers from the Punjab began to contribute more than those from the traditional Urdu areas of Delhi and Lucknow.

Urdun, al-: *see* Jordan.

Urdunn, Nahr al-: *see* Jordan River.

urea, also called CARBAMIDE, the diamide of carbonic acid. Its formula is H_2NCONH_2. Urea has important uses as a fertilizer and feed supplement, as well as a starting material for the manufacture of plastics and drugs. It is a colourless, crystalline substance that melts at 132.7° C (271° F) and decomposes before boiling.

Urea is the chief nitrogenous end product of the metabolic breakdown of proteins in all mammals and some fishes. The material occurs not only in the urine of all mammals but also in their blood, bile, milk, and perspiration. In the course of the breakdown of proteins, amino groups (NH_2) are removed from the amino acids that partly comprise proteins. These amino groups are converted to ammonia (NH_3), which is toxic to the body and thus must be converted to urea by the liver. The urea then passes to the kidneys and is eventually excreted in the urine.

Urea was first isolated from urine in 1773 by the French chemist Hilaire-Marin Rouelle. Its preparation by the German chemist Friedrich Wöhler from ammonium cyanate in 1828 was the first generally accepted laboratory synthesis of a naturally occurring organic compound from inorganic materials. Urea is now prepared commercially in vast amounts from liquid ammonia and liquid carbon dioxide. These two materials are combined under high pressures and elevated temperatures to form ammonium carbamate, which then decomposes at much lower pressures to yield urea and water.

Because its nitrogen content is high and is readily converted to ammonia in the soil, urea is one of the most concentrated nitrogenous fertilizers. An inexpensive compound, it is incorporated in mixed fertilizers as well as being applied alone to the soil or sprayed on foliage. With formaldehyde it gives methylene–urea fertilizers, which release nitrogen slowly, continuously, and uniformly, a full year's supply being applied at one time. Although urea nitrogen is in nonprotein form, it can be utilized by ruminant animals (cattle, sheep), and a significant part of these animals' protein requirements can be met in this way. The use of urea to make urea–formaldehyde resin (*q.v.*) is second in importance only to its use as a fertilizer. Large amounts of urea are also used for the synthesis of barbiturates.

Urea reacts with alcohols to form urethanes and with malonic esters to give barbituric acids. With certain straight-chain aliphatic hydrocarbons and their derivatives, urea forms crystalline inclusion compounds, which are useful for purifying the included substances.

urea–formaldehyde resin, any of a class of substances belonging to the family of organic polymers, prepared by heating urea and formaldehyde in the presence of mild alkalies, such as pyridine or ammonia. The urea and formaldehyde undergo a condensation reaction in which they combine to form a water-soluble polymer. This polymer is used to formulate adhesives and coating agents or is mixed with wood fibre, pigments, and other substances to produce powders that can be molded into solid objects. Under the influence of heat and pressure, further reactions occur that can convert the polymer into a moisture- and heat-resistant resin. The molecular structure of the final product is that of a three-dimensional network resembling those of resins made by the reaction of formaldehyde with phenol or with melamine.

Different types of urea–formaldehyde resins are used in making molded articles, such as buttons, tableware, and housings for apparatus, and in adhesives, lacquers, and agents that render textiles resistant to creasing or crushing.

urease, an enzyme that catalyzes the hydrolysis of urea, forming ammonia and carbon dioxide. Found in large quantities in jack beans, soybeans, and other plant seeds, it also occurs in some animal tissues and intestinal microorganisms. Urease is significant in the history of enzymology as the first enzyme to be purified and crystallized (by James B. Sumner in 1926). This achievement laid the groundwork for the subsequent demonstration that urease and other enzymes are proteins.

uremia, toxic effects of abnormally high concentrations of nitrogenous substances in the blood as a result of the kidney's failure to expel these waste products by way of the urine. The end products of protein metabolism accumulate in the blood but are normally filtered out when the blood passes through the kidneys. Uremia can result from any disorder that impairs the functioning of the kidneys or that hinders the excretion of urine from the body.

The symptoms of uremia are diverse. Fatigue, lassitude, and a loss of mental concentration are among the first signs. The patient may experience persistent itching sensations, along with muscle twitching or other involuntary movements. The skin becomes dry, flaky, and turns yellowish to tan. The mouth has a dry metallic taste, and the breath has a distinct ammonialike odour. Loss of appetite progresses to nausea and vomiting, and episodes of diarrhea and constipation are common. In the more serious stages of uremia, the buildup of waste products in the bloodstream and tissues causes a wide-ranging derangement of the nervous, cardiovascular, and respiratory systems and can lead to hypertension, convulsions, heart failure, and death.

The chief cause of uremia is damage to the kidneys, whether because of Bright's disease (glomerulonephritis), hypertension (high blood pressure), diabetes mellitus, or some other disorder that impairs kidney function. Blockages of the flow of urine due to urinary stones or, in males, enlarged prostate glands can also cause uremia. The treatment of uremia rests on the identification and treatment of the disorder that is the underlying cause. Patients whose kidneys are diseased and who are waiting for kidney transplants often suffer varying degrees of uremia. In these cases uremia, along with other syndromes due to renal insufficiency, is best treated by dialysis—*i.e.*, the artificial filtering of the blood by a machine outside the body.

urena (*Urena lobata*), also called ARAMINA, BUN OCHRA, CAESAR WEED, or CONGO JUTE, plant of the family Malvaceae and its fibre, one of the bast fibre (*q.v.*) group. The plant, probably of Old World origin, grows wild in tropical and subtropical areas throughout the world. The name urena apparently derives from the name given to the plant on India's Malabar Coast.

Urena was used for its fibre in Brazil from ancient times, but it has been slow in achieving importance as a cultivated fibre crop and is still considered a troublesome weed in some countries. Commercial cultivation of the plant began in the Belgian Congo (now Zaire) in the 1920s and in Central Africa in the 1930s.

The plant, an herbaceous perennial, is usually many-branched in the wild state and grows about 1 to 2 m (3 to 7 feet) high. Cultivated plants, densely sown, reach 3 to 4.5 m (10 to 15 feet) in height, with branches and leaves mainly concentrated near the top. The leaves vary in size and shape but are usually somewhat round, with 3 to 7 lobes and serrated edges. The flowers, growing singly from the angle between the leafstalk and plant stem (leaf axil), have five petals that are usually pink. The small seeds have hooklike appendages and are produced in the greatest quantities by uncultivated plants.

Urena grows best in hot, humid climates, with direct sunlight, and in rich, well-drained soil. It is found growing wild in the tropical and temperate zones of North and South America and in Asia, Indonesia, the Philippines, and Africa. Cultivated crops, usually grown as annuals, are found mainly in the Congo Basin and Central Africa, with smaller plantings in Brazil, India, and Madagascar. Harvesting when the plants are in full flower yields a fibre of high quality. The plants' stalks are cut by hand, above the woody plant base. After the stalks are subjected to a retting operation, the fibres are removed by hand.

Urena fibre is lustrous and creamy white or pale yellow in colour. The fibre strands are about 1 m (3.3 feet) long. Urena fibre is fine, soft, and flexible and is readily dyed. Used much like jute, which it resembles in appearance and strength, urena is made into cordage, burlap (hessian), sacking fabrics, and carpeting materials and is often blended with jute or other fibres.

ureter, one of two ducts that transmit urine from each kidney to the bladder. Each ureter is a narrow tube that is about 12 inches (30 cm) long. A ureter has thick, contractile walls, and its diameter varies considerably at different points along its length. The tube emerges from each kidney, descends behind the abdominal cavity, and opens into the bladder. At its termination the ureter passes through the bladder wall in such a way that, as the bladder fills with urine, this terminal part of the ureter tends to close.

urethane, also called ETHYL CARBAMATE, chemical compound used in medicine to treat certain forms of leukemia and multiple myeloma (tumours of bone marrow). Urethane originally was introduced into medicine as a sedative and hypnotic drug, but, because of its feeble and unpredictable action, it is no longer used for those purposes. Its use in the treatment of certain malignancies is based upon its ability to interfere with cell division by acting on the chromosomes of rapidly dividing cells, *i.e.*, cancerous cells. Paradoxically, urethane also is known to produce cancer in certain laboratory animals and, for this reason, is considered to be a potential human carcinogen (cancer-causing agent). Polymerized urethane forms polyurethane, which has various industrial uses.

urethra, duct that transmits urine from the bladder to the exterior of the body during urination. The urethra is held closed by the urethral sphincter, a muscular structure that helps keep urine in the bladder until voiding can occur.

Because the urethra is anatomically linked with the reproductive structures in the male, the characteristics of the male's and female's urethra are quite different. The male's urethra is about 8 inches (20 cm) long and passes along the length of the penis before emptying. At its emergence from the bladder, the urethra passes through the prostate gland, and seminal ducts from the testes enter the urethra at each side, making it the pathway for the transmission of semen as well as for the discharge of urine. The male urethra can be divided into three sections: the uppermost within the prostate, the next section within the urethral sphincter, and the lowermost (and longest) section within the penis.

The female urethra is embedded within the vaginal wall, and its opening is situated between the labia. The female urethra is much shorter than that of the male, being only 1½ inches (4 cm) long. It opens to the outside just after passing through the urethral sphincter. Both the male and female urethra are subject to bacterial infections (*see* urethritis).

urethritis, bacterial or viral infection and inflammation of the urethra, the channel for passage of urine from the urinary bladder to the outside. Urethritis is more frequent in males than in females.

The most frequent urethral infection is the venereal disease gonorrhea. The mucous glands in the lining of the urethra serve as important harbouring places for the gonococci, which invade the glands while the infection is just beginning and remain in them even after the mucous membrane has healed. Another common urethral infection is caused by the *Trichomonas vaginalis* organism frequently resident in the vagina. Chemical irritants or the spread of infection from other parts of the urinary tract may also cause urethritis.

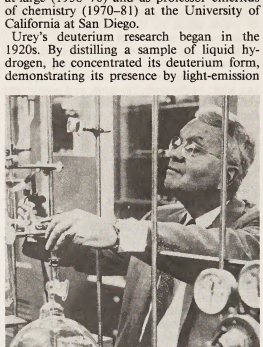
The inflammation in the urethra can narrow its channel, and swelling and the buildup of fibrous tissue can make urination difficult and painful. Obstruction or constriction of the urethra usually produce the same results: urination becomes difficult or impossible, causing an accumulation of stagnant urine in the bladder, and this usually leads to severe infection. Eventually back pressure prevents urine from leaving the kidneys, causing renal failure. The treatment of urethritis in most cases includes the administration of antibiotics to kill the infecting organisms.

Urewera National Park, park in northeastern North Island, New Zealand. Established in 1954, it has an area of 821 square miles (2,127 square km) and has the largest expanse of indigenous forest in the North Island. The park is located in a region between Wairoa and Rotorua, remote from European development, and contains mountain ranges, picturesque waterfalls, and several lakes. There is a wide range of forest types, and typical vegetation includes kohekohe, beech, rata, tawa, rimu, and pukatea. On Mount Manuoha (4,603 feet [1,403 m]) there is alpine grassland and subalpine scrub. Animal life includes feral cat, pig, goat, sheep, red deer, and opossum. Birds found there include the kiwi, ruru, pigeon, bush canary, gray warbler, and others. Recreational activities include hunting, fishing, canoeing, and walking. Aniwaniwa is the park's headquarters.

Urey, Harold C., in full HAROLD CLAYTON UREY (b. April 29, 1893, Walkerton, Ind., U.S.—d. Jan. 5, 1981, La Jolla, Calif.), American scientist awarded the Nobel Prize for Chemistry in 1934 for his discovery of the heavy form of hydrogen known as deuterium. He was a key figure in the development of the atomic bomb and made fundamental contributions to a widely accepted theory of the origin of the Earth and other planets.

Urey received a B.S. degree from Montana State University, Missoula, in 1917. After teaching there for two years, he earned a Ph.D. in chemistry (1923) from the University of California at Berkeley. While he was doing research in Copenhagen (1923–24), Urey took part in Niels Bohr's basic research on the theory of atomic structure. He taught at Johns Hopkins University, Baltimore (1924–29), and at Columbia University (1929–45); was professor of chemistry at the Institute for Nuclear Studies (1945–52) and Ryerson professor of chemistry (1952–58) at the University of Chicago; and served as professor-at-large (1958–70) and as professor emeritus of chemistry (1970–81) at the University of California at San Diego.

Urey's deuterium research began in the 1920s. By distilling a sample of liquid hydrogen, he concentrated its deuterium form, demonstrating its presence by light-emission



Urey, 1958
Argonne National Laboratory, courtesy American Institute of Physics
Emilio Segrè Visual Archives

studies. In 1931 he and his associates announced their discovery of heavy water, composed of an atom of oxygen and two atoms of deuterium. He also examined the chemical properties and separation of radioactive isotopes of carbon, oxygen, nitrogen, and sulfur.

During World War II he directed a Columbia research program that became an important part of the Manhattan Project, which developed the atomic bomb. Urey's group provided the fundamental information for the separation of the fissionable isotope uranium-235 from the more abundant isotope uranium-238 through the use of gaseous diffusion, and they also investigated methods for concentrating heavy hydrogen and separating boron isotopes.

After the war his work with the heavy isotope oxygen-18 led him to devise methods for estimating the temperature of the ocean during times as far back as 180 million years ago. This led him into the study of the relative abundances of the elements on Earth and the development of a theory of the origin of the elements and of their abundances in the Sun and other stars.

Urey theorized that the early atmosphere of the Earth was probably like the atmosphere now present on Jupiter—rich in ammonia, methane, and hydrogen. One of his students, Stanley Miller, working in his laboratory at the University of Chicago, demonstrated that when exposed to an energy source, such as ultraviolet radiation, these compounds and water might react to produce compounds essential for the formation of living matter.

Urey suggested that the planets of the solar system may have derived from a gaseous disk rotating about the Sun and that the disk, in combination with gases from the Sun, may have broken into fragments and begun to condense. He published his theory in *The Planets: Their Origin and Development* (1952).

Urfa (city, Turkey): *see* Şanlıurfa.

Urfé, Honoré d' (b. Feb. 10/11, 1567, Marseille, France—d. June 1, 1625, Villefranche-sur-Mer), French author whose pastoral romance *L'Astrée* (1607–27; *Astrea*) was extremely popular in the 17th century and inspired many later writers.

D'Urfé was born into a family of ancient nobility. He grew up in the Forez region of southeastern France and was educated at the Collège de Tournon. He became a partisan of the Holy League during the Wars of Religion and was banished to Savoy before being allowed to return home in 1599. In 1625 d'Urfé raised a regiment and campaigned against the Spaniards in the Valtellina, but he soon died of pneumonia.

D'Urfé's first work, *Epistres Morales* (1598; "Moral Letters"), reveals the influence of stoicism and Renaissance Platonism. His magnum opus, *L'Astrée,* appeared in five parts from 1607 to 1627 and altogether consists of some 5,000 pages. Part 4 of the book was edited by the author's secretary, Balthazar Baro, who also added Part 5 based on notes left by d'Urfé. With its scene set on the banks of the Lignon River in 5th-century Gaul and its atmosphere one of paradisiacal innocence, *L'Astrée* describes the life and adventures of shepherds and shepherdesses whose main preoccupation is love. The book derives its title from the pair Astrée and Céladon, who are unable to marry because of their families' mutual enmity.

D'Urfé's models for his novel were various Spanish and Italian pastoral romances read in the French court, notably *Diana* (1559) by Jorge de Montemayor. D'Urfé himself was a remarkable observer of human nature, however, and his characters are far from mere conventions. Céladon, Sylvandre, and Hylas were for generations of French readers what the characters of Sir Walter Scott and Charles Dickens were for the Victorian Age.

Urga (Mongolia): *see* Ulaanbaatar.

Urgeiriça, uranium mine and village, Viseu *distrito* ("district"), north-central Portugal. It lies south of Viseu town near the Mondego River. Although the deposits are small, the uranium extracted there in the late 1970s and early '80s was nevertheless significant enough to make Portugal a net exporter of uranium. A health spa frequented for the treatment of skin and respiratory diseases is at nearby Caldas de Felgueira. Pop. (1981 prelim.) 567.

Urgench, also spelled URGENČ, city, south-central Uzbekistan. The city lies along the Shavat Canal and the Amu Darya (river). Urgench was founded when the inhabitants of the ancient city of Urgench, near present-day Kunya-Urgench, 80 miles (130 km) to the northwest, moved there in the mid-17th century because of their lack of water supply. Formerly a centre of trade in the khanate of Khiva, Urgench now has several light industries and a music and drama theatre. Pop. (1991 est.) 130,400.

Urhobo, a people of the northwestern part of the Niger River delta in extreme southern Nigeria. They speak a language of the Kwa branch of the Niger-Congo language family. The term Sobo is used by ethnographers as a cover term for both the Urhobo and their neighbours, the Isoko, but the two groups remain distinct from each other. Their local communities are different in economy, social organization, dialect, and origins.

Under the influence first of European traders and then of the British colonial administration, the Urhobo and other peoples began to grow oil palms, and later rubber, as cash crops. Yams and cassava, as well as corn (maize), beans, peppers, and peanuts (groundnuts), are the Urhobo's major staple crops. The Urhobo also fish and are known for their canoes, sacred mud sculptures, masks, figures, bronze jewelry, and stilt and masquerade dances.

Property duties and rights descend patrilineally. The extended family, living in a compound of dwelling structures, is the basis of town or village wards. The Urhobo traditionally worship Oghene, the Supreme Creator, who is connected with the sky. Individuals may also worship personal or ancestral spirits and supernatural powers. Christianity and its clash with existing institutions has resulted in some social problems among the Urhobo. The Urhobo's homeland has become one of Nigeria's main petroleum-producing regions since the 1960s.

Uri, canton, central Switzerland, traversed by the steep-sided valleys of the Reuss River and its tributaries. About one-half of the canton's area is reckoned as productive. Forests occupy part of the canton, and more than 20 percent of the unproductive area in Uri is covered with glaciers. The highest summit in Uri is the Dammastock (11,909 feet [3,630 m]), north of the Furka Pass.

First mentioned in AD 732 as the place of banishment of the abbot of Reichenau by the Duke of Alemannia, the area was given in 853 by Louis the German to the nunnery at Zürich that he had just founded. The name Uri is probably derived from aurochs (German *auerochs,* "wild ox"), a bull's head having been borne traditionally as the arms of the region. As early as 1243 Uri had a common seal, and its privileges were recognized by Rudolf of Habsburg in 1274. With Schwyz and Unterwalden it founded the Everlasting League in 1291. It participated in the victory over the Austrians at Sempach in 1386 and annexed Urseren in 1410. At the Reformation, Uri clung to Roman Catholicism. Having formed part of the huge canton of Waldstätten in the Helvetic Republic after 1798, it became an independent canton again in 1803. It resisted all attempts at religious and constitutional reform, joined the League of Sarnen in 1832 to maintain the Swiss Confederation pact of 1815 without revision, and became one of the members of the Sonderbund (separatist Catholic league) in 1845. Its present constitution dates from 1888 (revised 1929), and its Landsgemeinde (open-air assembly) held annual meetings until 1928 near Altdorf (*q.v.*), the capital and largest town.

There are some cultivated fields in the Reuss River valley and pastures on the lower mountain slopes, but little of the land is capable of further cultivation because of the extremely uneven terrain. The chief railway is the main St. Gotthard line, and much of the hydroelectric power produced by plants on the Reuss is used for railway traction. Forestry is important, and there are cable and rubber factories at Altdorf. Tourism is aided by excellent roads leading to mountain passes giving access to adjacent cantons. The population is German speaking and Roman Catholic. Area 416 square miles (1,076 square km). Pop. (1991 est.) 33,650.

Uriburu, José Evaristo (b. Nov. 19, 1831, Salta, Argentina—d. Oct. 23, 1914, Buenos Aires), Argentine statesman who was his country's president in 1895–98.

Born into an old aristocratic family, Uriburu earned his doctoral degree in law in 1854 and then entered public life. He served in various government positions and held important diplomatic posts in several South American countries. He became Argentina's minister to Chile in 1883, and in that office he helped mediate the dispute at the end of the War of the Pacific, which Chile had waged against Bolivia and Peru. In 1892 Uriburu was elected vice president of Argentina, and he succeeded to the presidency after Luis Sáenz Peña resigned in January 1895. During his term Uriburu reorganized the armed forces and made reforms in public finance so that Argentina could resume payment on the public debt. He also continued peaceful relations with Chile during the serious boundary dispute with that country. He retired from the presidency in 1898, but served as interim president in 1903. From 1901 to 1910 he was a senator in the National Congress. His son, José Evaristo Uriburu (1880–1956), served as minister (1921–27) and ambassador (1927–31) to Great Britain.

Uriburu, José Félix (b. July 20, 1868, Salta, Argentina—d. April 29, 1932, Paris, France), Argentine soldier and statesman who led the military coup that in September 1930 overthrew the liberal regime of President Hipólito Irigoyen and restored the old landed oligarchy to the political power it had lost after the revolution of 1916. German militarist ideas and Benito Mussolini's corporate state idea were said to be his models for a new Argentina.

Uriburu was a member of the Argentine landed aristocracy and a nephew of President José Evaristo Uriburu. Educated at the military college of Argentina, he was an enthusiastic soldier and a firm believer in the rights and privileges of his class. In 1890, as a junior officer, he was the cofounder of a military secret society dedicated to preserving the political ascendency of his class in Argentina. In 1893 he became military aide-de-camp to his uncle, then vice president, and in 1896 he served on the joint Argentine-Chilean commission established to settle long-standing boundary disputes existing between the two countries. In 1902 he went to Germany, where he served as a member of the kaiser's imperial guard, becoming an ardent admirer of Prussian militarism.

In 1907 he became director of the Superior School for War, returning the following year to Germany. He was made a member of the Supreme Council of War and the Navy in 1919 and, in 1923, inspector general of the Argentine army. He retired from the army in 1929.

In 1930, during the Great Depression, Uriburu led an army revolt against President Irigoyen, becoming provisional president of Argentina in September of that year. In December he denounced the liberal-radical Irigoyen's prolabour legislation and demanded that a selected elite replace the liberal-radical democratic order that had governed since 1916. Shortly after this speech, he removed all radical-democratic leaders from their national and provincial administrative posts, dissolved the Argentine national legislature (a measure without precedent), reformed the constitution and election law, and refused to allow the liberal-radicals to participate in politics. In 1931 he arranged for a fraudulent presidential election that was designed to ensure the oligarchy's continued control of Argentine politics and then stepped down in favour of a fellow officer, Agustín P. Justo, who had greater support among army officers.

uric acid, a compound belonging to the purine group, and the chief form in which nitrogen, resulting from the breakdown of protein during digestion, is excreted by reptiles and birds. Small quantities of uric acid (about 0.7 gram per day) are excreted by humans as a product of the breakdown of purines that are constituents of nucleoproteins. In persons suffering from gout (*q.v.*), however, the level of uric acid in the blood may be high. Minute quantities of a sodium salt of uric acid, precipitated in cartilage and bone, are the cause of gout.

uricosuric, any agent that reduces the concentration of uric acid in the blood by increasing the rate of its excretion in the urine. Such drugs are used in the treatment of gout, a disease caused by abnormally high concentrations of uric acid in the bloodstream. Uricosurics act by inhibiting the reabsorption of uric acid by the tubules in the kidneys. Probenecid and sulfinpyrazone are the principal uricosurics. The effects of uricosuric drugs depend on the dose: many uricosurics when given in large doses increase uric acid excretion but in low doses actually decrease the excretion of it. *Compare* allopurinol.

Uriel, in the Apocrypha, a leading angel, sometimes ranked as an archangel with Michael, Gabriel, and Raphael. Because his name in Hebrew means "fire of God," or "light of God," he has been variously identified in Jewish traditions as an angel of thunder and earthquake, as the wielder of the fiery sword in driving Adam and Eve from Eden, as the destroyer of the hosts of Sennacherib, as the figure who enlightens Ezra with visions, and, generally, as an angel of terror, prophecy, or mystery. John Milton in *Paradise Lost* described Uriel as "Regent of the Sun" and the "sharpest sighted spirit of all in Heaven"; but Christian tradition has generally paid little attention to Uriel.

urinalysis, laboratory examination of a sample of urine to obtain clinical information. Most of the substances normally excreted in the urine are metabolic products dissolved or suspended in water. A deviation from normal in the concentration of urinary constituents or the abnormal presence of specific substances may thus be indicative of bodily disorders. Changes in urine colour, specific gravity, and volume may also provide evidence of a specific disease or body injury.

Of the large number of organic and inorganic substances present in the urine, some tend to be more significant clinically than others and include sugars, such as glucose, fructose, and pentose; acetone bodies, which, together with glucose, may be excessively high in the urine of individuals with diabetes mellitus; creatine and creatinine, nitrogenous compounds; hemoglobin and myoglobin, the pigments involved in oxygen transport and storage; amino acids and metabolites, such as homogentisic acid, cystine, cysteine, and phenylpyruvic acid, any one of which may be excreted in large amounts by individuals in whom the organic catalyst or enzyme metabolizing it is defective; uric acid, a purine derivative, in cases of gout; urea, the principal end product of protein metabolism in humans; urobilinogen and coproporphyrins, bile pigments; minerals, such as calcium, phosphorus, magnesium, copper, and lead; fats, which may be detected in the

urine in cases of severe diabetes mellitus and kidney disease.

Among the hormones that find their way into urine, the most important clinically include the catecholamines, chorionic gonadotrophin, pituitary gonadotrophins, and 17 ketosteroids and 17 hydroxysteroids. Among the urinary proteins, which are normally barely detectable, those most frequently found in high concentrations are the serum albumins and globulins, the presence of which in the urine is usually associated with some disturbance in kidney function (*see* kidney function test). A great variety of drugs can also be measured in the urine, an important factor in assessing overdosage and toxic states.

urinary bladder, in most vertebrates, except birds, organ for the temporary storage of urine from the kidneys, connected to the kidneys by means of tubular structures called ureters. A urinary bladder is present in fish as an expansible part of the urinary duct, in amphibians and bladder-possessing reptiles (*Sphenodon*, turtles, most lizards) as a pocket in the cloaca. In mammals it is a greatly expandible muscular sac. The bladder of an average adult human is uncomfortably distended at a volume of around 350 millilitres (⅔ quart) of urine.

In placental mammals a special duct, the urethra, leads from the urinary bladder to the exterior; it fulfills the excretory function of the more primitive cloaca. In females the urethra is separate from the genital tract. In males the vas deferens (sperm-carrying tubes) empty into the urethra, and both urine and semen pass through the urethra to reach the exterior.

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

urinary tract obstruction, blockage or constriction of the excretory ducts, causing urine to be dammed up in the kidneys (hydronephrosis). Obstructions in the urinary tract cause distension of the walls of the bladder, ureter, or renal pelvis, depending on the location of the obstruction, which can occur in the urethra, bladder, or ureters.

Obstructions are classified as congenital or acquired. Congenital blockage usually takes the form of valvelike folds or partitions in the mucous membrane lining the excretory ducts. The most frequent site is the junction of the ureter and the renal pelvis. An obstruction of this nature is symptomless and difficult to diagnose; consequently, a great deal of damage can be done to the kidneys before it is discovered.

Acquired obstructions are usually caused by malfunction or abnormal changes in the excretory passages. Obstructions can occur in the urethra from stricture of the wall, usually as a result of infections, or, in males, from enlargement of the prostate gland, which surrounds the urethra. When the urethra is blocked, urine backs up in the bladder. The bladder walls become stretched, and the walls of the ureters and the renal pelvis thicken. Infections set in, which cause further thickening and inflammation in the ureter, bladder, and pelvic walls. Obstruction of the bladder is caused by tumours, by mineral deposits that form stones, by an enlarged prostate, or by neuromuscular disorders. Some degree of dilatation and obstruction of the ureters occurs during a normal pregnancy, caused by the pressure of a growing fetus and by hormones that cause relaxation of muscle tone.

The major concern in a blockage or obstruction is the backup of fluids into the kidney, which causes the renal pelvis and calyces to become grossly distended. The functioning tissue of the kidneys can be totally destroyed: thickening of the walls of the pelvis and calyces causes pressure on the renal arteries that interferes with blood flow to the kidneys. This speeds up kidney tissue degeneration. Infections commonly complicate the already deteriorating condition. Kidney tubules and structures that produce urine are replaced by fibrous scar tissue. Urine constituents are reabsorbed by the renal veins, tubes, and lymphatic channels, leading to uremia. Standard treatment of urinary tract obstruction is prompt surgical correction of the condition.

urination, also called MICTURITION, the process of excreting urine from the urinary bladder. Nerve centres for the control of urination are located in the spinal cord, the brainstem, and the cerebral cortex (the outer substance of the large upper portion of the brain). Both involuntary and voluntary muscles are involved.

The urinary bladder is a storage reservoir for urine—a liquid containing waste products given off by the body and extracted from the bloodstream by the kidneys. The major contractile muscle of the bladder is the detrusor. Urination involves either sustained contractions or short intermittent contractions of the detrusor along with contraction of the muscles in the urethra, the duct from the urinary bladder that conducts urine from the body.

In man and most other animals, voiding of the bladder is influenced by the volume of urine it contains. When 100–150 millilitres (3.5–5 ounces) of urine accumulate, the first sensations of a need to void are felt. The feeling increases in intensity as more urine accumulates, and it becomes uncomfortable at a bladder volume of 350–400 millilitres. Impulses from the pelvic nerves mediate the sensations of bladder filling, painful distension, and the conscious need to urinate.

A slowly filling bladder adapts progressively to the pressure from increased volume. Hence, a bladder that is rapidly filled stimulates urination faster than one that fills slowly. When enough pressure is sensed by the walls of the bladder, the detrusor muscle contracts, the bladder neck and opening to the urethra relax, and the contents of the bladder are emptied. Normally the bladder empties completely.

Voluntary restraint of urination involves inhibition of bladder contraction, closure of the opening to the urethra, and contraction of the abdominal muscles. The ability to start and stop the flow of urine depends largely on the normal functioning of the muscles of the pelvic floor, the abdominal wall, and the diaphragm (the muscular partition between the abdomen and the chest). Infants' lack of inhibitory control over urination is related to the immaturity of the nervous system. Likewise, degeneration or destruction of certain areas of the central nervous system leads to incontinence due to the so-called neurogenic bladder. Such incontinence may be a dribbling overflow from a permanently distended bladder, or an efflux from a contracted bladder whose outlet is always open.

If the full bladder is not emptied, it becomes overdistended. In time, bladder distension can cause bleeding, ulcerations, and rupture of the bladder wall. Obstruction to the outflow of urine can follow enlargement of the prostate (the gland in males that encircles the urethra close to the bladder), swelling of the urethral tissue around its channel, fibrous stricture of the urethra, or contraction of the muscles at the openings of the bladder and the urethra. Usually urine is retained until the pressure in the bladder overcomes the obstruction. With moderately chronic retention and stress, the detrusor muscle increases in tone and the contractile force of the bladder is increased. When overdistension occurs over long periods, the detrusor muscle produces small rhythmic contractions that cause dribbling of urine. With continued distension, the muscle can become paralyzed, and urine voiding takes place only by overflow; this condition is usually termed passive incontinence. There may also be flow of urine back to the kidneys under these conditions, causing failure of kidney function.

urine, liquid or semisolid solution of metabolic wastes and certain other, often toxic, substances that the excretory organs withdraw from the circulatory fluids and expel from the body. The composition of urine tends to mirror the water needs of the organism. Freshwater animals usually excrete very dilute urine. Marine animals tend to combat water loss to their salty environment by excreting concentrated urine; some develop methods actively to expel salts. Terrestrial animals, depending on their habitat, usually retain water and secrete a highly concentrated urine.

In most mammals, including man, urine is formed in the nephrons of the kidneys by filtration of blood plasma into the nephron; the fluid found within the nephron is known as capsular urine and is essentially the same as blood plasma without the macromolecules (*e.g.*, proteins). As the capsular urine passes along the nephron tube, water and useful plasma components such as amino acids, glucose, and other nutrients are reabsorbed into the bloodstream, leaving a concentrated solution of waste material called final, or bladder, urine. It consists of water, urea (from amino acid metabolism), inorganic salts, creatinine, ammonia, and pigmented products of blood breakdown, one of which (urochrome) gives urine its typically yellowish colour. In addition, any unusual substances for which there is no mechanism of reabsorption into the blood remain in the urine. The products of nucleic acid breakdown are present as allantoin in most mammals and as uric acid in man and, through a quirk of breeding, in the Dalmatian dog.

In most birds, reptiles, and terrestrial insects, the end product of amino acid metabolism is not water-soluble urea but insoluble uric acid. The urine of birds and reptiles is a whitish, aqueous suspension of uric acid crystals that is passed into the cloaca and mixed with fecal material before being expelled. The urine of terrestrial insects is solid and in some cases is stored as pigment in the body rather than being expelled.

Amphibians and fishes excrete aqueous solutions of urea; unlike those of mammals, however, their excretory organs do not reabsorb large quantities of water, so their urine remains dilute. Some marine animals retain much of the urea in the blood, thus retarding osmotic water loss.

In small, primitive animals (teleost fishes, echinoderms, coelenterates, and single-celled animals), particularly those that live in aqueous environments, the end product of amino acid metabolism is the highly toxic gas ammonia, which is collected and expelled in a dilute aqueous solution. Many of the smaller animals develop no excretory system; each individual cell disposes of its waste products to the circulatory fluids, and the wastes then diffuse to the surrounding medium.

Uris, Leon (Marcus) (b. Aug. 3, 1924, Baltimore), U.S. novelist known for such panoramic, action-filled works as *Battle Cry* (1953) and *Exodus* (1958), which deals with the struggle to establish and defend the state of Israel.

Uris served as a Marine in World War II and was a newspaper driver before he turned to writing. Other books include *The Angry Hills* (1955), an account of the Jewish brigade from Palestine that fought with the British army in Greece; *Mila 18* (1961), a novel about the Jewish uprising against the Nazis in the Warsaw ghetto in 1943; *QB VII* (1970), dealing with Nazi war crimes; *Trinity* (1976), a chronicle of a Northern Irish farm family from the 1840s to 1916; and *The Haj* (1984), depicting the lives of Palestinian Arabs from World War I to the Suez war of 1956.

Urliones, Gil de, Urliones also spelled URLIENES; *see* Siloé, Gil de.

Urmia (Iran): *see* Orūmiyeh.

Urmia, Lake, Persian DARYĀCHEH-YE ORŪMIYEH, lake in northwestern Iran that is the largest lake in the Middle East. It covers an area that varies from 2,000 to 2,300 square miles (5,200 to 6,000 square km). Like the Dead Sea, it is remarkable for the extreme salinity of its waters. Since 1967 it has enjoyed the status of a wetland protected region, and efforts have been made by the Iranian government to increase its wildlife.

The lake lies in the bottom of the large central depression of the Azerbaijan region in northwestern Iran, at an elevation of 4,183 feet (1,275 m) above sea level. The basin is surrounded by mountains in the west and north, by plateaus in the south, and by plateaus and volcanic cones in the east. The lake is about 87 miles (140 km) long and 25 to 35 miles (40 to 55 km) wide, with a maximum depth of 53 feet (16 m). In its southern portion there is a cluster of about 50 tiny islands. The shoreline varies with the lake level; when the water is high, it extends into large salt marshes to the east and south. The lake's shores are largely uninhabited.

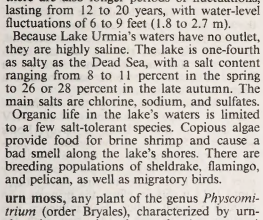
The governing factor of Lake Urmia's hydrography is its lack of an outlet. It forms the dead end of a large drainage system that covers an area of about 20,000 square miles (52,000 square km) and is subject to great seasonal variation. The main affluents are the Talkheh (Āji) River in the northeast, which gathers the melted snows from the Sabalān and Sahand massifs, and the twin rivers Zarīneh (Jagātu) and Simīneh (Tatavi) in the south.

The volume of water discharged into the lake by these rivers varies considerably during the year: during the spring the Talkheh River and Simīneh River may each discharge about 2,000 cubic feet (57 cubic m) per second, while the rate drops to only 130 or 60 cubic feet (3.7 or 1.7 cubic m) per second in the dry summer. This variation causes the lake itself to rise and fall, fluctuating by 2 to 3 feet (0.6 to 0.9 m). In addition to seasonal variations, there are also longer periods of fluctuations, lasting from 12 to 20 years, with water-level fluctuations of 6 to 9 feet (1.8 to 2.7 m).

Because Lake Urmia's waters have no outlet, they are highly saline. The lake is one-fourth as salty as the Dead Sea, with a salt content ranging from 8 to 11 percent in the spring to 26 or 28 percent in the late autumn. The main salts are chlorine, sodium, and sulfates.

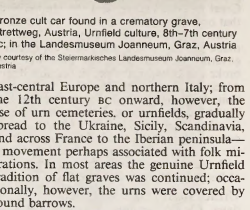
Organic life in the lake's waters is limited to a few salt-tolerant species. Copious algae provide food for brine shrimp and cause a bad smell along the lake's shores. There are breeding populations of sheldrake, flamingo, and pelican, as well as migratory birds.

urn moss, any plant of the genus *Physcomitrium* (order Bryales), characterized by urn-shaped or top-shaped capsules (spore cases) with lobed, hoodlike coverings. Fewer than 10 species are native to North America. The most common is *P. turbinatum,* sometimes called top moss, about 2.5 cm (1 inch) high and having a five- to eight-lobed capsule covering. The dark brown capsules have lids with short beaks and are borne on setae (stalks) less than 1 cm (0.4 inch) long. The phyllids (leaves) of both male and female plants form bright green rosettes.



Urn moss (*Physcomitrium turbinatum*)
Stephen Collins

Urnfield culture, a Late Bronze Age culture of Europe, so called because of the custom of placing the cremated bones of the dead in urns. The Urnfield culture first appeared in



Bronze cult car found in a crematory grave, Strettweg, Austria, Urnfield culture, 8th–7th century BC; in the Landesmuseum Joanneum, Graz, Austria
By courtesy of the Steiermarkisches Landesmuseum Joanneum, Graz, Austria

east-central Europe and northern Italy; from the 12th century BC onward, however, the use of urn cemeteries, or urnfields, gradually spread to the Ukraine, Sicily, Scandinavia, and across France to the Iberian peninsula—a movement perhaps associated with folk migrations. In most areas the genuine Urnfield tradition of flat graves was continued; occasionally, however, the urns were covered by round barrows.

Warlike behaviour among the culture's members appears to have been intense; settlements were normally fortified, and large supplies of beaten-bronze armaments have been found. The slashing sword, with flanged grips to protect the handle, was apparently adopted at this time. The uniformity of the Urnfield culture and the persistence of certain pottery and metal forms seemingly had great influence on the later culture of the Early Iron Age.

urochordate: *see* tunicate.

Urodela (amphibian order): *see* salamander.

urogenital malformation, any defect in the organs and tissues responsible for the formation and excretion of urine or in the sex organs or in both. Some of the more important conditions include:

1. Multicystic dysplastic kidney, a common type of kidney malformation in newborns in which cysts of varying size enlarge one or both kidneys. Though not necessarily fatal, the condition causes a decrease in the amount of functional kidney tissue, which creates a tendency toward infection.

2. Abnormal shapes of the kidney, of moderate frequency and including fused kidneys and horseshoe kidney. These organs usually function normally but show an increased tendency toward infection and stone formations.

3. Megalo-ureter, a disorder in which the passage carrying urine from kidney to bladder is enlarged, sometimes to the size of the small intestine. The cause is usually obstruction of the ureter, bladder, or urethra, which must be treated to avoid kidney damage.

4. Agenesis of the abdominal muscles, occurring mostly in males, involving the failure of either one set of muscles or all to form, in which case the abdomen consists of a loose sack of skin. Because there is no support for the viscera, various malfunctions, especially of the urogenital system, occur. Treatment consists of supporting the abdominal wall by the use of a corset and by symptomatic care of malfunctions already present.

5. Epispadias, an uncommon malformation of the male genital system in which the urethra opens on the upper surface of the penis. In hypospadias, often familial, the urethra opens on the underside of the penis. Plastic surgery can repair both anomalies.

6. Cryptorchidism (*q.v.*), or undescended testicles, a common disorder in males in which one or both of the testes, which usually descend from the abdomen into the scrotum during the ninth month of fetal life, fail to descend because of mechanical difficulty or hormonal defect. Spontaneous descent usually occurs within a few years; if not, hormone treatment or surgery is employed.

7. Female genital system malformations, mostly either agenesis of the ovaries, vagina, or uterus or abnormally shaped uterus. The former results in sterility or infertility, and the latter may interfere with the ability to carry an infant to term.

urogenital system, also called GENITOURINARY SYSTEM, in vertebrates, the organs concerned with reproduction and urinary excretion. Although their functions are unrelated, the structures involved in excretion and reproduction are morphologically associated and often use common ducts. The major structures of the urinary system in mammals are the kidneys, ureters, bladder, and urethra. The major structures of the reproductive system in males are the testes, sperm ducts, urethra, and penis; in females, they are the ovaries, fallopian tubes, uterus, and vagina. *See* excretion; reproduction.

urography, X-ray examination of any part of the urinary tract after introduction of a radiopaque substance (often an organic iodine derivative) that casts an X-ray shadow. This contrast fluid, which passes quickly into the urine, may be taken orally or injected intravenously. It may also be injected directly into the area being examined. Tumours, tuberculous abscesses, kidney stones, and obstruction by prostatic enlargement may be detected by this method. Specific types of urography include pyelography (examination of the kidney and ureter) and cystography (examination of the bladder). Motion-picture "voiding cystograms" provide evidence of gross reflux of urine into the ureters and pelvis of the kidney during voiding.

urology, medical specialty involving the diagnosis and treatment of diseases and disorders of the urinary tract and of the male reproductive organs. (The urinary tract consists of the kidneys, the bladder, the ureters, and the urethra.)

The modern specialty derives directly from the medieval lithologists, who were itinerant healers specializing in the surgical removal of bladder stones. In 1588 the Spanish surgeon Francisco Diaz wrote the first treatises on diseases of the bladder, kidneys, and urethra; he is generally regarded as the founder of modern urology. Most modern urologic procedures developed during the 19th century. At that time flexible catheters were developed for examining and draining the bladder, and in 1877 the German urologist Max Nitze developed the cystoscope. The cystoscope is a tubelike viewing instrument equipped with an electric light on its end. By introducing the instrument through the urethra, the urologist is able to view the interior of the bladder. The first decades of the early 20th century witnessed the introduction of various X-ray techniques that have proved extremely useful in diagnosing disorders of the urinary tract. Urologic surgery was largely confined to the removal of bladder stones until the German

surgeon Gustav Simon in 1869 demonstrated that human patients could survive the removal of one kidney, provided the remaining kidney was healthy.

Most of the modern urologist's patients are male, for two reasons: (1) the urinary tract in females may be treated by gynecologists, and (2) much of the urologist's work has to do with the prostate gland, which encircles the male urethra close to the juncture between the urethra and the bladder. The prostate gland is often the site of cancer; even more frequently, it enlarges in middle or old age and encroaches on the urethra, causing partial or complete obstruction of the flow of urine. The urologist treats prostate enlargement either by totally excising the prostate or by reaming a wider passageway through it. Urologists may also operate to remove stones that have formed in the urinary tract, and they may perform operations to remove cancers of the kidneys, bladder, and testicles.

uropygial gland (zoology): *see* preen gland.

urostomy, the surgical formation of a new channel for urine and liquid wastes following the removal of the bladder or ureters. *See* ostomy.

Urquhart, Sir Thomas, Urquhart also spelled URCHARD (b. 1611, Cromarty, Scot.—d. 1660), author of one of the most original and vivid translations from any foreign language into English. His works are marked by eccentricity of both language and method.

Urquhart studied at King's College, Aberdeen, and fought against the Covenanters at Turriff (1639). He was knighted by Charles I in 1641. His strong Royalist convictions led him to join the army of Charles II in 1651. Taken prisoner at the Battle of Worcester, he was incarcerated in the Tower of London and at Windsor. Cromwell allowed his release on parole, and after 1653 he appears to have been at liberty, probably taking refuge on the European continent with other Royalists. He died abroad, allegedly "in a fit of excessive laughter, on being informed by his servant that the King was restored," in 1660.

In the 1640s and early '50s Urquhart published several fantastical works that combined an obscure and unintelligible symbolism with sharply drawn autobiographical reminiscences. Urquhart eventually found the perfect medium for his rich, inventive, idiosyncratic style in translating the *Works of Mr. Francis Rabelais* (books i–ii, 1653; part of book iii, 1693). His linguistic exuberance and his sympathy with the free spirit of Rabelais combined to make this translation the long-established English-language version. Peter Anthony Motteux completed book iii (1693–94), as well as books iv and v (1708).

Urquiza, Justo José de (b. Oct. 18, 1801, Arroyo Urquiza, Río de la Plata [now in Argentina]—d. April 11, 1870, Entre Ríos province, Arg.), soldier and statesman who overthrew the powerful Argentine dictator Juan Manuel de Rosas and laid the constitutional foundations of modern Argentina.

A member of the Argentine oligarchy, Urquiza was educated at the College of San Carlos in Buenos Aires, from which he graduated in 1816. He early acquired both business and political experience. In 1818 he was employed in the port of Buenos Aires; after returning to Entre Ríos in June 1819 he served as a business agent. His family's relations with the dictator Francisco Ramírez enabled Urquiza to enter politics. He was active in the political life of his native province for many years before he went to Buenos Aires as the agent of Pascual Eschagüe, the governor of Entre Ríos. In the capital Urquiza became a confidant of the dictator Rosas. Made a colonel in 1837, he replaced his patron Eschagüe as governor of Entre Ríos in 1841.

As governor Urquiza made himself supreme in Entre Ríos by suppressing all other military forces within the province. He then proceeded to break the military power of the governor of Corrientes. Besides bringing order to his province, he encouraged fiscal and administrative reform in the province's government and educational reform in the schools.

Using Entre Ríos as a powerful base and forming an alliance with lesser provincial chieftains, Urquiza revolted against Rosas, defeating him in February 1852 at the Battle of Monte Caseros. In April 1852 he issued the Protocol of Palermo, which authorized him to regulate relations between the provinces. As provisional dictator of Argentina, in August 1852 he summoned to Santa Fe a constitutional congress that in 1853 sanctioned a new constitution modeled on that of the United States. All provinces accepted the constitution, but the province of Buenos Aires refused to join the new union and did not become a member until 1859. Besides creating the Argentine Confederation, Urquiza while president negotiated a navigation treaty with Great Britain, France, and the United States that opened Argentine ports to world trade.

After leaving the presidency in 1860 he was made general of the army and continued as governor of Entre Ríos. In 1861 war again broke out between the provinces and Buenos Aires, which was determined to lead the nation. Buenos Aires' victory at the Battle of Pavón was a severe setback to Urquiza's political plans. From 1865 to 1868 Urquiza was commander of the Argentine armies during the war against Paraguay. He was assassinated with his sons in his villa by followers of one of his political rivals in Entre Ríos.

Urraca (b. 1077–81—d. March 8, 1126, Saldana, Castile [Spain]), queen of Leon and Castile from 1109 to 1126, daughter of Alfonso VI.

Urraca became her father's heiress when her brother, Sancho, was killed at Uclés (1108). She was the widow of Count Raymond of Burgundy, by whom she had had one son, Alfonso Ramírez (born 1104), the future Alfonso VII. To counterbalance—it was hoped—the dangers of a female succession during the Almoravid crisis, Urraca's marriage to her second cousin, Alfonso I of Aragon, was arranged (1109). This marriage, instead of producing political stability in Urraca's kingdom, led to years of anarchy. Urraca and her husband, according to the marriage settlement, became corulers in each other's lands, and Alfonso thereupon put Aragonese garrisons into many Leonese and Castilian cities. The notion of an Aragonese-Castilian political union was, however, premature, and although Urraca's municipalities tended to accept the Aragonese king, the magnates were hostile. Civil war broke out and continued for years, many supporting the claims of the child Alfonso Ramírez to the throne. Matters were further complicated by the temperamental incompatibility of Urraca and her husband, who soon quarreled. Pope Paschal II, moreover, declared their marriage canonically invalid. They finally separated in 1114, though the Aragonese king continued for some years thereafter to keep his garrisons in Castile and to use the royal title.

Struggles also continued between nobles and municipalities, between rival bands of magnates, between the archbishops of Santiago and Toledo, and between the former, the bishop Diego Gelmírez, and Urraca herself. Alfonso Ramírez was crowned by Gelmírez in 1111, and his reign in Galicia began effectively—despite Urraca's intermittent but active opposition—in 1116. Urraca's death in 1126 ended a disastrous episode in the medieval political history of Christian Spain.

Urre, Philipp von: *see* Hutten, Philipp von.

Ursa Major (Latin: "Greater Bear"), also called THE GREAT BEAR, in astronomy, a constellation of the Northern Hemisphere, at about 10 hours 40 minutes right ascension (the coordinate on the celestial sphere analogous to longitude on the Earth) and 56° north declination (angular distance north of the celestial equator). It was referred to in the Old Testament (Job 9:9; 38:32) and mentioned by Homer in the Iliad (xviii, 487). The Greeks identified this constellation with the nymph Callisto, who was placed in the heavens by Zeus in the form of a bear together with her son Arcas as "bear keeper," or Arcturus; the Greeks named the constellation Arctos, the she-bear, or Helice, from its turning around Polaris, the Pole Star. The Romans knew the constellation as Arctos or Ursa. Ptolemy cataloged eight of the constellation's stars. Of these, the seven brightest constitute one of the most characteristic figures in the northern sky; the group has received various names—Septentriones, the Wagon, Plow, Big Dipper, and Charles's Wain. For the Hindus these seven stars represented the seven Rishis (or Sages). Two of the constellation's stars, Dubhe and Merak, are called the pointers because the line Merak–Dubhe points to the Pole Star.

Five stars of the constellation form an associated group with common proper motion, but Dubhe (the upper pointer) and Alcaid (the last star of the tail) have no connection with the others. Stars in other parts of the sky have been found to belong to the same cluster; Sirius, for example, is a stray member of it.

Ursa Minor (Latin: "Lesser Bear"), also called THE LITTLE BEAR, in astronomy, a constellation of the northern sky, seven of whose stars outline the Little Dipper. Polaris (Alpha Ursae Minoris), at the end of the Little Dipper's handle, marks (roughly) the position of the north celestial pole. The constellation lies at about 15 hours right ascension and 80° north declination.

Ursins, Marie-Anne de la Trémoille, princesse des (princess of the) (b. 1642, Paris, Fr.—d. Dec. 5, 1722, Rome, Papal States [Italy]), French noblewoman who exercised great influence in the government of Spain between 1701 and 1714, during the period of the War of the Spanish Succession.

Ursins moved to Italy with her first husband, and after his death she married an Italian duke, who died in 1698. She remained in Rome until 1701, where her salon became a centre of French influence in Italy.

After Ursins helped arrange the marriage of Philip V of Spain, grandson of Louis XIV of France, to María Luisa of Savoy, Louis sent her to Spain to be the queen's *camarera mayor* (principal lady of the bedchamber). She soon established a complete ascendancy over María Luisa, who, in turn, ruled Philip. Until 1714 it was, in effect, the princess who decided Spanish policy. Her influence was greatest in 1713 and 1714, when, with the French economist Jean Orry as de facto first minister, a complete reform of the Spanish administration was begun. Attempts by the princess to secure for herself an independent principality in Luxembourg almost caused the breakdown in 1713 of the peace negotiations at Utrecht that ended the War of the Spanish Succession.

After the death of María Luisa in February 1714, Ursins arranged for Philip to marry Isabella Farnese. The new queen, however, warned of the authority exercised by the princess, picked a quarrel with her at their first meeting (Dec. 23, 1714), and immediately exiled her from Spain. Ursins retired to Rome.

Ursinus (d. after 385?), antipope from 366 to 367.

After Pope Liberius' death on Sept. 24, 366, two Roman deacons, Ursinus and St.

Damasus I, were simultaneously elected as successors. The small, powerful faction supporting Ursinus gathered in the Basilica Julia, in Rome, where he was apparently consecrated on September 24.

Before Damasus' consecration on the following October 1, the pope's partisans engaged in a bloody confrontation with the Ursinians, whom they drove from the Basilica Julia. A similar battle occurred on October 26 at the Basilica Liberia, before which Ursinus had been exiled to Gaul. His adherents induced the Roman emperor Valentinian I to consider convoking a synod that would settle the papal dispute. The emperor allowed Ursinus to return to Rome in September 367.

Again violence erupted, and Ursinus was expelled on Jan. 12, 368, being allowed to live only outside Rome. Within a few months the Ursinians were driven even farther from the city because of their agitation. Ursinus returned to Gaul, and his followers continued in schism. Allowed to return to Italy (370–372), the Ursinians became established in Milan and rekindled their opposition to Damasus.

Finally, a Roman synod in 378 exonerated Damasus and condemned Ursinus, who was exiled to Cologne. Probably ambition rather than orthodoxy was the issue of the schism, and Ursinus is known to have been still involved in intrigues against Damasus as late as 381.

Ursula, Saint (fl. probably 4th century, Rome; feast day October 21), legendary leader of 11 or 11,000 virgins reputedly martyred at Cologne, now in Germany, by the Huns, 4th-century nomadic invaders of southeastern Europe. The story is based on a 4th- or 5th-century inscription from St. Ursula's Church, Cologne, stating that an ancient basilica had been restored on the site where some holy virgins were killed. Mentioned again in an 8th- or 9th-century sermon, the number of maidens increased to several thousand, reportedly martyred under the Roman emperor Maximian. In Jacobus de Voragine's *Legenda Aurea* (1265–66; *Golden Legend*) Ursula is a British princess who went to Rome accompanied by 11,000 virgins and was killed with them by the Huns on the return from the pilgrimage. The discovery at Cologne in 1155 of an ancient Roman burial ground believed to contain these martyrs' relics inspired additional legends. Ursula is the patron of the Order of St. Ursula (Ursulines), a congregation of nuns dedicated to educating girls. In the 1969 reform of the Roman Catholic church calendar her feast day was reduced to observances in certain localities.

Ursuline, member of ORDER OF SAINT URSULA (O.S.U.), a Roman Catholic religious order of women founded at Brescia, Italy, in 1535, by St. Angela Merici, as the first institute for women dedicated exclusively to the education of girls. Angela and her 28 companions placed themselves under the protection of St. Ursula, a legendary 4th-century martyr whose cult was popular in medieval Europe. The original Ursulines remained in their families and carried out all kinds of charitable work, but their main endeavour was instruction in Christian doctrine. As the Ursulines spread throughout Italy and France, certain modifications of form took place, although the aim and the spirit of the founder were preserved. In 1572 the Ursulines of Milan, at the request of St. Charles Borromeo, began to live in community as a congregation. The congregation of Paris in 1612 was raised to the status of a monastic order, living a strictly cloistered, or enclosed, life. In most modern Ursuline convents the enclosure has been modified to meet the needs of the apostolate. Through the efforts of Pope Leo XIII, in 1900 a "Roman union" of Ursuline convents was created. Many communities, however, retain their independent organization or are united in smaller groups. In 1639 Marie Guyard (Marie of the Incarnation) founded the Ursuline house at Quebec, the first congregation of women to be established in North America.

Urticaceae, the nettle family comprising about 45 genera of herbs, shrubs, small trees, and a few vines, distributed primarily in tropical regions. The family is typical of the nettle order (Urticales). Many species, especially the nettles (*Urtica*) and Australian nettle trees (*Laportea*), have stinging hairs on the stems and leaves. The leaves are varied and the sap is usually watery. The small, greenish flowers often form clusters in the leaf axils. Both male and female flowers may be borne on the same plant. The curled stamens of the male flowers straighten quickly as the flowers open, releasing the pollen. The dry, one-seeded fruit often is enclosed by the outer whorl of the flower cluster. The long fibres in the stems of some species, such as ramie (*q.v.; Boehmeria nivea*), are used in the textile industry.



Scrub nettle (*Urtica incisa*), a stinging nettle in the Urticaceae family
I.R. McCann/Australasian Nature Transparencies

One species of Australian nettle tree, *Laportea moroides*, is cultivated for its raspberry-like flower clusters. *Pilea*, a genus of creeping plants that includes the artillery plant (*P. microphylla*), and pellitory (*Parietaria*), a genus of wall plants, are grown as ornamentals. Baby tears (*Helxine soleirolii*), a mosslike creeping plant with round leaves, often is grown as a ground cover. The trumpet tree (*Cecropia peltata*), a tropical American species, has hollow stems that are inhabited by biting ants.

Urticales, the nettle order of flowering plants, containing about 110 genera and approximately 2,200 species in six families and belonging to the class called dicotyledon (characterized by two seed leaves). The order includes a diversity of plant types ranging from small herbaceous (nonwoody) species to large trees. Among the group are stinging nettles; mulberry, fig, and elm trees; hop vines; and the hemp, or marijuana, plant.

A brief treatment of Urticales follows. For full treatment, *see* MACROPAEDIA: Angiosperms.

Members of the order grow abundantly throughout the world. The large mulberry family (Moraceae) contains mostly trees and shrubs of the tropics and subtropics, with a few temperate species. The nettle family (Urticaceae) is another large group, consisting predominantly of herbs, some of them with stinging hairs. They occur mainly in the tropics, where they are shrubby and treelike, but many herbaceous nettles are native to temperate areas of the Northern Hemisphere. Ulmaceae, the elm family, includes trees and shrubs distributed over the north temperate, tropical, and subtropical regions. Some species grow to impressive heights. The family Cecropiaceae's most prominent members are fast-growing trees in the New World tropics. The hemp family (Cannabaceae) is the second smallest of the order, containing aromatic herbs of the hemp and hop genera, which are widespread in northern temperate areas. The taxonomic status of the family Barbeyaceae, which has only one species, remains uncertain.

Many species in the elm and mulberry families, including red mulberry (*Morus rubra*), letterwood (*Brosimum guianense*), and many members of *Ficus*, are used as timber trees and ornamentals. The rock elm (*Ulmus thomassi*), the hackberry (*Celtis occidentalis*), and other members of the Ulmaceae yield a variety of useful woods.

The mulberry family is the source of the chief edible fruits in the order. The breadfruit tree (*Artocarpus altilis*) is one of the highest yielding of food plants, and the carbohydrate-rich breadfruits constitute a staple food in many tropical lands. The edible fig (*F. carica*) has been cultivated since antiquity. Silkworms feed almost exclusively on mulberry leaves, particularly those of *Morus alba*. Some members of the Moraceae have a milky juice, latex, which furnished the earliest source of rubber, and species of *Ficus* and *Castilla* are still grown commercially to make some types of rubber and other products. Paper and bark cloth (tapa cloth) are products of the paper mulberry (*Broussonetia papyrifera*).

The two genera of the hemp family, *Humulus* and *Cannabis*, have been economically important for many centuries. The flowers of *H. lupulus* are the hops used in brewing to flavour beer. Various parts of the hemp plant (*C. sativa*) are dried to make the drug marijuana. Hemp is also the source of coarse fibres used for rope and sacks. A member of the nettle family, the Chinese grass plant (*Boehmeria nivea*), yields a fine fibre called ramie that is made into silklike cloth.

Urticales is distinguished from other plant orders chiefly by floral characteristics. In most members of the order, flowers are unisexual; that is, male and female structures occur in separate flowers. The ovary (female) has two carpels (ovule-bearing structures) but contains just one ovule (potential seed), which produces a single seed. Male flowers have only a few pollen-bearing stamens. Flowers are inconspicuous, lack petals, and are composed of four or five small greenish sepals. Leaves are simple, grow alternately on the stems, and have appendages called stipules.

Some species of nettles have stinging hairs tipped by a sharp terminal cell that penetrates skin, breaks off, and releases an irritating fluid. In the wood nettle of eastern North America (*Laportea canadensis*), the stinging fluid is formic acid. The more common species of *Urtica* (*U. dioica* and *U. gracilis*) produce an irritation that may last for hours, and other species can cause more severe reactions.

The nettle family typifies Urticales in being wind-pollinated. Some species are specially adapted for this process by having explosive stamens. In the artillery plant (*Pilea microphylla*) and many other genera of Urticaceae, the stamens spring out suddenly when the male flower bud opens, releasing puffs of pollen that the wind carries to female flowers of other plants.

Among the Moraceae, some species are insect-pollinated, notably the common fig. Small gall wasps use the clustered flower structures for laying their eggs, and they pollinate the fig trees in the process. Some of the flowers form an abnormal tissue, the gall, on which the wasp larvae feed. This close relationship between figs and gall wasps is a type of sym-

biosis, or mutual interdependence, that is also exemplified in the Urticaceae family. There the tropical American trumpet tree (*Cecropia peltata*) provides living space and special food bodies for ants of the *Azteca* genus, which in turn attack leaf-cutter ants that attempt to chew up the foliage.

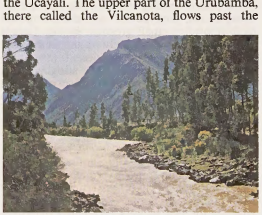
Many fruits of the Moraceae are multiple fruits, formed by the fusion of several flowers. Each "seed" in a fig is actually an individual fruit. The jackfruit (*Artocarpus heterophyllus*) produces immense fruits that grow along the main tree trunk. Two kinds of fruits appear in the Ulmaceae family. Elms (*Ulmus*) have a seed enclosed in a dry, winged structure adapted for wind dispersal. In other family members, such as the hackberries (*Celtis*), the fruit is fleshy, with a stony pit, and the seed is dispersed by birds and animals that eat the fruit.

In some species of *Ficus*, including the "strangler figs," birds and bats drop fig seeds onto the branches of other trees. There the seeds develop aerial roots that grow down along the trunk of the supporting tree, enlarge, and gradually crush the host to death. Banyans (*F. benghalensis*), which grow thick prop roots from their wide-spreading branches, may reach an immense size and resemble a dense grove of trees.

urticaria (medicine): *see* hives.

Uruapan, in full URUAPAN DEL PROGRESO, city, west-central Michoacán *estado* ("state"), west-central Mexico. Founded in 1533, Uruapan (from a Tarascan Indian term meaning "where the flowers abound") is famous for its Spanish-colonial atmosphere and colourful lacquerware and Indian handicrafts. It is a rail terminus and agricultural marketing and processing centre in an area producing coffee, grains, sugarcane, and tropical fruit. Uruapan is a base for tourists visiting the nearby volcano Paricutín, which appeared suddenly in 1943. The city is accessible by highway, railroad, and air from Mexico City to the east. Pop. (2000 prelim.) 265,211.

Urubamba River, Spanish RÍO URUBAMBA, river in the Amazon drainage system, rising in the Andes of southern Peru, near the border between Cuzco and Puno *departamentos*. It flows for about 450 miles (725 km) to its junction with the Apurímac, where it forms the Ucayali. The upper part of the Urubamba, there called the Vilcanota, flows past the



Urubamba River Valley in the Andes of Peru
Arthur Griffin

towns of Sicuani, Urcos, and Urubamba and is densely settled by Indian farmers. Below Urubamba, in the Gorge of Torontoy, the river plunges from 11,000 to 8,000 feet (3,400 to 2,400 m) in 20 miles (32 km). The lower course, downstream from Quillabamba, is sparsely populated.

Uruguaiana, also spelled URUGUAYANA, city, western Rio Grande do Sul *estado* ("state"), southern Brazil. It lies along the Uruguay River, across the bridge from the town of Paso de los Libres, Arg. Founded in 1839 as Sant' Ana do Uruguai, Uruguaiana was made a town and renamed in 1846; city status was



The Cathedral of Sant' Ana at Uruguaiana, Braz.
Plessner International

accorded in 1874. Uruguaiana is a livestock (sheep and cattle) centre and processes meat and animal by-products. It is also a river port and is linked by rail, road, and air to other cities in the state. Pop. (2000 prelim.) 118,181.

Uruguay, officially ORIENTAL REPUBLIC OF URUGUAY, Spanish REPÚBLICA ORIENTAL DEL URUGUAY, South America's second smallest country after Suriname, situated in the southeastern part of the continent, covering an area of 68,037 square miles (176,215 square km). The capital is Montevideo. Uruguay extends about 310 miles (500 km) from north to south and about 290 miles (470 km) from east to west. It is bordered on the north and northeast by Brazil, on the south by the estuary of the Río de la Plata, and on the southeast by the Atlantic Ocean; the entire western border is defined by the Uruguay River, which separates the country from Argentina. The population in 1990 was estimated at 3,011,000.

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

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

The land. Uruguay lies in a transitional zone between the humid pampas of Argentina and the warm, hilly uplands of Brazil. Its topography consists mainly of low plateaus and low hilly regions. Mount Mirador (1,644 feet [501 m]) in the hills of the Cuchilla Grande in the southeast is the country's highest point. The Negro River is Uruguay's principal river. Uruguay's climate is mild and temperate. Average temperatures in summer (December–February) are about 71° F (22° C) and in winter (July–August) about 50° F (10° C); mean annual precipitation is about 35 inches (890 mm). Flat or gently rolling grasslands, a part of the Pampa, dominate the Uruguayan landscape. Forests cover less than 5 percent of the total land area. Scarlet and white verbenas and other wildflowers abound in the prairies. The larger indigenous fauna includes the rhea, puma, jaguar, fox, deer, and wildcat; armadillo, as well as quail and partridge, are also found. The mineral and energy resources of Uruguay are limited. Small iron-ore, lead, copper, and gold deposits exist in the northern part of the country.

The people. Caucasians, mostly of Spanish and Italian origin, are the predominant ethnic group, mestizos account for a small percentage, and the remainder are mulattoes and blacks; few Indians remain. Spanish is the official language. Roman Catholics constitute three-fifths of the population, followed by the nonreligious (one-third), Protestants, and Jews. Uruguay has one of the lowest birth rates among South American countries, as well as one of the continent's lowest rates of natural increase. The age group encompassing persons 15 years and younger is more than one-fourth of the population. Life expectancy is relatively high at about 69 years for men and 74 years for women. The death rate, however, is also relatively high, in part because of high infant mortality. More than four-fifths of the population lives in urban areas, almost half in Montevideo.

The economy. Uruguay has a mixed economy in which both the public and private sectors participate. The economy is largely based on services, light industries, and agriculture. The gross national product (GNP) is staying about even with the rate of growth of the population, and the GNP per capita is somewhat higher than average for South American countries. Agriculture accounts for approximately one-tenth of the GNP and employs about one-seventh of the work force. One-half of Uruguay's farmland is worked by tenant farmers, who are protected by legislation enacted in 1954. The government sets support prices for certain staples.

Pastures cover almost four-fifths of Uruguay's land area and support large herds of sheep and beef cattle and other livestock. The European Economic Community countries remain the main market for Uruguay's large meat exports; Brazil is another important destination for its beef. The country's annual production of greasy wool continues to increase. Arable land is limited to somewhat less than one-tenth of the total land area and produces wheat, rice, corn (maize), potatoes, sugar beets, and sugarcane. The government has promoted the development of fishing. Mineral industries are of negligible importance, and Uruguay must import fuels and metals. Manufacturing industries account for about one-fourth of the GNP



Uruguay

and employ almost one-fifth of the work force. Light industries predominate and are concentrated around Montevideo, where much of the country's agricultural output is processed. Leading manufactures include processed food, refined petroleum, beverages, shoes, textiles, chemicals, and transport equipment. Electricity is almost totally generated from hydroelectric power. Production of hydroelectric power principally from the Uruguay River has reduced the country's consumption of imported petroleum. Tourism, an important industry, centres on seaside resorts; most of the tourists come from Argentina. Raw materials, fuels, and capital goods dominate imports; meat, wool, and hides lead exports. Leading trading partners include Brazil, the United States, Argentina, Germany, and Nigeria.

Government and social conditions. Uruguay was ruled by a military regime after 1973 but returned to civilian government in 1985 following national elections held in 1984. The president, the highest executive authority, governs with the assistance of the Council of Ministers, who are appointed by the president. The elected General Assembly consists of a

99-member Chamber of Deputies and a 31-member Senate. Political activity was banned in 1973 but was fully restored by 1985. The judiciary is headed by the Supreme Court, and there are tribunal and local courts.

With the establishment of social-security measures in the early 20th century, Uruguay became the first welfare state in Latin America. The comprehensive program includes extensive provisions for unemployment insurance, compensation for work injury, family allowances, and aid to the aged and indigent. Additionally, the quality of health care, sanitation, and diet promote health conditions superior to those in most other Latin-American countries. Uruguay has a high literacy rate. Education is free at all levels and compulsory at the primary level and the first stage of the secondary level. The University of the Republic (founded 1849) is the country's only major university. The extensive government restrictions on the communications media were lifted in 1985. Radio and television broadcasting are widely received.

History. Prior to European settlement, Uruguay was inhabited mainly by a group of Indian tribes known collectively as the Charrúas. The Spanish navigator Juan Díaz de Solís sailed into the Río de la Plata in 1516. Portuguese from Brazil established Colonia del Sacramento on the Río de la Plata in 1680. Subsequently, the Spanish established Montevideo in 1726, driving the Portuguese from their settlement, and 50 years later Uruguay became part of the Viceroyalty of Río de la Plata. Almost all of the area's indigenous Indians were exterminated in the course of the Spanish colonization.

Uruguay became involved in the wars of independence in the Spanish American colonies in 1811. After five years of growing revolutionary activity, the Spaniards defeated José Gervasio Artigas, leader of the revolt. During the subsequent Portuguese-Brazilian occupation, Juan Antonio Lavalleja successfully resumed Uruguay's fight in 1825, and independence was granted in 1828. Uruguay's major political parties, the Colorado (Red) Party and the Blanco (White) Party, emerged during the 1830s and '40s.

After an inconclusive civil war (1839–51), Argentine and Brazilian involvement in Uruguayan affairs led to war with Paraguay (1865–70) and subsequent military rule. José Batlle y Ordóñez, a Colorado and a reformer, was elected president in 1903 and dominated Uruguayan politics until his death in 1929. His programs made Uruguay noteworthy for advanced social legislation and political stability in the early 20th century.

Following a period of dictatorship during the Great Depression and of neutrality in World War II, Uruguay adopted a new constitution in 1951 (which was replaced again in 1966). The Nationalists (Blancos) won the 1958 elections after 93 years out of power. Subsequent inflation and economic crises stimulated extensive left-wing terrorist activity, which in turn led to a right-wing military coup in 1973. Human-rights abuses became common under the military government. The installation of a civilian government in 1985 saw the freeing of many political prisoners and the restoration of full political and civil rights.

Uruguay River, Portuguese RIO URUGUAI, Spanish RÍO URUGUAY, river in southern South America that rises in the coastal range of southern Brazil. Its chief headstream, the Pelotas River, rises just 40 miles (64 km) from the Atlantic coast at Alto do Bispo in Santa Catarina state, Brazil, and takes the name Uruguay after it is joined by the Canoas River near Piratuba. Flowing west through the coastal range of Brazil (separating Santa Catarina and Rio Grande do Sul states), it then turns southwestward, forming the Argentina–Brazil border. Below Monte Caseros, Arg., it turns southward, forming the border between Argentina and Uruguay until, above Buenos Aires, it combines with the Paraná River to form the great estuary of the Río de la Plata. Its 990-mile (1,593-kilometre) course is interrupted by rapids between Salto (Uruguay) and the influx of the Quaraí River (Spanish: Río Guareim) near Monte Caseros; hence its importance as a waterway is less than that of the Paraguay–Paraná river system. Ocean vessels can reach Paysandú, Uruguay, about 130 miles (210 km) from the mouth; smaller ships can proceed to Salto, 60 miles (100 km) farther upstream.

Uruk (ancient Mesopotamian city): *see* Erech.

Urumchi, Wade–Giles romanization WU-LU-MU-CH'I, Pinyin ÜRÜMQI, city in the Sinkiang Uighur autonomous *ch'ü* (region), northwestern China. Urumchi (Mongolian: "Fine Pasture") is the capital of the autonomous region. Situated in a fertile belt of oases along the northern face of the T'ien Shan (mountains), the city commands the northern end of a gap leading from the Tarim Basin into the Dzungarian Basin.

It first came under Chinese control in the 7th and 8th centuries, when the Chinese established the protectorate general of Pei-t'ing some 80 miles (130 km) to the east. A *hsien* (county) named Lun-t'ai was then founded at Urumchi, which became an important centre for caravans traveling into the I-li River valley from the main route across Turkistan. After the withdrawal of the T'ang dynasty (618–907) from the area in the 750s, Urumchi came under the control of the Uighurs. It again came under Chinese rule during the campaigns of the Ch'ing dynasty against the Dzungars in the 18th century. In 1760 military colonies were established in the surrounding oases, and in 1763 a Chinese city called Ti-hua was founded there.

The city became an important Manchu garrison for northwestern China. When the Muslim Dungan broke out in Sinkiang in the 1860s, Urumchi was taken by the rebels in 1864 but was eventually recaptured in 1876 by Ch'ing forces under Tso Tsung-t'ang. When the province of Sinkiang was set up in 1884, Urumchi became its capital. It grew rapidly into the greatest city and centre of trade in Central Asia. Its commercial importance was matched, in the last days of the empire, by its growing strategic and international significance, as the British and Russians each attempted to establish influence in Sinkiang.

Since 1949 Urumchi has been developed not only as the regional capital and cultural centre of Sinkiang but also as a major industrial base. A railway links Urumchi to the Chinese rail network and was completed in the early 1960s. A highway was built following the same route, and other highways have been built across the Dzungarian and Tarim basins, greatly improving Urumchi's communications. Efforts have been made to extend the irrigated farmlands in the vicinity, along the foot of the T'ien Shan, and to improve the region's agricultural productivity by mechanization.

Urumchi's new prosperity, however, comes from its mineral resources. In 1955 a large petroleum field was discovered at K'o-la-ma-i (Karamai) to the north in the Dzungarian Basin; it was brought into production in 1958–59 and has since become one of China's major sources of oil. Extensive coal deposits were found along the foot of the T'ien Shan, and there are major mining centres near Urumchi and at Liu-tao-wan. A large thermal-power station, ironworks and steelworks, an engineering industry (producing agricultural machinery), a cement works, chemical and fertilizer plants, an oil refinery, and cotton-textile mills have been built.

Urumchi remains a Uighur city, with Uighur as its chief language; most Uighurs are Muslim. There are Kazakh, Dungan, and Manchu minorities. Much effort has been devoted to building a Uighur cultural base. There are many schools and institutes of higher education, including a university, colleges for minorities, and institutions for studying the Russian language, medicine, and agricultural science. Pop. (1999 est.) 1,258,457.

Urūmiyeh (Iran): *see* Orūmiyeh.

Urushi (Caroline Islands): *see* Ulithi.

Uryankhai (people): *see* Tuvinian.

U.S.: *see under* United States, except as below.

U.S. News & World Report, weekly news magazine published in Washington, D.C., one of the most influential of its kind and the first to successfully imitate the general format pioneered by *Time*. It was established in 1933 by David Lawrence as *U.S. News* and won general note for its thorough coverage of major news events in Washington, D.C., and the United States, often carrying the complete text of major speeches and documents emanating from the capital. In 1945 Lawrence founded *World Report* to treat world news as *U.S. News* treated domestic news. The two magazines merged in 1948. From its start, *U.S. News & World Report* had an editorial viewpoint somewhat more conservative than its larger rivals, *Time* and *Newsweek*, and unlike them it paid scant attention to sports and the arts, except as they might pertain to developing major political and economic stories.

U.S.A.: *see* United States.

Usa, city, Ōita *ken* (prefecture), northern Kyushu, Japan; it lies 24 miles (39 km) northwest of the prefectural capital Ōita. The city developed around the site of the first and most famous of shrines dedicated to the Shintō god Hachiman, Usa Hachiman Shrine, which dates to about 717–724. An annual festival is held on March 18, and the Shinkōsai festival, with a procession of portable shrines (*mikoshi*), is held from July 31 to August 2.

Before World War II, Usa was known in the United States for its manufacture or distribution of products labeled "MADE IN USA," in an apparent attempt to deceive those Americans avoiding Japanese goods. Today the city's industries turn out machinery, textiles, and rice products (such as *ame,* or rice jelly), and the region grows rice, vegetables, and mandarin oranges. Pop. (2000 prelim.) 49,314.

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USAir Group, Inc., holding company for the American airline incorporated on March 5, 1937, as All American Aviation, Inc.; the airline was renamed All American Airways, Inc., in 1948, Allegheny Airlines, Inc., in 1953, and USAir, Inc., in 1979. The holding company was established in 1983. Current headquarters are at Arlington, Va., and US-Air, Inc., is based at Washington, D.C.

Beginning service in 1939 as a mail carrier over the mountainous regions of Pennsylvania and West Virginia, the company began passenger service in 1949 and expanded in subsequent decades to include a network of routes primarily serving cities and towns located in the northeastern quadrant of the United States, from the Middle West to the Atlantic Coast.

In 1968 Allegheny merged with Lake Central Airlines, Inc. (founded 1947 as Turner Airlines and adopting the Lake Central name

in 1950), which flew routes radiating from Indianapolis, Ind. In 1972 Allegheny merged with Mohawk Airlines, Inc. (founded 1945 as Robinson Airlines and adopting the Mohawk name in 1952), which flew commuter routes within New York state.

In 1987 USAir Group, Inc., bought Pacific Southwest Airlines, which had routes along the southern half of the West Coast. A more important acquisition in the same year was that of Piedmont Aviation, Inc. (founded 1940), a large airline serving the east-central United States and based in Winston-Salem, N.C.

Uşak, also spelled USHAK, city in the interior of western Turkey, at an elevation of 2,976 feet (907 m) above sea level. Situated in a region that was once part of the Hittite empire, Uşak lies near the ruins of ancient Flaviopolis. In more recent times it was the scene of some of the fiercest fighting of the Turkish War of Independence (1919–23).

Uşak is noted for its carpet industry, with specialization in heavy-pile carpets. Other industries include sugar refineries, cotton and woolen textiles, and leather products. Sugar beets and cereals are the main crops in the primarily agricultural area in which the city is situated. The city lies on the main road and railway line between İzmir, 125 miles (200 km) west, and Ankara (via Afyon Karahisar). Pop. (1985) 88,267.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Uşaklıgil, Halid Ziya (b. 1866, Constantinople—d. 1945, Istanbul), writer who is considered the first true exponent in Turkey of the novel in its contemporary European form.

He was educated at a French school in Izmir, where he became devoted to the works of the 19th-century French novelists. A journey to France also contributed to his knowledge of European culture, which deeply affected him and his writing. Such early novels as *Bir Ölünün Defteri* (1889; "Journal of a Dead Man") and *Ferdi ve Şürekâsı* (1894; "Ferdi and Company") reveal this French influence.

In 1896 Halid Ziya became involved with *Servet-i Fünun* ("The Wealth of Knowledge"), an avant-garde journal that he and the other writers of the "new literature" published to inform their readers about European, particularly French, cultural and intellectual movements. The hero of one of his greatest novels, *Mai ve Siyah* (1897; "The Blue and the Black"), is a spokesman for the "new literature" movement. The novel *Aşk-ı Memnu* (1900; "The Forbidden Love"), often considered his masterpiece, was followed by many more novels and short stories. His characters and plots, though mainly limited to westernized upper-class circles, were drawn from personal experience. After the Young Turk revolution in 1908, Halid Ziya taught courses in European literature at Istanbul University. After World War I he continued to write, his works including dramas, articles, and his memoirs.

use, in medieval English property law, the right of one person to take the profits of land belonging to another. It involved at least two and usually three persons. One man (A) would convey or enfeoff land to another (B) on the condition that the latter would use it not for his own benefit but for the benefit of a third man (C)—who could be A himself. C (or A), thus, had the profits—that is, the use—of the land and could treat the land as he pleased. This legal institution, which arose as early as the 11th century, came to be employed not only as a legitimate method of providing for property management and for conveyancing but also as a method of defrauding creditors, depriving feudal landlords of their dues, and permitting religious institutions to derive the benefit of land that they could not own directly.

Originally, carrying out the use depended on the conscience of the person entrusted with the property, because there was no writ by which the common-law courts could enforce it. Toward the end of the 14th century, however, the equity courts began to issue decrees for its enforcement. Whereas common-law courts had considered B to be the full owner, equity courts viewed him as merely the nominal owner and considered C the true, or "equitable," owner and rendered judgments on that basis.

By 1535 the use had become so objectionable because of its frequent employment for improper and illegal objects—particularly for avoiding dues or taxes—that Parliament enacted the Statute of Uses, which abolished many forms of the use. The uses that survived were called trusts, and they constitute the foundation on which the modern law of trusts exists.

use tax, levy on the use or possession of a commodity. Under the principle that the taxpayer should pay according to the benefits received from public services, a use tax is often levied on the user of a service, so that costs of the service are not borne by the general taxpayer. Common examples are motor-vehicle and boat licenses and user fees for airports or harbour-docking privileges. The revenue from the tax is generally used by a government to cover the costs of the maintenance and regulation of the services—in these instances, highways, waterways, and airports. In the United States a use tax is often levied by state or local governments on purchases made outside the jurisdiction and therefore not subject to the jurisdiction's retail sales tax. In this case the use tax is generally equal to the retail sales tax.

In the United States the first federal use tax was levied on telephone and telegraph messages during the Spanish-American War (1898). During World War I all freight and passenger transportation was subject to a use tax. A federal use tax was levied on all motor vehicles during World War II, but this tax was eventually shifted to the states.

The use tax as a vehicle-licensing plan serves a dual purpose as revenue raiser and as a method for identifying all vehicles using the public streets and roads. However, it is a regressive tax, despite numerous attempts to make it more equitable.

Userkaf (fl. 3rd millennium BC), first king of the 5th dynasty of Egypt (*c.* 2465–*c.* 2325 BC) who elevated the cult of Re, god of the sun, to unprecedented importance.

Probably descended from Redjedef (third king of the 4th dynasty), Userkaf strengthened his legitimacy by marrying the heiress Khentkaues, who was a descendant of the main branch of the royal family. Thus he ended the dynastic struggles that the rival branches had caused during the 4th dynasty.

His queen occupied a very prominent position and even built her own tomb at Giza, known as the Unfinished Pyramid. Userkaf himself built the first of a series of temples to Re at Abū Ṣīr, somewhat north of modern Cairo, on the west bank of the Nile. His pyramid at Ṣaqqārah was smaller than those of the 4th dynasty, perhaps indicating that the Re cult eclipsed some of the pharaoh's preeminence. Also, the royal control of administration slackened under Userkaf, with a corresponding growth of importance of provincial personalities, particularly in Upper Egypt.

ushabti figure, any of the small statuettes made of wood, stone, or faience that are often found in large numbers in ancient Egyptian tombs. The figures range in height from 4 to 9 inches (10 to 23 cm) and often held hoes in their arms. Their purpose was to act as a magical substitute for the deceased owner when



Ushabti figure, 26th dynasty; in the Fitzwilliam Museum, Cambridge, Eng.
By courtesy of the Fitzwilliam Museum, Cambridge, Eng.

the gods requested him to undertake menial tasks in the afterlife. The word *ushabti* is usually translated "answerer"; the earlier form of the word is *shawabti.* During the New Kingdom (1539–1075 BC) the figures were made to resemble the tomb owner by being fashioned in the form of a mummy bearing the owner's name.

Ushak (Turkey): *see* Uşak.

Ushak carpet, floor covering handwoven in the city of Uşak (Ushak), Tur. By the 16th century the principal manufacture in Ottoman Turkey of large commercial carpets had been established at Uşak, which produced for palace and mosque use and for export. By the 18th



Quatrefoil medallion with diamonds on a field of vines, detail of a Ushak carpet, 17th century; in the Philadelphia Museum of Art
By courtesy of the Philadelphia Museum of Art, The Joseph Lees Williams Memorial Collection; photograph, Otto E. Nelson—EB inc.

and early 19th centuries, this manufacture had come increasingly under European control. The carpets became coarser and rougher, with designs calculated to please European tastes, at the close of the 19th century. The quality had probably never been as fine as that of

the court carpets, made nearer to the capital cities.

The best-known pattern among the older carpets is a scheme of large, rounded medallions of two types, alternating upon a field of brick red or, occasionally, of dark blue. The medallions are in blues and black-brown, with yellow and white used sparingly. A second common pattern shows diagonal rows of eight-pointed star medallions alternating with diamonds. In the 18th and 19th centuries, a number of carpets with prayer-niche motifs in rows were made for mosque worship. Holbein rugs, Lotto carpets, and bird rugs have been attributed to Uşak, as have several prayer-rug types, including the so-called Tintorettos.

Ushant, Battle of (1794): *see* First of June, Battle of the.

Ushant Island (France): *see* Ouessant Island.

ushpizin (Aramaic: "visitors"), according to the Jewish Kabbalistic book the *Sefer ha-zohar* ("Book of Splendour"), seven ancient worthies who take turns visiting the homes of all pious Jews to share their dinner on the festival of Sukkoth. A custom developed of reciting a fixed formula of invitation to the seven: Abraham, Isaac, Jacob, Joseph, Moses, Aaron, and David. Poor scholars are sometimes invited to join the family dinner as representatives of the *ushpizin.*

Ushuaia, city, capital and port of Tierra del Fuego *provincia,* Argentina, on the Beagle Channel. It lies on the main island of Tierra



The port at Ushuaia, Arg.
George Holton—Photo Researchers

del Fuego Archipelago at the southern tip of South America.

The site was first settled by Wasti H. Stirling, an English missionary, in 1870. In 1884 an Argentine naval base was established, and in 1893, after the archipelago was partitioned between Argentina and Chile, Ushuaia was declared a city. Lumbering, sheep raising, fishing, and trapping are the city's principal economic activities. Ushuaia has the distinction of being the southernmost city in the world. Pop. (1999 est.) 57,334.

Usiri (Egyptian god): *see* Osiris.

Usk, Welsh BRYNBUGA, town, present and historic county of Monmouthshire, Wales, lying along the River Usk 20 miles (32 km) from its Bristol Channel mouth. The town was settled first by Celts and then by Romans, who called it Burrium. A Norman castle was built in the 12th century but was partially destroyed about 1402 during the rebellion of the Welsh prince Owen Glendower. Usk is now a small market town and tourist centre. The River Usk, which flows through the town, rises in the Black Mountain range at the Carmarthenshire-Powys county boundary, in Brecon Beacons National Park. Both the river and the town of Usk are noted for good fishing. Pop. (1991) 2,187.

Üsküdar, formerly SCUTARI, now a district of Istanbul, northwestern Turkey. It lies at the foot of the Bulgurlu Hills on the Asiatic side of the Bosporus Strait opposite Istanbul proper. Known as Chrysopolis in ancient times, it was a dependency of the older and better-sited colony of Chalcedon (modern Kadıköy), where, according to the historian Polybius, the Athenians set up a toll for ships passing through the Bosporus. The name Scutari came into use toward the end of the Byzantine period. The Ottoman Turks took the city in the 14th century and renamed it Üsküdar ("Courier") because of its function as a post station for Asiatic couriers. The Ottomans used it as a base for military operations and also, until the development of the Anatolian railways, as the terminus of caravan routes from Syria and Asia.

Üsküdar, as seen from the sea, presents a view of painted wooden houses and white minarets backed by the cypress trees of its great cemetery, Büyük Mezaristan, which lies farther inland. The cemetery includes the graves of 8,000 British soldiers who died there during the Crimean War (1853–56). The district's major buildings include the Mihrimah (or Iskele) Mosque, built by the architect Sinan in 1548, the vast barracks of Sultan Selim III, and the military hospital made famous during the Crimean War by the pioneering nursing work of Florence Nightingale.

Üsküdar is primarily residential, and considerable numbers of its residents commute to central Istanbul across the Bosporus. It is connected by rail and road with major centres of Anatolia and is linked by ferry service and bridge with European Istanbul.

Uşmān ʿAlī Khān, Mīr: *see* Osman Ali

Usman dan Fodio, Usman also spelled UTHMAN, OF USUMAN, Arabic ʿUTHMĀN IBN FŪDĪ (b. December 1754, Maratta, Gobir, Hausaland [now in Nigeria]—d. 1817, Sokoto, Fulani empire), Fulani mystic, philosopher, and revolutionary reformer who, in a *jihād* (holy war) between 1804 and 1808, created a new Muslim state, the Fulani empire, in what is now northern Nigeria.

Early years. Usman was born in the Hausa state of Gobir, in what is now northwestern Nigeria. His father, Muhammad Fodiye, was a scholar from the Toronkawa clan, which had emigrated from Futa-Toro in Senegal about the 15th century. While he was still young, Usman moved south with his family to Degel, where he studied the Qur'ān with his father. Subsequently he moved on to other scholar relatives, traveling from teacher to teacher in the traditional way and reading extensively in the Islāmic sciences. One powerful intellectual and religious influence at this time was his teacher in the southern Saharan city of Agadez, Jibrīl ibn 'Umar, a radical figure whom Usman both respected and criticized and by whom he was admitted to the Qādirī and other Ṣūfī orders.

About 1774–75 Usman began his active life as a teacher, and for the next 12 years he combined study with peripatetic teaching and preaching in Kebbi and Gobir, followed by a further five years in Zamfara. During this latter period, though committed in principle to avoiding the courts of kings, he visited Bawa, the sultan of Gobir, from whom he won important concessions for the local Muslim community (including his own freedom to propagate Islām); he also appears to have taught the future sultan Yunfa.

Growing leadership. Throughout the 1780s and '90s Usman's reputation increased, as did the size and importance of the community that looked to him for religious and political leadership. Particularly closely associated with him were his younger brother, Abdullahi, who was one of his first pupils, and his son, Muhammad Bello, both distinguished teachers and writers. But his own scholarly clan was slow to come over to him. Significant support appears to have come from the Hausa peasantry. Their economic and social grievances and experience of oppression under the existing dynasties stimulated millenarian hopes and led them to identify him with the Mahdī ("Divinely Guided One"), a legendary Muslim redeemer whose appearance is expected at the end of time. Although he rejected this identification, he did share and encourage their expectations.

During the 1790s, when Usman seems to have lived continuously at Degel, a division developed between his substantial community and the Gobir ruling dynasty. About 1797–98 Sultan Nafata, who was aware that Usman had permitted his community to be armed and who no doubt feared that it was acquiring the characteristics of a state within the state, reversed the liberal policy he had adopted toward him 10 years earlier and issued his historic proclamation forbidding any but the Shaykh, as Usman had come to be called, to preach, forbidding the conversion of sons from the religion of their fathers, and proscribing the use of turbans and veils.

In 1802 Yunfa succeeded Nafata as sultan, but, whatever his previous ties with the Shaykh may have been, he did not improve the status of Usman's community. The breakdown, when it eventually occurred, turned on a confused incident in which some of the Shaykh's supporters forcibly freed Muslim prisoners taken by a Gobir military expedition. Usman, who seems to have wished to avoid a final breach, nevertheless agreed that Degel was threatened. Like the Prophet Muḥammad, whose biography he frequently noted as having close parallels with his own, the Shaykh carried out a hegira (migration) to Gudu, 30 miles (48 km) to the northwest, in February 1804. Despite his own apparent reluctance, he was elected imam (leader) of the community, and the new caliphate was formally established.

The jihād. During the next five years the Shaykh's primary interests were necessarily the conduct of the *jihād* and the organization of the caliphate. He did not himself take part in military expeditions, but he appointed commanders, encouraged the army, handled diplomatic questions, and wrote widely on problems relating to the *jihād* and its theoretical justification. On this his basic position was clear and rigorous: the sultan of Gobir had attacked the Muslims; therefore he was an unbeliever and as such must be fought; and anyone helping an unbeliever was also an unbeliever. (This last proposition was later used to justify the conflict with Bornu.)

As regards the structure of the caliphate, the Shaykh attempted to establish an essentially

simple, nonexploitative system. His views are stated in his important treatise *Bayān wujūb al-hijra* (November 1806) and elsewhere: the central bureaucracy should be limited to a loyal and honest vizier, judges, a chief of police, and a collector of taxes; and local administration should be in the hands of governors (emirs) selected from the scholarly class for their learning, piety, integrity, and sense of justice.

Initially the military situation was far from favourable. Food supplies were a continuing problem; the requisitioning of local food antagonized the peasantry; increasing dependence on the great Fulani clan leaders, who alone could put substantial forces into the field, alienated the non-Fulani. At the Battle of Tsuntua in December 1804, the Shaykh's forces suffered a major defeat and were said to have lost 2,000 men, of whom 200 knew the Qur'ān by heart. But, after a successful campaign against Kebbi in the spring of 1805, they established a permanent base at Gwandu in the west. By 1805–06 the Shaykh's caliphal authority was recognized by leaders of the Muslim communities in Katsina, Kano, Daura, and Zamfara. When Alkalawa, the Gobir capital, finally fell at the fourth assault on October 1808, the main military objectives of the *jihād* had been achieved.

Later life. Although the *jihād* had succeeded, Usman believed the original objectives of the reforming movement had been largely forgotten. This no doubt encouraged his withdrawal into private life. In 1809–10 Bello moved to Sokoto, making it his headquarters, and built a home for his father nearby at Sifawa, where he lived in his customary simple style, surrounded by 300 students. In 1812 the administration of the caliphate was reorganized, the Shaykh's two principal viziers, Abdullahi and Bello, taking responsibility for the western and eastern sectors, respectively. The Shaykh, though remaining formally caliph, was thus left free to return to his main preoccupations, teaching and writing.

His five years at Sifawa were a productive period, to judge from the number of dated works that survive, most of them dealing with the practical problems of the community, including the series of books addressed to "the Brethren" (al-Ikhwān), arising out of the dispute with Bornu and its principal administrator and ideologist, Muḥammad al-Kanemi. At his weekly meetings on Thursday nights, he criticized aspects of the post-*jihād* caliphate (as indeed did Abdullahi and Bello), especially the tendency of the new bureaucracy and its hangers-on to become another oppressive ruling class. Around 1815 he moved to Sokoto, when Bello built him a house in the western suburbs, and where he died, aged 62, in 1817.

Assessment. Usman was the most important reforming leader of the western Sudan region in the early 19th century. His importance lies partly in the new stimulus that he, as a *mujaddid*, or renewer of the faith, gave to Islām throughout the region; and partly in his work as a teacher and intellectual. In the latter roles he was the focus of a network of students and the author of a large corpus of writings in Arabic and Fulani that covered most of the Islāmic sciences and enjoyed—and still enjoy—wide circulation and influence. Lastly, Usman's importance lies in his activities as founder of a *jamā'a*, or Islāmic community, the Sokoto caliphate, which brought the Hausa states and some neighbouring territories under a single central administration for the first time in history. (T.Ho.)

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Uṣṇīṣavijayā, Tibetan GTSUG-TOR-RNAM-PAR RGYAL-MA, popular Buddhist goddess in Nepal, Tibet, and Mongolia. Her name in Sanskrit means "victorious goddess of the *uṣṇīṣa*," the last-named object being the protuberance on the top of the Buddha's skull.



Uṣṇīṣavijayā, detail of a Nepalese painting, 19th century; in the Rijksmuseum voor Volkenkunde, Leiden, Neth.

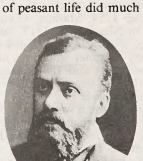
By courtesy of the Rijksmuseum voor Volkenkunde, Leiden, The Netherlands

She wears an image of the Buddha Vairocana in her headdress and is described as residing in the cellar of the *caitya* ("shrine"). She may be identified by the small figure of Buddha seated on a lotus, which she invariably holds in one of her eight hands. She is little known in China and Japan.

USO: *see* United Service Organizations, Inc.

Usolye-Sibirskoye, also spelled USOLJE-SIBIRSKOJE, or USOLE-SIBIRSKOE, city, Irkutsk *oblast* (province), east-central Russia. It lies along the Angara River and the Trans-Siberian Railroad. The city is an old centre of salt production that continues as a major producer of caustic soda. Other plants produce machinery and synthetic rubber. A health resort is nearby, using mud from Lake Maltinsky. Pop. (1991 est.) 106,800.

Uspensky, Gleb Ivanovich (b. Oct. 25 [Oct. 13, Old Style], 1843, Tula province, Russia—d. April 6 [March 24], 1902, St. Petersburg), Russian intellectual and writer whose realistic portrayals of peasant life did much to correct



Uspensky

Novosti Press Agency

the prevalent romantic view of the Russian agricultural worker.

Uspensky studied law at the Universities of Moscow and St. Petersburg and for a time worked as a teacher. His first important work, *Nravy Rasteryayevoy ulitsy* (1866; "The Customs of Rasteryayevoy Street"), is a series of narrative essays about poverty and drunkenness in the suburbs of the city of Tula. For a time he was a follower of the Narodniki (radical populists), but unlike them he refused to idealize the Russian peasant, whose primitive life became the main subject of his writing, as in *Vlast zemli* (1882; "The Power of the Soil"). After spending most of his last 10 years as a patient in mental homes, he committed suicide.

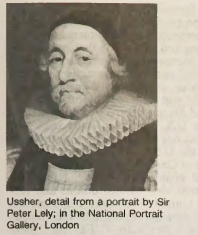
Ussachevsky, Vladimir (Alexis) (b. Nov. 3 [Oct. 21, Old Style], 1911, Hailaer, Manchuria [China]—d. Jan. 4, 1990, New York, N.Y., U.S.), Russian-born American composer known for his experiments with music for the tape recorder, often combined with live sound.

The son of Russian parents, Ussachevsky entered the United States in 1931 and thereupon studied at Pomona College, Claremont, Calif., and at the Eastman School of Music of the University of Rochester, Rochester, N.Y. In 1951 he began experimenting with tape composition, and in 1953 he began collaborating with the composer Otto Luening (*q.v.*). This fruitful partnership resulted in a number of works incorporating tape recorder and conventional instruments. In addition to works written with Luening, his compositions include *Sonic Contours* (performed 1952) for tape and instruments; a piano concerto; and orchestral, choral, and chamber works. He also wrote tape scores for George Tabori's film version of Sartre's play *No Exit* (1962) and for a television documentary, *An Incredible Voyage* (1968). In 1968 he began working in computer music. He taught music at Columbia University from 1947 to 1980, and in 1959 he helped found the Columbia–Princeton Electronic Music Center, New York City.

Ussher, James (b. Jan. 4, 1581, Dublin, Ire.—d. March 21, 1656, Reigate, Surrey, Eng.), Anglo-Irish prelate of the Anglican church who was memorable for his activity in religious politics and for his work on patristic texts, especially the chronology of the Old Testament.

Ordained priest in 1601, Ussher became professor (1607–21) and twice vice-chancellor (1614, 1617) at the university where he had received his B.A., Trinity College, Dublin. He was made bishop of Meath in 1621 and archbishop of Armagh in 1625. Ussher became primate of all Ireland in 1634. He was in England in 1642, when the Civil War broke out, and he never returned to Ireland. Having earned the respect of both Anglicans and Puritans, he proposed in 1641 a method for combining the episcopal and presbyterian forms of church government in the Church of England. A Royalist, he vainly counseled Charles I against assenting to the execution in 1641 of Thomas Wentworth, Earl of Strafford, to appease Parliament. Ussher was briefly bishop of Carlisle in 1642 before moving to Oxford. Declining an invitation to join the Westminster Assembly of Divines (1643–49), he preached against its legality. From 1647 to 1654 he was preacher at Lincoln's Inn, London.

Ussher wrote widely on Christianity in Asia Minor, on episcopacy, and against Roman Catholicism. An expert in Semitic languages, he argued for the reliability of the Hebrew text of the Old Testament and employed an agent in the Middle East to collect biblical and other manuscripts for him. Scholars still respect him for his correct distinction between the genuine and the spurious epistles of the 2nd-century St. Ignatius of Antioch, on which he published works in 1644 and 1647. The general public may find Bibles perpetuating his chronological researches (published in the 1650s), which dated the creation of the universe at 4004 BC. This date was widely accepted in the Western world until the 19th century. Ussher had a



Ussher, detail from a portrait by Sir Peter Lely; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

fine library, which is now in the University of Dublin.

U.S.S.R.: *see* Union of Soviet Socialist Republics.

Ussuri River, Chinese (Wade-Giles) WU-SU-LI CHIANG, or (Pinyin) WUSULI JIANG, northward-flowing tributary of the Amur River that for a considerable distance forms the boundary between China (Heilungkiang province) and Russia (Siberia). The Ussuri is formed by the confluence of the Ulakhe and Arsenyevka rivers, both of which rise on the southwestern slopes of the Sikhote-Alin mountains. Its length from the source of the Ulakhe is 565 miles (909 km), and its basin is 72,200 square miles (187,000 square km) in area. The Ussuri is navigable from its confluence with the Great (Bolshaya) Ussurka. It joins the Amur River near Khabarovsk. In the 1960s large sections of the river border came under dispute between China and what was then the Soviet Union, and a sharp armed clash erupted between the two countries in 1969. In 1977 they reached limited agreement on rules of navigation on the Ussuri.

Ussuriysk, also spelled USSURIJSK, city, Primorsky *kray* (region), far eastern Russia. It lies about 50 miles (80 km) north of Vladivostok along the Trans-Siberian Railroad at the junction with a line to Harbin in Heilungkiang province, China. Founded as the village of Nikolskoye in 1866, it became a city in 1897 and was renamed Nikolsk-Ussuriysk in 1926, Voroshilov in 1935, and Ussuriysk in 1957. It has food-processing, footwear, clothing, and other light industries. A medical school and agricultural and teacher-training colleges are also located there. Pop. (1994 est.) 161,800.

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Ust-Ilimsk, city and administrative centre of Ust-Ilimsk *rayon* (sector), Irkutsk *oblast* (province), south-central Russia. It became a city in 1973 in connection with the building of the nearby Ust-Ilimsk dam and hydroelectric-power station on the Angara River. A huge timber-processing complex was constructed there in the early 1980s. Pop. (1994 est.) 111,100.

Ust-Kamenogorsk, Kazak ÖSKEMEN, city, eastern Kazakstan. It lies in the foothills of the Rūdnyy Altai Mountains and at the junction of the Ulba and Irtysh rivers. Founded as a Russian fort in 1720, it later became a centre of trade with Mongolia and China and the gateway to the mineral wealth of the Rūdnyy Altai. Ust-Kamenogorsk is now a major centre of nonferrous metallurgy (lead, zinc, titanium, and magnesium) in Kazakstan, with important associated research institutes and laboratories. Other industries include food processing and machine building. The city is also an important transport junction. There are teacher-training and construction and road-building institutes, as well as various technical colleges. A large hydroelectric station lies upstream on the Irtysh. Pop. (1993 est.) 334,000.

Ust-Orda Buryat, also called UST-ORDYNSKY BURYAT, autonomous *okrug* (district) in Irkutsk *oblast* (province), east-central Russia. It lies west of Lake Baikal and extends across the Angara River. The *okrug* was created in 1937. Its plateau relief is partly in boreal forest, or taiga, of larch, spruce, fir, pine, and birch and partly in forest-steppe. Coal is mined in the west, where the Trans-Siberian Railroad crosses the *okrug*. Timber working is well developed, but agriculture, mainly pig husbandry and dairying, is confined to the forest-steppe of the west and south. The indigenous Buryat live mostly in rural areas, and the urban population is mainly Russian. Ust-Ordynsky city is the capital of the *okrug*. Area 8,600 square miles (22,400 square km). Pop. (1995 est.) 143,000.

Ustaša, also spelled USTASHA, plural USTAŠE, Croatian fascist movement that nominally ruled the Independent State of Croatia during World War II. In 1929, when King Alexander I tried to suppress the conflict between Croatian and Serbian political parties by imposing a personal dictatorial regime in Yugoslavia, Ante Pavelić, a former delegate to Parliament and an advocate of Croatian separatism, fled to Italy and formed the Ustaša ("Insurgence") movement. Dedicated to achieving Croatian independence from Yugoslavia, the *ustaše* modeled themselves on the Italian Fascists and founded terrorist training centres in Italy and Hungary. To foment political crises in Yugoslavia, the Ustaša's members attempted to incite a peasant rebellion in northern Dalmatia in 1932 and participated in the assassination of King Alexander in 1934 at Marseille.

The Ustaša achieved its goal after the Axis powers invaded and partitioned Yugoslavia in April 1941. Pavelić then returned to Croatia and, under the sponsorship of the Italians, formed the government of a Croatian state that had been expanded to include some of Serbia and all of Bosnia and Herzegovina. The Ustaša also conscripted an army to join the Axis powers and to fight the resistance movements that were beginning to operate in the Yugoslav lands. To make their state more purely Croatian, the *ustaše* set about exterminating its Serb, Jewish, and Gypsy inhabitants with a brutality that shocked even the Germans and occasionally obliged the Italians to intervene. Although many Yugoslavs reacted to their brutality by joining the resistance movements, the Ustaša remained in control of Croatia until May 1945, when the German army protecting them collapsed and Pavelić and his supporters fled before the communist Partisans.

Ústí nad Labem, German AUSSIG, capital, Severočeský *kraj* (region), northwestern Czech Republic. It is a port on the left (west) bank of the Elbe (Labe) River at the latter's confluence with the Bílina River. Although dating from the 10th century, the city has developed mainly since the 19th century and has been largely reconstructed since World War II. Its western outskirts mark the limit of the north Bohemian coal basin. The growth of lignite (brown-coal) mining, of Elbe navigation, and of rail transport stimulated the city's industrial expansion and commerce. Ústí nad Labem's varied manufactures include engineering products, glass, ceramics, and textiles. On the left bank of the Elbe is a large chemical complex manufacturing dyes, varnish, sulfuric acid, and fertilizers; on the right bank, another complex produces baking powder, margarine, vegetable oil, and soap. The Střekov Castle, standing on a precipitous basalt crag across the river, is the only notable reminder of the city's medieval origin. Pop. (1994 est.) 99,500.

Ustinov, Dmitry Fedorovich (b. Oct. 17 [Oct. 30, New Style], 1908, Samara, Russia—d. Dec. 20, 1984, Moscow), Soviet military and political figure who was minister of defense from 1976 to 1984.

An engineer by profession, Ustinov graduated in 1934 from the Military Institute of Mechanics in Leningrad (now St. Petersburg) and worked first as a construction engineer, then as director of a Leningrad armament factory. In 1941 Stalin appointed Ustinov people's commissar of armaments, a position that he kept under the titles of minister of armaments (1946–53) and minister of defense industries (1953–57). In that post, Ustinov in 1941 initiated the evacuation of many Soviet arms factories to sites east of the Ural Mountains, out of the reach of the advancing German armies. After the war he set the course by which the Soviet armed forces eventually reached their high levels during the Cold War. He was a full member of the Central Committee from 1952, and in 1957 Nikita Khrushchev made him a deputy premier, still with overall responsibility for the armaments industry. In 1963 he became both chairman of the Supreme Council of National Economy and first deputy premier. In 1965 he became a candidate member of the Politburo, and in 1976, when Defense Minister Marshal Andrey Grechko died, Ustinov was appointed to replace him. At the same time, he was made a full member of the Politburo and marshal of the Soviet Union. During the 1970s Ustinov played an important behind-the-scenes role in Soviet-U.S. arms limitation negotiations.

Ustyurt Plateau, Kazak ÜSTIRT, Turkmen ÜSTYURT, plateau in Uzbekistan and Kazakstan, lying between the Aral Sea and the Amu Darya (river) delta in the east and the Mangyshlak (Tupqarghan) Plateau and the Kara-Bogaz-Gol (Garabogazköl'; an inlet of the Caspian Sea) in the west. It has an area of about 77,000 square miles (about 200,000 square km) and an average elevation of about 500 feet (about 150 m), rising to a maximum of 1,200 feet (365 m) in the southwest. At its edges it drops steeply to the Aral Sea and the surrounding plain. The plateau consists of a monotonous desert which provides meagre pasture for camels and sheep. Oil and natural-gas deposits lie west of the plateau.

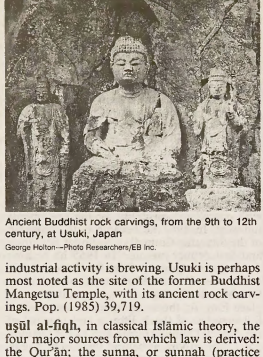
usufruct, in Roman-based legal systems, the temporary right to the use and enjoyment of the property of another, without changing the character of the property. This legal concept developed in Roman law and found significant application in the determination of the property interests between a slave held under a *usus fructus* (Latin: "use and enjoyment") bond and a temporary master. Any property acquired by a slave as a result of his labour legally belonged to that master.

Modern civil-law systems recognize two types of usufructs. The perfect usufruct includes only those things that a usufructuary (one who holds property under right of usufruct) can use without changing their substance, such as land, buildings, or movable objects; the substance of the property, however, may be altered naturally over time and by the elements. The quasi-, or imperfect, usufruct includes property that is consumable or expendable, such as money, agricultural products, and the like, which would be of no advantage to the usufructuary if he could not consume them, expend them, or change their substance.

The term usufruct never found its way into the English common law, although certain general similarities can be found in the common-law concept of estate.

Usuki, city, Ōita *ken* (prefecture), Kyushu, Japan. The city faces Usuki Bay on the Bungo

Channel between the Inland Sea and the Pacific Ocean. An early castle town, Usuki once carried on trade with Portugal. It is now a fishing port and commercial centre; the main



Ancient Buddhist rock carvings, from the 9th to 12th century, at Usuki, Japan
George Holton—Photo Researchers/EB Inc.

industrial activity is brewing. Usuki is perhaps most noted as the site of the former Buddhist Mangetsu Temple, with its ancient rock carvings. Pop. (1985) 39,719.

uṣūl al-fiqh, in classical Islāmic theory, the four major sources from which law is derived: the Qur'ān; the sunna, or sunnah (practice of the Prophet as transmitted through his sayings); *ijmāʿ* (consensus of scholars); and qiyas (analogical deductions from these three). The *uṣūl*, systematized under ash-Shāfiʿī (767–820), were the result of an Islāmization of law that began about the 2nd century of the Muslim era (8th century AD).

Law existed apart from religion under the first four caliphs and the Umayyad dynasty and was generally administered through existing pre-Islāmic institutions of foreign (Roman, Byzantine, Jewish, Persian) character. Pious Muslim scholars, who were later grouped into the ancient legal schools of Iraq, Ḥejaz, and Syria, began to reinterpret the law in an Islāmic light. Ash-Shāfiʿī completed this Islāmization process by establishing a norm for interpretation, the *uṣūl*, but the functions of the individual principles were fixed in legal theory by later scholars.

Usulután, city, southeastern El Salvador. It lies on the Pacific coastal plain at the southern foot of Usulután Volcano. The city's name, which is Indian, means "city of the ocelots." Usulután is a commercial centre dealing in the grain, coffee, sugarcane, fruit, and hardwood lumber produced in the adjacent hinterland. The city has only small industrial developments. Pop. (1985 est.) 32,172.

Usumacinta River, Spanish RÍO USAMACINTA, river in southeastern Mexico and northwestern Guatemala, formed by the junction of the Pasión River, which arises in the Sierra de Santa Cruz (in Guatemala) and the Salinas River, also known as the Chixoy, or the Negro, which descends from the Sierra Madre de Guatemala.

The Usumacinta River flows northwestward, receiving the Lacantum River and forming the border between Mexico and Guatemala. Below the ruins of Piedras Negras, located in Guatemala, the river begins its meandering course through the swampy lowlands of the southern shores of the Bay of Campeche. It forms the Chiapas–Tabasco border and continues generally northwestward. The main arm joins the Grijalva River and empties into the Bay of Campeche below Frontera; the central arm, called San Pedro y San Pablo, flows into the bay at the town of San Pedro; and the eastern arm, the Palizada, empties into the Términos Lagoon in Campeche state. The total length of the main channel, including the Chixoy, is approximately 600 miles (1,000 km). Navigable for 300 miles (480 km) inland, the Usumacinta has had great economic significance as a means of communication for the towns on its banks and for exporting logs, chicle, and other lowland products.

Usuman dan Fodio (Muslim reformer): *see* Usman dan Fodio.

usury, in modern law, the practice of charging an illegal rate of interest for the loan of money. In Old English law, the taking of any compensation whatsoever was termed usury. With the expansion of trade in the 13th century, however, the demand for credit increased, necessitating a modification in the definition of the term. Usury then was applied to exorbitant or unconscionable interest rates. In 1545 England fixed a legal maximum interest; any amount in excess of the maximum was usury. The practice of setting a legal maximum on interest rates later was followed by most states of the United States and most other Western nations.

In some Muslim countries the charging of interest is still forbidden, at least in theory. The Qur'ān, the Muslim holy book, prohibits the charging of interest, although various methods have been devised in order to circumvent the prohibition. For instance, a higher price may be charged for goods when payment is deferred than is charged if payment is made in advance or upon delivery.

USWA: *see* United Steelworkers of America.

USX Corporation, American holding company that was incorporated in 1986 to oversee the operations formerly directed by the United States Steel Corporation. Headquartered in Pittsburgh, Pa., USX oversees four independent operating units: USS, Inc. (formerly United States Steel Corporation), headquartered in Pittsburgh; Marathon Oil Company, headquartered in Findlay, Ohio; Texas Oil & Gas Corp., headquartered in Dallas, Texas; and U.S. Diversified Group, headquartered in Pittsburgh.

At the beginning of the 20th century, a number of businessmen were involved in the formation of United States Steel Corporation, including Andrew Carnegie, Elbert H. Gary, Charles M. Schwab, and J.P. Morgan. Carnegie had founded Carnegie Steel Company, centred in Pittsburgh, and Gary had founded Federal Steel Company, centred in Chicago. In 1900 Schwab became president of the Carnegie company; and, when Carnegie expressed a wish to retire, Schwab approached Gary with the idea of a giant consolidation. With the aid of J.P. Morgan, they bought Carnegie's interests for over $492,000,000 and put together U.S. Steel, composed of the Carnegie and Federal companies as the nuclei, along with National Steel, National Tube, American Steel and Wire, American Steel Hoop, American Sheet Steel, and American Tinplate. U.S. Steel was capitalized at $1,400,000,000 and became the first billion-dollar corporation in American history. Schwab was named president (but resigned in 1903 to join Bethlehem Steel), and Gary was made chairman of the board (a post that he held until his death in 1927).

Very soon after, in 1901, two other companies, American Bridge and Lake Superior Consolidated Iron Mines, were brought in; and more companies were absorbed in the years following. The example of U.S. Steel prompted mergers elsewhere in the metal industry.

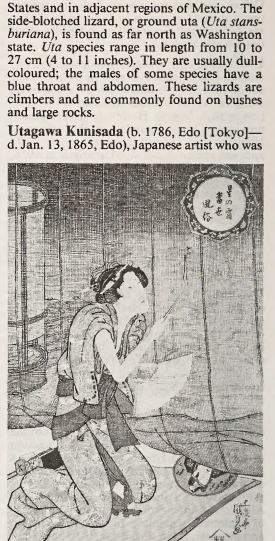
During its formative period the company was dominated by Gary, who exercised influence throughout the American steel industry through his famous "Gary dinners," to which he invited the heads of major steel producers; out of the meetings came agreements on cooperative pricing and marketing that stabilized a once wildly fluctuating market. Gary opposed "unreasonable" competitive practices, and he opposed labour organizers. A general steel strike in 1919 was answered by his refusal to negotiate and his use of strikebreaking tactics. In 1920 the U.S. Supreme Court held that U.S. Steel was not a monopoly in restraint of trade under the U.S. antitrust laws.

A successor of Gary, Myron C. Taylor (1874–1959), board chairman from 1932 to 1938, took a different view toward unions and recognized the United Steelworkers of America in 1936. Another major figure in the company's history was Benjamin F. Fairless (1890–1962), president 1938–52 and board chairman 1952–55.

In the late 20th century, though it remained the largest steel producer in the United States, only about one-third of U.S. Steel's business remained in steel. With the acquisition of Marathon Oil Company in 1982 and Texas Oil & Gas Corp. in 1986, U.S. Steel assumed a major role in the oil and gas industry. The company had also become heavily involved in the chemical industry, mining, construction, real estate, and transportation (such as railroads, shipping, and shipbuilding). Thus, in 1986, the holding company USX Corporation was established to oversee the diversified interests divided among four operating units: USS (for steel), Marathon Oil, Texas Oil & Gas, and U.S. Diversified Group (directing the chemical, engineering, real estate, and other businesses).

Uta, genus of New World lizards of the family Iguanidae. The seven species that have been described occur in the southwestern United States and in adjacent regions of Mexico. The side-blotched lizard, or ground uta (*Uta stansburiana*), is found as far north as Washington state. *Uta* species range in length from 10 to 27 cm (4 to 11 inches). They are usually dull-coloured; the males of some species have a blue throat and abdomen. These lizards are climbers and are commonly found on bushes and large rocks.

Utagawa Kunisada (b. 1786, Edo [Tokyo]—d. Jan. 13, 1865, Edo), Japanese artist who was



"Hoshino shimo," also known as "Woman in the Mosquito Net," woodblock print by Utagawa Kunisada; in the Tokyo National Museum
By courtesy of the Tokyo National Museum

probably the most prolific of all the painters and printmakers of the ukiyo-e ("pictures of the floating world") movement. He was particularly known for his erotically decadent portraits of women, executed with a powerful, free style. Kunisada also excelled at portraits of actors, which were frequently more original than those of his teacher Utagawa Toyokuni. His masterpiece is a series of illustrations for *Nise murasaki inaka genji,* a parody by Ryūtei Tanehiko of *The Tale of Genji* (*Genji monogatari*).

Utagawa Kuniyoshi, original name IGUSA MAGOSABURŌ (b. Jan. 1, 1798, Kanda, Edo [now Tokyo]—d. April 14, 1861, Edo), Japanese painter and printmaker of the ukiyo-e ("pictures of the floating world") movement.



"Kōsō goichidai ryakuzu," woodblock print by Utagawa Kuniyoshi; in the Sakai Collection, Tokyo
By courtesy of the Sakai Collection, Tokyo

Like his rival Utagawa Kunisada, Kuniyoshi was a pupil of Utagawa Toyokuni. He established his fame as the designer of *musha-e* ("warrior prints") with his series of prints entitled "Tsūzoku *Suikoden* gōketsu hyakuhachinin" ("One Hundred and Eight Popular Warrior Heroes from *Shui-hu ch'uan*"), published in about 1827. He also produced landscapes, frequently using Western perspective. Among the most famous of these are the 10-print series "Tōto meisho" ("Famous Sights of Edo") and the five-print series "Tōto Fujimi sanjūrokkei" ("Thirty-six Sites in Edo Overlooking Mount Fuji").

To make the best use of the Britannica, consult the INDEX *first*

Utagawa Toyokuni, original name KURAHASHI KUMAKICHI, later KUMAUEMON, also called TOYOKUNI (b. 1769, Edo [now Tokyo]—d. Feb. 24, 1825, Edo), Japanese artist of the ukiyo-e ("pictures of the floating world") movement who developed the style of his master, Utagawa Toyoharu, making it one of the most popular of its day.

Toyokuni specialized in prints of actors but was also known for his portraits of women. His "Yakusha butai-no-sugatae" ("Portraits of Actors in Their Various Roles"), a series of large *nishiki-e,* or polychrome prints, created between 1794 and 1796, marked the peak of his creative work. His drawing for woodblock prints was characterized by the use of powerful and vivid lines that achieved an effect of exaggeration reminiscent of the style of his contemporary Sharaku. Toyokuni's later style degenerated frequently into sheer grotesquerie.

Utah, constituent state of the United States of America, located in the western mountain region in the west-central United States. It is bounded on the north by Idaho and Wyoming, on the east by Colorado, on the south by Arizona, and on the west by Nevada. The capital is Salt Lake City.

A brief treatment of Utah follows. For full treatment, *see* MACROPAEDIA: United States of America: *Utah.*

Prehistoric habitation of the Utah region occurred as early as 10,000 BC. About AD 400 the Pueblo (Anasazi) Indian culture, with its communal cliff dwellings, was located throughout Utah. This culture disappeared about 1250 and was followed by Shoshoni Indians, practicing a desert culture. Spain explored the area in the late 18th century. The region passed to Mexico in 1821 and became a part of the United States in 1848, at the conclusion of the Mexican War. U.S. exploration of Utah, however, had preceded its annexation: Jim Bridger reached the Great Salt Lake in 1824. Later explorers included Jedediah Smith and John C. Frémont.

Utah entered its formative stage in U.S. history with the arrival of the Mormons in 1847. The Mormons, members of the Church of Jesus Christ of Latter-day Saints, had fled persecution in Ohio, Missouri, and Illinois. Using the Great Salt Valley as their base, they colonized a huge portion of the surrounding area. They applied for statehood no less than six times between 1849 and 1887 and finally entered the Union in 1896 as the 45th state, only after they had renounced polygamy and their church's political People's Party.

Utah straddles three physiographic regions. In the northeast is the Middle Rockies region, containing the Uinta Mountains, the only major east–west mountain range in the United States. The western third of the state is part of the Basin and Range Province, a broad, flat, desertlike area with occasional mountain peaks. Both the Great Salt Lake and the Great Salt Lake Desert are in this region. The remainder of the state (slightly more than half) lies within the Colorado Plateau. This elevated region is cut by brilliantly coloured canyons.

Utah is basically arid, though the southwestern corner is almost dry subtropical in climate. The state has four distinct seasons. The average July temperature is about 70° F (21° C). Except in the southwestern corner, the average winter temperature is slightly below freezing. Daily temperatures vary widely, relatively low humidity prevails, and average precipitation is 11 inches (280 mm) a year. The average annual snowfall is 4.5 feet (1.4 m).

About 70 percent of the land of Utah is owned by either the federal or the state government. The majority of the state's population is concentrated in a short strip, not more than 100 miles (161 km) long, stretching from Ogden to Provo. Its four counties contain more than three-fourths of the state's population. The birth rate is high and the death rate low. With increasing rates of immigration, the state has grown rapidly. Between 1970 and 1980 its population increased by nearly 38 percent, more than three times the national average. Indians comprise about 1 percent of the population, and Hispanic people constitute 4 percent.

Agricultural production is highly dependent on irrigation, and more than three-fourths of farm income is from livestock and livestock products. Hay is the most important crop, followed by wheat, barley, and corn (maize). Mineral wealth is particularly important. Copper once accounted for much of the value of the state's mineral production, but its production has been reduced considerably. Utah is the world's foremost producer of beryllium and is a major producer of gold, silver, lead, uranium, and molybdenum. There are large coal and petroleum reserves. The state remains below the national average in the proportion of personal income derived from manufacturing. Printing and publishing; food processing; the manufacture of transportation equipment, computer hardware and software, nonelectrical machinery, rocket engines, and fabricated metals; and petroleum refining, are the major manufacturing activities.

With access to all national markets, Utah is developing into a major distribution centre for the West. Although overall railway mileage has declined, the road network has been expanding rapidly.

More than two-thirds of the population is Mormon, and the church exerts a strong influence on the state's cultural life and traditions. Mormon culture emphasizes closely knit family life, widespread interest in family genealogy, abstention from the use of alcoholic beverages and tobacco, and participation in sports and personal-development programs. Performing arts are highlighted by the Mormon Tabernacle Choir, the Utah Symphony Orchestra, the Salt Lake Oratorio Society, and Ballet West. More than one-half of Utah's governmental expenditure is for education. Utah has the highest proportion of high-school graduates and the highest median level of school years completed of any state in the nation. Area 84,904 square miles (219,901 square km). Pop. (2000 prelim.) 2,233,169.

Utamaro, in full KITAGAWA UTAMARO, original name KITAGAWA NEBSUYOSHI (b. 1753, Japan—d. Oct. 31, 1806, Edo, Japan), Japanese printmaker and painter who was one of the greatest artists of the ukiyo-e movement (paintings and woodblock prints of the "floating world"); he is known especially for his masterfully composed portraits of sensuous female beauties.



"Four Famous Beauties Enacting the Ox-Cart Scene in the Sugawara Drama," woodblock print by Utamaro; in the Philadelphia Museum of Art
By courtesy of the Philadelphia Museum of Art, given by Mrs. John Rockefeller; photograph, Alfred J. Wyatt

Probably born in a provincial town, he went to Edo (now Tokyo) with his mother. There, under the name of Toyoaki, he started painting and designing rather unoriginal woodblock prints of women. He also occupied himself with nature studies and published many illustrated books, of which *Gahon chūsen* (1788; "Insects") is best known.

In about 1791 Utamaro gave up designing prints for books and concentrated on making half-length single portraits of women rather than prints of women in groups as favoured by other ukiyo-e artists. In 1804, at the height of his success, he made some prints depicting the military ruler Toyotomi Hideyoshi's wife and concubines. Consequently, he was accused of insulting Hideyoshi's dignity and was ordered to be handcuffed for 50 days. The experience crushed him emotionally and ended his career as an artist. Among his best known works are the woodblock-print series "Fu ninsōgaku jittai" ("Ten Physiognomies of Women"), "Seirō jūni-toki" ("Twelve Hours at the Gay Quarters"), "Seirō nanako-machi" ("The Seven Beauties of the Gay Quarters"), and "Kasen koi no fu" ("Women in Love").

Ute, Shoshonean-speaking group of Indians of western Colorado and eastern Utah; their



Ute warrior and his bride, photograph by Hillers of the John Wesley Powell expedition, Utah, 1873–74
By courtesy of the Smithsonian Institution, Washington, D.C.

name was given to the latter state. When the Spanish Father Silvestre Vélez de Escalante traversed their territory in 1776, while seeking a route from Santa Fe (now in New Mexico) to California missions, the Ute had no horses and lived in small family clusters subsisting by food collecting. At that time there was no clear distinction between the Ute and the Southern Paiute, both of whom spoke Ute, which belongs to the Southern Numic branch of the Numic (formerly Plateau Shoshonean) languages. After acquiring horses in the early 19th century, however, the Ute of western Colorado and later of northern Utah became organized in loose bands of hunters. As the area was settled by Europeans, these bands became predators on livestock. In the southern regions of Utah, Nevada, and California, however, the Ute and Chemehuevi remained afoot, and the Ute came to be called Southern Paiute (*see* Paiute).

After the Indian wars (1864–70) most of the Colorado Ute were settled on a reservation in southwestern Colorado; those of Utah were placed on the Uintah and Ouray Reservation, where most of them remain. They numbered about 1,700 in Colorado and 2,660 in Utah in the late 20th century.

uterine cancer, a disease characterized by abnormal growth of cells in the uterus. Cancers affecting the lining of the uterus (endometrium) are the most common cancers of the female reproductive tract. Other uterine cancers, called uterine sarcomas, develop from underlying muscle or connective tissues; they are much rarer.

Although the causes of uterine cancer vary and in many cases remain unknown, several factors have been identified that increase the risk of developing the disease. Many of these risk factors stem from a hormone imbalance in which levels of estrogen in the uterus are higher than levels of progesterone. Women who began their menstrual cycles before age 12 or who entered menopause after age 52 are at a higher risk for uterine cancer. Other risk factors include age (over 40 years), lack of a previous pregnancy, obesity, and estrogen replacement therapy following menopause. Whites are 20 percent more likely to develop uterine cancer than are blacks.

Symptoms of uterine cancer may include vaginal bleeding or discharge (especially in postmenopausal women), pelvic pain, a discernible lump, and weight loss. A biopsy or dilatation and curettage (D & C) may be used to obtain uterine cells for examination. Cancers of the uterus can also be detected by observing the reproductive tract with a specialized viewing scope. Internal imaging procedures include X rays, computed tomography (CT) scans, magnetic resonance imaging (MRI), and ultrasound.

Once uterine cancer has been diagnosed, its stage is determined to indicate how far the cancer has progressed. Advanced tumours may have spread to the cervix, vagina, lymph nodes, or peritoneum, or they may have metastasized to distant organs such as the lungs or digestive tract.

The five-year patient-survival rate for uterine cancer is quite high when the cancer is diagnosed early. If the cancer has spread beyond the lining of the uterus but remains confined to the pelvis, five-year survival is roughly 50 percent. Once the cancer has metastasized to other organs, the five-year survival rate is low.

Surgery is used to treat most uterine cancers. A simple hysterectomy removes the uterus and cervix, whereas a radical hysterectomy also removes underlying connective tissue and ligaments along with part of the vagina. Radiation therapy is sometimes used in conjunction with surgery. In cases where uterine cancer has spread beyond the uterus, chemotherapy may be required. Some uterine cancers can be treated by hormonal therapy if the cancer cells are found to contain a specific protein called the progesterone receptor.

Long-term use of oral contraceptives reduces the risk of uterine cancer. Some medical societies recommend an annual Pap test plus pelvic examination for all women once they have reached 18 years of age or become sexually active.

uterine cervix, lowest region of the uterus; it attaches the uterus to the vagina and provides a passage between the vaginal cavity and the uterine cavity. The cervix, only about 4 centimetres (1.6 inches) long, projects about 2 centimetres into the upper vaginal cavity. The cervical opening into the vagina is called the external os; the cavity running the length of the cervix is the endocervical canal; the opening of the endocervical canal into the uterine cavity, the internal os. The endocervical canal transports sperm into the uterine cavity, allows the escape of blood from the uterus during menstruation, and supplies mucus (a thick lubricating protein) to the female reproductive tract. During childbirth the canal is greatly stretched (see parturition, human).

The endocervical canal is lined with a moist mucous membrane. Cells within this tissue layer secrete fluids and project minute hairlike structures called cilia that help to move sperm through the canal. The fluids given off consist mainly of water, sugars, starches, and proteins. During ovulation (when the ovaries release an egg) the mucous secretions are plentiful and watery; before and after ovulation the secretions are thick and relatively scant. The mucus is arranged in a meshlike pattern of filaments and spaces. During ovulation the openings in the meshwork of filaments become larger so that sperm may freely pass through. Lysozyme, also present in cervical mucus, is an enzyme that helps to destroy certain types of bacteria and acts as a defense against infections.

Covering the mucous membrane is a thick layer of collagen and elastic fibres. There is also some muscle tissue, but the quantity is considerably less than in the rest of the uterus. The cervix is densely fibrous and, consequently, more rigid than the other uterine tissue. During pregnancy the cervix is the only part of the uterus that does not expand to house the developing child; the mucus inside the endocervical canal becomes very thick at this time and acts as a plug that helps to seal off the rest of the uterus from infection. Shortly before childbirth, the mucus thins, and the cervical walls relax to permit delivery.

Afflictions pertaining to the cervix include chronic inflammation, laceration and hemorrhaging during childbirth, malignant and benign tumours, and any of the many infectious venereal diseases.

uterine tube (anatomy): *see* fallopian tube.

uterus, also called WOMB, an inverted pear-shaped muscular organ of the female reproductive system, located between the bladder and rectum. It functions to nourish and house the fertilized egg until the unborn child, or offspring, is ready to be delivered.

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

The uterus has four major regions: the fundus is the broad, curved upper area in which the fallopian tubes (*q.v.*) connect to the uterus; the body, the main part of the uterus, starts directly below the level of the fallopian tubes and continues downward until the uterine walls and cavity begin to narrow; the isthmus is the lower, narrow neck region; the lowest section, the cervix, extends downward from the isthmus until it opens into the vagina. The uterus is 6 to 8 centimetres (2.4 to 3.1 inches) long; its wall thickness is approximately 2 to 3 centimetres (0.8 to 1.2 inches). The width of the organ varies; it is generally about six centimetres wide at the fundus and only half this distance at the isthmus. The uterine cavity opens into the vaginal cavity, and the two make up what is commonly known as the birth canal.

Lining the uterine cavity is a moist mucous membrane known as the endometrium. The lining changes in thickness during the menstrual cycle, being thickest during the period of egg release from the ovaries (*see* ovulation). If the egg is fertilized, it attaches to the thick endometrial wall of the uterus and begins developing. If the egg is unfertilized, the endometrial wall sheds its outer layer of cells; the egg and excess tissue are then passed from the body during menstrual bleeding (*see* menstruation). The endometrium also produces secretions that help keep both the egg and the sperm cells alive. The components of the endometrial fluid include water, iron,

potassium, sodium, chloride, glucose (a sugar), and proteins. Glucose is a nutrient to the reproductive cells, while proteins aid with implantation (*q.v.*) of the fertilized egg. The other constituents provide a suitable environment for the egg and sperm cells.

The uterine wall is made up of three layers of muscle tissue. The muscle fibres run longitudinally, circularly, and obliquely, entwined between connective tissue of blood vessels, elastic fibres, and collagen fibres. This strong muscle wall expands and becomes thinner as a child develops inside the uterus. After birth, the expanded uterus returns to its normal size in about six to eight weeks; its dimensions, however, are about one centimetre (0.4 inch) larger in all directions than before childbearing. The uterus is also slightly heavier and the uterine cavity remains larger.

The uterus of a female child is small until puberty, when it rapidly grows to its adult size and shape. After menopause, when the female is no longer capable of having children, the uterus becomes smaller, more fibrous, and paler. Some afflictions that may affect the uterus include infections; benign and malignant tumours; malformations, such as a double uterus; and prolapse, in which part of the uterus becomes displaced and protrudes from the vaginal opening.

Utgard (Norse mythology): *see* Jötunheim.

Uthagamandalam, formerly OOTACAMUND, town, administrative headquarters of Nilgiri district, Tamil Nādu state, southeastern India, in the Nilgiri Hills, at about 7,500 ft (2,300 m) above sea level. It is sheltered by several peaks, including Doda Betta (8,652 ft), the highest point in Tamil Nādu. Founded by the British in 1821, it was used as the official government summer headquarters for the Madras Presidency until Indian independence in 1947. The town is primarily a tourist resort, but it also contains tea-processing and textile industries, schools, and two colleges affiliated with the University of Madras. Pop. (1991) 81,800.

Uthai Thani, town and *changwat* (province) in the Northern region of Thailand, west of the Mae Nam (river) Chao Phraya. The provincial capital, Uthai Thani, is a market town in the eastern lowland part of the province. The province (area 2,598 sq mi [6,730 sq km]) includes a fertile lowland in the east and the Prathet Thai highlands in the west. Somewhat isolated from the country's main transportation lines and centres of development, it produces fish and rice. There are several ancient town ruins. Pop. (2000 est.) town, 19,400; province, 303,600.

Uthman dan Fodio, Arabic 'UTHMĀN IBN FŪDĪ (Muslim reformer): *see* Usman dan Fodio.

'Uthmān ibn 'Affān (d. June 17, 656, Medina, Arabian Peninsula), third caliph to rule after the death of the Prophet. He centralized the administration of the caliphate and established an official version of the Qur'ān. 'Uthmān is critically important in Islāmic history because his death marked the beginning of open religious and political conflicts within the Islāmic community (*see* fitnah).

'Uthmān was born into the rich and powerful Umayyad clan of Mecca, and he became a wealthy merchant. When Muḥammad began preaching in Mecca *c.* 615, he soon aroused the hostility of the Umayyads, but about five years later 'Uthmān accepted Muḥammad and thus became the first convert of high social and economic standing. Muḥammad valued this contact with the Meccan aristocracy, and he allowed 'Uthmān to marry one of his daughters. 'Uthmān rarely displayed energy or initiative, however, and his role in the first years of Islāmic history was passive.

'Umar, the second caliph, died in 644, and 'Uthmān was elected successor by a council named by 'Umar before his death. Apparently 'Uthmān was selected as a compromise, when the more powerful candidates cancelled each other out. He also represented the Umayyad clan, which had suffered a partial eclipse during the Prophet's lifetime but was now reasserting its influence.

As caliph, 'Uthmān promulgated an official version of the Qur'ān, which had existed in various versions. 'Uthmān followed the same general policies as had 'Umar, but he had a less forceful personality than his predecessor. He continued the conquests that had steadily increased the size of the Islāmic empire, but the victories now came at a greater cost and brought less booty in return. 'Uthmān tried to create a cohesive central authority to replace the loose tribal alliance that had emerged under Muḥammad. He established a system of landed fiefs and distributed many of the provincial governorships to members of his family. Thus much of the treasure received by the central government went to 'Uthmān's family and to other provincial governors rather than to the army. As a result of his policies, 'Uthmān was opposed by the army, and he was often dominated by his relatives, unlike 'Umar, who had been strong enough to impose his authority on the governors, whatever their clan or tribe.

By 650 rebellions had broken out in the provinces of Egypt and Iraq. In 655 a group of Egyptian malcontents marched upon Medina, the seat of caliphal authority. 'Uthmān, however, was conciliatory, and the rebels headed back to Egypt. Shortly thereafter, however, another group of rebels besieged 'Uthmān in his home, and, after several days of desultory fighting, he was killed.

Utica, modern UTIQUE, traditionally the oldest Phoenician settlement on the coast of North Africa. It is located near the mouth of the Majardah (French Medjerda, ancient Bagradas) River in modern Tunisia. After its founding in the 8th or 7th century BC, Utica grew rapidly and was second only to Carthage among Phoenician settlements in Africa. In the Third Punic War (149–146 BC), Utica sided with Rome against Carthage; after the destruction of Carthage it was made the administrative centre of the Roman province of Africa. Utica became a *municipium* (a community that exercised partial rights of Roman citizenship) under Octavian (later the emperor Augustus) in 36 BC and a *colonia* (a Roman settlement with full rights) under the emperor Hadrian (reigned AD 117–138); but it lost its primacy in Africa when Carthage was refounded as a Roman city in 44 BC. Little is known of its later history. Excavations have uncovered a number of Phoenician graves dating from the 8th century BC onward and a substantial residential section of the Roman city.

Utica, city, seat (1798) of Oneida County, central New York, U.S., on the Mohawk River and Barge Canal, 45 mi (72 km) east of Syracuse. The first settlers were Dutch and Palatinate Germans, and in 1758 the British built Old Ft. Schuyler, near the site of an ancient Indian council stone. Destroyed by the Indian–Tory raid in 1776, the early village was rebuilt and connected by stagecoach to Albany (1793) and by river to Schenectady. Incorporated as the village of Utica (its name was drawn from a hat) in 1798, its growth as a textile-industrial centre dates from the completion of the Erie Canal in 1825. In 1879 F.W. Woolworth opened his first store in Utica, selling only five-cent merchandise. Diversified manufacturing (including metal fabricating and the manufacture of machinery and electronic equipment) developed after World War II. The city is surrounded by dairylands with truck gardens to the west. Mohawk Valley Community College and the Utica College of Syracuse University were established there in 1946, and the State University of New York College of Technology in 1973. The Munson-Williams-Proctor Institute (incorporated as a school of art in 1919) maintains a museum. Utica is the site of a state psychiatric center and the New York State Masonic Home. The annual Utica Eisteddfod festival is sponsored by the city's Welsh citizens. Inc. city, 1832. Pop. (2000) city, 60,651; Utica-Rome MSA, 299,896.

Uticensis: *see* Cato, Marcus Porcius (the Younger).

Utilitarianism, in normative ethics, a tradition dating from late-18th-century England in which action is held to be right if it tends to promote happiness—not only that of the agent but of everyone affected by his act. Thus, Utilitarians focus upon the consequences of an act rather than upon its intrinsic nature or the motives of the agent. The leading proponents of Utilitarianism were the English philosophers Jeremy Bentham and John Stuart Mill.

A brief treatment of Utilitarianism follows. For full treatment, *see* MACROPAEDIA: Philosophical Schools and Doctrines, Western.

Utilitarianism is among those moral theories, often called teleological (concerning ends or purposes), that derive judgments about right or wrong from judgments about the quality of certain states of affairs—*e.g.,* the quality of people's lives. Its main opposition comes from those moral theories, often called deontological (concerning duty or moral obligation), that maintain that, although some judgments about right can be derived from judgments about desirable states of affairs, others cannot be. Prominent among the latter, according to deontologists, are certain judgments about justice. Mill saw justice as Utilitarianism's largest problem, and that opinion persists.

Many Utilitarians have met such objections by defining new forms of the theory. One range derives from differing attitudes toward the value theory. The classical form is hedonist, but one can employ values other than, or in addition to, pleasure (ideal Utilitarianism), or one can, more neutrally, and in a version popular in economics, regard anything as valuable that appears as an object of (rational or informed) desire (preference Utilitarianism). One can also deny parity to the two sides of the value scale, maintaining that avoidance of disutility is morally more important than promotion of utility (negative Utilitarianism). One can also apply the test of utility maximization directly to single acts (act, or direct, Utilitarianism), or to acts only indirectly through some other suitable object of moral assessment, such as rules of conduct (rule Utilitarianism).

Some of the strands of Utilitarianism, especially hedonism and consequentialism, are traceable to ancient Greek philosophy; but Utilitarianism in its full sense, with its emphasis on impartial utility maximization, is an essentially modern theory. British antecedents of Bentham include Bishop Richard Cumberland in the late 17th century, Francis Hutcheson in the early 18th, and David Hume. There were two important non-British influences on Bentham, in the Frenchman Claude-Adrien Helvétius and the Italian Cesare Beccaria, both of the 18th century. Bentham's own major statement, *An Introduction to the Principles of Morals and Legislation,* was published in 1789, and John Stuart Mill's essay "Utilitarianism," perhaps the most compact and attractive of the classical statements, appeared in 1861.

By the time of the publication of *The Methods of Ethics* by the British philosopher Henry Sidgwick in 1874, Utilitarianism had become one of the foremost ethical theories of the day.

It continued to be advocated, challenged, and redefined into the 20th century. G.E. Moore, in *Principia Ethica* (1903) and *Ethics* (1912), proposed new criteria for the Utilitarian ideal. Economists have developed their own theory largely in Utilitarian terms, and many of the important 20th-century developments in Utilitarianism are to be found in the economic literature. The Utilitarian framework has also been employed by social scientists, mathematicians, and statisticians in formal decision theory.

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Utkal Plains, coastal plains in eastern Orissa state, eastern India. Extending over approximately 16,000 sq mi (41,400 sq km) and fronting the Bay of Bengal on the east, the plains are bounded by the Tamilnād Plain on the south, the Lower Ganges Plain on the north, and the Eastern Ghāts on the west. The Utkal Plains are coastal lowlands consisting chiefly of Mahānadi Delta deposits and marine sediments, and they merge with the Eastern Ghāts at an elevation of about 250 ft (76 m). The plains have a nearly straight shoreline. Buddhism flourished in the Utkal Plains in the 3rd century AD under Aśoka, and the region is described in the rock edicts of Dhauli as forming part of the ancient Kaliṅga territory. Successive ancient dynasties including the Sātavāhanas, Karas, and Eastern Gaṅgas ruled the region until, in the latter half of the 16th century, it passed to the Muslims and later to the Marāṭhās. The British assumed control of the plains in 1804. Comprised of recent and Tertiary alluvium, with patches of Archaeon gneiss and sandstone, the plains are widest in the deltaic regions. Sand dunes of decomposed granites and zircon, created mainly by the action of wind at low tide, and lagoons are found along the Bay of Bengal. Chilka, the largest lake in the region (in the southwest), is salty; Samang and Sur (north and northeast of Puri, respectively) are freshwater lakes. Littoral forests are found along the coast of Cuttack and Balasore districts, and tropical moist deciduous forests are found inland throughout Puri and Cuttack districts. The Mahānadi, Brāhmani, Baitarani, and Subarnarekha rivers are often subject to heavy flooding; the combined outflow of these rivers has formed the Mahānadi Delta in the northern part of the plains. The region has fertile red and black soils. Agriculture is the main occupation, and rice is the principal crop; pulse (legumes) and oilseeds are also grown. Major irrigation projects located in the plains permit double cropping. Industry, centred in urban areas such as Cuttack, Bhubaneswar, and Puri along the Calcutta–Madras railway, includes paper mills, refrigerator plants, and the production of ceramics, glass, refractories, textiles, and galvanized pipe. The plains have a network of roads and railways, inland waterways in Cuttack district, and an airfield at Bhubaneswar.

Utkala (India): *see* Orissa.

Uto (Egyptian goddess): *see* Buto.

Uto-Aztecan languages, family of American Indian languages spoken in Mexico, northern Guatemala, and the western United States. The Uto-Aztecan languages are recognized by modern linguists as falling into eight groups, four of which make up the Shoshonean division and three the Sonoran division. The formerly recognized Nahuan division is now generally included in Sonoran.

The languages of the Shoshonean division (all of which are spoken in the United States), are (1) Numic (formerly called Plateau Shoshonean), which includes Mono and Northern Paiute, Panamint and Shoshoni, and Kawaiisu and Ute; (2) Tubatulabal; (3) the Takic (or sothern Californian) branch, including Serrano, Luiseño–co–Juaneño, Gabrieleño–Fernandeño, Cahuilla, and Cupeño; and (4) Hopi.

The languages of the Sonoran division comprise (1) the Piman group, or Pimic, including Papago, Pima Bajo (or Lower Pima), Tepecano, and northern and southern Tepehuán; (2) the Yaquian, or Taracahitian, branch, also called Taracahitic, including Tarahumara, Guarijío, Yaqui–Mayo, and the extinct languages Tubar, Eudeve, and Opata; and (3) the Coran group, also called Corachol, including Cora and Huichol.

The former Nahuan division includes the three major dialects Nahuatl, Pipil, and the extinct Pochutec.

The Uto-Aztecan lanugages are more distantly related to the Kiowa–Tanoan language family of the southwestern United States, and the combined group is known as Azteco-Tanoan.

utopia, an ideal commonwealth whose inhabitants exist under seemingly perfect conditions. Hence "utopian" and "utopianism" are words used to denote visionary reform that tends to be impossibly idealistic.

The word first occurred in Sir Thomas More's *Utopia,* published in Latin as *Libellus . . . de optimo reipublicae statu, deque nova insula Utopia* ("Concerning the highest state of the republic and the new island Utopia"; 1516); it was compounded by More from the Greek words for "not" (*ou*) and "place" (*topos*) and thus meant "nowhere." During his embassy to Flanders in 1515, More wrote Book II of *Utopia,* describing a pagan and communist city-state in which the institutions and policies were entirely governed by reason. The order and dignity of such a state was intended to provide a notable contrast with the unreasonable polity of Christian Europe, divided by self-interest and greed for power and riches, which More then described in Book I, written in England in 1516. The description of Utopia is put in the mouth of a mysterious traveller, Raphael Hythloday, in support of his argument that communism is the only cure against egoism in private and public life. More, in the dialogue, speaks in favour of mitigation of evil rather than cure, human nature being fallible. The reader is thus left guessing as to which parts of the brilliant jeu d'esprit are seriously intended and which are mere paradox.

Written utopias may be practical or satirical, as well as speculative. Utopias are far older than their name. Plato's *Republic* was the model of many, from More to H.G. Wells. A utopian island occurs in the *Sacred History* of Euhemerus (flourished 300 BC), and Plutarch's life of Lycurgus describes a utopian Sparta. The legend of Atlantis inspired many utopian myths; but explorations in the 15th century permitted more realistic settings, and Sir Thomas More associated *Utopia* with Amerigo Vespucci. Other utopias that were similar to More's in Humanist themes were the *I mondi* (1552) of Antonio Francesco Doni and *La città felice* (1553) of Francesco Patrizi. An early practical utopia was the comprehensive *La città del sole* (written *c.* 1602) of Tommaso Campanella (*q.v.*). Francis Bacon's *New Atlantis* (published 1627) was practical in its scientific program but speculative concerning philosophy and religion. Christian utopian commonwealths were described in *Antangil* (1616) by "I.D.M.," *Christianopolis* (1619) by Johann Valentin Andreae, and *Novae Solymae libri sex* (1648) by Samuel Gott. Puritanism produced many literary utopias, both religious and secular, notably, *The Law of Freedom . . .* (1652), in which Gerrard Winstanley advocated the principles of the Diggers. *The Common-Wealth of Oceana* (1656) by James Harrington argued for the distribution of land as the condition of popular independence.

In France such works as Gabriel de Foigny's *Terre australe connue* (1676) preached liberty. François Fénelon's *Télémaque* (1699) contained utopian episodes extolling the simple life. *L'An 2440* by Louis-Sébastien Mercier (1770; Eng. trans., 1772) anticipated Revolutionary doctrines. G.A. Ellis' *New Britain* (1820) and Étienne Cabet's *Voyage en Icarie* (1840) were related to experimental communities in the United States that revealed the limitations of purely economic planning. Consequently, Bulwer-Lytton, in *The Coming Race* (1871), invented an essence that eliminated economics altogether, and William Morris demonstrated his contempt for economics in *News from Nowhere* (1890). Two influential utopias, however, had an economic basis: *Looking Backward, 2000–1887* (1888) by Edward Bellamy (*q.v.*) and *Freiland* (1890; *A Visit to Freeland . . .* 1894) by Theodor Herzka. H.G. Wells, in *A Modern Utopia* (1905), returned to speculation.

Many utopias are satires that ridicule existent conditions rather than offering practical solutions for them. In this class are Swift's *Gulliver's Travels* (1726) and Samuel Butler's *Erewhon* (1872). In the 20th century, when the possibility of a planned society became too imminent, a number of bitterly anti-utopian, or dystopian, novels appeared. Among these are *The Iron Heel* (1907) by Jack London, *My* (1924; *We,* 1925) by Yevgeny Zamyatin, *Brave New World* (1932) by Aldous Huxley, and *Nineteen Eighty-four* (1949) by George Orwell. *The Story of Utopias* (1922) by Lewis Mumford is an excellent survey.

Concurrent with the literature, there have also been many attempts by religious groups and political reformers to establish utopian communities, especially in the Americas. In the two centuries between 1663 (when some Dutch Mennonites established the first such communitarian colony in what is now Lewes, Del.) and 1858, some 138 settlements were begun in North America. The first to outlast the lifetime of its founder was the Ephrata Community (*q.v.*) established in Pennsylvania in 1732 by some German Pietists. Other German Pietist settlements were founded by George Rapp (Harmony in Pennsylvania, Harmony [or Harmonie] in Indiana, and Economy in Pennsylvania), by the Amana group (in Iowa), and by the Shakers (*q.v.*; 18 villages in eight states). Some of them pursued celibacy. Other communal religious sects still flourish; among the largest are the Hutterites, chiefly in the United States and Canada but having colonies also in Paraguay and England.

One of the first secular communities was New Harmony, founded in 1825 when the British manufacturer Robert Owen purchased Harmony, Ind., from the Rappites. It was a cooperative rather than communist society. Although it foundered, it sponsored the first kindergarten, the first trade school, the first free library, and the first community-supported public school in the United States.

The ideas of the French social reformer Charles Fourier had a strong influence upon American reformers in the 1840s, particularly upon the leaders of Brook Farm in Massachusetts. Between 1841 and 1859, about 28 Fourierist colonies were established in the United States. The Icarians, followers of Cabet, established ill-fated communities in Illinois (Nauvoo, formerly settled by Mormons), Missouri, Iowa, and California.

A unique venture was the Oneida Community founded in Putney, Vt., by John Humphrey Noyes in 1841 and moved to Oneida, N.Y., in 1848. The group practiced "complex marriage," in which all husbands

and wives were shared. Noyes said that Oneida was the continuation of Brook Farm without its mistakes. He was convinced that socialism was impossible without religion, and that the "extended" family system would dissolve selfishness and demonstrate the practicality of this way of life. Children remained with their mothers until they could walk but were then placed in a common nursery.

After the American Civil War the enthusiasm for secular utopian experiments waned. There were some new settlements in the 1890s, following the publication of such Utopian tracts as Laurence Gronlund's *The Cooperative Commonwealth* (1884) and Bellamy's *Looking Backward*, but the impulse had run its course and these latter movements were soon gathered into the fold of political socialism. The creation of utopian religious communities continued into the 20th century, but they too were usually short-lived. The religious colonies, in almost all instances, were established and maintained by a single powerful personality who was believed by his disciples to have a singular gift of prophecy or wisdom. Most of these colonies flourished during the lifetime of the original leader and then declined slowly after his death.

Utopia Planitia, northern lava plain on the planet Mars. It was the landing site of the U.S. Viking 2 planetary probe (1976). The boulder-strewn plain of Utopia Planitia, at 47°.97 N and 225°.74 W, superficially resembles the Viking 1 landing site in Chryse Planitia (*q.v.*). Soil samples from the two sites are nearly identical in composition, which is probably the result of a mixing of windblown dust from wide regions of the planet. The Utopia plain differs from the Chryse area in that it has a system of shallow troughs, which may be part of a large-scale polygonal patterning possibly associated with ice wedging by permafrost. The vesicular boulders detected at the Utopia site may be either local lavas or rocks ejected from the nearby crater Mie. Photographs transmitted by the Viking 2 lander showed the presence of a thin layer of white ground frost, composed of water, for about 100 days during each of the two Martian winters observed. The frost is probably deposited when carbon dioxide and water condense on airborne dust and precipitate. The carbon dioxide portion is thought to evaporate during exposure to sunlight, leaving only water frost.

Utraquist, also called CALIXTIN, OF CALIXTINE, any of the spiritual descendants of Jan Hus who believed that the laity, like the clergy, should receive the Eucharist under the forms of both bread and wine (Latin *utraque,* "each of two"; *calix,* "chalice"). Unlike the militant Taborites (also followers of Hus), the Utraquists were moderates and maintained amicable relations with the Roman Catholic Church. As a consequence, the Council of Basel in 1433 declared them to be true Christians. In 1434 the Utraquists joined Catholic Czech forces to defeat the Taborites at the Battle of Lipany. When, however, the Utraquists developed into an independent church, Rome withheld approval, even though Roman bishops officiated at Utraquist ordinations to the priesthood. The Utraquists, together with all other Protestant sects, were outlawed in Bohemia after the Battle of White Mountain in 1620.

Utre, Philipp von: *see* Hutten, Philipp von.

Utrecht, *provincie,* central Netherlands, the country's smallest, with an area of 514 square miles (1,331 square km). It extends southward from the narrow Lake Eem, which separates Utrecht *provincie* from the South Flevoland polder of Flevoland *provincie.* Utrecht *provincie* lies between the *provincies* of Noordholland and Zuidholland (west) and Gelderland (east). Its history is closely linked with that of the city of Utrecht, its capital.

The *provincie* is drained by the Lower Rijn (Rhine), Kromme (Winding, or Crooked) Rijn, Lek, Vecht, and Eem rivers. The sandy soil of its hilly eastern part supports pig and poultry raising and horticulture around Amersfoort and Utrecht. The low-peat areas of the northwest have a few polders and lakes where much peat was cut and where dairy farming is now important. River clay found in the southwest, deposited by the Rijn, IJssel, and other rivers, supports fruit growing and market gardening. Utrecht, the largest city, and Amersfoort are the only sizable industrial communities; but there is light manufacturing in smaller towns such as Zeist, Veenendaal, and Maarssen. The *provincie*'s northern part mostly comprises the resort and residential region known as the Gooi, whereas the region between Utrecht city and Amersfoort is pleasantly wooded.

Utrecht has many fine old castles and manor houses founded by wealthy Amsterdam merchants in the "Golden Age" (1650–1720). Near Baarn in the village of Soestdijk is former queen Juliana's royal residence. Pop. (1986 est.) 944,372.

Utrecht, *gemeente* (commune) and capital, Utrecht *provincie,* central Netherlands. It lies along the Kromme Rijn (Winding, or Crooked, Rhine), Oude (Old) Rijn, and Vecht rivers and the Amsterdam–Rijn Canal. Its original Roman name, Trajectum ad Rhenum (Ford on the Rhine), later became Ultrajectum, and then Utrecht.

The site of successive Roman, Frisian, and Frankish fortresses, Utrecht became a bishop's see in 696, when St. Willibrord was permitted by the Frankish king Pepin (Pippin II) to establish his headquarters there. Willibrord became the archbishop of the Frisians and, starting from Utrecht, converted to Christianity most of what is now the northern Netherlands. Utrecht was chartered in 1122 and had a city council as early as 1304. Utrecht's greatest prosperity was in the 11th and 12th centuries, but throughout the Middle Ages it remained the most powerful and important town in the northern Netherlands. Under its bishops, it became the capital of a powerful principality and a cultural, commercial, and industrial (mainly cloth-weaving) centre until it was surpassed by Amsterdam (26 miles [42 km] northwest) in the 15th century. Utrecht's bishops came increasingly under the influence of Holland until the Utrecht bishop Henry of Bavaria sold his temporal rights to Emperor Charles V in 1527, upon which Utrecht became part of the Habsburg dominions. Spanish domination prevailed until 1577, when the women of Utrecht scaled the local Spanish fortress and tried to pull it down. Thenceforth Utrecht supported the cause of the prince of Orange. Partly in reaction to the Spanish occupation, the town became a firm stronghold of Calvinism and remained so for many centuries. The Union of Utrecht (1579) was signed by the seven northern provinces of the Netherlands in league against Spain; the treaty established a military league to resist the Spaniards and served as the foundation of the later Netherlands kingdom. The archbishopric of Utrecht was established in 1559, suppressed in 1580, and revived in 1851. Occupied by the forces of Louis XIV (1672–74), Utrecht was the site of the negotiations culminating in the treaties of Utrecht (1713–14), which ended the War of the Spanish Succession. It was occupied by the French from 1795 to 1813 and was the residence of Napoleon's brother Louis, king of Holland (1806–10).

Utrecht is the seat of Roman Catholic and Old Catholic (Jansenist) archdioceses and of the county court of law. Its university (1636), the largest of the Dutch state universities, has many special schools and a library partly housed in the palace of King Louis Napoleon. Utrecht has numerous museums, including the Central Museum (art, history, archaeological findings), The Netherlands Railway Museum, The Netherlands Gold and Silver Museum, the Clock and Watchmaking Museum, the Museum of Modern Religious Art, the Old Catholic Museum, and the National Museum "from Music Box to Barrel Organ."

All that remain of Utrecht's cathedral (built 1254–1517) are the transept and tower (1321–82), the latter being the tallest church tower in The Netherlands (about 370 feet [113 m]). The cathedral's nave collapsed in a storm of 1674 and was never rebuilt; the chapter room (1409), which is joined to the church by a Gothic cloister, is now the main assembly hall of the university. Other churches are Jans Church (founded 1040), Sint Pieters Church (1048), Nicolai Church (1131), Jacobi Church (1173), Buur Church (10th century), Geerte Church (1260), and Sint Catharijne Church (1468; now the Roman Catholic cathedral), all in a variety of styles reflecting numerous additions and restorations. The Paushuize (Pope's House) was completed in 1523 for the only Dutch pope, Adrian VI, who was a native of Utrecht. The city's Maliebaan (1636) is one of the finest promenades in The Netherlands. In the 19th century the old city ramparts were made into parks, and modern residential districts arose.

The city is now the headquarters of The Netherlands' railroads. It has a vegetable, fruit, and cattle market and is a financial and insurance centre and a site of the national mint. The Royal Dutch Industries Fair, founded in 1916, is the most important of the famous spring and autumn trade fairs held in the city. Diversified industries include construction, steelworking, printing, and the manufacture of aluminum, clothing, furniture, and chemicals. Pop. (1987 est.) 229,326; metropolitan area, 516,064.

Utrecht, State University of, Dutch RIJKSUNIVERSITEIT TE UTRECHT, state-supported coeducational institution of higher learning founded in 1636 at Utrecht, Neth. In the 17th and 18th centuries Utrecht attracted many foreign students, especially from England and Scotland. James Boswell, Samuel Johnson's biographer, studied law at Utrecht (1763–64).

The largest Netherland state university, Utrecht has faculties of theology, law, medicine, science, arts, veterinary medicine, and social sciences. It offers interdisciplinary programs in geography and pre-history.

Utrecht, treaties of, also called PEACE OF UTRECHT (April 1713–September 1714), a series of treaties between France and other European powers (April 11, 1713 to Sept. 7, 1714) and another series between Spain and other powers (July 13, 1713 to June 26, 1714), concluding the War of the Spanish Succession (1701–14).

France concluded treaties of peace at Utrecht with Britain, the Dutch republic, Prussia, Portugal, and Savoy. By the treaty with Britain (April 11), France recognized Queen Anne as the British sovereign and undertook to cease supporting James Edward, the son of the deposed king James II. France ceded Newfoundland, Nova Scotia, the Hudson Bay territory, and the island of St. Kitts to Britain and promised to demolish the fortifications at Dunkirk, which had been used as a base for attacks on English and Dutch shipping. In the treaty with the Dutch, France agreed that the United Provinces should garrison part of Flanders and should retain certain barrier fortresses in the Spanish Netherlands. In the treaty with Prussia, France acknowledged Frederick I's royal title (claimed in 1701) and recognized his claim to Neuchâtel (in present Switzerland) and southeast Gelderland. In return France received the principality of Orange from Prussia. In the treaty with Savoy, France recog-

nized Victor Amadeus II, duke of Savoy, as king of Sicily and that he should rule Sicily and Nice. The treaty with Portugal recognized its sovereignty on both banks of the Amazon River. France's Guiana colony in South America was restricted in size.

The peace treaties involving Spain took longer to arrange. Spain's treaty with Britain (July 13) gave Gibraltar and Minorca to Britain. The treaty was preceded by the *asiento* agreement, by which Spain gave to Britain the exclusive right to supply the Spanish colonies with African slaves for the next 30 years. On Aug. 13, 1713, the Spanish treaty with Savoy was concluded, ceding the former Spanish possession of Sicily to Victor Amadeus II as his share of the spoils of war. In return he renounced his claims upon the Spanish throne. The peace between Spain and the Dutch was delayed until June 26, 1714, and that between Spain and Portugal until the Treaty of Madrid (February 1715).

The Holy Roman emperor Charles VI, in what is considered the end of the War of the Spanish Succession, concluded peace with France in the Treaties of Rastatt and Baden (March 6, 1714 and Sept. 7, 1714; *see* Rastatt and Baden, Treaties of). Peace between the emperor and Spain was not concluded until the Treaty of The Hague (February 1720).

The question of the Spanish Succession was finally settled in favour of the Bourbon Philip V, grandson of France's Louis XIV. Britain received the largest portion of colonial and commercial spoils and took the leading position in world trade. In international politics the settlement at Utrecht established a pattern for the next 20 years.

Utrecht school, principally a group of three Dutch painters—Dirck van Baburen (*c.* 1590–1624), Gerrit van Honthorst (1590–1656), and Hendrik Terbrugghen (1588–1629)—who



"Christ Before the High Priest," oil on canvas by Gerrit van Honthorst of the Utrecht school, *c.* 1617; in the National Gallery, London

By courtesy of the trustees of the National Gallery, London

went to Rome and fell fully under the pervasive influence of Caravaggio's art before returning to Utrecht. Although none of them ever actually met Caravaggio (d. 1610), each had access to his paintings, knew his former patrons, and was influenced by the work of his follower Bartholomeo Manfredi (1580–1620/21), especially his half-length figural groups, which were boldly derived from Caravaggio and occasionally passed off as the deceased master's works.

Back in the Netherlands the "Caravaggisti" were eager to demonstrate what they had learned. Their subjects are frequently religious ones, but brothel scenes and pictures in sets, such as five works devoted to the senses, were popular with them also. The numerous candles, lanterns, and other sources of artificial light are characteristic and further underscore the indebtedness to Caravaggio.

Although Honthorst enjoyed the widest reputation at the time, painting at both the Dutch and English courts, Terbrugghen is generally regarded as the most talented and versatile of the group.

Utrera, city, Sevilla *provincia,* in the *comunidad autónoma* ("autonomous community") of Andalusia, southwestern Spain. It lies southeast of the city of Seville on the Arroyo de la Antigua, which is a tributary of the Guadalquivir River.

The site has been occupied since prehistoric times and was known as Utricula during the Roman period. The city, an episcopal see before domination by the Moors (who called it Gatrera), was retaken by Alfonso X the Wise of Castile in the 13th century; it reverted to a Moorish stronghold until finally reconquered (1340) by Juan Manuel for use as a Christian base. During the European Middle Ages it was a notorious refuge for brigands and outlaws. The city was twice ruined—by Muḥammad V in 1368 and in the Peninsular War, 1808–14—and rebuilt. Landmarks such as a 14th-century Moorish castle, the Gothic Churches of Santa María and Santiago, and the Sanctuary of Consolation (Consolación) remain.

Economic activities are agriculturally based and include the production of olive oil, poultry, textiles, wines, margarine, cereals, and flour. Horses and fighting bulls are raised in the vicinity. Pop. (1981) 32,794.

Utrillo, Maurice (b. Dec. 25, 1883, Paris, Fr.—d. Nov. 5, 1955, Le Vésinet), French painter, noted especially for his pictures of the houses and streets of the Montmartre district of Paris.

Utrillo was the illegitimate son of the model and artist Suzanne Valadon (1865–1938). His father was not known, and he was given a name by a Spanish art critic, Miguel Utrillo. The young Utrillo had no instruction as an artist apart from that given by his mother, who herself was untutored. When, as an adolescent, he became an alcoholic, his mother encouraged him to take up painting as therapy. Despite his frequent relapses into alcoholism, painting became Utrillo's obsession, and he produced thousands of oils, as well as a few drawings and lithographs. In 1924, to keep her son permanently away from the bars of Montmartre, Valadon moved with him to a château near Lyon. In 1935 the artist married a widow, Lucie Pauwels (Lucie Valore), herself a Sunday painter, and they settled in Le Vésinet, a fashionable suburb of Paris.



"Impasse Cottin," oil on cardboard, by Maurice Utrillo, *c.* 1910; in the National Museum of Modern Art, Paris

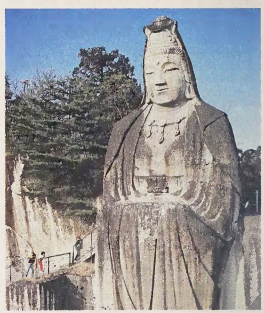
© 1993 ARS N.Y./SPADEM; photograph, Scala/Art Resource, New York City

Although Utrillo was initially attracted by the Impressionist paintings of Camille Pissarro and Alfred Sisley, he had neither aesthetic concepts nor artistic preferences, wishing only to reproduce what he saw, as faithfully as possible. Shy and withdrawn, he painted very few portraits. Except for a number of flower pieces, the bulk of his compositions were devoted to the old, deteriorating houses and streets of Montmartre, its windmills (no longer existing), and its cafés and amusement places. Trips to Brittany and Corsica also yielded a few paintings.

His best work is that of his "white period" (*c.* 1908–14), so called from the lavish use of zinc white. In heavy, rich pigment he built up aging, cracked walls, often covered with large inscriptions. These freshly conceived and freely brushed oils brought him fame and a great fortune. In 1929 he was made a chevalier of the Legion of Honour. In his later years, his painting, largely based upon picture postcards, declined sharply in originality and vigour.

First-rate Utrillos are few, but critics have linked him, as a landscapist, with such 18th- and 19th-century masters as Francesco Guardi, Hubert Robert, and Camille Corot. Unfortunately, countless crude forgeries have interfered with his good reputation.

Utsunomiya, capital, Tochigi *ken* (prefecture), Honshu, Japan. The city is situated on the alluvial plain between the Ta River



The Peace Kannon at Utsunomiya, Japan

Mit and Joan Mann—CAMERAMANN INTERNATIONAL

and the Kinu River. A castle town in the 11th century, it later served as a post town on the Nikkō Highway during the Tokugawa era (1603–1867). The city became the prefectural administrative centre in 1884. During World War II industries were relocated to Utsunomiya from Tokyo, producing railway cars, aircraft, and machinery. Utsunomiya's other manufactures include processed foods, paper, and tobacco. Rice and vegetables are grown in the surrounding area. A university was founded there in 1949.

The layout of the city and many of its buildings have not changed since the 19th century. Tourism is based on several old temples and other places of interest. The Oya Temple was founded during the Heian era (794–1185) and

contains the oldest Buddhist images in Japan. The Peace Kannon (a manifestation of the goddess of compassion) is an 88-foot (27-metre) statue carved on the wall of a quarry. Pop. (2000 prelim.) 443,787.

Uttar Pradesh and Uttaranchal, constituent states of India, situated in the north-central part of the country. Uttar Pradesh lies mainly in the lowland of the Gangetic Plain; in 2000 Uttaranchal was carved out of the mountainous northern portion of Uttar Pradesh. Uttaranchal is bounded by China (Tibet) to the northeast, Nepal to the southeast, and, in India, by the states of Uttar Pradesh to the southwest and Himāchal Pradesh to the northwest. Uttar Pradesh is bordered by Nepal to the northeast and, in India, by the states of Bihār and Jharkhand to the east, Chhattīsgarh and Madhya Pradesh to the south and southwest, Rājasthān, Haryāna, and the national capital territory of Delhi to the west, and Uttaranchal to the north. The capital of Uttar Pradesh is Lucknow; that of Uttaranchal is Dehra Dun. Area Uttar Pradesh, 93,933 square miles (243,286 square km); Uttaranchal, 19,739 square miles (51,125 square km). Pop. (2001 prelim.) Uttar Pradesh, 166,052,859; Uttaranchal, 8,479,562.

A brief treatment of Uttar Pradesh and Uttaranchal follows. For full treatment, *see* MACROPAEDIA: India.

In the Vedic period (*c.* 1500–600 BC) the area of the two modern states formed part of the ancient country known as Madhyadeśa. Later such great Hindu kings as Aśoka and Samudra Gupta ruled the area. In the 16th century it came under the rule of the Mughal emperors, who remained until the close of the 18th century. The British gradually extended their power west from Bengal in the 19th century, and Uttar Pradesh became the main scene of the Indian Mutiny of 1857 against British rule. The area was in the forefront of the Indian independence movement, and Uttar Pradesh became a state on Jan. 26, 1950, when India became a republic. Six of the first nine prime ministers of independent India (including Jawaharlal Nehru and his daughter, Indira Gandhi) came from it. The people of what is now Uttaranchal long pressed to be given separate status; momentum for this began building in the 1990s, and the new state was established on Nov. 9, 2000.

Uttaranchal's physiography can be divided into two regions: the Himalayas in the north, where some peaks rise above 23,000 feet (7,000 m); and a submontane region in the south, composed of a forested piedmont zone and a damp and marshy tract of thick jungle and tall grass. The state is drained mainly by the five source streams of the Ganges (Ganga) River (notably the Alaknanda and Bhāgīrathi rivers that join northeast of Hardwār to form the Ganges) and, in the northwest, by the Yamuna River, itself a tributary of the Ganges. These two great rivers and numerous tributaries flow southward and eastward into Uttar Pradesh and the vast Gangetic lowland. Other rivers wash out from Nepal and onto the almost level and featureless plain, which makes up virtually all of the state. Only in the south does the elevation rise in the uplands that comprise part of the central Indian plateau.

Uttar Pradesh has a tropical monsoon climate. January temperatures range from 55° to 64° F (13° to 18° C), and summer highs often exceed 90° F (32° C). The bulk of annual precipitation comes during the rainy season from the Bay of Bengal summer monsoon. Rainfall varies from 40 to 80 inches (1,000 to 2,000 mm) in the east to 24 to 40 inches (600 to 1,000 mm) in the west. The climate of Uttaranchal is much more temperate and is influenced by elevation. Precipitation also ranges between 40 and 80 inches, though in some places it exceeds that upper figure. Most precipitation falls during the summer monsoon, but snowfall can be considerable in the higher elevations during the winter months.

Uttar Pradesh is the most populous state in India, containing about one-sixth of the country's total population. By contrast, Uttaranchal has one of the smaller state populations, and its population density is about one-fourth that of Uttar Pradesh. Hindus constitute more than four-fifths of the population of Uttar Pradesh and an even larger proportion in Uttaranchal; Muslims comprise most of the remainder in both states. Hindi is the mother tongue of most in each state, with a sizable minority in Uttar Pradesh speaking Urdū. Hindustani, combining words from the two languages, is spoken in both states. A large majority of each state's population is classified as rural. Central Uttar Pradesh is the most urbanized region.

Agriculture is by far the most important sector of each state's economy, employing some 75 to 80 percent of the workforce and accounting for the majority of total income. Much land is under irrigation, and food crops—rice, wheat, corn (maize), and edible oilseeds—are dominant. Sugarcane is the most important commercial crop in both states. The per-acre yield of rice and wheat increased substantially after high-yielding varieties of seeds and fertilizers and improved irrigation methods were introduced in the 1960s.

Silica and limestone deposits are worked in both states, and some coal is mined in Uttar Pradesh. Each state also has some reserves of gypsum, magnesite, phosphorite, and bauxite. Some of Uttaranchal's forest resources are being exploited, but its vast hydroelectric potential is largely untapped. Thermal power plants supply most of Uttar Pradesh's electricity, though some hydropower is generated, mainly in the southeast.

Both states are among the least industrially developed in India. Only a tiny fraction of the population is engaged in industry, most in such cottage industries as handloom weaving. Large-scale operations include sugar refining in Uttaranchal and cement manufacture in Uttar Pradesh. In addition, the union government has established a number of large industrial facilities in Uttar Pradesh and has also established an oil refinery at Mathura and developed coalfields in Mirzāpur. Tourism has grown in importance in both states.

Most towns in Uttaranchal are accessible by roads, with topography limiting east-west connections; spur rail lines link the larger towns to the national rail system. Uttar Pradesh has a dense network of roads and railroads, though the condition of roads and bridges is generally poor. The state's transportation system also includes the three major inland waterways of the Ganges, Yamuna, and Ghāghara rivers. Rail transport in both states is hampered by the presence of two different track gauges.

Uttar Pradesh, the birthplace of Hindu civilization, has contributed much to the composite culture of India. From time immemorial, various arts have flourished in towns and cities, as well as in the countryside. Handicrafts were developed at various centres, notably in Bhadohi and Mirzāpur (carpet weaving), Lucknow (*chikan* embroidery), Morādābād (metal enameling), and Vārānasi (brocades and brass ware). The *kathak* dance style, nurtured in the state, is the most popular form of classical dance in India. The songs and dances of the countryside are significant features of social culture. They include the *kajari* of Mirzāpur and Vārānasi and the Alha Udal, a folk epic. The state's most famous tourist meccas are Āgra (with the Tāj Mahal and Āgra Fort) and Vārānasi (with its miles of riverfront ghats, or steps, for religious bathing).

Uttaranchal's remoteness and its proximity to Nepal have produced a rich diversity of musical, dance, and artistic styles. Four of Hinduism's most holy shrines and pilgrimage centres are found in the state's mountains: Yamunotri, at the source of the Yamuna River; Gangotri, the source of the Bhāgīrathi River; Kedarnāth temple, dedicated to the god Śiva (Shiva); and Badrināth temple, devoted to Vishnu.

Uttar Pradesh has more than a dozen universities and some 400 colleges. Schools of arts and Hindustani music in Lucknow and elsewhere have done much to encourage the growth of the fine arts in the state. Uttaranchal has four universities and several affiliated colleges. Literacy rates have grown significantly in both states.

Uttara-kalārya: *see* Vaḍakalai.

Uttlesford, district, administrative and historic county of Essex, England. It occupies the northwestern corner of the county, where it borders Cambridgeshire and Hertfordshire. A low ridge of chalk hills runs from southwest to northeast through a rolling countryside. The district is largely rural. The main town is Saffron Walden; there are also many smaller old parishes, such as Thaxted, Great Dunmow, and Stansted Mountfitchet. The region has long been a residential area for affluent commuters to London. Area 248 square miles (642 square km). Pop. (2001) 68,940.

Utu (Mesopotamian deity): *see* Shamash.

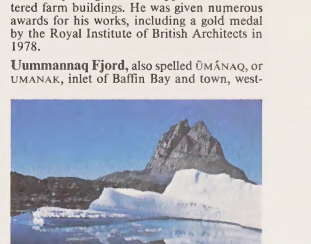
Utzon, Jørn (b. April 9, 1918, Copenhagen), Danish architect best known for his dynamic, imaginative, but problematical design for the Sydney Opera House, Australia.

Utzon studied at the Copenhagen School of Architecture (1937–42) and then spent three years in Stockholm, where he came under the influence of the Swedish architect Erik Gunnar Asplund. He also studied in the United States, and, for a six-month period in 1946, he worked in the office of the Finnish architect and designer Alvar Aalto. Among his important early works were two houses in Denmark, his own at Hallebæk (1952) and another at Holte (1952–53).

In 1956 Utzon's dramatic design for the new opera house at Sydney placed first in competition and brought him international fame. Construction, however, posed a variety of problems, many resulting from the innovative nature of the design, a series of saillike shells. He resigned from the project in 1966, but construction continued until September 1973. The completed Opera House is now Sydney's best-known landmark.

Utzon is also noted for two housing estates, one near Helsingør (1956) and another in Fredensborg in northern Sjælland (1957–60). Both made effective use of the surrounding terrain. His Bagsūaerd Church (1976) in suburban Copenhagen has the appearance of clustered farm buildings. He was given numerous awards for his works, including a gold medal by the Royal Institute of British Architects in 1978.

Uummannaq Fjord, also spelled ŪMÁNAQ, or UMANAK, inlet of Baffin Bay and town, west-



Uummannaq Fjord with Uummannaq Rock, Greenland
W. Ferchland

ern Greenland, north of Nuussuaq Peninsula, separated from Karrat Isfjord by Upernivik and Ubekendt islands. About 100 miles (160 km) long and 15–30 miles (24–48 km) wide, Uummannaq divides into several smaller fjords extending eastward to the inland ice cap, where they are fed by extensive glaciers. Qarajaqs Isfjord is its most southerly arm. The town of Uummannaq (founded 1763) is on a small island just north of Nuussuaq Peninsula. A hunting and fishing base, it has a hospital and a weather and radio station. Pop. (1991 est.) Uummannaq town, 1,420.

Uusimaa, in full UUDENMAAN LÄÄNI, Swedish NYLANDS LÄN, *lääni* (province), southern Finland, on the Gulf of Finland. Helsinki, the national capital and also the provincial administrative capital, is located midway along the Uusimaa coast. Other important towns include Porvoo (Borgå), Kerava, Lovisa (Loviisa), Hyvinkää, Hangö (Hanko), and Ekenäs (Tammisaari). In some areas the population is mainly Swedish-speaking. The area is low and flat in the south, rising gradually to the north.

Economic activity outside of Helsinki includes granite and limestone quarrying; the cultivation of rye, oats, potatoes, and sugar beets; cattle raising; timbering; and the manufacture of wood products. The economy of the Helsinki area, the centre of Finland's business and industrial activity, is highly diversified. Tapiola, a part of the town of Espoo, is a newly planned residential area. Area 3,822 square miles (9,898 square km). Pop. (1992 est.) 1,262,752.

UV Ceti star: *see* flare star.

Uvalde, city, Uvalde county, southwestern Texas, U.S. It lies along the Leona River, 84 miles (135 km) west-southwest of San Antonio. Fort Inge was built (1849) on the Leona's east bank, and the site was settled in 1852 by W.W. Arnett, who was joined in 1853 by Reading W. Black and H.L. Stratton. Black opened a trading post (1855) and called the community Encina. Incorporated in 1856 and named county seat, it was renamed for the county (which derived its name from Guan de Ugalde, Mexican governor of Coahuila).

Economic activities in Uvalde and its vicinity are basically agricultural and include vegetable processing and the production of animal feed, honey, wool, and mohair. The city's institutions include Southwest Texas Junior College (1946) and the Garner Museum, the home of Vice President John Nance Garner (1933–41). Pop. (1991 est.) 15,043.

Uvarov, Sergey Semyonovich, Count (Graf) (b. Aug. 25 [Sept. 5, New Style], 1786, Moscow, Russia—d. Sept. 4 [Sept. 16], 1855, Moscow), Russian statesman and administrator, an influential minister of education during the reign of Tsar Nicholas I.

Uvarov served as a diplomat (1806–10), head of the St. Petersburg educational district (1811–22), and deputy minister of education (1832) before being named minister of education in 1833. In an important report to the tsar in 1833 he declared that education must be conducted "with faith in the . . . principles of orthodoxy, autocracy, and nationality." These words were subsequently adopted by various periodicals and associations as articles of faith. The ideology that they came to represent was rooted in loyalty to dynastic rule, traditional religious faith, and romantic glorification of the Russian homeland. Uvarov's subsequent educational policies were reactionary: he restricted the educational opportunities of nonnoble students and tightened government control over university and secondary-school curricula. During his tenure the educational system did expand significantly, however, particularly in the fields of technical and vocational instruction.

Uvarov was minister of education from 1833 to 1849 and president of the Academy of Science from 1818 until his death. He was created a count in 1846.

uvarovite, calcium chromium garnet found as small, brilliant, green crystals. It is the rarest of all the garnets, and its crystals commonly



Uvarovite garnet from Canada
By courtesy of the Field Museum of Natural History, Chicago; photograph, John H. Gerard

are too small to be cut. Otherwise, it would rival emerald as a popular gemstone because of its beautiful colour. Typical occurrences are in chromite, as in the northern Urals, California, Canada, Finland, and Silesia in Poland. For details of chemistry and occurrence, *see* garnet.

Uvéa, Île (New Caledonia): *see* Ouvéa Island.

uveitis, inflammation of the uvea, the middle coat of the eyeball, which is pigmented and contains blood vessels. The uvea consists of three parts: the iris, the ciliary body (containing the muscle that controls the curvature of the lens), and the choroid, the layer of the eyeball between the retina and the sclera (the white outer covering of all except the front part of the eyeball). Anterior uveitis affects only the iris or the ciliary body, or both; posterior uveitis, the choroid. Uveitis is also classified by whether or not it is granulomatous—that is, whether or not there is persistent inflammatory tissue with a granular surface.

Granulomatous uveitis causes impairment of vision, pain, watering of the eyes, and sensitivity of the eyes to light; the nongranulomatous type also causes impairment of vision, but there is less pain and less sensitivity to light. Eventual complete recovery occurs far more often in the nongranulomatous type than in the granulomatous.

Causes of uveitis include systemic infections (*e.g.,* measles, syphilis, and tuberculosis), other systemic diseases (*e.g.,* rheumatoid arthritis), and allergic reactions. In many cases no particular cause can be identified.

Anterior uveitis is called iritis if the inflammation is confined to the iris, cyclitis if it affects only the ciliary body, and iridocyclitis if both structures are involved. Anterior uveitis causes contraction of the pupil and deposition of clumps of cells on the iris and the cornea. The pupillary edges of the iris may adhere to the lens, impeding the flow of the aqueous humour. The resultant increased pressure within the eyeball may injure the optic nerve and cause blindness (*see* glaucoma). Posterior uveitis usually affects the retina. Blurring of vision results from the retinal involvement and from debris in the vitreous, the jellylike substance that fills the rear portion of the globe. Complications include bleeding with growth of connective tissue into the vitreous, the clouding of the lens, and atrophy of the eyeball.

In some rare cases, there may occur a condition called "sympathetic ophthalmia," in which symptoms of irritation occur not only in the injured eye but also, sympathetically as a hypersensitive reaction, in the uninjured eye. Insufficient or delayed therapy can result in blindness in both eyes.

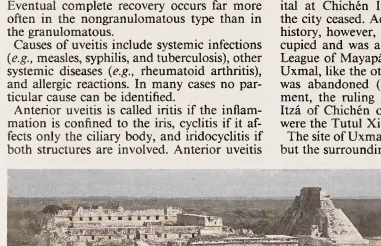
Treatment of uveitis is directed toward elimination of infection, reduction of inflammation, and preservation of vision, including that of the eye that may have escaped the uveitis.

Uwajima, city, Ehime *ken* (prefecture), Shikoku, Japan. It faces the Bungo Channel between the Inland Sea and the Pacific Ocean. Uwajima developed as a castle town in the late 16th century. Connected by rail to major ports on the Inland Sea in 1945, it became the transport hub of southwestern Shikoku. The port is an active fishing centre; associated industries produce ships, processed foods, and fishnets.

Uwajima contains places of historic interest, including the remains of its castle. Atago Park, named for the Shintō god who protects towns from fire, contains the Uwatsuhiko Shrine, well known for its festivals. The city hosts *tōgyū* (contests between bulls) after the harvest season. Pop. (1990) 68,035.

Uxmal, ruined ancient Mayan city about 50 miles (80 km) south of modern Mérida, Yucatán state, Mexico. The site is the most important representative of the Puuc architectural style that flourished in the Late Classic Period (AD 600–900). Quite probably this style and the northern Maya lowland culture continued in full vigour for a century or so after the decline and abandonment of the southern Maya lowland centres such as Tikal, Palenque, and Uaxactún. After about 1000, when the Toltec (or Toltec-inspired) invaders arrived in Yucatán and established their capital at Chichén Itzá, major construction in the city ceased. According to Maya legendary history, however, Uxmal continued to be occupied and was a participant in the political League of Mayapán. When the league ended, Uxmal, like the other great cities of the north, was abandoned (*c.* 1450). Before abandonment, the ruling family of the city, like the Itzá of Chichén or the Cocom of Mayapán, were the Tutul Xius.

The site of Uxmal is a dry grass savanna area, but the surrounding region is heavily forested.



The House of Turtles (foreground), the Temple of the Magician (right), and the Nunnery Quadrangle, Uxmal
© Robert Frerck/Odyssey Productions/Chicago

Water was furnished by wells (*cenotes*) within the city or by rain-collecting pools to the west, in which breed malarial mosquitoes. The ruins cover about 160 acres (60 hectares), but remains of the residential districts of the city cover considerably more ground. Limestone was used in construction, and most surfaces were finished with plaster. Stones were cut and fitted so expertly that in many cases the mortar is not visible. The main buildings are the Temple of the Magician, atop a huge pyramid; the Nunnery Quadrangle, consisting of four rectangular buildings, probably the quarters of the priests; the Governor's Palace, erected on a triple terrace; the House of Turtles, a smaller building so called from its frieze of sculptured turtles; and the House of Pigeons, also a quadrangle, one building of which resembles a huge dovecote.

Uyo, town, capital of Akwa Ibom state, southeastern Nigeria. Uyo lies on the road from Oron to Ikot Ekpene. A collecting station for palm oil and kernels, it is also a local trade centre (yams, cassava, palm produce) for an area inhabited mainly by the Ibibio people. The town has a brewery and a textile mill. It is the site of the University of Uyo (1983). Pop. (1991 est.) 66,860.

Uyuni, town, southwestern Bolivia. It lies on the cold, windswept Altiplano, a high intermontane plateau, at 12,024 feet (3,665 m) above sea level, just east of the vast Uyuni Salt Flat. Founded in 1890, it prospered, with the assistance of Slav and Syrian colonists, as a railroad junction and mining and market centre. Northeast of the town are the Pulacayo and Huanchaca silver mines. From Uyuni a branch of Bolivia's main north-south railroad line runs southwestward to the Pacific Ocean, giving the nation access to port facilities at Antofagasta, Chile. Pop. (1992) 11,372.

Uyuni Salt Flat, Spanish SALAR DE UYUNI, arid, windswept salt flat in southwestern Bolivia. It lies on the Altiplano, at 11,995 feet (3,656 m) above sea level. The Uyuni Salt Flat is Bolivia's largest salt-encrusted waste area (approximately 4,085 square miles [10,582 square km]) and is separated from the Coipasa Salt Flat, a similar but smaller feature to the north, by a range of hills. On its shores are saltworks at Salinas de Garci Mendoza on the north, Llica on the northwest, and Calcha on the south.

Uzbek (Mongol ruler): *see* Öz Beg.

Uzbek, any member of a Central Asian people found chiefly in Uzbekistan, but also in other parts of Central Asia and in Afghanistan. The Uzbeks speak either of two dialects of Uzbek, a Turkic language of the Altaic family of languages. More than 16 million Uzbeks live in Uzbekistan, 2,000,000 in Afghanistan, 1,380,000 in Tajikistan, 570,000 in Kyrgyzstan, and smaller numbers in Kazakstan, Turkmenistan, and Sinkiang in China.

The Uzbek designation is thought to refer to Öz Beg (Uzbek), the Mongol khan under whom the Golden Horde attained its greatest power. The Uzbeks grew out of a mingling of ancient, settled Iranian populations with a variety of nomadic Mongol or Turkic tribes that invaded the region between the 11th and the 15th century. The former were ethnically similar to the Tajiks, and the latter included Kipchaks, Karluks, and Turks of Samarkand (relatively more Mongolized groups). A third element was added with the invasion of Mongol nomadic tribes under the leadership of Muḥammad Shaybānī Khan in the early 16th century.

The great majority of Uzbeks are Sunnite Muslims of the Ḥanafī rite, a group noted for the acceptance of personal opinion (*raʾy*) in the absence of Muslim precedent. The Uzbeks, especially the urban Uzbeks, are considered to be the most religious Muslims of Central Asia; early marriages for young girls, bride-price, and religious marriages and burials are among the traditions still practiced. The Uzbeks are the least Russified of those Turkic peoples formerly ruled by the Soviet Union, and virtually all still claim Uzbek as their first language.

Uzbek khanate, any of the three states that ruled Transoxania, in present-day Uzbekistan, before it came under Russian rule in the 19th century. The khanates of Bukhara and Khiva (Khwārezm) were established by two branches of the Shaybānid dynasty, which won control of Transoxania from the Timurids in the late 15th and early 16th centuries. The Shaybānids were replaced at Bukhara successively by the Astrakhanids and the Mangits. A third state, the khanate of Kokand, emerged in the mid-18th century. The whole area came under Russian control in the 1860s and '70s, but the khans remained as figurehead rulers until after the Russian Revolution of 1917.

Uzbek language, member of the Turkic language subfamily of the Altaic family, spoken in Uzbekistan, eastern Turkmenistan, northern and western Tajikistan, southern Kazakstan, northern Afghanistan, and northwestern China. Uzbek belongs to the southeastern, or Chagatai, branch of the Turkic languages.

In Uzbek roughly two main dialect groups can be distinguished. One includes the southern, or Iranized, dialects (Tashkent, Bukhara, Samarkand) and the semi-Iranized dialects (Fergana, Kokand), which, owing to the influence of the Tajik language, have modified the typical Turkic feature of vowel harmony. The other group comprises the northern Uzbek dialects in southern Kazakstan and several dialects in the region of Khiva. These dialects show much less Iranian influence. (Kipchak-Uzbek is practically a dialect of the Kazak language.) In the creation of a new literary language after the Russian Revolution of 1917, a dominant role was first played by the northern dialects and later by the southern dialects. The latter serve as the basis of the current literary language. Uzbek has been written in the Arabic, Latin, and Cyrillic scripts. In 1993 the government of Uzbekistan officially reinstated a modified Latin alphabet for the Uzbek language.

See also Turkic languages.

Uzbekistan, officially REPUBLIC OF UZBEKISTAN, Uzbek ŬZBEKISTON, or ŬZBEKISTON RESPUBLIKASI, country in Central Asia that gained independence from the Soviet Union in 1991. It is bounded by Kazakstan on the north and west; by Kyrgyzstan and Tajikistan on the east and southeast; by Turkmenistan on the southwest; and for a short distance in the south by Afghanistan. The capital is Tashkent (Toshkent). Area 172,700 square miles (447,400 square km). Pop. (1996 est.) 23,206,000.



Uzbekistan

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

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

Physical and human geography. Uzbekistan lies in the heart of Central Asia, largely between the Amu Darya (ancient Oxus River) in the southwest and the Syr Darya (ancient Jaxartes River) in the northeast. It includes the republic of Karakalpakstan (Qoraqalpoghistan) within its borders. Although Uzbekistan contains fertile oases and high mountain ranges in the south and east, almost four-fifths of the country consists of flat, sun-baked lowlands. These lie in the centre and west and merge to the south with the Kyzylkum (desert) and farther to the west with the Ustyurt Plateau, both of them arid. In the northwest the complex delta of the Amu Darya drains into the Aral Sea, the southern two-thirds of which extend into Uzbekistan. The Zeravshan River valley, in the southeast, is the Uzbeks' ancient cultural heartland and contains the historic cities of Bukhara (Bukhoro) and Samarkand (Samarqand). Mountains and their attendant river valleys, some of them with fertile soils and dense populations, are typical of the eastern one-fourth of the republic.

Uzbekistan has a climate that is very dry and distinctly continental. Summers are long and warm, and winters are short and generally mild. Temperatures in the summer average 90° F (32° C) in many parts of the country.

Uzbekistan's rivers originate in the southeast, in the mountains of Tajikistan and Kyrgyzstan; their waters are largely lost to irrigation and evaporation as they flow northwest through the dry lowlands of the centre and west, and many tributaries disappear in the sands or are captured for irrigation before they reach the main riverbed. The diversion of the waters of the Amu Darya and Syr Darya for irrigation has caused the Aral Sea, once the world's fourth largest inland lake, to shrink by almost half. The Aral Sea has become increasingly saline, and its waters have been polluted with chemical fertilizers and insecticides carried into it by feeder rivers, problems mirrored in the salinization and chemical poisoning of much of Uzbekistan's overused croplands.

The Uzbeks, a Muslim people speaking a language belonging to the southeastern, or Chagatai, branch of the Turkic language subfamily, make up more than seven-tenths of the republic's population. Russians account for less than one-tenth of the population; there are smaller numbers of Tajiks, Kazaks, Tatars, and Karakalpaks. The population is growing at a rapid rate owing to relatively low mortality rates and very high birth rates. The most densely populated areas are the Fergana and related valleys in the extreme east and the Zeravshan River valley in the south-central region.

Uzbekistan is one of Central Asia's major cotton growers and one of the largest cotton producers in the world. It is also important for the raising of Karakul sheep and of silkworms. Cattle raising and the cultivation of a wide variety of melons, grapes, and other fruits and vegetables form the remainder of its agriculture.

The republic is a major producer and exporter of natural gas, and it also has sizable reserves of petroleum, coal, and various metallic ores. In the Kuramin Range there are deposits of copper, zinc, lead, tungsten, and molybdenum. Uzbekistan is the main producer of machinery and heavy equipment in Central Asia. A chemical industry is closely connected with the Uzbek cotton industry, producing fertilizers for the cotton fields and deriving many other chemical products from

the by-products and waste materials of cotton processing.

The Uzbek government was formerly based on the model of the all-union Soviet government, with the Communist Party of Uzbekistan (CPU) holding de facto power at all levels. Opposition parties were allowed to organize but later were suppressed, and the CPU, which renamed itself the People's Democratic Party, still held power after elections held late in 1994. Under the 1992 constitution the chief executive is the president, and the legislative body of the republic is its Supreme Assembly.

Education in the republic is compulsory between the ages of 6 and 14. In the years before and after the collapse of Soviet rule, the republic undertook to switch from Russian to Uzbek in the educational curricula used in state schools. The centuries-old madrasahs (Islāmic theological schools) in Bukhara, Khiva, and Samarkand continue to function, though during the Soviet period they became dependent on state funding.

Over the centuries, the area now known as Uzbekistan has been a noted centre of Muslim culture. Outstanding scholars who came from the area include Muḥammad ibn Mūsā al-Khwārizmī, a 9th-century mathematician; Abū ar-Rayḥān al-Bīrūnī (973–1048), a 10th-century polymath and philosopher; Ulūgh Beg, a 15th-century astronomer who built an observatory at Samarkand; and the late 15th-century poet ʿAlī Shīr Navāʾī. During the Soviet period the republic's Muslims struggled to retain and protect their cultural inheritance.

History. The historical origins of the Uzbeks lie with the Mongols in the 13th century AD, when Genghis Khan's grandson Shibaqan received as his inheritance the territory lying north of the Syr Darya, between the Ural Mountains in the west and the Irtysh River in the east. Shibaqan's Mongols, which formed part of the Golden Horde (the western part of the Mongol Empire), ruled over nearly 100 mainly Turkic tribes, who would eventually intermarry with the Mongols to form the Uzbeks and other Turkic peoples of Central Asia. The Uzbek national name seems to have originated in the 14th century from Khan Öz Beg, under whom the Golden Horde reached its apogee; after about 1340 the territory over which he had ruled became known as "that of Öz Beg (or Uzbek)." Under Abū al-Khayr Khan (d. 1468), the Mongol-Uzbeks moved southeastward until they reached the north bank of the Syr Darya. Under Muḥammad Shaybānī (or Shaibani) Khan, Abū al-Khayr's grandson, the tribal federation the Uzbeks had formed in the early 16th century invaded and occupied the settled regions of Bukhara and Samarkand and, later, Urgench and Tashkent, where they ousted the earlier empire founded by Timur (Tamerlane). This area, which is sometimes called Transoxania ("beyond the Oxus"), became the Uzbeks' permanent homeland.

Even at this period the Uzbeks were far from homogeneous; they were a mixture of the descendants of ancient local Iranian populations, Turkic-speaking tribes, and their Mongol overlords. After occupying Transoxania, the Uzbeks became even more intermingled with other tribes such as the Karlyks and the Uighur.

Shaybānī's Uzbek dynasty ruled Transoxania until 1598, after which the region passed through various hands and gradually declined in its material prosperity and the level of its cultural life. By the 19th century the Uzbeks no longer had any political or national existence, and their land was under the nominal control of the khanates of Bukhara, Khiva, and Kokand, all three of which succumbed to Russian expansion in the period 1855–76.

The Uzbek Soviet Socialist Republic was created in 1924, within the Soviet Union. Under Soviet rule Uzbekistan concentrated on growing cotton with the help of irrigation, mechanization, and chemical fertilizers and pesticides. These policies, while making the republic a major producer of cotton, eventually caused serious environmental damage that came to affect the health of the Uzbek populace. In June 1990 Uzbekistan became the first Central Asian republic to declare that its own laws had sovereignty over those of the central Soviet government. Uzbekistan, as the republic is now known, achieved full independence in 1991.

The new state was dominated by the remnants of the former Communist Party, and life became difficult as the economy languished, despite the exploitation of petroleum wealth. The government fought an insurgency by Muslim militants attempting to replace the state with one governed under Islāmic law. Following the September 11 attacks (*q.v.*) on the United States (2001), Uzbekistan provided logistical support for the U.S. invasion of Afghanistan.

Uzhhorod, Russian UZHGOROD, also spelled UŽGOROD, Hungarian UNGVÁR, city and administrative centre of Zakarpattya *oblast* (province), western Ukraine. It is situated along the Uzh River just east of the Slovakian border. First mentioned in chronicles in 872 and founded in the late 9th century, Uzhhorod has long had commercial and military significance. It was under Hungarian control from the 11th to the late 17th century, when it became a possession of the Austrian Habsburgs. Nevertheless, Hungarian influence remained strong. It passed to Czechoslovakia in 1919, to Hungary in 1938, back to Czechoslovakia in 1945, and to the Soviet Union in the same year. Its population is predominantly Ukrainian, with significant numbers of Russians and Hungarians. Uzhhorod has long been an important cultural, educational, religious, and economic centre of the Carpathian region.

The city's industries include the manufacture of machine tools, furniture, and foodstuffs. It is the seat of Uzhhorod National University (founded 1945). Notable sites include a castle, a 17th-century cathedral, and an art museum. Pop. (2001) 117,317.

Uzi submachine gun, compact automatic weapon that is used throughout the world as a police and special-forces firearm. The Uzi is named for its designer, Uziel Gal, an Israeli army officer who developed it after the Arab-Israeli war of 1948. Gal based his weapon partly on earlier Czech designs, in which bullets were fed into the gun's chamber from a box-shaped magazine inserted into the pistol grip. The bullets were fired by a hollowed-out bolt that slid around much of the barrel as it shot forward. Gal combined these features to produce a gun that was easy to load, of unprecedented compactness, reasonably stable and accurate even when fired automatically, and extremely well-tooled and durable. The weapon was phased out by the Israeli army in 2003.

Issued in several designs, the standard Uzi is 650 mm (25.6 inches) long with its folding metal butt fully extended. The barrel is only 260 mm (10 inches) long. When loaded with a 25- or 32-round magazine of 9-millimetre pistol ammunition, the gun weighs about 4 kg (9 pounds). The Uzi has also been made in miniature versions that are as short as 460 mm (18 inches).

Užice, formerly (1947–92) TITOVO UŽICE, town, Serbia, Serbia and Montenegro. It lies along the Djetinja River and the Sarajevo-Čačak-Belgrade railway line. A medieval town of strategic importance, Užice was the headquarters for the Partisan army in autumn 1941. It was renamed in honour of Josip Broz Tito in 1946 but reverted to its old name in 1992. The Museum of the Insurrection is installed in the building that served as headquarters for Tito's Partisans. The town is a centre for a nonferrous metals and machinery industry and also for a livestock-breeding and fruit-growing region. The town's manufactures include rolled and drawn products of copper, aluminum, and their alloys. Pop. (2002) 54,717.

Uzlovaya, also spelled UZLOVAJA, city and centre of a *rayon* (sector), Tula *oblast* (province), western Russia. In Soviet times it developed as a centre of coal mining on the Moscow–Donets Basin railway; it was incorporated in 1938. Lignite (brown coal) is mined there. The city also has chemical industries and manufactures machinery for the mining industry. Pop. (2002) 59,763.

Uzun Ḥasan (b. 1423, Amida [now Diyarbakır, Turkey]—d. Jan. 6, 1478, Tabrīz [now in Iran]), ruler (1453–78) of the Turkmen Ak Koyunlu dynasty, who created a short-lived empire in Iran, Iraq, and Armenia.

With the death of Kara Osman, founder of the Ak Koyunlu dynasty, in 1435, a civil war ensued among his descendants. By 1453 Uzun Ḥasan had emerged victorious and succeeded to the throne. His principality, centred at Amida, was surrounded by two hostile powers: in the east, the rival Turkmen dynasty of Kara Koyunlu, led by Jahān Shāh; and in the west, the growing power of the Ottomans. Uzun Ḥasan entered into a series of alliances to secure his western flank. He made a major move in 1458 by marrying Catherine, the daughter of Kalo-Ioannes, the Christian emperor of Trebizond (in northeastern Anatolia). He also strengthened diplomatic ties with Venice, Muscovy, Burgundy, Poland, and Egypt and with the Karamanid dynasty of south-central Anatolia.

In 1461 Uzun Ḥasan began his campaigns against the Kara Koyunlu. With the death of Jahān Shāh in 1467, Uzun Ḥasan was able to annex territories in Azerbaijan and Iraq. By 1469 he had occupied all of Iran. Uzun Ḥasan's support of the Karamanids, however, precipitated war (1472) with the Ottomans (August 1473), who decisively defeated the Ak Koyunlu at the Battle of Terjan and thus emerged supreme in Anatolia.

Uzziah, also spelled OZIAS, also called AZARIAH, or AZARIAS, in the Old Testament (2 Chronicles 26), son and successor of Amaziah, and king of Judah for 52 years (*c.* 791–739 BC).

Assyrian records indicate that Uzziah reigned for 42 years (*c.* 783–742). His reign marked the height of Judah's power. He fought successfully against other nations and exacted tribute from the Ammonites. Judah expanded westward with settlements in Philistia.

During the period of Uzziah's reign, the nation prospered, and desert areas were reclaimed by water conservation. Jerusalem's walls were reconstructed, towers were added, and engines of war were mounted at strategic points. A large army was also maintained. The nation's prosperity under Uzziah was considered to have been a result of the king's fidelity to Yahweh.

According to the biblical record, Uzziah's strength caused him to become proud, which led to his destruction. He attempted to burn incense in the Temple, an act restricted to priests. When the priests attempted to send him from the Temple, the king became angry and was immediately stricken with leprosy. His son Jotham ruled for his father until Uzziah died.

V-1 missile, also called FLYING BOMB, BUZZ BOMB, or DOODLEBUG, German jet-propelled missile of World War II, the forerunner of modern cruise missiles.

More than 8,000 V-1s were launched against London from June 13, 1944, to March 29, 1945, with about 2,400 hitting the target area. A smaller number were fired against Belgium. The rockets were launched from the Pas-de-Calais on the northern coast of France and subsequently from other sites in German-occupied western Europe.

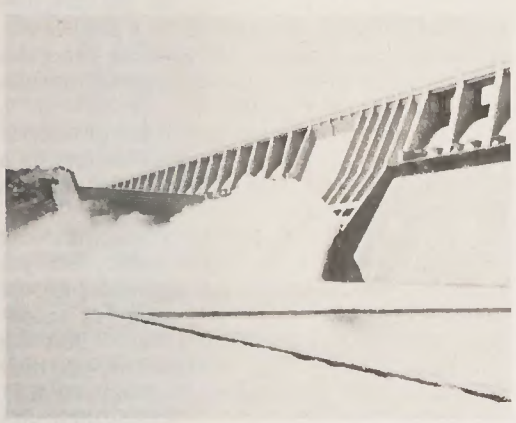
The V-1 was about 8 m (25 feet) long, exclusive of the long tailpipe of its jet engine, and had a wingspan of about 5.5 m. It was launched from catapult ramps or sometimes from aircraft. It carried a 900-kilogram (2,000-pound) explosive warhead at about 580 km (360 miles) per hour and had an average range of 240 km.

V-2 missile, also called V-2 ROCKET, formally A-4, German ballistic missile of World War II, the forerunner of modern space rockets and long-range missiles.

Developed in Germany from 1936, it was first fired against Paris on Sept. 6, 1944. Two days later the first of more than 1,300 V-2s was fired against Great Britain (the last on March 27, 1945). Belgium was bombarded almost as heavily. After the war, both the United States and the Soviet Union captured large numbers of V-2s and used them in research that led to the development of their missile and space exploration programs.

The V-2 was 14 m (47 feet) long, weighed 12,700–13,200 kg (28,000–29,000 pounds) at launching, and developed about 60,000 pounds of thrust, burning alcohol and liquid oxygen. The payload was about 900 kg of high explosive, horizontal range was about 350 km (220 miles), and the peak altitude usually reached was about 100 km.

Vaal River, northern tributary of the Orange River, South Africa. Rising at Sterkfontein Beacon near Breyten, in Eastern Transvaal province, it flows 750 miles (1,210 km) southwest to its confluence with the Orange near Douglas; the Vaal's middle section forms most of the Orange Free State's northern provincial boundary. It is basically a plateau river and occupies a shallow bed. Most of the year its flow is minimal, but the winter months can create the muddy torrent for which the Vaal ("Gray-brown") is named. The river's flow is regulated by the Vaal Dam, 23 miles (37 km) upstream of Vereeniging, where water is diverted into the Hartz Valley irrigation scheme. The river's major tributaries—the Klip, Wilge, Vals, Vet, and Riet rivers—enter on its left bank. The Vaal is fully developed economically, its waters used for the domestic and industrial needs of the Witwatersrand.



Vaal Dam on the Vaal River, South Africa
Authenticated News International

Vaasa, in full VAASAN LÄÄNI, Swedish VASA LÄN, *lääni* (province), western Finland, on the Gulf of Bothnia. The province's land rises from a level but indented coastline through generally forested country, with large cultivated plains, toward an eastern lake region. The timber industry and agriculture are important. The city of Vaasa is the province's administrative capital, main seaport, and largest city. Other important towns are Kaskö (Kaskinen), Kokkola, Kristinestad (Kristiinankaupunki), Pietarsaari (Jakobstad), Seinäjoki, and Nykarleby (Uusikaarlepyy). Area 10,200 square miles (26,418 square km). Pop. (1993 est.) 448,363.

Vaasa, Swedish VASA, town, capital of Vaasa *lääni* (province), western Finland, on the Gulf of Bothnia. Founded in 1606 by the Swedish king Charles IX, it was chartered in 1611 and named for the reigning house of Vasa. Finland's second Court of Appeal was instituted there in 1776. Devastated by fire in 1852, the town was soon rebuilt in a more strategic location some 5 miles (8 km) closer to the sea, and its name was officially changed to Nikolainkaupunki until 1917 (although its traditional name was always used locally). Vaasa was the provisional capital of Finland during the Finnish War of Independence (1918).

Vaasa is now an important port, exporting timber and importing other raw materials. Its industries include flour and textile mills, a sugar refinery, large bakeries, and machinery and soap factories. It has regular passenger and car ferry service to Sweden. Pop. (1993 est.) mun., 54,289.

Vaca, Álvar Núñez Cabeza de: *see* Núñez Cabeza de Vaca, Álvar.

vacancy, in crystallography, absence of an atom or molecule from a point that it would normally occupy in a crystal. Such an imperfection (crystal defect) in the regular spacing of atoms changes the electrical and optical properties of the crystal. The theory of colour centres holds that vacancies give colour to many solids. Vacancies can be created by mechanical deformation of the crystal, rapid cooling from high temperature, or the impact of radiation on the crystal. In the so-called Schottky defect, an atom moves from the inside of the crystal to its surface. In the Frenkel defect, an atom moves to a new position between other atoms of the solid. In either case, the empty space created by the migration of the atom is a vacancy. The relative numbers of these two types of defects vary from crystal to crystal. *See also* colour centre.

Văcărescu FAMILY, Romanian boyars of Phanariote (Greek) origin, a gifted family that gave the first poets to Romanian literature.

Ienăchiţă (1740–99), after traveling and studying in St. Petersburg and Vienna, wrote poems inspired by Russian folk songs. He wrote the first Romanian grammar book (*Gramatica românească,* 1787). His chief poems, *Amărîtă turturea* ("Sad Turtledove") and *Testamentul,* reveal a high artistic level and a mastery of a rich Romanian language. Ienăchiţă's sons, Alecu (1765–99) and Nicolae (1784–1825), also wrote poems inspired by folk songs and modern Greek anacreontics. They composed love poems and satires.

Iancu (1792–1863), son of Alecu, was the most important writer of the Văcărescu family. A poet several times exiled for his anti-Russian activity, he was the first Romanian playwright and also an able translator into Romanian of plays by Jean Racine, Molière, and August von Kotzebue. His *Colecţii de poezii* ("Collected Poems") appeared in 1848.

Elena (also spelled Hélène; 1866–1947), a niece of Iancu, was a poet and novelist who wrote in French. A maid of honour of Queen Elizabeth of Romania, she had a love affair with the Crown Prince (afterward King) Ferdinand; the marriage was opposed by King Carol I, and Elena was exiled to Paris, where she spent the rest of her life. She published many volumes of lyrical verse: *Chants d'aurore* (1886: "Dawn Songs"), for which she was awarded the prize of the French Academy; *L'Âme sereine* (1896; "The Serene Soul"); *Lueurs et flammes* (1903; "Gleams and Flames"); and *Dans l'or du soir* (1928; "In the Gold of the Evening"). She also wrote a few novels. In 1925 she was elected an honorary member of the Romanian Academy.

Vacarius (b. *c.* 1115–20, Lombardy [Italy]—d. after 1198, England), scholar of Roman (civil) and canon law, who was, at the nascent University of Oxford and elsewhere, the first known teacher of Roman law in England.

Educated at Bologna, Vacarius went to England to act as counsel to Theobald, archbishop of Canterbury, in his successful struggle (ending in 1146) to have the papal legateship transferred from the bishop of Winchester to himself. By 1149 Vacarius had become a popular lecturer on civil law. For those of his listeners who could not afford legal training, he is said to have prepared a treatise (nine books) on the Digest, or Pandects, and Codex of the Byzantine emperor Justinian I. Known as *Liber pauperum,* this work became one of the chief legal texts at Oxford, where, at an uncertain date, Vacarius began to teach. Oxford students of law soon were called *pauperistae,* in reference to his book.

King Stephen (reigned 1135–54) tried ineffectually to suppress Vacarius' teaching and to destroy civil and canon law books in England. After the accession of Henry II to the throne, however, Vacarius served his friend Roger of Pont l'Évêque, archbishop of York, as legal adviser, ecclesiastical judge, and envoy to the papal court. Apparently he shared Roger's antagonism to Thomas Becket, archbishop of Canterbury. Nothing is known of him after 1198 or 1199, when Pope Innocent III wrote to him concerning the Fourth Crusade.

vaccine, suspension of either weakened or killed microorganisms that is capable of causing antibody production against an infectious microorganism when artificially introduced into the body, thereby conferring immunity from a subsequent infection of that microorganism. A vaccine can also consist of the weakened toxins produced by microorganisms. Once stimulated by a vaccine, the antibody-producing cells of the body remain sensitized to the infectious agent and respond to reinfection by producing more antibodies, thus reinstituting the immune response. Vaccines may be produced from either bacteria or viruses, although they have been most effective in preventing viral diseases. Vaccines of weakened, or attenuated, microorganisms generally produce a mild or subclinical form of the disease. Attenuated vaccines include those for measles, hepatitis, and smallpox. Vaccines of inactivated, or killed, microorganisms also produce the immune response (*i.e.,* antibody production); however, greater quantities of the vaccine are required, and the time period before the appearance of the response is longer. Inactivated vaccines include those for influenza, rabies, and typhoid. Vaccines are given either orally or by injection.

The first vaccine was introduced by the British physician Edward Jenner in 1798 when he noted that the virus of cowpox (vaccinia) could produce lasting protection against smallpox when he inoculated humans with it. In 1881 Louis Pasteur demonstrated immunization against anthrax by means of the injection of a comparatively harmless attenuated culture of the bacillus causing that disease. Four years later he developed a vaccine for rabies. A widespread and intensive search for new vaccines was subsequently conducted. The resulting vaccines have been credited with the control of many former scourges. Smallpox has been eradicated through vaccination, and vaccines against polio, diphtheria, whooping cough, measles, and rubella have largely controlled these diseases in the devel-

oped world. Effective vaccines have also been developed for typhoid and paratyphoid fevers, cholera, plague, tuberculosis, undulant fever, tularemia, chronic staphylococcal and streptococcal infections, tetanus, influenza, yellow fever, some types of encephalitis, Rocky Mountain spotted fever, typhus, and hepatitis B, although some of these vaccines are used only in selected population groups at high risk. Interest in bacterial vaccines slackened with the introduction of antibiotics in the mid-20th century, but vaccines remain a mainstay in the fight against many infectious diseases.

In the late 20th century new types of vaccines were developed with the help of advanced laboratory techniques. Medical researchers became able to identify those biochemical components of a pathogen, or disease-causing microorganism, that stimulate the immune response to that organism in the body. Such a biochemical component can then be produced in the laboratory and subsequently administered to humans, upon whom it acts like any other vaccine. An improvement on this approach, using recombinant DNA technology, is to splice the gene which codes for the production of that immunity-causing component into the DNA of an entirely different microorganism, the vaccinia virus, which was formerly used as a smallpox vaccine. The altered virus is then injected into humans and stimulates antibody production both to itself and to the pathogen whose genes have been incorporated into it. This approach potentially enables the vaccinia virus to function as a live vaccine against several different diseases once it has received gene splices from the relevant disease-causing microorganisms. *See also* immunization.

Vaccinium, genus of about 150 species of shrubs, in the heath family (Ericaceae), found widely throughout the Northern Hemisphere and extending south along tropical mountain ranges. The shrubs are erect or creeping, with alternate, deciduous or evergreen leaves. The small flowers resemble those of the true heaths (*Erica*), but the ovary is beneath the flower. The flowers are clustered in the leaf axil (the upper angle between the leaf stem and the main stem) or are solitary. The berries are usually edible.

More than 40 species of *Vaccinium* shrubs occur in North America, especially in the northern and mountainous parts. The highbush blueberry (*V. corymbosum*) and other species of blueberries are found in the eastern United States and adjacent Canada. The cowberry (*V. vitis-idaea*), also known as red whortleberry, or mountain cranberry, grows in northern Canada. Several species occur in the Rocky Mountains region. More than 10 species are found in the Pacific states, including the western blueberry (*V. occidentale*), the red bilberry (*V. parvifolium*), and the California blueberry (*V. ovatum*).

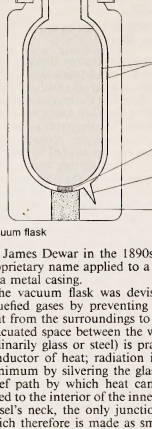
Four species occur in Great Britain: the bilberry (*V. myrtillus*), also called blaeberry, or whortleberry; the bog bilberry (*V. uliginosum*); the small-fruited cranberry (*V. oxycoccus*); and the cowberry. All are widely distributed throughout Europe, Asia, and North America. *See also* bilberry; blueberry; cranberry.

Václav (Czech personal name): *see under* Wenceslas.

Vacoas-Phoenix, town (township) on the island of Mauritius, in the western Indian Ocean. It lies in the western highlands region of the country, about 10 miles (16 km) south of Port Louis, the national capital. Vacoas and Phoenix were separate villages until 1963, when they became a single administrative unit; later (1968) the town became independently administered. Major industries include beer brewing, vegetable canning, and the manufacture of cosmetics and garments. The town has well-surfaced roads, and a major highway links it with Port Louis. Sugarcane and vegetables grown in the surrounding region are marketed in the town. Pop. (1983 prelim.) 56,011.

vacuole, in biology, a space within a cell that is empty of cytoplasm, lined with a membrane, and filled with fluid. Especially in protozoa, vacuoles are cytoplasmic organs (organelles), performing functions such as storage, ingestion, digestion, excretion, and expulsion of excess water. The large central vacuoles often found in plant cells enable them to attain a large size without accumulating the bulk that would make metabolism difficult.

vacuum flask, also called DEWAR VESSEL, or THERMOS FLASK, vessel with double walls, the space between which is evacuated. It was invented by the British chemist and physicist



Vacuum flask

Sir James Dewar in the 1890s. Thermos is a proprietary name applied to a form protected by a metal casing.

The vacuum flask was devised to preserve liquefied gases by preventing the transfer of heat from the surroundings to the liquid. The evacuated space between the walls (which are ordinarily glass or steel) is practically a nonconductor of heat; radiation is reduced to a minimum by silvering the glass or steel. The chief path by which heat can be communicated to the interior of the inner vessel is at the vessel's neck, the only junction of the walls, which therefore is made as small as possible. This thermal isolation applies equally to heat, a hot liquid remaining at a high temperature in the flask for several hours.

vacuum technology, all processes and physical measurements carried out under conditions of below-normal atmospheric pressure. A process or physical measurement is generally performed in a vacuum for one of the following reasons: (1) to remove the constituents of the atmosphere that could cause a physical or chemical reaction during the process (*e.g.*, vacuum melting of reactive metals such as titanium); (2) to disturb an equilibrium condition that exists at normal room conditions, such as the removal of occluded or dissolved gas or volatile liquid from the bulk of material (*e.g.*, degassing of oils, freeze-drying) or desorption of gas from surfaces (*e.g.*, the cleanup of microwave tubes and linear accelerators during manufacture); (3) to extend the distance that a particle must travel before it collides with another, thereby helping the particles in a process to move without collision between source and target (examples of uses are in vacuum coating, particle accelerators, television picture tubes); (4) to reduce the number of molecular impacts per second, thus reducing chances of contamination of surfaces prepared in vacuum (useful in clean-surface studies).

For any vacuum process a limiting parameter for the maximum permissible pressure can be defined. It can be the number of molecules per unit volume (reasons 1 and 2), the mean free path (reason 3), or the time required to form a monolayer (reason 4).

At room temperature and normal atmospheric pressure, 1 cubic foot (0.03 cubic m) of air contains approximately 7×10^{23} molecules moving in random directions and at speeds of around 1,000 miles per hour (1,600 kilometres per hour). The momentum exchange imparted to the walls is equal to a force of 14.7 pounds for every square inch of wall area. This atmospheric pressure can be expressed in a number of units, but until relatively recently it was commonly expressed in terms of the weight of a column of mercury of unit cross section and 760 mm high. Thus, one standard atmosphere equals 760 mm Hg, but to avoid the anomaly of equating apparently different units, a term, torr, has been postulated; one standard atmosphere = 760 torr (1 torr = 1 mm Hg). This term was replaced in 1971 by an SI unit defined as the newton per square metre (N/m^2) and called the pascal (one pascal = 7.5×10^{-3} torr).

The first major use of vacuum technology in industry occurred about 1900 in the manufacture of electric light bulbs. Other devices requiring a vacuum for their operation followed, such as the various types of electron tube. Furthermore, it was discovered that certain processes carried out in a vacuum achieved either superior results or ends actually unattainable under normal atmospheric conditions. Such developments included the "blooming" of lens surfaces to increase the light transmission, the preparation of blood plasma for blood banks, and the production of reactive metals such as titanium. The advent of nuclear energy in the 1950s provided impetus for the development of vacuum equipment on a large scale. Increasing applications for vacuum processes were steadily discovered, as in space simulation and microelectronics.

Various kinds of devices have been developed for producing, maintaining, and measuring a vacuum. Several of the more significant types are described below.

Oil-sealed rotary pump. Capacities are available from ½ to 1,000 cubic feet per minute, operating from atmospheric pressure down to as low as 2×10^{-2} torr for single-stage pumps and less than 5×10^{-3} torr for two-stage pumps. The pumps develop their full speed from atmosphere to about one torr, the speed then decreasing to zero at their ultimate pressures. One device of this type, useful for pumping both liquids and gases, is a two-bladed pump in which the rotor is eccentric to the stator, so forming a crescent-shaped volume that is swept by the blades through the outlet valve. Another variety, a rotary piston pump, is similar to a single-bladed pump, but the single blade is part of the sleeve fitting around the rotor. The blade is hollow and acts as an inlet valve, closing off the pump from the system when the rotor is at top centre.

Ultimate pressures attainable are limited by leakage between the high- and low-pressure sides of the pump (due mainly to carryover of gases and vapours dissolved in the sealing oil that flash off when exposed to the low inlet pressure) and decomposition of the oil exposed to hot spots generated by friction.

Typical applications of this pump are in food packaging, high-speed centrifuges, and ultraviolet spectrometers. It is also widely used as a forepump or a roughing pump, or both, for most of the other pumps described.

Mechanical booster. Capacities are available from 100 to 70,000 cu ft per minute,

operating usually in the pressure range of 10 to 10^{-3} torr. The peak speed of the pump is developed in the pressure range of 1 to 10^{-2} torr, the speed at the lower end of the pressure range depending on the type of forepump used. A typical mechanical booster utilizes two figure-eight-shaped impellers, synchronized by external gears, rotating in opposite directions inside a stator. The gas is trapped between the impellers and the stator wall and transferred from the high vacuum to the fore vacuum side of the pump. The mechanical booster must be backed by another pump in series when working in its normal pressure range. The most frequently used type of forepump is the oil-sealed rotary pump. Typically, the mechanical booster is employed for pumping vacuum-melting furnaces, in an impregnation plant for electrical equipment, and in low-density wind tunnels.

Vapour diffusion pump. This pump is mainly used on equipment for the study of clean surfaces and in radio-frequency sputtering. Capacities are available up to 190,000 cu ft per minute with an operating pressure range of 10^{-2} to less than 10^{-9} torr when water-cooled baffles are used and less than 10^{-11} torr when refrigerated baffles are employed. The pumping speed for a vapour pump remains constant from about 10^{-3} torr to well below the ultimate pressure limitations of the pump fluid—that is, with the best fluids to pressures of better than 10^{-9} torr. The diffusion pump is initially evacuated by an oil-sealed rotary pump to a pressure of about 0.1 torr or less. When the pump fluid in the boiler is heated, it generates a boiler pressure of a few torr within the jet assembly. High-velocity vapour streams emerge from the jet assembly, impinge and condense on the water- or air-cooled pump walls, and return to the boiler. In normal operation a portion of any gas arriving at the inlet jet is entrained, compressed, and transferred to the next stage. This process is repeated until the gas is removed by the mechanical forepump.

Sputter ion pump. Capacities are available up to 14,000 cu ft per minute, with an operating pressure range of 10^{-2} torr to below 10^{-11} torr. The full speed of the pump is developed in the pressure range from about 10^{-6} to 10^{-8} torr, although the characteristic at the lower pressure is dependent on pump design. This pump makes use of the sputtering principle, in which a cathode material such as titanium is vaporized—or sputtered by bombardment with high-velocity ions. The active gases are pumped by chemical combination with the sputtered titanium, the inert gases by ionization and burial in the cathode, and the light gases by diffusion into the cathode.

A typical pump consists of two flat rectangular cathodes with a stainless steel anode between them made up of a large number of open-ended boxes. This assembly, mounted inside a narrow box attached to the vacuum system, is surrounded by a permanent magnet. The anode is operated at a potential of about seven kilovolts (kV), whereas the cathodes are at ground potential.

Sputter ion pumps have a long life and can provide ultrahigh vacuum, free of organic contamination and vibration. They are employed mainly for clean-surface studies and in those applications where any organic contamination will give unsatisfactory results.

Titanium sublimation pump. Capacities are available up to many thousands of cu ft per minute, operating in the pressure range of 10^{-3} to below 10^{-11} torr. The full speed of the pump, which only pumps chemically reactive gases, is developed at pressures below 10^{-5} torr. In this type of pump, titanium is sublimed onto the pump walls from either a resistance or an electron-beam heated source. Active gases are pumped by chemical combination, but inert gases are not pumped. As a consequence, it must always be used in conjunction with a diffusion or sputter ion pump. At pressures below 10^{-5} torr the film will be deposited faster than it is being consumed, allowing deposition to be carried out at intervals rather than on a continuous basis. Sublimation pumps are generally used in conjunction with a sputter ion pump in applications where a high speed is required and freedom from organic contamination is essential, as in the evaporation of materials onto a clean surface.

Sorption pump. Typically, the size of these pumps is about 1,000 grams of sorbent material, which retains gas molecules on its surface. They are capable of pumping from atmosphere to 10^{-2} torr or can be used in series down to 10^{-5} torr. In most cases the sorbent material is a molecular sieve—that is, a material that has been processed so that it is porous, with pore sizes comparable to the size of molecules, although activated charcoal can also be employed. The sorbent is positioned inside a cylindrical container that is connected to the vacuum system and that can be immersed in liquid nitrogen for supercooling to aid the sorption process. The gas is released when the sorbent returns to room temperature. This pump is used mainly for roughing systems in which the sputter ion and titanium sublimation pumps serve to ensure freedom from organic contamination.

Cryopump. This type of pump utilizes extremely low temperatures to condense gases and thus remove them from the system. Pumping speeds of millions of cu ft per minute are possible with the cryopump over the pressure range 10^{-3} torr to well below 10^{-10} torr. This type of pump can develop its full speed curve over the entire pumping range. Most cryopumps employ helium to cool the low-temperature surface; the helium can be in the form of gas at about 15 K or liquid helium at 4.2 K. A cryopump, which depends on the condensation of the gas for its pumping speed, will not effectively pump gases, such as helium and hydrogen, that have high vapour pressures at the low-temperature surface. Consequently, complementary diffusion or sputter ion pump capacity is a necessary adjunct to a cryopump vacuum-producing system. Most such pumps are used in high-altitude or space simulation.

McLeod gauge. The McLeod gauge takes advantage of Boyle's law (the product of pressure and volume for a given quantity of gas remains constant if a constant temperature is maintained) to determine gas pressure within a range of 10 to 10^{-6} torr. Raising the mercury level in the McLeod gauge seals off the gas from the system to which the gauge is connected. When the level of mercury is raised further, the gas is compressed. The difference in levels of mercury between this trapped volume and the system being evacuated corresponds directly to the pressure in torr in the trapped volume. As the gauge depends only on the known initial volume trapped, the final compressed volume, and the pressure in this final volume—all of which can be directly measured—it is called an absolute gauge and is mainly a standard for calibrating other gauges.

Thermal conductivity gauges. Two types of thermal conductivity gauges, the Pirani and the thermocouple, determine pressure by the rate at which heat is dissipated from a hot filament. The Pirani gauge basically is a Wheatstone bridge with one arm in the form of a heated filament placed in the vacuum system. The resistance of the filament depends on its temperature, which, in turn, depends on the rate of dissipation of thermal energy through the residual gas. Thermal energy dissipation is affected by the pressure and thermal conductivity characteristics of the residual gas. The bridge is powered from a constant voltage source, and out-of-balance current due to temperature changes is indicated directly in torr. In the thermocouple gauge, the hot junction of the thermocouple is attached to a filament in the vacuum system and powered from a constant voltage source. The mode of operation is the same as that of the Pirani except that the temperature of the filament indicates the pressure. These gauges are rugged and simple to operate and cover a range of from 100 to 10^{-4} torr.

Cold-cathode ionization gauge. This gauge makes use of the fact that the rate of ion production by a stream of electrons in a vacuum system is dependent on pressure and the ionization probability of the residual gas. Also called the Penning gauge, it consists of two cathodes opposite one another with an anode centrally spaced between them inside a metal or glass envelope. Outside the envelope a permanent magnet provides a magnetic field to lengthen the path travelled by the electron in going from cathode to anode, thus increasing the amount of ionization occurring within the gauge. Normally the anode is operated at about 2 kV, giving rise to a direct current caused by the positive ions arriving at the cathode. The pressure is indicated directly by the magnitude of the direct current produced. The pressure range covered by this gauge is from as low as 10^{-7} torr. It is widely used in industrial systems because it is rugged and simple to use.

Hot-filament ionization gauge. The operating principles of this gauge are similar to the Penning gauge except that the electrons are produced by a hot filament and accelerated to a grid. The pressure range covered is either 1 to 10^{-3} torr or 10^{-3} to 10^{-7} torr, depending on the electrode structure. Electrons emitted from the filament ionize residual gas molecules in the container being evacuated; the ion current arriving at the collector plates is directly proportional to the pressure and the ionization probability of the residual gas. This is a clean, accurate gauge that can be used down to about 10^{-6} torr; below this pressure its accuracy is reduced due to the soft X-rays produced by electrons striking the grid. These X-rays generate a current in the collector circuit independent of pressure.

Bayard-Alpert hot-filament ionization gauge. In this ionization gauge, the cross section of the collector is reduced to minimum to reduce the X-ray effect. This is achieved by inverting the gauge—that is, the collector (a fine wire) is surrounded by the grid. The pressure range covered is 10^{-3} to 10^{-9} torr or down to 10^{-11} torr if a modulated instrument is used. Operating principles are the same as for the other ionization gauges described above.

vacuum tube: *see* electron tube.

Vaḍakalai (Tamil), Sanskrit UTTARA-KALĀRYĀ, one of two Hindu subsects of the Śrīvaiṣṇava, the other being the Teṅkalai. Though the two groups use both Sanskrit and Tamil scriptures, the Vaḍakalai relies more on Sanskrit texts, such as the Vedas (earliest sacred scriptures of India), the *Upaniṣads* (early religiophilosophic texts), and the religious poem the *Bhagavadgītā*. Their main point of disagreement, however, is on the question of God's grace. The Vaḍakalai contend that some effort is required on the part of the devotee who seeks deliverance, and they use as an example the baby monkey, which, when carried, holds fast to its mother. Its theory is thus called *markaṭa-nyāya* (the analogy of the monkey). The performance of religious duties is also expected. The two groups also hold different views about Viṣhnu's consort, Śrī (Lakṣmi). The Vaḍakalai believe that she is indistinguishable from the Lord and can grant the grace necessary for spiritual liberation.

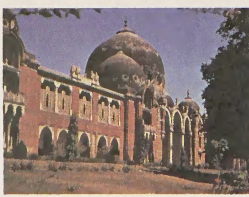
The Vaḍakalai are referred to as the northern school (as opposed to the southern school, the Teṅkalai) because their main centre is in Mysore. Their most important teacher was Vedāntadeśika, also known as Veṅkaṭanātha,

who lived sometime during the late 14th century. *See also* Teṇkalai.

Vadianus, Joachim, original name JOACHIM VON WATT (b. *c.* 1484, Sankt Gallen, Switz.—d. April 6, 1551, Sankt Gallen), Swiss religious reformer and one of the most important native Swiss Humanists.

Crowned poet laureate by the Habsburg emperor Maximilian (1514), Vadianus served as rector at the University of Vienna (1516–17) and supervised the publication of the works of various ancient writers, notably Ovid and Pliny the Elder. Later he practiced medicine at Sankt Gallen, where he was mayor in 1526. He used both his political influence and his power as a popular preacher to establish the Reformation in the city. He presided at the second debate at Zürich (1523) over doctrines of the reformer Huldrych Zwingli and at a similar debate at Bern (1528) over the preaching of Berthold Haller. He produced a number of minor historical works.

Vadodara, also called BARODA, city, administrative headquarters of Vadodara district, east central Gujarāt state, west central India, on the Viśvāmitra River, southeast of Ahmadābād. The earliest record of the city is in a grant



The Maharaja Sayajirao University of Baroda at Vadodara, Gujarāt, India
Vidyavrata

or charter of AD 812 that mentions it as Vadapadraka, a hamlet attached to the town of Ankottaka. In the 10th century Vadapadraka displaced Ankottaka as the urban centre. It seems also to have been known as Chandanavati, after Raja Chandan of the Dor Rājputs, who wrested it from the Jainas. The city underwent periodic renamings, to Varāvati, Vatpatraka, Baroda, and, in 1971, Vadodara.

The history of Vadodara falls into a Hindu period (until 1297); a period under the Muslim Delhi sultanate (1297–*c.* 1401); an independent Gujarāt sultanate, during which the nucleus of the present city was built (*c.* 1401–*c.* 1573); a Mughal Empire period (*c.* 1573–1734); and a Marāthā period, during which it became the capital of the powerful Gaekwar family (1734–1947). In 1802 the British established a residency in the city to conduct relations between the East India Company and the Gaekwars; later it was also responsible for British relations with all the states of Gujarāt and the Kāthiāwār Peninsula.

The long history of Vadodara is reflected in its many palaces, gates, parks, and avenues. It houses the Maharaja Sayajirao University of Baroda (1949) and other educational and cultural institutions, including several museums. Among the city's varied products are cotton textiles and homespun cloth, chemicals, matches, machinery, and furniture. Vadodara is a rail and highway junction and has an airfield.

Vadodara district occupies 3,007 sq mi (7,788 sq km), extending from the Narmada River (south) to the Mahi River (north). It corresponds roughly to the capital division, or district, of the former princely state of Baroda (the Gaekwar dominions). Cash crops are cotton, tobacco, and castor beans. Wheat, pulses, corn (maize), rice, and garden crops are grown for local use and export. Pop. (2001 prelim.) city, 1,306,035; metropolitan area, 1,492,398; district, 3,639,775.

vadose zone, region of aeration above the water table. This zone also includes the capillary fringe above the water table, the height of which will vary according to the grain size of the sediments. In coarse-grained mediums the fringe may be flat at the top and thin, whereas in finer grained material it will tend to be higher and may be very irregular along the upper surface. The vadose zone varies widely in thickness, from being absent to many hundreds of feet, depending upon several factors. These include the environment and the type of earth material present. Water within this interval, which is moving downward under the influence of gravity, is called vadose water, or gravitational water.

Vadsø, town and seat of Finnmark *fylke* (county), northern Norway. Located on the northern shore of Varangerfjorden, the original settlement was on the adjacent island of Vassøya, but in the early 1700s the port was reestablished on the mainland. Vadsø received its town charter in 1833, and the town prospered, principally through trade with Russia. It was almost totally destroyed by the Germans during World War II but has been rebuilt. The inhabitants, almost one-half of whom are Finnish, long have depended primarily on fishing and fish processing. Pop. (1999 est.) 6,182.

Vadstena Bracteate, gold coin-like ornament with runic inscriptions and rich designs, discovered in Östergötland, Swed., probably dating from the 5th century. A 24-character futhark (runic alphabet), arranged in three groups of eight symbols, is engraved on it, followed by eight characters, *tuwa tuwa,* of unknown, perhaps magical, significance. The bracteate is the oldest and best record of the tripartite division of the futhark. An old replica was found at Motala, Swed., and a variant at Grumpan. The bracteate had obviously been used as an amulet; the purpose of the runes had been to protect the wearer.



Vadstena Bracteate
By courtesy of Kungl. Vitterhets Historie Och Antikvitets Akademien, Stockholm

Vaduz, capital of Liechtenstein, central Europe, in the Rhine Valley. The seat of one of the two former lordships (Schellenberg and Vaduz) that united to form the principality in 1719, Vaduz is a flourishing tourist centre and the residence of the ruling prince, whose castle overlooks the town. Mentioned in a document of *c.* 1322, destroyed in the Swabian Wars



Vaduz castle, Liechtenstein
Josef Muench

(1499), and rebuilt in the following centuries, the castle was restored in 1905–16 in 16th-century style. Although it has belonged to the princes since 1712, Francis Joseph II, who succeeded to the monarchy in 1938, was the first to make it his permanent residence. The town's Fürst Liechtensteinische Gemäldegalerie displays parts of the world-famous art collection of the princes of Liechtenstein. The State Art Collection includes works by 20th-century painters, and the Liechtenstein Postal Museum has a collection of stamps, including all of those issued by the country since 1912. Pop. (2000 est.) 5,043.

Vaganova, Agrippina (Yakovlevna) (b. July 6, [June 24, old style], 1879, St. Petersburg, Russia—d. Nov. 5, 1951, Leningrad), ballerina and teacher who developed a technique and system of instruction based on the classic style of the Imperial Russian Ballet but which also incorporated aspects of the more vigorous, acrobatic Soviet ballet developed after the Revolution. Her pupils included such outstanding dancers as Marina Semenova, Natalia Dudinskaya, and Galina Ulanova.

Vaganova was herself a student of outstanding teachers, and she also learned from observing Enrico Cecchetti and his student the prima ballerina Olga Preobrajenska. Upon graduation in 1897 from the Russian Imperial School of Ballet, St. Petersburg, she joined the Mariinsky (now Kirov) Theatre, where she became known as "queen of variations" for her soaring leaps and brilliant footwork. Although she danced the ballerina roles of Odette-Odile (*Swan Lake*), the Tsar-Maiden (*The Humpbacked Horse*), and the Mazurka (*Chopiniana*), she was not given official ballerina ranking until 1915, two years before her retirement from the stage.

Vaganova began her teaching career after the Revolution and in 1921 joined the Leningrad Khorteknikum (formerly the Imperial Ballet School), becoming its director in 1934. She also trained teachers at the Leningrad Ballet School (1934–41) and the Leningrad Conservatory (1946–51), where she was appointed professor. Her teaching system emphasized harmony and coordination of all parts of the body but particularly developed the back, enabling her students to make soaring leaps and manoeuvre while in the air.

She staged many ballets for the Mariinsky (Kirov) company, notably *Swan Lake* (1933), with Galina Ulanova as Odette-Odile. In 1936 she was made Peoples' Artist of the Russian Soviet Federated Socialist Republic. Her writings include a collection of memoirs and letters, *Agrippina Yakovlevna Vaganova* (1958), and the widely used textbook, *Fundamentals of the Classic Dance* (1934), which has been translated into many languages, including an English version by Anatole Chujoy (1946).

vagina, canal in female mammals that receives the male reproductive cells, or sperm, and is part of the birth canal during the birth process. In humans, it also functions as an excretory canal for the products of menstruation.

In humans the vagina is about 9 cm (3.5 inches) long; it is located in front of the rectum and behind the bladder. The cervix of the uterus connects to the upper region of the vagina. The vaginal channel is narrowest at the upper and lower ends. In most virgins, the external opening to the vagina is partially closed by a thin fold of tissue known as the hymen. The opening (vaginal orifice) is partially covered by the labia majora.

The lining of the vaginal cavity responds to stimulation from the various ovarian hormones by either building new cell layers or shedding the old ones. The thickness of the lining varies directly with the amount of estrogen liberated from the ovaries; the lining is thickest and most elastic during ovulation (egg release from the ovaries) and during pregnancy. The vaginal lining characteristically has several transverse ridges known as vaginal rugae, which permit expansion of the vaginal cavity. These tend to disappear in older women and in those women who have borne children.

There are no glands in the vaginal wall. The mucus that lubricates the vaginal cavity had traditionally been ascribed to the cervix or to the Bartholin's glands in the labia. After extensive clinical observation, however, William H. Masters and Virginia Johnson reported in 1966 that vaginal lubrication during sexual excitement was supplied by the seepage of a mucuslike fluid through the walls of the vagina. The cells in the lining contain large quantities of glycogen (stored animal starch). Bacteria within the vagina ferment the glycogen, so that lactic acid is produced. The lactic acid makes the surface of the lining slightly acidic, thus protecting against disease-causing microorganisms that have gained entry via the vaginal orifice.

The muscle walls of the vagina are thick and elastic in order to accommodate both the movement of the penis during intercourse and the passage of a child during delivery. The muscular wall is composed of two layers of muscle fibres, a weak internal circular layer and a strong external longitudinal layer. Covering the muscle tissue is a sheath of connective tissue that consists of blood vessels, lymphatic ducts, and nerve fibres. This layer joins those of the urinary bladder, rectum, and other pelvic structures.

Maladies that can affect the vagina include bacterial infections (*see* leukorrhea; vaginitis), ulcerated sores, prolapse (in which the internal portions of the vagina protrude out of the vaginal orifice), and occasionally cancerous tumours.

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

vaginismus, muscle spasm that closes the opening to the vagina in the female reproductive tract. The vagina serves as a birth canal for the delivery of babies and as the copulatory organ during sexual intercourse. The spasm may be so intense that the vagina seems pathologically obstructed. Vaginismus is a protective mechanism that sometimes develops when there are tender lesions in the reproductive tract. More commonly, it is an involuntary physiological manifestation of fear or anxiety that is experienced at the prospect of sexual intercourse. Vaginismus can totally prevent coitus or make it extremely difficult, a condition known as dyspareunia.

vaginitis, inflammation of the vagina, usually owing to infection. The chief symptom is leukorrhea, *i.e.,* the abnormal flow of a whitish or yellowish discharge from the vagina. The treatment of vaginitis depends on the cause of the inflammation. Several different microorganisms can produce vaginitis in women of reproductive age; atrophic vaginitis, caused by reduced estrogen levels, can occur in women after menopause; and certain chemicals can cause an irritant or allergic vaginitis.

Among the microorganisms that commonly cause vaginitis are *Candida albicans,* a common yeast that is the cause of candidiasis; *Gardnerella* bacteria; and *Trichomonas vaginalis,* a protozoan. The last two types of vaginal infections are usually transmitted from males to females through sexual contact and help make vaginitis one of the most common sexually transmitted diseases. Candidiasis can also occur during pregnancy and can cause infant thrush in children born to infected mothers. Treatment of these infectious forms of vaginitis is by appropriate antimicrobial drugs.

Atrophic vaginitis occurs in postmenopausal women because the lack of estrogen stimulation causes the surface membrane of the vagina to become thin, dry, and fragile, increasing the likelihood of infection. Regular treatment with an estrogen cream restores the protective surface and eliminates vaginitis.

Articles are alphabetized word by word, not letter by letter

vagrancy, state or action of one who has no established home and drifts from place to place without visible or lawful means of support. Traditionally a vagrant was thought to be one who was able to work for his maintenance but preferred instead to live idly, often as a beggar. The punishment for this ranged from branding and whipping to conscription into the military services and transportation to penal colonies. In English law, a man who deserted his wife and children was considered a vagrant, as was any man who gave a false account of himself.

The vagueness of the common-law meanings of vagrancy has been reflected in subsequent statutory law. In the United States and northern Europe, vagrancy must generally be accompanied by the act of begging before it becomes punishable. Usually local authorities merely encourage the vagrant to move on, relieving themselves of the financial burden of maintaining the offender. In some countries the term describes a more serious offense than begging. Often it applies to a person who has a fixed habitation but pursues a calling condemned by the law as immoral, such as prostitution or gambling.

Vagrancy is frequently used by police and prosecutors as a tool for proscribing a wide range of behaviour. Political demonstrations, the obstruction of streets or walks, riotous activities, and loitering have all been variously interpreted as violations of vagrancy laws. This fluid application of a vague statute or ordinance has been heavily criticized by legal scholars and civil libertarians. The United States Supreme Court declared a Florida state statute unconstitutional in February 1972 on the grounds that its terms were not sufficiently explicit to inform those subject to it what conduct would render them liable to its penalties. *See also* disorderly conduct.

vagus nerve, also called TENTH CRANIAL NERVE, longest and most complex of the cranial nerves. The vagus nerve runs from the brain through the face and thorax to the abdomen. It is a mixed nerve that contains parasympathetic fibres. The vagus nerve has two sensory ganglia (masses of nerve tissue that transmit sensory impulses): the superior and the inferior ganglia. The branches of the superior ganglion innervate the skin in the concha of the ear. The inferior ganglion gives off two branches: the pharyngeal nerve and the superior laryngeal nerve. The recurrent laryngeal nerve branches from the vagus in the lower neck and upper thorax to innervate the muscles of the larynx (voice box). The vagus also gives off cardiac, esophageal, and pulmonary branches. In the abdomen the vagus innervates the greater part of the digestive tract and other abdominal viscera.

The vagus nerve has the most extensive distribution of the cranial nerves. Its pharyngeal and laryngeal branches transmit motor impulses to the pharynx and larynx; its cardiac branches act to slow the rate of heartbeat; its bronchial branch acts to constrict the bronchi; and its esophageal branches control involuntary muscles in the esophagus, stomach, gallbladder, pancreas, and small intestine, stimulating peristalsis and gastrointestinal secretions.

Váh River, tributary of the Danube River in Slovakia. Rising in the Tatra Mountains as the Biely Váh (in the High Tatras) and Čierny Váh (in the Low Tatras), the river describes a long arc to the west and south. It joins the Little Danube to become the Váh Danube (Vážský Dunaj), which forms the eastern limit of Great Rye Island, and after several miles enters the Danube River at Komárno, in extreme southern Slovakia, after a course of 242 miles (390 km). The area of its drainage basin is 4,109 square miles (10,641 square km). The Váh has a large number of tributaries, many of which fall steeply off the Tatras and the outer ranges of the Carpathians. The east-west valley formed by its upper course provides a natural transportation route across Slovakia that is followed by major road and rail arteries; the river's north-south valley between Žilina and Bratislava similarly serves as a corridor. The river flows rapidly—particularly when swollen by seasonal meltwater, since the Tatras have few storage lakes—through a picturesque valley. There are numerous small hydroelectric-power stations along the Váh.

vāhana (Sanskrit: "mount," or "vehicle"), in Hindu mythology, the creature that serves as the vehicle and as the sign of a particular deity. The *vāhana* accompanies, pulls the chariot of, or serves as the seat or mount of his god. The *vāhana* is also used on banners and emblems to identify the god or the cult affiliation of the devotee.

Some scholars understand the concept as a way of incorporating local theriomorphic (animal form) deities into the classical pantheon of Hindu deities. Others suggest the mythological pattern might have been borrowed from Mesopotamian art and mythology.

The *vāhanas* of the major gods, such as Śiva's bull Nandi and Vishnu's bird Garuḍa, have a considerable mythology of their own. The *vāhanas* of other gods include the *haṃsa* (goose or swan) of Brahmā, the rat of Gaṇeśa, the peacock of Skanda, the elephant Airāvata of Indra, the parrot of Kāma, the owl of Lakṣmī, the lion of Pārvatī, and the man of Kubera.

Vahideddin, Mehmed (Ottoman sultan): *see* Mehmed VI.

Vaida-Voevod, Alexandru (b. 1872, Olpret, Transylvania [now in Romania]—d. March 19, 1950, Bucharest), politician who served three times as prime minister of Romania (1919–20, 1932, 1933) and was a leading spokesman for the union of Transylvania with the lands of the Old Kingdom (Moldavia and Walachia).

A native of Hungarian-ruled Transylvania, Vaida-Voevod joined a small Romanian nationalist group in the Hungarian Parliament after 1906, becoming one of the foremost opponents of the governmental policy of forced Magyarization of national minorities. In Oc-

tober 1918 he presented a resolution to Parliament announcing Transylvania's right to self-determination, and in December 1918, following Hungary's surrender to the Allies in World War I, he won appointment to the Transylvanian directing council, which proclaimed union with Romania. He subsequently joined the Romanian delegation to the post-World War I peace conference at Paris (1919).

Following the successes of his National Party in the elections of November 1919, Vaida-Voevod was named Romanian prime minister in a coalition government. His radical approach to national land reform prompted the intervention of King Ferdinand, who dissolved the administration by fiat (March 1920). From 1928 to 1930 Vaida-Voevod served as minister of the interior; and from August to October 1932 he held simultaneously the prime ministry and the ministry of foreign affairs. His final ministry (January–November 1933) was marked by widespread labour unrest and growing fascist activity. After his dismissal from office, he formed his own virulently nationalist, semifascist group.

Vaigai River, river in Tamil Nādu state, southern India, flowing 150 miles (240 km) generally southeast. Rising in the Varushanād Hills of western Tamil Nādu, it initially flows northeast through the Kambam and Varushanād valleys. In its central reaches the Vaigai flows eastward into the Vaigai reservoir at Narasingāpuram. Near Sholavandān it bends to the southeast, passing Madurai town on its course to its mouth on Palk Strait, which separates the southeast coast of India from Sri Lanka. The Vaigai River rarely floods; its chief tributaries are the Siruliar, Theniar, Varāha Nadī, and Mangalar.

Vaihinger, Hans (b. Sept. 25, 1852, Nehren, Württemberg [Germany]—d. Dec. 18, 1933, Halle, Ger.), German philosopher who, influenced by Arthur Schopenhauer and F.A. Lange, developed Kantianism in the direction of pragmatism by espousing a theory of "fictions" as the basis of what he called his "as if" philosophy. (*See* as if, philosophy of.)

Vaihinger taught philosophy at the University of Halle from 1884 to 1906, when nearsightedness forced his retirement. His major work, *Die Philosophie des Als Ob* (1911; *The Philosophy of "As If"*), begun in 1876, went through many editions. Vaihinger began writing *Kantstudien* ("Kant Studies") in 1896 with the assistance of international scholars and eight years later founded the Kant Society. He saw life as a maze of frustrations and searched for a philosophy to make life livable.

Vail, town and ski resort, Eagle county, west-central Colorado, U.S. It is located 100 miles (160 km) west of Denver. The town extends about 7 miles (11 km) through the Gore Creek valley in the Gore and Sawatch mountain ranges. Vail was founded by Peter Seibert and Earl Eaton, who, together with other investors, purchased the land and built the resort town in 1962 in the style of a quaint Alpine village. The skiable terrain around Vail Mountain extends for 15 square miles (39 square km), making Vail the largest ski resort in North America. It was host to the World Alpine Ski Championships in 1989. Pop. (1990) 3,659.

Vail, Alfred Lewis (b. Sept. 25, 1807, Morristown, N.J., U.S.—d. Jan. 18, 1859, Morristown), American telegraph pioneer and an associate and financial backer of Samuel F.B. Morse in the experimentation that made the telegraph a commercial reality.

Shortly after Vail graduated from the University of the City of New York in 1836, he met Morse and became interested in Morse's telegraph experiments. In return for a share in the rights, he agreed to construct telegraph equipment and to bear the cost of obtaining American and foreign patents. Working in Morristown with the financial backing of Vail's father, Vail, Morse, and a third associate, Leonard D. Gale, made the first successful demonstration of the electric telegraph on Jan. 6, 1838. Public demonstrations followed in New York City and Philadelphia, and in March 1843 Congress authorized construction of a telegraph line between Washington, D.C., and Baltimore, Md. On May 24, 1844, Vail, as Morse's assistant, received, over the Washington-Baltimore line, the famous first message, "What hath God wrought!" Though Vail continued to work with Morse for another four years, he gradually lost interest in the telegraph and resigned. His cousin Theodore Newton Vail was later the organizer of telephone service in the United States.

Vail, Theodore Newton (b. July 16, 1845, Minerva, Ohio, U.S.—d. April 16, 1920, Baltimore, Md.), American executive who twice headed the Bell Telephone Company at critical times and played a major role in establishing telephone services in the United States.

After a highly successful career in the railway postal service, Vail was persuaded in 1878 to join Bell Telephone as general manager. During his active tenure in this position (until 1887) he developed a long-distance service by merging and interconnecting local exchanges, set up the Western Electric Company to manufacture telephone equipment, and placed the telephone industry on a sound financial basis.

Retiring in 1889, he spent several years in Argentina developing a waterpower plant in Córdoba and a street railway in Buenos Aires. After the deaths of his wife (1905) and his only child (1906), he returned to the United States.

In 1907 Vail was invited to return as president of the American Telephone & Telegraph Company (AT&T), the successor to Bell. When the Bell patents had expired in 1893 and 1894, hundreds of independent local firms had begun to compete with the Bell company. Vail chose to cooperate with the new competitors, charging them a fee for connection with his long-distance lines. In 1915 the first transcontinental telephone line was opened, and, in the same year, radio-telephone communications began across the Atlantic Ocean. Vail, who directed U.S. telephone services for the government during World War I, stayed on as AT&T president until his retirement in 1919.

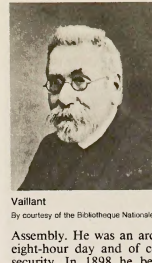
Vaillant, Édouard-Marie (b. Jan. 28, 1840, Vierzon, Fr.—d. Dec. 18, 1915, Paris), French revolutionary publicist and politician who was exiled for his role in the Paris Commune of 1871. After his return he became an important member of the Socialist Party.

Educated as an engineer, Vaillant subsequently studied medicine, first in Paris and later in Heidelberg, Tübingen, and Vienna. He returned to France, and during the German siege of Paris (1870–71) he wrote revolutionary articles propagating the thought of Auguste Blanqui, French socialist theoretician, whose friend and disciple he had become.

Vaillant participated in the Paris insurrection of March 18, 1871, and was elected a member of the Commune, the revolutionary government of Paris. With the defeat of the Commune, he fled to England, where he met Karl Marx. He was a member of the General Council of the First International (September 1871). In 1872, with other Blanquists, Vaillant withdrew from the International, believing it to be insufficiently revolutionary.

Vaillant was condemned to death in absentia in July 1872 and returned to France only after the general amnesty of 1880. There he was active in Blanquist groups until 1904.

Vaillant was elected a municipal councillor (1884) and from 1893 until the end of his life represented a Paris district in the National



Vaillant
By courtesy of the Bibliotheque Nationale, Paris

Assembly. He was an ardent advocate of the eight-hour day and of comprehensive social security. In 1898 he became leader of the Blanquists in the Chamber. In 1905, when the various socialist factions were united, he began his friendship and collaboration with Jean Jaurès, the leading socialist politician; together they were able to control all the socialist congresses until 1914. Though a lifelong pacifist, Vaillant regarded it as the duty of all socialists to defend France on the outbreak of World War I.

Vaiont Dam, concrete arch dam across the Vaiont River in Italy with a height of 859 feet (262 m) and crest length of 623 feet (190 m). Completed in 1961, it was severely damaged by a massive landslide into the reservoir in 1963 that claimed the lives of more than 2,500 people.

Vair, Guillaume du (b. March 7, 1556, Paris, Fr.—d. Aug. 31, 1621, Tonneins), a highly influential French thinker and writer of the troubled period at the end of the 16th century.

A lawyer by training, du Vair occupied high offices of state under Henry IV, having made his reputation with his eloquent and cogently argued orations. He first came to the fore with a brilliant oration on the death of Mary, Queen of Scots. The elaborate style of his speeches, with all their erudition and ingenuity, was appreciated in an age that had a highly developed taste for rhetoric. As a thinker, du Vair is famed for such treatises as *De la constance et consolation ès calamités publiques* (1593; "On Constancy and Consolation in Public Calamities," Eng. trans. *A Buckler, Against Adversitie,* 1622). In this work he put forward an amalgam of Stoicism and Christianity that was well calculated to appeal to readers in a France torn apart by civil war. Philosophers such as Justus Lipsius had already attempted to fuse Christian and Stoic ethics, but du Vair's importance in the dissemination of ideas of this sort is undeniable. François de Malherbe was the first of the French poets to take up du Vair's doctrines, and the French *moraliste* tradition of the 17th century owed much to him. A number of his philo-



Du Vair, engraving by François Langlois
H. Roger-Viollet

sophical works were translated into English in the 17th century.

vairāgin, in Hinduism, a religious ascetic who worships principally one or another form of the god Vishnu. *Vairāgins* generally wear white robes, in contrast to the ochre-coloured robes worn by Śaiva ascetics, and are also differentiated by their tilak (sect mark on the forehead), which is never made of ash and is always vertical in design.

Most *vairāgins*, when not wandering or on pilgrimage, reside in monastic communities called *sthānas* ("spots" or "places"); but the *nāgā* ("naked") *vairāgins*, who are also the militants among the Vaiṣnava ascetics, form their own groups, called *akhāṛās*. In the past, battles between groups of naked ascetics belonging to different sects centred mainly on bathing and processional rights during pilgrimage assemblies, such as the Kumbha Melā.

Vairocana (Sanskrit: "Illuminator"), also called MAHĀVAIROCANA ("Great Illuminator"), the supreme Buddha, as regarded by many Mahāyāna Buddhists of East Asia and of Tibet, Nepal, and Java.

Some Buddhists regard Vairocana, or Mahāvairocana, as a being separate from the five "self-born" Dhyāni-Buddhas, one of whom is known as Vairocana (*see* Dhyāni-Buddha). Among the Shingon sect of Japan, he is the chief object of reverence and is regarded as the source of the entire universe. In Japanese he is called Dainichi Nyorai ("Great Sun Buddha"), or Roshana; in Chinese P'i-lu-che-na; in Tibetan Rnam-par-snang-mdzad, or Rnam-snang ("Maker of Brilliant Light").



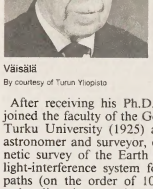
Dainichi Nyorai ("Great Sun Buddha") by Unkei, lacquered wood sculpture, 1175; in the Enjō-ji, Nara, Japan
Asuka-en

When represented as one of the "self-born" Buddhas, as he is in Nepali, Tibetan, and Japanese art, Vairocana occupies the chief position and is often considered to be the progenitor of the other four Dhyāni-Buddhas, or the Ādi-Buddha himself. In paintings, Vairocana is coloured white and his hands are shown in the dharmā-chakra-mudra ("teaching gesture"). His consort is Vajradhātvīśvarī or Tārā, his family Moha, his mount the dragon (or lion), his symbol the chakra ("wheel"), his skandha ("personality component") *rūpa* ("matter"), his syllable *a* or *oṃ*, his element space, his sense perception hearing, his sense organ the ear, and his location in the human body the head.

In China and Japan, Vairocana is given reverence by Buddhists of the Yogācāra school (which led to the foundation of the Shingon sect). Legend claims that he transmitted to a supernatural personage, Vajrasattva, the Yoga doctrine, which was in turn introduced into China in AD 719 by Vajrabodhi and into Japan by Kūkei (Kōbō Daishi; 774–835).

In Japan he is also worshiped in the form of the fierce Fudō Myō-ō (Chinese: Pu-tung-fo; Sanskrit: Acala), whose duty it is to combat evil and to take charge of the soul after death. Vairocana is frequently represented in Japanese painting and sculpture, most notably the 53-foot (16-metre), seated, bronze Roshana in the Tōdai-ji, at Nara, which was installed in AD 752 but restored in later centuries. As the supreme Buddha, his characteristic gesture is the mudra of the six elements, in which the index finger of the left hand is clasped by the five fingers of the right, symbolizing the uniting of the five elements of the material world (earth, water, fire, air, and ether) with the spiritual (consciousness).

Väisälä, Yrjö (b. Sept. 6, 1891, Kontiolahti, Russia—d. July 21, 1971, Rymättylä, Fin.), Finnish meteorologist and astronomer noted for developing meteorological measuring methods and instruments.



Väisälä
By courtesy of Turun Yliopisto

After receiving his Ph.D. in 1922, Väisälä joined the faculty of the Geodetic Institute of Turku University (1925) and worked as an astronomer and surveyor, completing a magnetic survey of the Earth and inventing the light-interference system for measuring long paths (on the order of 100 metres) for use as baselines in geodetic surveys (1927). Later in his career, Väisälä turned to meteorology and developed, among other things, a new method of radio direction finding (1951). In 1952 he helped found the Turku University Astronomical Observatory and was its director until his death. Väisälä received the Honorary Award of the Finnish Academy of Sciences and Letters in 1954.

Vaiśālī, Pāli VESALI, city of ancient India, north of Patna, northwestern Bihār state, on the Gandak River. In antiquity Vaiśālī was the capital of the Licchavi republic and was closely associated with the early histories of both Buddhism and Jainism. Roads connected it with Rājagṛha to the south and Kapilavastu and Śrāvasti to the north. Mahāvīra, the founder of Jainism, was born in Vaiśālī and spent much time there. The Buddha also visited the city on many occasions. Its several important monasteries and shrines were described by the Chinese pilgrim Fa-hsien in the 5th century AD. After the death of the Buddha (*c.* 483 BC) the second great council of Buddhists was held at Vaiśālī to provide rules of conduct.

According to tradition, the city in early times was surrounded by three walls with gates and watchtowers. The site today is marked by two groups of mounds and has been partly excavated by archaeologists. The earliest occupation of the site is associated with black-and-red pottery of probably pre-Buddhist age; it was followed by the northern black polished ware of early Buddhist times. Vaiśālī is on the site of a village now known as Basarh.

Vaisheshika, also spelled VAISESIKA, Sanskrit VAIŚEṢIKA ("Particular"), one of the six orthodox systems (darshans) of Indian philosophy, significant for its naturalism, a feature that is not characteristic of most Indian thought. The Sanskrit philosopher Kaṇāda Kāśyapa (2nd–3rd century AD?) expounded its theories and is credited with founding the school. Important later commentaries were written by Praśastapāda, Udayana, and Śrīdhara.

After a period of independence, the Vaisheshika school fused entirely with the Nyāya (*q.v.*) school, a process that was completed in the 11th century. Thereafter the combined school was referred to as Nyāya-Vaisheshika.

The Vaisheshika school attempts to identify, inventory, and classify the entities and their relations that present themselves to human perceptions. It lists six categories of being (*padārthas*), to which was later added a seventh. These are:

(1) *Dravya,* or substance, the substratum that exist independently of all other categories, and the material cause of all compound things produced from it. *Dravyas* are nine in number: earth, water, fire, air, ether, time, space, spirit, and mind.

(2) *Guṇa,* or quality, which in turn is subdivided into 24 species.

(3) *Karman,* or action. Both *guṇa* and *karman* inhere within *dravya* and cannot exist independently of it.

(4) *Sāmānya,* or genus, which denotes characteristic similarities that allow two or more objects to be classed together.

(5) *Viśeṣa,* or specific difference, which singles out an individual of that class.

(6) *Samavāya,* or inherence, which indicates things inseparably connected.

To these six was later added *abhāva,* nonexistence or absence. Though negative in content, the impression it makes is positive; one has a perception of an absence where one misses something. Four such absences are recognized: previous absence, as of a new product; later absence, as of a destroyed object; total absence, as of colour in the wind; and reciprocal absence, as of a jar and a cloth, neither of which is the other.

The Vaisheshika system holds that the smallest, indivisible, indestructible part of the world is an atom (*aṇu*). All physical things are a combination of the atoms of earth, water, fire, and air. Inactive and motionless in themselves, the atoms are put into motion by God's will, through the unseen forces of moral merit and demerit.

Vaishnavism, also called VISHNUISM, or VIṢṆUISM, Sanskrit VAIṢṆAVISM, worship of the god Vishnu and of his incarnations, principally as Rāma and as Krishna. It is one of the major forms of modern Hinduism—with Śaivism and Shaktism (Śāktism).

A major characteristic of Vaishnavism is the strong part played by bhakti, or religious devotion. The ultimate goal of the devotee is to escape from the cycle of birth and death so as to enjoy the presence of Vishnu. This cannot be achieved without the grace of God. Vishnu is not only the end (*upeya*) but also the means (*upāya*). For his part, the devotee must cultivate the auxiliary disciplines of *karman,* the path of good works, and *jñāna,* the way of spiritual knowledge.

Sectarian Vaishnavism had its beginnings in the cult of Vāsudeva-Krishna, who may have been a Yādava tribal leader (*c.* 7th–6th century BC). The Vāsudeva cult coalesced with others worshiping the deified sage Nārāyaṇa so that by about the 2nd century AD Vāsudeva, Krishna, and Nārāyaṇa appeared in the celebrated religious poem the *Bhagavadgītā* as interchangeable names of Lord Vishnu. The cult of the pastoral Krishna was soon added.

The philosophical schools of Vaishnavism differ in their interpretation of the relationship

between individual souls and God. The doctrines of the most important schools are: (1) *viśiṣṭādvaita* ("qualified monism"), associated with the name of Rāmānuja (11th century) and continued by the Śrīvaiṣṇava sect, prominent in South India; (2) *dvaita* ("dualism"), the principal exponent of which was Madhva (13th century), who taught that although the soul is dependent on God it is not an extension of God, that the soul and God are separate entities; (3) *dvaitādvaita* ("dualistic monism"), taught by Nimbārka (12th century), according to which the world of souls and matter is both different and not different from God; (4) *śuddhādvaita* ("pure monism") of Vallabha, which explains the world without the doctrine of maya (illusion); (5) *acintyabhedābheda* ("inconceivable duality and nonduality"), the doctrine of Caitanya, in which the relation between the world of souls and matter on the one hand and God on the other is not to be grasped by thought but is both different and nondifferent.

In addition to these philosophical schools, each of which has its own sectarian following, Vaishnavism also includes a number of popular expressions of devotionalism, which were furthered in the late medieval period by the vernacular writings of Rāmānanda and his disciples and by Vaishnava poets such as Tulsīdās in the Hindi area, Mīrā Bāī in Gujarāt, and Nāmdev in the Marāthā country.

Vaiṣṇava-Sahajiyā, member of an esoteric Hindu cult centred in Bengal that sought religious experience through the world of the senses, specifically human sexual love. *Sahaja* (Sanskrit: "easy" or "natural") as a system of worship was prevalent in the Tantric traditions common to both Hinduism and Buddhism in Bengal as early as the 8th–9th centuries. The divine romance of Krishna and Rādhā was celebrated by the poets Jayadeva (12th century), Caṇḍīdās, and Vidyāpati (mid-15th century), and parallels between human love and divine love were further explored by Caitanya, the 15th–16th-century mystic, and his followers. The Vaiṣṇava-Sahajiyā cult developed from the 17th century onward as a synthesis of these various traditions.

The Vaiṣṇava-Sahajiyās elevated *parakīyārati* (literally, "the love of a man for a woman who legally belongs to another") above *svakīyā-rati* (conjugal love) as the more intense of the two. *Parakīyārati*, it was said, was felt without consideration for the conventions of society or for personal gain and thus was more analogous to divine love. Rādhā is conceived as the ideal of the *parakīyā* woman, and the Vaiṣṇava-Sahajiyās never attempted (as did some sects of Vaishnavism) to depict her as the wife of Krishna.

The Vaiṣṇava-Sahajiyās were disfavoured by other religious groups and operated in secrecy. In their literature they deliberately employed a highly enigmatic style. Because of the extreme privacy of the cult, little is known about its prevalence or its practices today.

Vaiśravaṇa, alternate name for Kubera (*q.v.*), the popular god of wealth in Hindu, Jaina, and Buddhist mythology. In Tibetan Buddhism he is one of the eight protective deities. *See* dharmapāla.

Vaisya, also spelled VAISHYA, Sanskrit VAIŚYA, third highest in ritual status of the four varnas, or social classes, of Hindu India, traditionally described as commoners. Legend states that the varnas (or colours) sprang from Prajapati, a creator god—in order of status, the Brahman (white) from his head, the Kshatriya (red) from his arms, the Vaisya (yellow) from his thighs, and the Sudra (black) from his feet. The yellow colour associated with the Vaisya, according to one theory, links them with the south point of the compass. The Vaisya were commoners, not servile groups. Their role lay in productive labour, in agricultural and pastoral tasks, and in trading. Their way of life demanded study, sacrifice, and the giving of alms. Early scriptures show that Vaisya could and did rise even to the rank of Brahman, as in the case of the two sons of Nābhāgarishṭa, mentioned in the sacred work *Harivaṁśa*.

The Vaisya share with the two higher classes, the priestly Brahman and the authoritative Kshatriya, the distinction of being *dvija*, or "twice-born," achieving their spiritual rebirth when they assume the sacred wool thread at the *upanayana* ceremony. The Vaisya are credited in history with favouring the rise of the reformist religious beliefs of Buddhism and Jainism. In modern times, the Vaisya class has become a symbol of middle-class respectability and prestige; it is a stepping-stone used by people to raise their status in the system through modified behaviour and the adoption of more prestigious caste names. *See also* varṇa.

Vajirañāṇavarorasa, also spelled WACHIRAYANWAROROT, or WACHIRAYAN WAROT (b. April 12, 1860, Bangkok—d. Aug. 2, 1921, Bangkok), prince-patriarch of Buddhism in Siam, who institutionalized Thai Buddhism, spread the faith in the countryside, and was his generation's leading intellectual.

Vajirañāṇa was a son of King Mongkut and spent, by his own account, a youth of profligate luxury. Early contact with a scholarly and ascetic Scottish physician, Peter Gowan, and Prince Pavareś, then leader of the Buddhist reform sect founded by King Mongkut in the 1830s, finally led him to think seriously of a monastic vocation, and in 1879 he was ordained a monk. He then devoted himself to the study of Pali and the Buddhist scriptures and distinguished himself in ecclesiastical examinations. In 1892 he became abbot of Wat Pavaraniveśa, the leading monastery of the reform Dhammayut order, and in the following year became patriarch of the order.

Having written numerous textbooks, reorganized the Buddhist hierarchy, and modernized monastic education, he became a close adviser to King Chulalongkorn and assisted in the extension of modern education in the provinces. In 1910 he was appointed Supreme Patriarch of Thai Buddhism. As a classical Pali scholar, he was elected an Honorary Member of the Royal Asiatic Society of Great Britain. His autobiography is the earliest of that genre in Thai literature.

Vajiravudh, also called PHRAMONGKUTKLAO, or RAMA VI (b. Jan. 1, 1881, Bangkok—d. Nov. 26, 1925, Bangkok), king of Siam from 1910 to 1925.

Vajiravudh was educated at Oxford University, where he read history and law; he also received military training at Sandhurst and served briefly with the British Army. Having been named their apparent in 1895, he returned to Siam in 1903 and succeeded his father, Chulalongkorn, in 1910. He promoted numerous social reforms, including a recodification of Siamese law to make monogamy the only legal form of marriage, adoption of the Gregorian calendar, implementation of universal smallpox vaccination, the establishment of the Thai Red Cross, and enactment of a law that required all subjects to take surnames. In 1917 he founded Chulalongkorn University, the first in Siam, and in 1921 he made universal primary education free and compulsory. His attempts to close gambling houses and opium dens encountered resistance.

Vajiravudh's long overseas education isolated him from the life of his people; moreover, his uncritical love of English traditions led to such unwise actions as the founding of a royal paramilitary force under his direct command, the Wild Tiger Corps, outside the regular armed forces. Resentment of this corps, coupled with youthful impatience with Siam's slow political development, led to an abortive plot against him led by young army and navy officers in 1912. He frustrated and alienated not only conservatives, who saw his reforms as undermining of traditional society, but also liberals, who were offended by his refusal to grant a constitution and by his obstinacy in maintaining the primacy of the absolute monarch.

Vajiravudh, however, had considerable success in foreign policy. He entered World War I on the side of the Allies in 1917 and joined the League of Nations. He used the increased willingness of the Western powers to treat Siam as a fully equal state to gain a renegotiation of earlier unequal treaties and the renunciation of Western rights in Siam.

In private life Vajiravudh was a prolific writer and translator. He introduced Western forms into Thai literature, particularly the dialogue drama. Using several dozen pseudonyms, he composed about 50 original plays, adapted more than 100 from English and French dramatists, and translated several of Shakespeare's.

Vajji (Indian history): *see* Vṛjji.

Vajpayee, Atal Bihari, Bihari also spelled BEHARI (b. Dec. 25, 1924, Gwalior, Madhya Pradesh, India), leader of the pro-Hindu Bharatiya Janata Party (BJP) and twice prime minister of India (1996; 1998–2004).

Vajpayee was first elected to parliament in 1957 as a member of the Bharatiya Jana Sangh (BJS), a forerunner of the BJP. In 1977 the BJS joined three other parties to form the Janata Party, which led a government that lasted until July 1979. As foreign minister in the Janata government, Vajpayee earned a reputation for improving relations with Pakistan and China. In 1980, following a split in the Janata Party, Vajpayee helped the BJS reorganize itself as the BJP. In 1992 he was one of the few Hindu leaders to speak out against the destruction of the historic mosque at Ayodhyā by anti-Muslim extremists. Vajpayee was sworn in as prime minister in May 1996 but was in office only 13 days, after failing to attract support from other parties. In early 1998 he again became prime minister, in elections in which the BJP won a record number of seats, but was forced to make a shaky alliance with regional parties. Although considered a pragmatist, he assumed a defiant posture in the face of Western criticism of India's testing of several nuclear weapons in 1998. He had earlier been praised for his conciliatory gestures toward India's Muslim minority. In 2000 his government began an extensive program of divestment of public funds from several key state-run industries. In 2003 Vajpayee made a concerted effort to resolve India's long-running feud with Pakistan over the Kashmir region. Although India achieved steady economic growth under his leadership, his coalition was defeated in parliamentary elections in 2004, and he resigned from office.

vajra, Tibetan RDO-RJE, five-pronged ritual object extensively employed in Tibetan Buddhist ceremonies. It is the symbol of the Vajrayāna school of Buddhism.

Vajra, in Sanskrit, has both the meanings of "thunderbolt" and "diamond." Like the thunderbolt, the *vajra* cleaves through ignorance. The thunderbolt was originally the symbol of the Hindu rain god Indra (who became the Buddhist Śakra) and was employed by the 8th-century Tantric (Esoteric) master Padmasambhava to conquer the non-Buddhist deities of Tibet. Like the diamond, the *vajra* destroys but is itself indestructible and is thus likened to *śūnya* (the all-inclusive void).

The *vajra* is fashioned out of brass or bronze, the four prongs at each end curving around the central fifth to form a lotus-bud shape. A nine-pronged *vajra* is less commonly used.

In ritual use the *vajra* is frequently employed in conjunction with the bell (Sanskrit *ghaṇṭā*; Tibetan *dril bu*), the various gestures (*mudrās*), when correctly executed, having



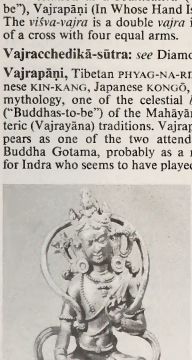
Vajra; in the Newark (New Jersey) Museum

By courtesy of the Newark Museum, New Jersey

considerable metaphysical power. The *vajra* (symbolizing the male principle, fitness of action) is held in the right hand and the bell (symbolizing the female principle, intelligence) in the left hand, the interaction of the two ultimately leading to enlightenment. In art the *vajra* is an attribute of many divinities, such as the celestial Buddha Akṣobhya and his manifestation as a *bodhisattva* ("Buddha-to-be"), Vajrapāṇi (In Whose Hand Is the *Vajra*). The *viśva-vajra* is a double *vajra* in the shape of a cross with four equal arms.

Vajracchedikā-sūtra: *see* Diamond Sūtra.

Vajrapāṇi, Tibetan PHYAG-NA-RDO-RJE, Chinese KIN-KANG, Japanese KONGŌ, in Buddhist mythology, one of the celestial *bodhisattvas* ("Buddhas-to-be") of the Mahāyāna and Esoteric (Vajrayāna) traditions. Vajrapāṇi first appears as one of the two attendants of the Buddha Gotama, probably as a replacement for Indra who seems to have played this role at



Vajrapāṇi, bronze statuette from Nepal, 19th century; in the Rijksmuseum voor Volkenkunde, Leiden, Neth.

By courtesy of the Rijksmuseum voor Volkenkunde, Leiden, The Netherlands

an earlier date. Later, in the Esoteric, or Tantric, tradition he emerged as the *bodhisattva* who headed one of the three major Buddha "families." His "family" consisted of fierce deities he was able to control through the use of his *vajra* (thunderbolt).

Vajrayāna (Sanskrit: Vehicle of the Diamond [or Thunderbolt]), also called TANTRIC BUDDHISM, important development within Buddhism in India and neighbouring countries, notably Tibet. Vajrayāna, in the history of Buddhism, marks the transition from Mahāyāna speculative thought to the enactment of Buddhist ideas in individual life. The term *vajra* (Sanskrit: "diamond," or "thunderbolt") is used to signify the absolutely real and indestructible in man, as opposed to the fictions an individual entertains about himself and his nature; *yāna* is the spiritual pursuit of the ultimately valuable and indestructible.

Other names for this form of Buddhism are Mantrayāna (Vehicle of the Mantra), which refers to the use of the mantra (*q.v.*) to prevent the mind from going astray into the world of its fictions and their attendant verbiage and to remain aware of reality as such; and Guhyamantrayāna, in which the word *guhya* ("hidden") refers not to concealment but to the intangibility of the process of becoming aware of reality.

Philosophically speaking, Vajrayāna embodies ideas of both the Yogācāra discipline, which emphasizes the ultimacy of mind, and the Mādhyamika philosophy, which undermines any attempt to posit a relativistic principle as the ultimate. Dealing with inner experiences, the Vajrayāna texts use a highly symbolic language that aims at helping the followers of its disciplines to evoke within themselves experiences considered to be the most valuable available to man. Vajrayāna thus attempts to recapture the Enlightenment experience of the Gautama Buddha.

In the Tantric view, Enlightenment arises from the realization that seemingly opposite principles are in truth one. The passive concepts *Śūnyatā* ("voidness") and *prajñā* ("wisdom"), for example, must be resolved with the active *karuṇā* ("compassion") and *upāya* ("means"). This fundamental polarity and its resolution are often expressed through symbols of sexuality (*see* yab-yum).

The historical origin of Vajrayāna is unclear, except that it coincided with the spread of the mentalistic schools of Buddhism. It flourished from the 6th to the 11th century and exerted a lasting influence on the neighbouring countries of India. The rich visual arts of Vajrayāna reach their culmination in the sacred *maṇḍala* (*q.v.*), a representation of the universe used as an aid for meditation.

Vajrayoginī, in Vajrayāna (Tantric Buddhism), female embodiment of the cognitive function leading to Buddhahood. Vajrayāna emphasizes experience over speculation but uses the terms of speculative philosophical Buddhism in an imaginative way. This practice means that images taken from the ordinary life of the individual become the means to further a deeper understanding of man's being, which is both action (*upāya*) and knowledge (*prajñā*), each reinforcing the other.

In iconographical representations, Vajrayoginī is usually depicted in a terrifying form, holding in her hands a skull and a dagger, her right leg stretched out, the left one slightly bent (*ālīḍha*). She is surrounded on all sides by cremation grounds, indicating that the ordinary world has become dead in contrast to the rich world of inner life and its vision of reality without distorting fictions. Although she may be visualized alone, she is usually in union (*yab-yum*) with Heruka, who, when he is united with Vajrayoginī, is known as Hevajra. As such he is very popular in Tibet, particularly with the Bka'-brgyud-pa (a major Buddhist sect), whose tutelary deity he is.

As an expression of the multiplicity of psychic phenomena, Vajrayoginī may be accompanied by other aspects of herself, such as Vajravairocanī (She Who Reveals), coloured yellow, like the all-illuminating sun, or Vajravarnanī (She Who Colours), coloured green, symbolizing the widest range of perception and the fact that man's view is "coloured." In her principal form, Vajrayoginī is also known as Vajraḍākinī (She Who Roams over the Void).

In spite of her importance in Vajrayāna Buddhism, Vajrayoginī does not figure as the main deity of a *Tantra* (literary work). There are four *sādhanas* (methods of visualization) describing her various forms.

Vakaga, northernmost *préfecture* of the Central African Republic, bordering Chad to the northwest and The Sūdan to the northeast. Until the mid-1960s it was an autonomous sub-prefecture named for the town of Birao, the prefectural seat. The northern part of Vakaga, around Birao, with an average temperature of 80° F (27° C), is drier than the rest of the country. Rainfall averages 34.5 inches (876 mm) per year, from May to September.

The land rises from 1,529 ft (465 m) at Birao to more than 4,000 ft on the Sudanese border, reaching 4,462 ft at Mt. Ngaya and 4,422 ft at Mt. Tinga. Vakaga is sparsely inhabited. Sorghum is the staple grain crop. Ground transport is poor—the road between Birao and Ouanda Djallé, the two main towns, is open only seasonally—but both Birao and Ouanda Djallé have air connections with Bangui. Two major game reserves, André Félix National Park in the east and Saint-Floris National Park in the west, are noted for their antelope, elephants, giraffes, hippopotamuses, lions, panthers, and other large mammals. The area of Vakaga is 17,934 sq mi (46,450 sq km). Pop. (1988) 32,118.

Vākāṭaka DYNASTY, Indian ruling house originating in the central Deccan in the mid-3rd century AD, the empire of which is believed to have extended from Mālwa and Gujarāt in the north to the Tungabhadra in the south and from the Arabian Sea in the west to the Bay of Bengal in the east. The Vākāṭakas, like many of the contemporary dynasties of the Deccan, claimed Brahmanical origin. Little is known, however, about Vindhyaśakti (*c.* AD 250–270), the founder of the family. Territorial expansion began in the reign of his son Pravarasena I, who came to the throne *c.* 270 and reached the Narmada in the north by annexing the kingdom of Purikā.

Pravarasena's kingdom was partitioned after his death. The main line continued with Rudrasena I (*c.* 330), his son Pṛthvīṣeṇa I (*c.* 350), and Pṛthvīṣeṇa's son Rudrasena II (*c.* 400). In the period of Pṛthvīṣeṇa the Vākāṭakas came into contact with the powerful Gupta family of North India, which was making a bid to expand in the west at the expense of the Western Kṣatrapas. Because of its territorial position, the Vākāṭaka family was recognized as a useful ally; Prabhāvatī Gupta, the daughter of Candra Gupta II, was married to Rudrasena II. In this period, Gupta impact was significant in Vākāṭaka polity and culture. Rudrasena's death was followed by a lengthy regency of Prabhāvatī Guptā during the minority of her sons Divākarasena and Dāmodarasena. After the Guptas became involved in a war against the Hūṇas, the Vākāṭaka dynasty was free to expand in central India, and in the period of Narendrasena (*c.* 450–470), son of Pravarasena II, Vākāṭaka influence spread to such central Indian states as Kosala, Mekala, and Mālava. This power, however, ultimately brought the Vākāṭakas into conflict with the Nalas and caused a setback to the family. Its power was temporarily revived in the reign of Pṛthvīṣeṇa II, the last known king of the line, who acceded to the throne *c.* 470.

Apart from this senior line was the Vatsagulma (Bāsim, in Akola district) line, which branched off after Pravarasena I and occupied the area between the Indhyādri Range and the

Godāvari River. The Vākāṭakas are noted for having encouraged arts and letters.

Vākhān, also spelled WĀKHĀN, OF WAKHAN CORRIDOR, a mountainous region and panhandle in the Pamir Mountains of extreme northeastern Afghanistan. From the demarcation of the Afghan frontier (1895–96), the panhandle formed a political buffer between Russian Turkistan, British India, and China. It is now bounded by Tajikistan (north), China (east), and Pakistan (south). The Vākhān River flows from west to east through Vākhān for 100 miles (160 km), joining the Pamir River near Qal'eh-ye Panjeh, which is the region's main village.

Vakhtangov, Yevgeny Bagrationovich (b. Feb. 1 [Feb. 13, New Style], 1883, Vladikavkaz, Russia—d. May 29, 1922, Moscow), Russian theatrical director of the Moscow Art Theatre.

A pupil of Konstantin Stanislavsky, Vakhtangov succeeded by the early 1920s in reconciling the naturalistic acting techniques of his master with the bold experiments of Vsevolod Y. Meyerhold. His departure from naturalism in the direction of greater theatricality gave rise to some of the most original productions of the Russian post-Revolutionary theatre. In 1920 he took charge of the Third Workshop, which was a subsidiary studio of the Moscow Art Theatre, and gradually led that company toward a "fantastic realism." He made use of masks, music, dance, and boldly abstract costume and scenery design in pursuit of a theatre that would offer the popular audience dreams, fantasy, and satire rather than a mirror of itself.

As director, simultaneously, of the Habima Theatre, Vakhtangov found in Jewish folklore a further field for the exercise of whimsy and grotesquerie. *The Dybbuk,* S. Ansky's tale of demoniac possession, was a particular success (1922). While far less extreme than Meyerhold, Vakhtangov did not hesitate to realize bold new interpretations. In his brilliant production of Carlo Gozzi's Chinese fairy tale *Turandot,* he introduced commedia dell'arte techniques and had actors dress and make up on the stage and stagehands change sets in view of the audience. The production of *Turandot,* which was begun when Vakhtangov was fatally ill, was nevertheless infused with the gaiety, charm, and optimistic humanity that were characteristic of his work. After the dress rehearsal he was confined to bed, and he died three months later at age 39. The Third Workshop was renamed the Vakhtangov Theatre.

Val-de-Marne, *département,* Île-de-France *région,* northern France. It borders the southeast limits of Paris and was created in 1964 as part of the administrative reorganization of Greater Paris. Val-de-Marne comprises the southeast portion of the former Seine *département* and a few *communes* of the former Seine-et-Oise *département,* which themselves were originally created in 1790 out of the old province of Île-de-France.

The northeast embraces the residential urban centres in and around the great S bend of the Marne River and the area of its confluence with the Seine River, which bisects the *département* from south to north. The Marne, which is popular for boating, is also an important commercial waterway. Both banks of the Seine are heavily industrialized. Market (truck) gardens scattered among the built-up areas produce quantities of vegetables. The southeast part of the *département* consists of woods and agricultural land. A large part of Orly Airport is in Val-de-Marne, though its terminal is in the neighbouring Essonne *département.* Adjoining the airport at Rungis is the Paris central produce market, which was moved there from Les Halles in the centre of the city. The produce market and the airport are served by a branch of the Autoroute du Soleil, the main French motorway, which crosses the *département* north-south.

The northern part of Val-de-Marne includes Vincennes, and the southeastern embraces the late 16th-century château and park of Gros Bois. The *département* has two *arrondissements*—Créteil, the capital, which occupies a central position, and Nogent-sur-Marne. Val-de-Marne is in the educational division of Paris. Area 95 square miles (245 square km). Pop. (1993 est.) 1,235,800.

Val-d'Oise, *département,* Île-de-France *région,* embracing the northern outer suburbs of Paris. Oblong in shape, the *département* extends from the northeast of Paris to the border of Normandy. It was created in 1964 from the northern part of the Seine-et-Oise *département,* which in 1790 was formed from portions of the historical province of Île-de-France.

The Oise River crosses the *département* from northeast to southwest, flowing through Pontoise, the capital, and joining the Seine River just south of the border. The Seine, in its northern meanders, flows three times along the southern departmental border. The short western boundary is bordered by the Epte River.

In the late 20th century the urban spread of Paris continued to encroach upon the eastern half of the *département,* much of which is covered by the hilly forests of Montmorency, L'Isle-Adam, and Carnelle; but agriculture (chiefly cereal grains) persisted in the western half. Mushrooms are grown on a large scale in limestone caves between Pontoise and Montmorency. Auvers-sur-Oise, which inspired the 19th-century Dutch painter Vincent van Gogh, is an attraction for tourists. Enghien-les-Bains is the nearest spa to Paris.

The southeastern area of the *département,* particularly the area of Argenteuil, which was made famous by Impressionist artists, is heavily industrialized. The southeast corner includes part of the Paris airport of Le Bourget. The Autoroute du Nord, one of the main French motorways, runs within the eastern departmental border. The *département* is divided into the *arrondissements* of Cergy, Pontoise, Argenteuil, and Montmorency. It is in the educational division of Paris. Area 481 square miles (1,246 square km). Pop. (1993 est.) 1,088,100.

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Val-d'Or, town, Abitibi-Témiscamingue region, western Quebec province, Canada. Val-d'Or lies near Lakes Blouin, de Montigny, and Lemoine. Although its name means "valley of gold," there is no valley in the vicinity. The town was founded by miners in 1934, and its economy depends chiefly on mining (gold, molybdenum, zinc, lead, and copper) and lumbering. Val-d'Or is also a base for the hunting and fishing of the Abitibi country, and the north entrance to La Vérendrye Wildlife Sanctuary is approximately 25 miles (40 km) south. A civil and military airport is located immediately south, at Bourlamaque. Inc. village, 1935; town, 1937. Pop. (1991) 23,842.

Valabhī, city of ancient India that was the capital of the Maitraka dynasty in the 5th–8th century AD. It was situated on an inlet of the Gulf of Cambay (Khambhāt), northwest of the port of Bhavnagar, in Saurāṣṭra (Gujarāt), western India. The city is thought to have been established about AD 470 by the founder of the dynasty, Senāpati Bhaṭārka, during the period when the Gupta empire was breaking up. It continued as capital until about 780, when it suddenly and unaccountably disappeared from history. It apparently survived the Arab invasions of Saurāṣṭra about 725–735.

Valabhī was a celebrated centre of learning, with numerous Buddhist monasteries. It was visited by the Chinese pilgrim Hsüan-tsang in the middle of the 7th century and by I-ching at the century's close. The latter described it as equaling the fame of Nālandā in Bihār. According to a Jaina tradition, the second Jaina Council was held in Valabhī in the 5th or 6th century AD; at this council the Jaina scriptures assumed their present form. The city has now vanished, but it is identified with a village, Vala, where numerous copperplate inscriptions and seals of the Maitrakas have been found.

Valachi, Joseph, in full JOSEPH MICHAEL VALACHI (b. Sept. 22, 1903, New York, N.Y., U.S.—d. April 3, 1971, La Tuna Federal Correctional Institution, Texas), American gangster, member of Lucky Luciano's mob family, who turned informer in 1962.

Valachi held a rank in the Mafia equivalent to that of a sergeant, with interests chiefly in the numbers rackets and other gambling from the 1930s to the '50s. In 1959 he was convicted of narcotics violations and sentenced to 15 to 20 years in prison. In June 1962, in the federal prison at Atlanta, Ga., crime boss Vito Genovese, a fellow inmate, suspecting him (incorrectly) of having become an informer, gave him the kiss of death (a sign that he was to be killed). Valachi panicked, killed a fellow prisoner who he mistakenly thought was his assassin, and, in revenge against the death threat, told all to the U.S. Bureau of Narcotics and Dangerous Drugs, the FBI, the Justice Department, and the U.S. Senate Permanent Subcommittee on Investigations, headed by John L. McClellan. Valachi was the first syndicate member ever to describe the history, membership, and inner workings of the national crime cartel popularly called the Mafia—what Valachi termed La Cosa Nostra ("Our Thing"). Robert Kennedy called his testimony the "biggest single intelligence breakthrough yet in combating organized crime and racketeering in the United States." Investigations, indictments, and convictions followed Valachi's testimony.

His memoirs were published as *The Valachi Papers* (1968), by Peter Maas.

Valadon, Suzanne, original name MARIE-CLÉMENTINE VALADON (b. Sept. 23, 1865, Bessines-sur-Gartempe, near Limoges, France—d. April 19, 1938, Paris), French painter noted for her robust figures and bold use of colour. She was the mother of the painter Maurice Utrillo.

Valadon was the illegitimate daughter of a laundress, and, even before reaching her teens, she was surviving without her mother's support. She took a variety of jobs, including those of waitress and circus acrobat. In the early 1880s she became an artist's model, posing for such artists as Pierre Puvis de Chavannes, Henri de Toulouse-Lautrec, and Pierre-Auguste Renoir. By observing the artists for whom she modeled, she began to learn technique and to draw and produce pastels. About 1890 she met Edgar Degas, who admired (and purchased) her work and whose friendship she won. Her first paintings date from about 1892 and her prints from about 1894. She married a businessman in 1896, but she continued to exhibit and produce art. In 1909 she ended her marriage, and about that time her mature style began to emerge. Her subjects were nudes, still-lifes, portraits, and landscapes. Her sensitive observation combined with bold linework and patterns won her much acclaim. She exhibited frequently

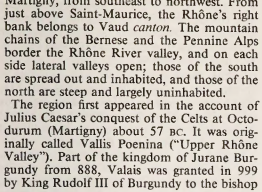


"The Blue Room," oil on canvas by Suzanne Valadon, 1923; in the National Museum of Modern Art, Paris
Musée National d'Art Moderne, Centre Georges Pompidou, Paris

and in the 1920s and '30s became internationally known.

Valais (French), German WALLIS, *canton*, southern Switzerland. It borders Italy to the south and France to the west and is bounded by the *cantons* of Vaud and Bern on the north and Uri and Ticino on the east. Its area includes the valley of the upper Rhône River, from its source at the Rhône Glacier to its mouth on Lake Geneva; the valley runs from east to west and then, in a right angle at Martigny, from southeast to northwest. From just above Saint-Maurice, the Rhône's right bank belongs to Vaud *canton*. The mountain chains of the Bernese and the Pennine Alps border the Rhône River valley, and on each side lateral valleys open; those of the south are spread out and inhabited, and those of the north are steep and largely uninhabited.

The region first appeared in the account of Julius Caesar's conquest of the Celts at Octodurum (Martigny) about 57 BC. It was originally called Vallis Poenina ("Upper Rhône Valley"). Part of the kingdom of Jurane Burgundy from 888, Valais was granted in 999 by King Rudolf III of Burgundy to the bishop



Electric power station near Vissoie in the Anniviers valley, Valais *canton*, Switzerland
FPG

of Sion, who became prefect, count of Valais, and later prince-bishop. The area's subsequent history was mostly related to the struggles of the patriots against their episcopal overlords and of the bishops against the dukes of Savoy, who coveted their land. Efforts to Protestantize Valais during the Reformation were unsuccessful. The prince-bishops retained their power until the revolution of 1798, when Valais became part of the Helvetic Republic. Napoleon made Valais the independent Rhodanic Republic in 1802 and incorporated it into France as the *département* of Simplon in 1810. In 1815 Valais entered the Swiss Confederation. Although it took part in the conservative Sonderbund (a Roman Catholic separatist league) in 1845, it did not fight but submitted to federal forces in 1847.

The *canton* is thinly populated, with no major cities; Sion (*q.v.*) is the capital and major town. Of the total territory, only about half is productive, with mountain pasture, glaciers, and forest covering the rest. Valais has at least 50 peaks (notably the Matterhorn) exceeding 13,000 feet (4,000 m); these contribute to the economic importance of the resort and tourist industries. The formerly marshy plain of the Rhône valley has been transformed into the finest orchard in Switzerland. Valais is also Switzerland's main wine-producing region.

Large hydroelectric plants produce a quarter of the nation's power; the tallest gravity dam in the world (at 7,759 feet [2,365 m] above sea level), the Grande Dixence, is in the Hérémence valley. Metal products and chemicals are manufactured in the *canton*, with plants near Sierre, at Visp, and at Monthey. An oil refinery is located at Collombey-Muraz. The *canton* is served by an airport at Sion and numerous railways and by roads extending through the famous Simplon, Great St. Bernard, and Grimsel passes. Cableways are numerous as a means of transport. The highest cableway in Europe, to the Klein-Matterhorn, 2.4 miles (3.8 km) long and reaching an elevation of 12,533 feet (3,820 m), began operation in 1980. The population is about two-thirds French-speaking and one-third German-speaking and more than 90 percent Roman Catholic. Area 2,017 square miles (5,225 square km). Pop. (1994 est.) 266,713.

Vâlcea, also spelled VÎLCEA, *judeţ* (county), south-central Romania. The Transylvanian Alps (Southern Carpathians) and the sub-Carpathians rise above settlement areas in the valleys, and the Olt and Cerna rivers drain southward through the county. Râmnicu Vâlcea (*q.v.*; the county capital), Băbeni, and Berzoi are timber production centres. Chemical factories operate in Govora, and building materials are produced in Călimăneşti. Drăgăşani is a wine-making centre. Livestock raising and cereal growing are the county's major agricultural activities. There are several 16th- and 17th-century monasteries in the county. The fortified manors of Măldăreşti, dating from the 18th and 19th centuries, include a museum. Resorts with mineral springs include Băile Olăneşti and Călimăneşti. Highway and railway connections extend through Râmnicu Vâlcea, Drăgăşani, and Brezoi. Area 2,203 square miles (5,705 square km). Pop. (1992 prelim.) 436,300.

Valdai Hills, Russian VALDAYSKAYA VOZVYSHENNOST, upland region running north-south, about midway between St. Petersburg and Moscow, Russia. The hills are a northward extension of the Central Russian Upland. The ridge is overlain by deposited glacial materials in the form of terminal moraines and other detritus. The Valdai Hills reach a height, near Vyshny Volochok, of 1,125 feet (343 m). Toward the west the hills decline steeply toward the Lake Ilmen lowland, but there is no distinct boundary on the east.

The uplands form the watershed between the basins of the Volga and Western Dvina rivers and the Ilmen plain; in the Middle Ages they were an important portage region between the rivers. At Vyshny Volochok the first canal in Russia was built, in 1708.

Valdemar, name of rulers grouped below by country and indicated by the symbol •.

DENMARK

• **Valdemar I,** byname VALDEMAR THE GREAT, Danish VALDEMAR DEN STORE (b. Jan. 14, 1131, Denmark—d. May 12, 1182, Denmark), king of Denmark (1157–82) who ended the Wend (Slav) threat to Danish shipping, won independence from the Holy Roman emperor, and gained church approval for hereditary rule by his dynasty, the Valdemars.

The son of Knud Lavard, duke of South Jutland, and a great-grandson of the Danish king Sweyn II, Valdemar gained sole possession of the monarchy, concluding more than 25 years of civil wars waged by competing contenders for the throne. He soon began a series of expeditions against the Wends, aided by his foster brother Absalon, whom he made bishop of Roskilde. By 1169 his forces had captured the Wendish stronghold of Rügen (now in Germany), which was incorporated into the diocese of Roskilde, and had stormed the Wend sanctuary at Arcona. A year later, however, he was forced to divide his gains with his ally Henry the Lion, duke of Saxony.

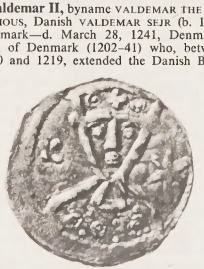


Valdemar I, coin, 12th century; in the Royal Collection of Coins and Medals, National Museum, Copenhagen
By courtesy of the Nationalmuseet, Copenhagen

Valdemar acknowledged the overlordship of the Holy Roman emperor Frederick I Barbarossa and accepted his antipope Victor IV (or V), leading Denmark's chief prelate Eskil, archbishop of Lund, to choose exile rather than oppose Pope Alexander III. After Valdemar and Bishop Absalon reneged and acknowledged Alexander in about 1165, Eskil returned to Denmark, confirmed the canonization of the king's father, and anointed his son Canute VI as joint king (1170), inaugurating the hereditary rule of the Valdemars and vitiating the overlordship of Frederick I.

After sponsoring improvements in Danish fortifications and armed forces to defend against a possible German attack, Valdemar was able to ally with Frederick I in 1181 on virtually an equal footing. The alliance was strengthened by the marriage of Valdemar's daughter to a son of Frederick. Valdemar's strong rule provoked several rebellions that proved unsuccessful; the most serious (1180) was caused by the policies of Absalon, archbishop of Lund after 1177. The uprising was repressed by Valdemar in 1181.

• **Valdemar II,** byname VALDEMAR THE VICTORIOUS, Danish VALDEMAR SEJR (b. 1170, Denmark—d. March 28, 1241, Denmark), king of Denmark (1202–41) who, between 1200 and 1219, extended the Danish Baltic



Valdemar II, coin, 13th century; in the Royal Collection of Coins and Medals, National Museum, Copenhagen
By courtesy of the Nationalmuseet, Copenhagen

empire from Schleswig in the west to include lands as far east as Estonia. In his later years he worked to unify Denmark's legal and administrative systems.

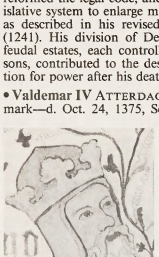
The son and brother, respectively, of the Danish kings Valdemar I and Canute IV, Valdemar acted as the duke of Schleswig from 1188 and conquered Holstein (North Albingia) and Hamburg (1200–01). Succeeding to the throne in 1202, he initially supported the Welf candidate for the office of Holy Roman emperor, Otto IV, who in turn recognized Valdemar's sovereignty in Holstein. Valdemar later broke with Otto, defeated a Welf coalition (1214), and supported Otto's rival, the future emperor Frederick II, who yielded to Valdemar the Wendish (Slavic) lands and the German territory north of the Elbe and Elde rivers.

Active from 1206 in crusades to Christianize the eastern Baltic region, Valdemar launched a campaign in Estonia in 1219, aided by the Knights of the Sword, Bishop Albert of Riga, and a Wendish navy. After his victory at Reval (Tallinn), Valdemar ruled over all of Estonia, and the country was divided into two bishoprics, Reval and Dorpat (Tartu). Conflicts with his allies led to a reapportionment of the Estonian dominions (1222), after which he retained only Reval and northern Estonia.

Shortly after crowning his son Valdemar as joint king (1218) to perpetuate his dynasty's control over the vast Danish empire, Valdemar was surprised, captured, and imprisoned with his son by Count Heinrich of Schwerin (in northeast Germany) and held until 1225, his Danish and German vassals failing to come to his aid. After prolonged negotiations, he agreed to retain only Rügen and Estonia beyond the Baltic as a condition of release; in addition, he surrendered his sons and many hostages and paid a heavy ransom. In 1227 he launched a counteroffensive but was decisively defeated at Bornhöved, and his North German empire was finished. Danish sovereignty was also challenged in Estonia, but by an agreement with the Knights of the Sword (1238), Valdemar retained his possessions there.

Despite his foreign reverses, Valdemar's rule in Denmark was strong. He carried through domestic reforms, completing the reorganization of the Danish army begun by Valdemar I and granting landed peasants exemption from taxes in return for knight service. He effectively controlled the church and the nobility, reformed the legal code, and changed the legislative system to enlarge monarchical power, as described in his revised Law of Jutland (1241). His division of Denmark into large feudal estates, each controlled by one of his sons, contributed to the destructive competition for power after his death.

• **Valdemar IV** ATTERDAG (b. *c.* 1320, Denmark—d. Oct. 24, 1375, Schleswig), king of Denmark (1340–75) who united his country under his own rule after a brief period of alien domination. His aggressive foreign policy led to conflict with Sweden, North German principalities, and the North German trading centres of the Hanseatic League.



Valdemar IV, detail from a reproduction by Agnese Varming after a contemporary fresco; in the Church of St. Peter, Nœstved, Den.

By courtesy of the Nationalhistoriske Museum paa Frederiksborg, Den

A son of King Christopher II, Valdemar lived after 1328 at the court of Louis IV the Bavarian, Holy Roman emperor. In 1338 he left the imperial court, and, with the aid of the Emperor and of Louis, margrave of Brandenburg, he began a diplomatic offensive to wrest sovereignty in Denmark from Gerhard and John the Mild, counts of Holstein. After the assassination of Gerhard in April 1340, Valdemar reached an agreement with John and was recognized as king of Denmark.

Through his marriage to Helvig, sister of Valdemar, duke of Slesvig (Schleswig), Valdemar Atterdag obtained northern Jutland and extended his control to the remainder of the alienated Danish lands. Using money raised by increasing taxes and by his sale (1346) of Estonia, he had by 1349 established control of Zealand and large areas of Funen and Jutland. Also in 1349 he intervened in North German politics, opposing the attempt of the German king Charles IV (Holy Roman emperor after 1355) to remove Valdemar's ally Louis of Brandenburg and to take Rügen and Rostock from Danish control. After liberating Louis's lands as far as Berlin, Valdemar reconciled Charles with Louis (1350) and reaffirmed Danish sovereignty in Rügen and Rostock.

On returning to Denmark, Valdemar faced a revolt (1350) by leading Jutland magnates, aided by the counts of Holstein; it was the first of a series of uprisings challenging the formidable personal rule that he had established. After all the outbreaks had been quelled, a parliament met at Kalundborg (1360) to consolidate the peace and to define the reciprocal rights and obligations of the ruler and his subjects.

Valdemar completed his reunification of his father's kingdom in 1360 by regaining Skåne from Sweden. The following year he conquered Gotland, including its wealthy town of Visby. He thus gained a strong foothold in the Baltic trade and aroused the opposition of a powerful coalition of the Hanseatic League, Sweden, Mecklenburg, Holstein, and the dissident Jutland nobles. After the coalition's forces severely defeated him in 1368, Valdemar was forced to accept the Treaty of Stralsund (1370), by which the Hanseatic towns were granted commercial privileges but the Danish kingdom remained intact. The marriage of his daughter Margaret to the Norwegian king Haakon VI in 1363 made possible the unification of Denmark and Norway, which lasted from 1380 until 1814.

Sweden

• **Valdemar** BIRGERSSON (b. 1243—d. Dec. 26, 1302), king of Sweden (1250–75) who governed jointly with his father Birger Jarl (*q.v.*) until the latter's death in 1266 and then reigned alone. Because of an extramarital affair with his wife's sister, a postulant nun, by whom he had a child, Valdemar in 1274 made a pilgrimage to Rome to gain forgiveness. Pope Gregory X exacted concessions, whereby Valdemar acknowledged papal overlordship and the responsibility to send taxes to Rome; and these concessions inspired Valdemar's brothers to rebel. By 1275, Magnus, the next in line, had made himself king (as Magnus I). Valdemar, defeated in battle, fled into exile in Norway, where he continued unsuccessfully for many years to hatch conspiracies to regain the throne.

Valdenses (religious movement): *see* Waldenses.

Valdepeñas, city, Ciudad Real province, in the autonomous community (region) of Castile-La Mancha, south central Spain. The city lies on the left bank of the Río Jabalón, southeast of the city of Ciudad Real. Situated in a fertile area of La Mancha plain, it is the centre of a grape-growing district, the wines of which are among the most popular in Spain. Related industries are vinegar making, liquor distilling, and barrel making. The city has a large number of wine cellars (*bodegas*). Its Gothic Church of the Assumption was originally a mosque. Pop. (1981) 24,946.

Valdés, Alfonso de (b. 1490?, Cuenca, Spain—d. Oct. 3?, 1532, Vienna), Humanist satirist, one of the most influential and cultured thinkers in Spain of the early 16th century and twin brother of Juan de Valdés.

Valdés may have studied at the University of Alcalá before joining the court of the emperor Charles V as a secretary and official Latinist. Valdés held important positions at the Diet of Worms, where he worked for reconciliation between Martin Luther and the church, and at the Diet of Regensburg. He was named to the post of archivist in Naples but died of the plague in Vienna before he could assume the position. His principal works are the *Diálogo de Mercurio y Carón* ("Dialogue of Mercury and Charon") and the *Diálogo de las cosas ocurridas en Roma* (*c.* 1529; "The Dialogue of What Happened at Rome"), which express his loyalty to the emperor and his devotion to the Humanist ideals of Erasmus, whose disciple and correspondent he was. In both he justified imperial policy and criticized the foes of a purified religion.

Valdés, Juan de (b. 1490?, Cuenca, Spain—d. May 1541, Naples), Spanish Humanist. He and his twin brother, Alfonso, were members of an influential intellectual family that played significant roles in the religious, political, and literary life of Spain and its empire.

Juan studied under Spain's leading Humanists and developed religious views that closely followed the ideas of Erasmus of Rotterdam, with whom both he and his brother maintained a correspondence. His work *Diálogo de la doctrina cristiana* (1529; "Dialogue on Christian Doctrine") was not well received by the Inquisition, and Valdés found it prudent to leave Spain. Accepting a post from the emperor Charles V, he spent the rest of his life in Italy but wrote in Spanish for his Italian public. The *Diálogo de la lengua* (*c.* 1535; "Dialogue on the Language"), which circulated only in manuscript until the 18th century, treated of Spanish style and language with that blend of wit, grace, learning, and common sense that characterizes Humanism at its best.

Valdés, Juan Meléndez (Spanish poet): *see* Meléndez Valdés, Juan.

Valdés Leal, Juan de Nisa (b. May 4, 1622, Seville—d. Oct. 15, 1690, Seville), painter, president of the Seville Academy, and the major figure in Sevillian painting for many years, known for his dramatic, inventive, and often violent paintings.

His father was Portuguese, and he was educated in Córdoba under the guidance of Antonio del Castillo and worked there until 1653. For the next few years he painted both in Córdoba and Seville. Moving to the latter city in 1656, he became in 1660 an original member of the Academy there (founded by Murillo), and later (1663–66) he served as its president. After the death of Murillo he was the principal painter in Seville.

In his early work he was markedly influenced by Francisco de Herrera the Elder and by Castillo. Paintings such as the "St. Andrew" of 1645 (San Francisco, Córdoba) and "La Virgen de los Plateros" (Museo Provincial de Bellas Artes, Córdoba) are marked by their exotic colours, dramatic lighting, and vigorous brushstrokes. The paintings from Seville show even more clearly elements that prefigure the

Spanish Rococo: hectic movement, immaterial forms, and brilliant colouring. Influenced in this period both by Seville painters and by Herrera the Younger and Madrid painters, he produced such works as the "Vanitas" (1660), the "Finis Gloriae Mundi" and the "Triumph of Death" (1660 and 1672), and "Jesus Disputing with the Doctors" (1686), all characterized by their macabre subject matter, dynamic energy, and theatrical violence. The violence of his subjects has often distracted attention from the inventiveness of his execution.

Valdez, city, southeastern Alaska, U.S. It lies on Prince William Sound and is the northernmost all-year port in North America. Formerly known as Copper City, it was named in 1898 for its harbour (explored and named by Spaniards in 1790) when it became a gateway for the Yukon goldfields. It is a port of entry and the southern terminal for the trans-Alaskan pipeline from Prudhoe Bay. The petroleum industry is the main economic activity, supplemented by mining, tourism (hunting and fishing), and fur farming. After it was severely damaged in 1964 by an earthquake, the town was rebuilt 5 miles (8 km) west on safer ground. The Columbia Glacier is nearby. Valdez was the principal settlement affected when the oil tanker *Exxon Valdez* ran aground in Prince William Sound on March 24, 1989, in what was the largest oil spill in U.S. history. Inc. 1901. Pop. (2000) 4,036.

Valdivia, capital of Valdivia *provincia,* Los Lagos *región,* southern Chile. It lies at the confluence of the Callecalle and Cruces rivers, which there form the Valdivia River, 11 miles (18 km) from the Pacific Ocean. Although it was founded in 1552 and was a strategically significant outpost during the colonial era, Valdivia did not flourish until after the mid-19th century, when a large influx of German settlers introduced capital and new skills into the local economic life. The city's commercial and administrative heart, on the Valdivia River's south bank, is flanked by residential districts, railroad shops, boatyards, and factories producing foodstuffs, leather, lumber products, and fabricated metals. Linked to the city by two bridges are a north-bank industrial neighbourhood, the Southern University of Chile (founded 1954), an airport, and fairgrounds. The preponderance of frame and corrugated metal buildings gives Valdivia a pioneer-city appearance. Almost all of its important maritime trade is by barge to or from the seaport of Corral, at the mouth of the Valdivia River. Both Valdivia and Corral were severely damaged in the 1960 earthquake and tidal wave. Pop. (1999 est.) mun., 122,166.

Valdivia, Pedro de (b. *c.* 1498, Extremadura, Spain—d. January 1554, Tucapel, Viceroyalty of Peru [now in Chile]), conqueror and governor of Chile for Spain and founder of the cities of Santiago and Concepción.

Valdivia served with the Spanish army in Italy and Flanders before being sent to South America in 1534. During the Peruvian civil war (1538), he fought with Francisco Pizarro against Diego de Almagro. For the Chilean expedition, Valdivia took charge (1540) of 150 Spaniards (including his mistress, Inés Suárez) and some Indian allies. He marched across the coastal desert of northern Chile, defeated a large force of Indians in the valley of Chile, and, on Feb. 12, 1541, founded Santiago. In 1546 he extended Spanish rule south to the Bío-Bío River. After fighting in Peru for two years, Valdivia returned to Chile as governor. In 1550 he began to conquer Chile south of the Bío-Bío and founded the city of Concepción. He was killed during a campaign directed against the Araucanian Indians.



Valdivia, detail of an engraving
Archivo Mas, Barcelona

Valdosta, city, seat (1860) of Lowndes county, southern Georgia, U.S., about 60 miles (100 km) northeast of Tallahassee, Fla. Troupville, the original town and county seat (1828, as Franklinville), was moved 4 miles (6 km) east in 1859 to the present site to be on the right-of-way of the area's first railroad. The new town was named for Georgia governor George M. Troup's plantation, Val d'Osta (for the Italian region Valle d'Aosta). Valdosta is a rail and commercial centre for tobacco, timber, and cattle, with diversified manufacturing. It is also an inland naval stores market, especially for turpentine. Tourism (based on numerous local fishing lakes and rivers) and Moody Air Force Base, 12 miles (19 km) northeast, also contribute to the economy. Valdosta State University was established in 1906. Inc. town, 1860; city, 1901. Pop. (2000) 43,724.

Vale of Glamorgan, county, southern Wales, extending along the Bristol Channel coast west of Cardiff and lying entirely within the historic county of Glamorgan (Morgannwg). It comprises an undulating coastal platform, with an average elevation of about 200 feet (60 m), that often terminates abruptly in cliffs at the coast. Along other sections of the coast, however, there are sand dunes. The rectangular layout of the town of Cowbridge in the centre of the Vale of Glamorgan, together with the discovery of Roman coins nearby, suggests that the Roman military station of Bovium may have been located there. The Normans built substantial fortifications at both Cowbridge and the coastal town of Barry. Massive docks were built at Barry in the 1880s to export coal mined in the Rhondda valley and other valleys to the north. Coal exports ceased in the second half of the 20th century.

Modern Barry is both the industrial and administrative centre of the county, and chemical industries have grown to the east of the port. Agriculture is the main economic activity inland, and Cowbridge serves as a market centre. The county produces beef and dairy cattle. Barry Island is a popular tourist resort, and the town of Penarth functions as both a resort and a residential area for workers who commute to Cardiff. The Turner House Art Gallery in Penarth is part of the National Museum of Wales. Area 130 square miles (337 square km). Pop. (1998 est.) 121,300.

Vale of White Horse, district, administrative county of Oxfordshire, historic county of Berkshire, England, lying southwest of Oxford. It encompasses the northern part of the historic county of Berkshire. Its principal feature is a rich clay valley that lies north of the chalk Berkshire Downs. The vale stretches 17 miles (27 km) from Shrivenham to Abingdon and is drained by the River Ock, a tributary of the Thames. At Uffington the hills reach an elevation of 856 feet (285 m) at Whitehorse Hill, on which a gigantic figure (374 feet long) of a horse is cut, the turf having been removed to reveal the white, chalky subsoil. It is of unknown origin and date but is certainly prehistoric. A number of other prehistoric remains occur in the vicinity, including the megalith (large standing stone) known as Wayland's Smithy. A prehistoric grassy track, the Ridge Way (one of the best walks in England), follows the crest of the hills. Other ancient tracks follow the foot of the escarpment, which is marked by a series of spring-line villages; in the centre is Wantage, the ancient market town said to be the birthplace (849) of Alfred the Great. In addition to the vale itself, the predominantly rural district takes in the northern slopes of the Berkshire Downs and frontage on the River Thames. Abingdon, where the Ock flows into the Thames, is the site of the district's main administrative offices and is the largest town. The Atomic Energy Authority and the Agricultural Research Council maintain research establishments in the district, and automobiles and surgical instruments are manufactured. Area 224 square miles (581 square km). Pop. (1998 est.) 113,200.

Vale Royal, borough, administrative and historic county of Cheshire, England. It is named for a great Cistercian abbey built by Edward I near the present village of Whitegate. The borough is centred on the Cheshire salt field in the middle of the county. Its two main towns, Winsford and Northwich, were both founded on salt production; Northwich was important for salt as early as Roman times. In the 18th and 19th centuries the uncontrolled extraction of salt caused much subsidence both in the countryside and among the buildings of Northwich. The modern chemical industry of the borough is still based on brine products. Winsford is famous for its rock salt mine, the only one still in production in the county, although extraction has declined. The borough has abundant agricultural land that is especially important for dairying. In the west, Delamere Forest, the remnant of a great medieval hunting ground, is an important recreational area. Area 147 square miles (381 square km). Pop. (1998 est.) 117,800.

Valence, town, capital of Drôme *département,* Rhône-Alpes *région,* southeastern France. Valence lies on the left bank of the Rhône River. Built on a succession of terraces bordering the Rhône, the town is dominated by the ancient Cathedral of Saint-Apollinaire, which was consecrated by Pope Urban II in 1095 and completed early in the 12th century. Damage done to the cathedral during the Wars of Religion (1569–98) was repaired in the 17th century. The Champ de Mars, a vast esplanade south of the cathedral, offers a fine view of the Rhône River valley. Valence probably became a bishopric in the 4th century and was ruled by its bishops until Louis XI in 1450 persuaded them to give up their temporal power in exchange for royal protection and a university (suppressed after the French Revolution).

Valence is a commercial centre for the fruit and vegetable products of the Rhône River valley and manufactures jewelry and textiles. Pop. (1999) 66,568.

valence, also spelled VALENCY, in chemistry, the property of an element that determines the number of other atoms with which an atom of the element can combine. Introduced in 1868, the term is used to express both the power of combination of an element in general and the numerical value of the power of combination.

A brief treatment of valence follows. For full treatment, *see* MACROPAEDIA: Chemical Bonding.

The explanation and the systematization of valence was a major challenge to 19th-century chemists. In the absence of any satisfactory theory of its cause, most of the effort centred on devising empirical rules for determining the valences of the elements. Characteristic valences for the elements were measured in terms of the number of atoms of hydrogen with which an atom of the element can com-

bine or that it can replace in a compound. It became evident, however, that the valences of many elements vary in different compounds. The first great step in the development of a satisfactory explanation of valence and chemical combination was made by the American chemist G.N. Lewis (1916) with the identification of the chemical bond of organic compounds with a pair of electrons held jointly by two atoms and serving to hold them together. In the same year, the nature of the chemical bond between electrically charged atoms (ions) was discussed by German physicist W. Kossel. After the development of the detailed electronic theory of the periodic system of the elements, the theory of valence was reformulated in terms of electronic structures and interatomic forces. This situation led to the introduction of several new concepts—ionic valence, covalence, oxidation number, coordination number, metallic valence—corresponding to different modes of interaction of atoms.

valence electron, any of the fundamental negatively charged particles in the outermost region of atoms that enters into the formation of chemical bonds. Whatever the type of chemical bond (ionic, covalent, metallic) between atoms, changes in the atomic structure are restricted to the outermost, or valence, electrons. They are more weakly attracted to the positive atomic nucleus than are the inner electrons and thus can be shared or transferred in the process of bonding with adjacent atoms. Valence electrons are also involved in the conduction of electric current in metals and semiconductors.

Valencia, medieval kingdom of Spain, alternately Muslim and independent from 1010 to 1238 and thereafter held by the kings of Aragon. Though its territory varied, it generally comprised the modern provinces of Alicante, Castellón, and Valencia.

When Umayyad power in Moorish Spain disintegrated in the reign of Hisham II (1010), Valencia eventually came to be ruled by 'Abd al-Aziz al-Mansūr (reigned 1021–61), grandson of the famous Cordoban caliph of that name. Stabilized by the protection of the caliphs of Córdoba and by friendship with Christian princes, his reign marked a period of peace and prosperity. However, his successor, a minor, 'Abd al-Malik (reigned 1061–65), was attacked by Ferdinand I of Castile and Leon, who missed capturing Valencia but inflicted such a defeat on its defenders that they sought protection from al-Ma'mun, the ruler of Toledo. Al-Ma'mun deposed the minor, and for the next 10 years (1065–75) Valencia formed part of his domains.

The weakness of al-Qādir, al-Ma'mun's successor, permitted the Valencians to reassert their independence under the leadership of the Toledan governor, Abū Bakr, who allied himself with Alfonso VI of Leon and Castile. But when the latter took Toledo in 1085, he installed al-Qādir as puppet ruler in Valencia with mercenary support. The following year, when the mercenaries were recalled to stem the Almoravids, al-Qādir was left defenseless before his hostile subjects. Several potentates maneuvered to depose him. The count of Barcelona, allied with the Muslim ruler of Zaragoza (Saragossa), besieged Valencia (1089). To forestall them, Alfonso offered the spoils of the city to the freebooter Rodrigo Díaz de Vivar, called El Cid. On his approach the siege was lifted, but the Cid found it more politic to exact protection money from al-Qādir than to occupy the city. This latter course was forced on the Cid when the Valencians assassinated al-Qādir in 1092 and constituted themselves as a republic under Almoravid protection. The Cid ruled Valencia from 1094 until his death in 1099. When his widow was forced to relinquish the kingdom to the Almoravids in 1102, the Christians burned the city before evacuating it.

For the next 30 years Valencia was ruled by Almoravid governors; but, in the confused period that preceded the arrival of the Almohads, the city again recovered a measure of independence. The Valencians admitted as their overlords several ephemeral Murcian princelings, until the Valencian Ibn Mardanish seized control of both kingdoms in 1147. This prince, of Spanish origins, aroused popular opposition in Valencia by his alliances with the Christians, and in 1151 the Valencians, with Almohad support, revolted against him. The kingdom remained in the hands of local rulers, vassals of the Almohads, until it fell to James I of Aragon on Sept. 28, 1238. Henceforth, its history fused with that of Aragon.

Valencia, Catalan VALÈNCIA, officially COMUNIDAD VALENCIANA, *comunidad autónoma* ("autonomous community") of eastern Spain. It encompasses the Spanish levantine provinces of Castellón, Valencia, and Alicante and was established by the statute of autonomy of July 1, 1982.

Valencia (Valentia) was a prosperous area during the Roman Empire and was taken by the Visigoths in the early 5th century AD. In the early 8th century it was captured by the Moors, and in 1021 it became the newly established independent Moorish kingdom of Valencia. The Christian reconquest of the kingdom of Valencia from Muslim rule by the crown of Aragon was completed by 1245. The kingdom continued to be administered separately under its own parliament and laws; the *Furs de València,* which were promulgated in 1261, confirmed Valencia's autonomy under the crown of Aragon. The regional government was formalized as the *Generalitat del Regne* in 1418 and was nullified in 1707 by the decree of *Nueva Planta,* which brought the region under the laws and administration prevailing in the rest of Spain.

Various political parties advocating Valencian autonomy came to the fore after World War I. The *comunidad autónoma* government established in 1982 consists of an executive council, headed by a president, and a unicameral legislative assembly, or *cortes.*

The Valencia autonomous community is long and narrow and occupies a rough north-to-south axis along the Mediterranean Sea, which lies to the east. It is bounded on the northeast by Catalonia, on the north and west by Aragon and New Castile, and on the southwest by Murcia. Castellón province occupies the northern part of the Valencia autonomous community, Valencia province is in the centre, and Alicante is the southernmost province.

The coastal plains on the Mediterranean side of the autonomous community rise into the Iberian and Baetic mountains on the west. The landscape of the western mountain region is deeply eroded, being subject to violent downpours followed by prolonged droughts; much of the zone has been stripped of a grass cover. Rolling hills predominate in the southernmost province of Alicante, softening the sharp contrast between coastal plain and mountainous hinterlands found elsewhere in Aragon. The most sizable stream in the autonomous community, the Segura River, flows eastward through Alicante province. A Mediterranean climate prevails over the autonomous community, with rainy and mild winters; winters are harsher in the hinterlands. Annual precipitation is low, ranging from 16 to 20 inches (400 to 500 mm), and the agricultural wealth of the coastal plains is based on intensive irrigation. Annual precipitation ranges from 17 inches (430 mm) in the province of Castellón to 11 inches (280 mm) around Elche; the number of months without rain increases from north to south.

The seacoast has been densely populated since the Muslim occupation (714–1238), and the region's rich farmland is subdivided into small farms, or *minifundios.* The owners of the *minifundios* form a rural middle class with strong ties to the urban middle class through marriage and social mobility. The population is becoming increasingly concentrated in the coastal cities, making Valencia one of the largest cities in Spain. The development of the urban infrastructure has not kept pace with the growth of the cities, and urban sprawl is reducing the availability of the rich surrounding farmlands.

Intensive irrigation has made the autonomous community one of the richest farming regions in the Mediterranean basin, with individual farms producing from two to four cash crops a year. One-fourth of the land under cultivation is irrigated, with oranges and rice the main crops. The large-scale cultivation of oranges dates from the late 19th century, when rail transport opened up the European market to Valencian produce. Israel, Algeria, and South Africa have subsequently, however, cut into the Valencian share of the world orange market. Rice paddies are widespread, and their exceptionally high yields frequently result in overproduction. One-third of the arable land is dry-farmed, producing traditional Mediterranean crops of grapes and olives.

The structure of the industrial sector closely parallels that of the agricultural sector, with production generally in the hands of small proprietors whose establishments manufacture a wide range of consumer goods, including furniture, candy, shoes, and toys. Factories are widely dispersed, though there is some concentration around the centres of Valencia, Alcoy, Elche, Elda, and Sagunto.

The region's service sector is well-developed, accounting for a large share of the gross domestic product and employing a commensurate portion of the work force. Tourism has expanded considerably, though it is unevenly distributed, favouring Alicante over the other provinces.

There is an unusual degree of marketing cooperation in agriculture and industry, and many cooperatives are found in the region. Catalan has traditionally been the language of the middle class, and a Valencian variant has been discernible since the 15th century. Notable Valencian writers of the early 20th century include Vicente Blasco Ibáñez (d. 1928) and Gabriel Miró (d. 1930); both authors, however, wrote in Castilian.

The traditional middle-class farmstead is the *alqueria,* which is built of stone and features a central passage allowing carts access to an enclosed courtyard behind the living quarters. In the upper story the harvest is stored. The farmstead of the poorer peasant is the *barraca,* which is built of reeds and adobe and roofed with thatch.

There are numerous religious festivals, many of them recalling the Muslim occupation. The *gayates,* or festivities, of Castellón commemorate the reconquest, while various towns in Valencia and Alicante stage festivals featuring Moors and Christians. The *fallas,* or festive bonfires, celebrate Valencia's feast day, culminating in the burning of elaborate floats. Area 8,998 square miles (23,305 square km). Pop. (1988 est.) 3,811,293.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Valencia, *provincia,* in the *comunidad autónoma* ("autonomous community") of Valencia, eastern Spain. It is situated along the Mediterranean Sea and has an area of 4,156 square miles (10,763 square km). The province centres on the coastal plain of the Gulf of Valencia; it is limited to the south by

the mountains of northern Alicante and less clearly to the north by the watershed of the Río Turia. Interior plateaus rise westward in a series of faulted steps, representing the edge of the Meseta Central (high tableland), trenched deeply by the gorges of the Río Júcar and its tributary, the Cabriel. Much of the interior is wild, sparsely populated country, opening out onto the lower and richer lands around Requeña and Liria.

The coastal plain (1,244 sq mi [3,222 sq km]) is the largest in eastern Spain, where more than 75 percent of the province's wealth and 80 percent of its population are concentrated. The plain's productivity is the result of extensive irrigation, based upon the rivers and continuously developed and expanded since pre-Roman times. Chief products include oranges on the plain and rice near the coast. Cereals, fruit, and vegetables are also cultivated on the plain, and vines and olives are grown on the hills. Fishing is of some importance on the coast. Industrial development includes construction of a nuclear power plant at Cofrentes, underway in 1980. The capital is Valencia (*q.v.*) city; other urban centres are Alcira, Sueca, Torrente, Sagunto, and Cullera. Pop. (1982 est.) 2,112,921.

Valencia, capital of Valencia province and the autonomous community (region) of Valencia, and of the former kingdom of Valencia, eastern Spain. Located on the Mediterranean coast at the mouth of the Río Turia (Guadalaviar), it is surrounded by orchards in a region known as the Huerta de Valencia. The earliest mention (Valentia) is by the Roman historian Livy, who states that the consul Decimus Junius Brutus Callaicus settled the soldier veterans of the Lusitanian leader Viriathus there in 138 BC. It later became a prosperous Roman colony.



Plaza del Caudillo, Valencia, Spain
Ed Drews—Photo Researchers

Taken by the Visigoths in AD 413 and in 714 by the Moors, it became in 1021 the seat of the newly established independent Moorish kingdom of Valencia, which extended from Almería to the Ebro estuary. From 1089 until the final capitulation of the city in 1094, the kingdom was fought for by the Spanish soldier-hero El Cid, who eventually secured it from the Moorish Almoravids. It remained in the hands of El Cid, after whom it is sometimes called Valencia del Cid, until his death there in 1099. The Moors recovered the city (and kingdom) in 1102.

In 1238 James I of Aragon added Valencia to his dominions; but the kingdom continued to be administered separately, with its own laws and parliament. In 1479, with the other countries of the Aragonese crown, the kingdom was united with Castile under the monarchs Ferdinand and Isabella, resulting in a long period of peace during which the city developed rapidly and the arts prospered. The first Spanish printing press is said to have been set up there in 1474, and during the next two centuries the city was the seat of the Valencian school of painting. During the Spanish Civil War it was the loyalist capital from 1936 to 1939.

Valencia has been called the city of the 100 bell towers, of which the most outstanding are the Gothic Miguelete Tower (1381–1424), adjoining the cathedral, and the hexagonal Tower of Santa Catalina (1688–1705), a fine example of Valencian Baroque style. The most important church is the cathedral (La Seo), situated in the ancient city centre. Begun in the 13th century (completed 1482), it represents several styles (its three doorways are respectively Romanesque, Baroque, and Gothic); and it possesses many works of art, including two large religious paintings by Goya. On Thursdays at noon the doorway opening onto the Plaza de la Constitución is the site of the Tribunal de las Aguas (Water Court), which has been in existence at least since the 10th century. It is composed of farmers, who hear disputes over irrigation waters and dispense justice on the spot, conducting all proceedings orally, in the Valencian dialect of Catalan.

Notable civic buildings include the splendid late-Gothic (15th century) Lonja de la Seda (Silk Exchange); the Palacio de la Diputación, which housed the parliament of the kingdom of Valencia, with a 15th-century courtyard and beautifully panelled rooms; the Town Hall (Ayuntamiento), a modern building with important archives and the city historical museum; and the 18th-century Neoclassical Palacio de Justicia. Valencia was a walled town, but the walls were removed in the 19th century, and only two of its gates survive. Remains of Moorish buildings include the Almudín (the public granary), which houses the Museum of Paleontology, and the Baños del Almirante (13th century).

There are museums of art and ceramics, botanical gardens, and a university (1501) which, in the early 1970s, was being transferred to a newly developed University City.

From Valencia's port, El Grao, are exported agricultural produce (rice, oranges, lemons, onions, wine) and manufactured items, including furniture, glazed tiles and ceramics, fans, textiles, and iron products. Pop. (1982 est.) 770,277.

Valencia, city, capital of Carabobo state, northwestern Venezuela, on the Río Cabriales in the central highlands at 1,600 ft (490 m) above sea level, near the western shore of Lake Valencia. It was founded in 1555, eight years before the founding of Caracas, the national capital, as Nueva Valencia del Rey by Alonso Díaz Moreno, a soldier from the Spanish city of Valencia; it rivalled Caracas as the region's major city until well into the 19th century. In 1814, during the struggle that led to Venezuela's independence, the city was the site of a bloody battle between forces of about 200 under Rafael Urdaneta and opposing Spanish forces of about 4,000. The final, decisive battle of that war (June 1821) was fought at Carabobo, 18 mi (29 km) south of the city, and is commemorated by a monument. During and after that war Valencia was three times capital of the republic, in 1812, 1830, and 1858. Today it is one of Venezuela's two major industrial centres; growth factors both historically and presently include its location on the axis of communications between central and western Venezuela and at a pass connecting the cattle-raising Llanos (plains) with the urban consumers of the northern highlands, and its easy access to Puerto Cabello, 34 mi (55 km) by expressway to the north. Lying in the heart of the nation's most fertile and productive agricultural region, Valencia benefits from the wide variety of crops grown there. Industries include the manufacture of animal feeds (it has long been the principal centre for fattening cattle from the plains), fertilizers, food and dairy products, vegetable oils, soaps and detergents, chemicals and pharmaceuticals, paper, cartons, rubber goods, textiles, garments, shoes, cement, furniture, automobile accessories, and motor vehicle assembly. It is the site of the Universidad de Carabobo (1852). The city is linked with Caracas, 75 mi (120 km) to the northeast, by railroad and expressway. Pop. (1981 est.) 568,000.

Valencia, Guillermo (b. Oct. 29, 1873, Popayán, Colom.—d. July 8, 1943, Popayán), Colombian poet and statesman, whose technical command of verse and skill at translation are notable.

Valencia, a member of a prominent family, received a humanistic classical education and read widely in several languages, developing the cosmopolitan outlook and balanced temperament that were reflected in both his political and his literary life. His first volume of poetry, *Ritos* (1898, rev. ed. 1914; "Rites"), containing original poems and free translations from French, Italian, and Portuguese, established his literary reputation at home and abroad as a leader of the experimental Modernist movement with its exotic imagery. Unlike many of the Modernists, however, he was an escapist only in his poetry, not in his own life. He led an active career as a statesman and a diplomat and was twice a candidate for the presidency of Colombia, in 1918 and 1930.

He was never a prolific poet; in later years, he abandoned original poetry almost entirely, concentrating on translations. One of these was *Catay* (1928; "Cathay"), which he translated from Franz Toussaint's *La Flute de jade* ("The Jade Flute"), a French translation of an anthology of Chinese poems. He translated *La balada de la cárcel de Reading* (1932; "The Ballad of Reading Gaol") from the English poem by the 19th-century writer Oscar Wilde. He also turned more frequently to writing essays, many of which are collected in *Panegíricos, discursos y artículos* (1933; "Panegyrics, Speeches, and Articles").

Valencia, Lake, Spanish LAGO DE VALENCIA, lake in Carabobo and Aragua states, central Venezuela. Lying in a basin in the Cordillera de la Costa (Maritime Andes) of the central highlands at an elevation of 1,362 ft (415 m) above sea level, Lake Valencia measures approximately 18 mi (29 km) from east to west and 10 mi from north to south. Its total area of 141 sq mi (364 sq km) makes it the second largest natural lake of Venezuela, after Lake Maracaibo. On its shores cotton, sugarcane, tobacco, corn (maize), coffee, fruits, and cattle are raised. Formerly known as Tacarigua, the lake is fed by many streams. The lake was formerly ringed with marshlands, but it has become a popular resort area. Valencia city is near the southwestern shore and Maracay is on the northeastern rim.

Valencia, Ramón María Narváez, duque de (duke of): *see* Narváez, Ramón María.

Valenciennes, town, Nord *département*, Nord-Pas-de-Calais region, northern France, on the Escaut (Scheldt) River. The origin of the name is obscure. Some believe that it stems from one of the three Roman emperors called Valentinian. Others attribute it to a corruption of *val des cygnes* ("valley of the swans"), swans being featured on the civic coat of arms.

The town flourished under the counts of Hainaut. In 1328 Philippa of Hainaut married Edward III of England there. In 1433 Valenciennes went to Philip the Good and then to Charles the Bold, dukes of Burgundy. Louis XI tried in vain to capture it; the Treaty of Nijmegen, 1678, saw it finally ceded to France. The Germans entered Valenciennes in the first month of World War I, and great destruction was caused by allied raids in the last week of the fighting. The damage was repeated between 1940 and 1944. After the war a new town centre was built. Valenciennes was

once important for its fine lace; the industry had practically died out, but was renovated to some extent. Prosperity was brought to Valenciennes by the exploitation of the first French coalfield and the development of ironworking. But these traditional industries were endangered in the early 1980s by the general crisis of the industrial north. Conversion to a different industrial base may be facilitated by the high quality of existing transportation and service facilities. New industries actively being sought included petroleum refining and automobile construction. The Musée des Beaux-Arts displays works by such masters as Rubens and Van Dyck, as well as some by notable painters born in the vicinity, including Watteau, Pater, and Harpignies. Pop. (1982) 41,976.

Valenciennes lace, one of the most famous of bobbin laces, first made in the French city of Valenciennes, Nord *département,* and later in Belgium (around Ypres and Ghent) and on the French–Belgian frontier at Bailleul.



Valenciennes lace
(Top) From Valenciennes, Fr., mid-18th century, in the Institut Royal du Patrimoine Artistique, Brussels; (bottom) from Belgium, Ghent, or Ypres, third quarter of the 19th century, in the Rijksmuseum, Amsterdam
By courtesy of (top) the Institut Royal du Patrimoine Artistique, Brussels; (bottom) the Rijksmuseum, Amsterdam, photograph (top) © A.C.L., Brussels

Lace produced in Valenciennes itself flourished from about 1705 until 1780. The industry continued on a diminished scale into the 19th century at other centres.

The lace is distinguished by having no cordonnet (the raised outline present in most laces of the period to give definition to the design) and is consequently flat and even in texture. Early Valenciennes had a repertoire of backgrounds including a "snowy" ground of little "partridge eye" circles; from 1715 the laceworkers within the city (as opposed to those around it) started using exclusively a diamond mesh ground, calling this type *vrai* ("true") Valenciennes and that with the older grounds, still used outside the city, *fausse* ("false") Valenciennes. Never a formal, "dress" lace, Valenciennes was nevertheless costly; it was used by the rich and by those at court for bedlinen, lingerie, fichus (triangular scarf draped over the shoulders), and the like. Early patterns were of curving, conventional leaves and flowers; in the late 18th century there was greater naturalism in their treatment. From around 1830 the diamond *vrai* Valenciennes mesh and some of the characteristic patterns were successfully imitated by machine.

Valens (b. *c.* 328—d. Aug. 9, 378). Eastern Roman emperor from 364 to 378. He was the younger brother of Valentinian I, who assumed the throne upon the death of the emperor Jovian (Feb. 17, 364). On March 28, 364, Valentinian appointed Valens to be co-emperor. Valens was assigned to rule the Eastern part of the empire, while Valentinian took the throne in the West. Soon Valens was challenged by the pagan Procopius, who had himself proclaimed emperor in Constantinople (September 365). When Valens marched from Antioch to confront the usurper, Procopius was deserted by many of his troops; on May 27, 366, he was betrayed and put to death.



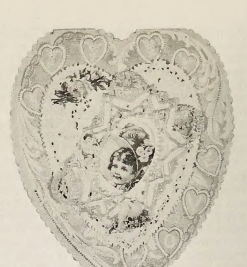
Valens, portrait on a Roman coin, *c.* AD 360; in the British Museum
Peter Clayton

Valens next waged war on the Visigoths, who had aided Procopius and were threatening to invade Thrace. In May 367 the Emperor crossed the Danube and devastated the Visigothic territories (in modern Romania). Two years later he invaded the area again and decisively defeated the tribe. After suppressing the conspiracy of Theodorus at Antioch in the winter of 371–372, Valens became involved in war with the Persians. He achieved a victory in Mesopotamia but in 376 was obliged to make peace on unfavourable terms. In that year the Visigoths, defeated and pursued by the Huns, were allowed by Valens' generals to settle in Roman territory south of the Danube. Soon the tribe rebelled against the Romans and engaged the Emperor in the great Battle of Adrianople (modern Edirne, Tur.) on Aug. 9, 378. The poor tactics employed by Valens led to the total defeat of his army, and the Emperor himself was numbered among the fallen.

Valens was an Arian Christian who persecuted Catholics while interfering little with the pagans. Bishops who had been restored by the emperor Julian were banished, although near the end of his reign Valens relented somewhat and allowed these exiles to return.

Valentine, Latin VALENTINUS (b. Rome—d. September 827, Rome), pope for about 40 days during August–September 827. He became archdeacon under Pope St. Paschal I. Beloved for his goodness and piety, he was elected pope in August but died a month later. Nothing is known of his pontificate.

valentine, special form of greeting card exchanged in observance of St. Valentine's Day (February 14), a day set aside as a lovers' festival. The custom has no connection with the two St. Valentines or with known incidents in their lives. It is probable that the valentine was the first of all greeting cards. The paper



Valentine, *c.* 1890–1900; in the Hallmark Collection
By courtesy of Hallmark Cards Inc.

valentine dates from the 16th century; by 1800 hand-painted copperplates were produced to meet large demands. These were followed by woodcuts and lithographs.

Valentine, SAINT (d. 3rd century, Rome; feast day February 14), name of two legendary martyrs whose lives seem to be historically based. One was a Roman priest and physician who suffered martyrdom during the persecution of Christians by the emperor Claudius II Gothicus and was buried on the Via Flaminia. Pope St. Julius I reportedly built a basilica over his grave. The other, bishop of Terni, Italy, was martyred, apparently also in Rome, and his relics were later taken to Terni. It is possible these are different versions of the same original account and refer to only one person.

St. Valentine's Day as a lovers' festival dates at least from the 14th century. The modern tradition of sending valentine cards has no relation to the saints. E. M. Fusciardi's *Vita di S. Valentino* appeared in 1936.

Valentinian I, Latin in full FLAVIUS VALENTINIANUS (b. 321—d. Nov. 17, 375, Brigetio, Pannonia Inferior), Roman emperor from 364 to 375 who skillfully and successfully defended the frontiers of the Western Empire against Germanic invasions.

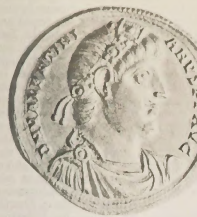
Valentinian, the son of an army officer stationed in Pannonia (in central Europe), joined the army and served with his father in Africa. According to some sources, when Valentinian was a tribune in the forces of Julian the Apostate (emperor 360–363), he was disgraced for refusal to renounce Christianity. He did serve, however, in Julian's Persian expedition of 363, and was promoted by Julian's successor, Jovian, who died soon afterward (Feb. 17, 364).

Nine days later the commanders of the army proclaimed Valentinian emperor at Nicaea (modern İznik, Tur.). On March 28 he appointed his younger brother Valens as co-ruler and assigned him to govern the East, while Valentinian retained the West. Both agreed to allow religious toleration, which, unlike Valens, Valentinian maintained throughout his reign.

Displaying inexhaustible energy, Valentinian set about fortifying and defending the borders. In January 365, his generals in Gaul were defeated by the Germanic Alemanni; by October, Valentinian had set up residence in Paris from which he directed operations against the invaders. His general Jovinus defeated them three times. At Durocatalaunum (modern Châlons-sur-Marne, Fr.), the third engagement, Jovinus inflicted heavy casualties on the Alemanni, securing Gaul for years to come. Meanwhile, in 367, the Emperor moved to Ambiani (modern Amiens, Fr.) to be in closer communication with his general Theodosius (father of the later emperor Theo-

dosius I), who was defending Britain from Saxon, Pictish, and Scottish invaders.

In order to strengthen the line of succession, Valentinian proclaimed (Aug. 24, 367)



Valentinian I, Roman coin, *c.* AD 370; in the British Museum
Peter Clayton

his nine-year-old son, Gratian, as co-emperor. Two months later Valentinian took up residence at Trier (now in Germany). He remained there for seven years, devoting his attention to the construction of an elaborate system of fortifications on the Rhine. Then, an invasion of Pannonia by the Quadi in 375 brought Valentinian to Sirmium (modern Sremska Mitrovica, Yugos.), where he soon fell sick and died.

Despite his achievements, Valentinian gained a reputation for irritability and cruelty. He frequently chose ministers of the worst character who ruthlessly oppressed the provincials.

Valentinian II, Latin in full FLAVIUS VALENTINIANUS (b. 371, Treveri, Belgica—d. May 15, 392, Vienna [modern Vienne], Viennensis), Roman emperor from 375 to 392.

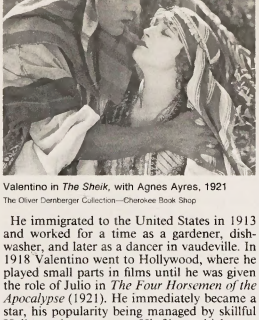
Valentinian was the son of the emperor Valentinian I and his second wife, Justina. On Nov. 22, 375, five days after the death of his father, the four-year-old Valentinian was proclaimed emperor at Aquincum (modern Budapest). The declaration was made without the knowledge or consent of the two reigning emperors, Valens and Gratian, but they later accepted Valentinian and allowed him to rule (through his mother) Italy, Africa, and Illyricum. In 383 Gratian was put to death by the usurper Magnus Maximus, and in 387 Maximus invaded Italy. Valentinian and his mother fled to Thessalonica, Greece, to the dominions of the new Eastern emperor, Theodosius I. After the overthrow of Maximus by Theodosius in 388, Valentinian was restored to his rule. But in 392 the young emperor was found dead in his palace at Vienna, perhaps murdered by agents of Arbogast, whom he had sought to dismiss from the regency of Gaul.

Valentinian III, Latin in full FLAVIUS PLACIDIUS VALENTINIANUS (b. July 2, 419, Ravenna—d. March 16, 455, Rome), Roman emperor from 425 to 455. At no time in his long reign were the affairs of state personally managed by Valentinian. He was the son of the patrician Flavius Constantius (who ruled as Constantius III in 421) and Galla Placidia. When his uncle, the emperor Honorius, died in 423, the usurper John ruled for two years before he was deposed. Then Placidia controlled the West in her young son's name until 437, although the powerful patrician Aetius became the effective ruler toward the end of this regency. The most important political event of these years was the landing of the Vandals in Africa in 429; 10 years later they threw off the overlordship of Valentinian's government.

On Oct. 29, 437, Valentinian married Licinia Eudoxia, the daughter of Theodosius II (Eastern emperor, 408–450) and Eudocia. Little is known of Valentinian in the years after his marriage. He spent his life in the pursuit of pleasure while Aetius controlled the government. In 444 Valentinian, acting in conjunction with Pope Leo I the Great, issued the famous Novel 17, which assigned to the bishop of Rome supremacy over the provincial churches. The most important political events of the closing years of his reign were the Hun invasions of Gaul (451) and of northern Italy (452), but it is not known whether Valentinian personally played any significant part in meeting these crises.

As a result of false information that made him doubt Aetius' loyalty, Valentinian murdered the great patrician with his own hands in the imperial palace at Rome on Sept. 21, 454. The following year, two barbarians, Optila and Thraustila, who had been retainers of Aetius, avenged their master by murdering the Emperor in the Campus Martius.

Valentino, Rudolph, byname of RODOLFO PIETRO FILIBERTO RAFFAELLO GUGLIELMI (b. May 6, 1895, Castellaneta, Italy—d. Aug. 23, 1926, New York City), Italian-born U.S. motion-picture actor who was idolized as the "Great Lover" of the 1920s.



Valentino in *The Sheik,* with Agnes Ayres, 1921
The Oliver Dornberger Collection—Cherokee Book Shop

He immigrated to the United States in 1913 and worked for a time as a gardener, dishwasher, and later as a dancer in vaudeville. In 1918 Valentino went to Hollywood, where he played small parts in films until he was given the role of Julio in *The Four Horsemen of the Apocalypse* (1921). He immediately became a star, his popularity being managed by skillful Hollywood press agents. His films, which were usually romantic dramas, included *The Sheik* (1921), *Blood and Sand* (1922), *The Eagle* (1925), and *The Son of the Sheik* (1926).

Valentino's sudden death from a ruptured ulcer at age 31 caused worldwide hysteria, several suicides, and riots at his lying in state, which attracted a crowd that stretched for 11 blocks. Each year after his death a mysterious "Woman in Black," sometimes several "Women in Black," appeared at his tomb.

A biography by Alexander Walker was published in 1976.

Valentinois, Cesare Borgia, duc de (duke of): *see* Borgia, Cesare.

Valentinois, Diane de Poitiers, duchesse de (duchess of): *see* Diane de Poitiers.

Valentinus (fl. 2nd century AD), Egyptian religious philosopher, founder of Roman and Alexandrian schools of Gnosticism, a system of religious dualism (belief in rival deities of good and evil) with a doctrine of salvation by *gnōsis,* or esoteric knowledge. Valentinian communities, founded by his disciples, provided the major challenge to 2nd- and 3rd-century Christian theology.

Valentinus studied philosophy at Alexandria. His disciples claimed that he had been educated by Theodas, a purported pupil of St. Paul, and was baptized a Christian. According to documentary fragments of 2nd- and 3rd-century theologians Valentinus moved to Rome *c.* 136, during the time of Pope St. Hyginus (*c.* 136–140), and exercised influence there for some 25 years, expounding his synthesis of Christian and oriental Gnostic teaching. Aspiring to be bishop of Rome, he left the Christian community when he was passed over for that office *c.* 140.

On abandoning Rome for Cyprus *c.* 160, and possibly Alexandria, Valentinus continued to develop his system of mythically derived religious philosophy. He is the reputed author of the *Gospel of Truth,* which achieved a fusion of Christian Pauline theology with Gnostic principles. A 4th-century Egyptian papyrus, the Jung Codex (discovered in 1946), containing Coptic translations of Valentinian texts, has helped in the difficult reconstruction of Valentinus' doctrine, which had survived only in short excerpts of his letters and commentaries quoted or paraphrased by his orthodox theological adversaries.

The Valentinian system developed into Eastern and Western forms in greater complexity, although the earlier structure was similar to Pauline mystical theology, with its emphasis on the instrumentality of Christ's death and resurrection in effecting Christian deliverance. Current scholarship tends to increase the importance of Valentinian doctrine in influencing the later rise of anthropocentric modes of Christian spirituality, leaving traces in every era of the church down to the present, with the emergence of a Western prototype, Pelagianism, after the 5th-century monk from Britain, Pelagius.

Valenzuela, Fernando de, MARQUÉS (marquess) DE VILLA SIERRA (b. Jan. 19, 1630, Naples—d. Feb. 7, 1692, Mexico), Spanish royal favourite and minister during the regency of Charles II.

He obtained a footing in the palace by his marriage with Maria de Uceda, lady-in-waiting to Mariana, Philip IV's second wife. When he was appointed introducer of ambassadors (Oct. 12, 1671), it became notorious that whoever had a petition to present must apply to him. He became popularly known as the *duende,* the fairy or brownie of the palace, and was believed to be the lover of the queen. Dismissed (1675) from court by intrigue, he was made marqués de Villa Sierra by the queen and ambassador to Venice. He exchanged the embassy for the governorship of Granada, organized a counterintrigue, and returned to court. The queen-regent appointed him prime minister and made him a grandee, to the profound indignation of the other grandees. At the palace revolution of January 1678, Valenzuela fled to the Escorial, was captured, degraded from the grandeeship, and exiled to the Philippines (and then to Mexico), and his property was confiscated.

Valera, city, central Trujillo state, northwestern Venezuela, on the Río Motatán, on a northern spur of the Cordillera de Mérida. The state's largest city, Valera overshadows the state capital, Trujillo, 12 mi (19 km) to the east-northeast. It is the leading commercial centre for the agricultural hinterland, in which sugarcane, cacao, coffee, fruit, and grains are cultivated. Flour milling is a principal industry. The area has traditionally supplied about one-fourth of the nation's wheat. The city is just a few miles south of the Pan-American Highway, providing easy access to the growing towns around Lake Maracaibo and in the Cordillera de Mérida. Valera also has an airport. Pop. (1981 est.) 115,000.

Valera y Alcalá Galiano, Juan (b. Oct. 18, 1824, Cabra, Spain—d. April 18, 1905, Madrid), important Spanish 19th-century novelist and stylist, also a diplomat and politician. Valera travelled to Europe and America in the diplomatic corps and served as deputy, senator and under-secretary of state in Madrid.

His novels are characterized by deep psychological analysis of the characters, especially women. He was opposed to naturalistic narrative and held that the novel was a form of poetry. His best known works are *Pepita Jiménez* (1874), notable for its terse, elegant style and masterful character development, *Doña Luz* (1879) and *Juanita la Larga* (1895). Other important novels are *Las ilusiones del doctor Faustino* (1875), *Morsamor* (1899) and *El comendador Mendoza* (1877). Valera's prolific literary output includes some very fine translations, including parts of Goethe's *Faust* and *Daphnis and Chloe* (1907); literary criticism of *Don Quixote, Faust,* and other works; short stories, including *El pájaro verde* (1887; "The Green Bird"); plays (*La venganza de Atahualpa*); and numerous essays on religion, philosophy, history and politics. His letters to intellectual figures such as Marcelino Menéndez y Pelayo and Leopoldo de Cueto constitute a valuable record of his impressions on many topics of the era.

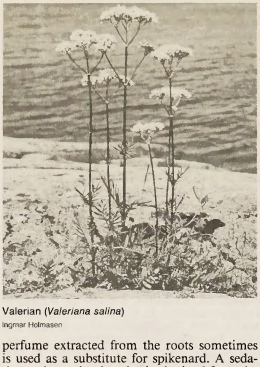
Valerian, Latin in full PUBLIUS LICINIUS VALERIANUS (d. 260), Roman emperor 253–260.

He was consul under Severus Alexander (emperor 222–235) and played a leading role in inducing the Senate to risk support for Gordian I's rebellion against the emperor Maximinus (238). Valerian may have been one of the 20 consulars who successfully defended Italy against the Emperor. He is not again mentioned until the reign of Decius (emperor 249–251). Under Gallus (emperor 251–253) Valerian held a command on the Upper Rhine and was summoned to bring the northern armies to aid in the struggle against the rival emperor Aemilian. Valerian arrived too late to save Gallus but managed to avenge and succeed him.

As emperor he vigorously renewed Decius' persecution of the Christians, executing, among others, Bishop Cyprian of Carthage and Bishop Xystus (Sixtus II) of Rome. Recognizing that it was no longer possible for one emperor to control the whole empire, Valerian appointed his son Gallienus to rule the West while he marched east to repel the Persian invasion. But he was captured by the Persian king Shāpūr I in June 260 and died in captivity.

Valerianaceae, the valerian family of the teasel order (Dipsacales), containing about 10 genera and more than 400 species of annual and perennial herbs, a few outstanding as ornamentals, salad or pot herbs, and as sources of medicines and perfumes. Greek valerian refers to Jacob's ladder (*Polemonium caeruleum*), in the phlox family (Polemoniaceae). The true valerian—native to the temperate zones, the Andes Mountains, and Africa—have three- to five-lobed tubular flowers, often spurred at the base and clustered in tight heads. The sepals are either absent or bristle-like. The leaves may be simple or divided.

The largest genus, *Valeriana,* contains about 200 species and is best known for common valerian, or garden heliotrope (*V. officinalis*), occasionally as tall as 1½ metres (5 feet). The species is native to Eurasia and is naturalized in North America, where other members of the genus are native. It has divided leaves and sweetly fragrant, pinkish-white heads of small blooms. The scent of the flowers is the source of its popular name, for common valerian is not a true heliotrope (the genus *Heliotropium* belongs to the family Boraginaceae). A spicy



Valerian (*Valeriana salina*)
Ingmar Holmasen

perfume extracted from the roots sometimes is used as a substitute for spikenard. A sedative and carminative also is obtained from the roots.

Two Mediterranean species of the genus *Valerianella,* grown for their long, undivided leaves that are used in salads and as pot herbs, are corn salad (*V. olitoria*) and Italian corn salad (*V. eriocarpa*). The genus has about 80 members, mostly Eurasian; a few are native or naturalized in North America. Red valerian, or Jupiter's-beard (*Centranthus ruber*), native to the Mediterranean, is widely naturalized in British meadows, roadsides, and on walls. Its billowy masses of tiny, fragrant, pink, white, or red blooms are borne on stems sometimes reaching 90 centimetres (3 feet). Other ornamental species are *Fedia cornucopiae,* an annual with red flower clusters from the Mediterranean; *Plectritis congesta,* a rose-pink flowered annual from northwestern Northern America; and members of the Eurasian genus *Patrinia,* perennials with yellow or white flowers.

Valerius Flaccus, Gaius (fl. 1st century AD), epic poet, author of an *Argonautica,* an epic which, though indebted to other sources, is written with vivid characterizations and descriptions and style unmarred by the excesses of other Latin poetry of the Silver Age.

Very little is known of Valerius Flaccus' life, but he must have died about AD 90, because Quintilian mourns his recent death in his *Institutio oratoria,* a work written before AD 96.

The *Argonautica,* his only surviving work, is an epic poem in hexameter verse, dedicated to the Emperor Vespasian. It describes the famous voyage of the ship "Argo" in which Jason and other heroes sailed to Colchis to bring the Golden Fleece back to Thessaly.

Valerius clearly borrowed material from the *Argonautica* of the Alexandrian poet Apollonius Rhodius (fl. *c.* 200 BC); and for his style and treatment he was deeply indebted to Virgil, though his Medea is a much gentler and less passionate figure than Dido. His verse technique owes much to Ovid. But he possessed creative gifts of his own; his work is written in simple and direct language and the narrative reveals strong dramatic talent. Valerius' work is also free of some of the vices of contemporary Latin poetry, such as display of erudition and exaggerated rhetoric.

The *Argonautica* was unknown until the first four and a half books were discovered by the Italian Humanist Poggio at Saint-Gall in 1417. The first edition was published in 1474; later editions include that in the Teubner series (1913).

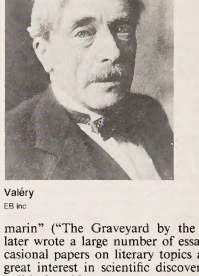
Valerius Licinianus Licinius: *see* Licinius.

Valerius Maximus (fl. *c.* AD 20), Roman historian and moralist who wrote an important book of historical anecdotes for the use of rhetoricians.

Born into a poor family, Valerius Maximus owed everything to Sextus Pompeius (consul AD 14 and proconsul of Asia), his friend and patron, whom he accompanied to the East *c.* 27. His book, *Factorum et dictorum memorabilium libri ix* (*c.* AD 31; "Nine Books of Memorable Deeds and Sayings"), was intended for use in the schools of rhetoric and written to exemplify human virtues and vices. The book's anecdotes, drawn chiefly from Roman history, include extracts from the annals of other peoples, principally the Greeks. The arrangement is loose and irregular, and the style turgid, artificial, and showy, but Valerius sometimes managed an effective and well-placed pointed expression, an ingenious transition, or a clever piece of fancy. Despite its contradictions and errors, his collection proved very popular, especially in the Middle Ages.

Valerius' sources are not easily determined. He made considerable use of Cicero, and he also used Pompeius Trogus, Livy, and probably Varro. Valerius was a champion of the empire, and he voiced the general feeling that the Romans of his day were inferior to their ancestors but greatly superior to the rest of the world.

Valéry, Paul, in full AMBROISE-PAUL-TOUSSAINT-JULES VALÉRY (b. Oct. 30, 1871, Sète, Fr.—d. July 20, 1945, Paris), French poet, essayist, and critic. His greatest poem is considered *La Jeune Parque* (1917; "The Young Fate"), which was followed by *Album de vers anciens 1890–1900* (1920) and *Charmes ou poèmes* (1922), containing "Le Cimetière



Valéry
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marin" ("The Graveyard by the Sea"). He later wrote a large number of essays and occasional papers on literary topics and took a great interest in scientific discoveries and in political problems.

Valéry was born at a small Mediterranean port where his father was a customs officer. He was educated at Montpellier, where he studied law and cultivated his interest in poetry and architecture. He was a diffident youth, and his few friends at this time were Gustave Fourment, who became a professor of philosophy, and the writers Pierre Louÿs and André Gide. His early literary idols were Edgar Allan Poe, J.-K. Huysmans, and Stéphane Mallarmé, to whom he was introduced in 1891 and whose artistic circle he came to frequent regularly.

Valéry wrote many poems between 1888 and 1891, a few of which were published in magazines of the Symbolist movement and favourably reviewed, but artistic frustration and despair over an unrequited love affair prompted him in 1892 to renounce all emotional preoccupations and to dedicate himself to the "Idol of the Intellect." He disposed of most of his books, and from 1894 until

the end of his life he would rise at dawn each day, meditate for several hours on scientific method, consciousness, and the nature of language, and record his thoughts and aphorisms in his notebooks, which were later to be published as the famous *Cahiers*. Valéry's new-found ideals were Leonardo da Vinci ("Introduction à la méthode de Léonard de Vinci" [1895]), his paradigm of the Universal Man, and his own creation, "Monsieur Teste" (Mr. Head), an almost disembodied intellect who knows but two values, the possible and the impossible ("La Soirée avec Monsieur Teste" [1896]).

From 1897 to 1900, Valéry worked as a civil servant in the French War Office; from 1900—the year of his marriage to a close friend of Mallarmé's daughter—until 1922, he was private secretary to Edouard Lebey, director of the French press association. Valéry's main daily duty was to read out the chief events from the newspapers and the Paris Stock Exchange to the director, and he thereby became a well-informed commentator on current affairs.

Pressed by Gide in 1912 to revise some of his early writings for publication, Valéry began work on what was intended to be a valedictory poem to the collection *La Jeune Parque*, centred on the awakening of consciousness in the youngest of the three ancient "Parques," or "Fates," which traditionally symbolized the three stages of human life. He became so engrossed in the technical problems it presented that he took five years to complete the long symbolic work. When finally published in 1917, it brought him immediate fame. His reputation as the most outstanding French poet of his time was quickly consolidated with *Album de vers anciens, 1890–1900* and *Charmes ou poèmes*, a collection that includes his famous meditation on death in the cemetery at Sète (where he now lies buried).

Valéry's most idiosyncratic works are all variations on the theme of the tension within the human consciousness between the desire for contemplation and the will to action: in "Introduction à la méthode de Léonard de Vinci" and repeatedly in his notebooks, he contrasts the infinite potentialities of mind with the inevitable imperfections of action; in *La Jeune Parque*, he shows a young Fate by the sea at dawn, uncertain whether to remain a serene immortal or to choose the pains and pleasures of human life; in "Le Cimetière marin" he broods by the sea at noon on Being and Not-Being, on the living and the dead; his many letters regularly complain of the conflict in his own life between the dictates of public life and his desire for solitude.

Valéry wrote no more poetry of consequence after 1922, but his place as a major writer was secure. Though his fame was first established, and still largely rests, on his poetic achievements, and though he devoted considerable attention to the problems of writing poetry, he consistently claimed that poetry in itself did not much interest him, and that literary composition, like mathematics and the sciences, served him only as mirrors to the workings of his own mind. His essays and prefaces, more often than not written quickly to order, were the fruits of his regular meditations and reveal his interest in a remarkably wide variety of subjects: writers and writing, philosophers and language, painters, dancing, architecture, and the fine arts are all reexamined with refreshing vigour. He retained an abiding interest in education, politics, and cultural values, and two remarkably prescient youthful essays on the Sino-Japanese conflict ("Le Yalou," written 1895) and the threat of German aggression ("La Conquête allemande," 1897) reveal the same anxious awareness of the forces menacing Western civilization as his very last public lecture on Voltaire (delivered in 1944).

After the death of Lebey in 1922, the formerly retiring Valéry became a prominent public personage. His erudition, courtesy, and dazzling conversational gifts made him a much sought-after society figure, and he was as much at ease in the company of the foremost international writers and scientists of the day as with generals and heads of state. Valéry was greatly interested in the state of modern physics and mathematics, and through extensive reading and, often, personal acquaintance he became well versed in the work of such scientists and mathematicians as Maurice, duc de Broglie, Bernhard Riemann, Michael Faraday, Albert Einstein, and James Clerk Maxwell. He made lecture tours all over Europe and delivered speeches on a number of national occasions. He was elected to the Académie Française in 1925, was made administrative head of the Centre Universitaire Méditerranéen at Nice in 1933, and became professor of poetry, a chair created especially for him, at the Collège de France in 1937. On his death, he was given a full state funeral.

Though he made much of his preoccupation with intellectual problems and incurred the particular displeasure of the Surrealists for his scathing attacks on poetic inspiration, there is ample evidence in Valéry's work that he remained all his life keenly responsive to the pleasures of the senses: the voluptuousness of his female nude studies ("Luxurieuse au bain," "La Dormeuse," and the picture of Eve in "Ébauche d'un serpent"), the warmth with which he writes of the lovers' embrace ("Le Cimetière marin," "Fragments du Narcisse," "La Fausse Morte") or of the sun, sky, and sea, which he had loved since his Mediterranean childhood—all show that he must not be too closely identified with his arid Monsieur Teste. The distinctive feature of his prose and poetry, even when he is dealing with the most abstract of subjects, is sensuousness; his prose is aphoristic and graceful, his poetry rich in natural images and allusions, always classical in form, and, at its best, as sinewy, subtly rhythmical, and melodious as the very best verse of the great dramatist Jean Racine or the Symbolist poet Paul Verlaine.

(R.D.D.G.)

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Valetta (Malta): *see* Valletta.

Valhalla, Old Norse VALHÖLL, in Norse mythology, the hall of slain warriors, who live there blissfully under the leadership of the god Odin. Valhalla is depicted as a splendid palace, roofed with shields, where the warriors feast on the flesh of a boar slaughtered daily and made whole again each evening. They drink liquor that flows from the udders of a goat, and their sport is to fight one another every day.

Thus they will live until the Ragnarök (Doomsday), when they will march out the 540 doors of the palace to fight at the side of Odin against the giants. When heroes fall in battle it is said that Odin needs them to strengthen his forces for the Ragnarök.

Valignano, Alessandro (b. February 1539, Chieti, Kingdom of Naples—d. Jan. 20, 1606, Macau), Italian Jesuit missionary who helped introduce Christianity to the Far East, especially to Japan.

Born into an influential Italian family and educated for the law, Valignano joined the Society of Jesus in 1566 after undergoing a religious experience. In 1573 the Society appointed him to the Far East to help supervise the growth of its missions there. He arrived in Portuguese India in 1574 and spent most of the rest of his life in the service of missions in Goa, India; Macau, off the China coast; and in Japan. Among the missionaries he helped to prepare for work in China was the Italian Jesuit Matteo Ricci, who was responsible for the tremendous influence of Catholicism at the Chinese court in the 17th century.

It was in Japan, however, that Valignano made his major contribution to the propagation of Christianity. On his first visit he arranged for the Jesuit mission to receive a portion of the highly profitable silk trade between Japan and Macau. In this way, he not only made his mission self-supporting but also was able to convert several of the Japanese daimyos (hereditary feudal lords), who also hoped to share in the trade. Further, Valignano's priests dressed like Zen Buddhist monks to accommodate themselves in every possible way to Japanese culture. So highly esteemed was Valignano that he was received by two successive rulers of Japan and was permitted to establish a centre to train native priests. The four young Japanese Christian samurai he sent to Rome in 1582 comprised the first

Japanese diplomatic mission to Europe. They were feted by the king of Spain, received by the Pope, and painted by Tintoretto.

Although Christianity was suddenly proscribed in Japan in the early 17th century, Valignano's work had a tremendous influence. By the time of his death, there were an estimated 300,000 Christians and 116 Jesuits in the country.

Valindaba, site of a uranium enrichment pilot plant in Gauteng province, South Africa, on the western outskirts of Pretoria. Built by the Uranium Enrichment Corporation of South Africa (Ucor), it became operational in 1975. Valindaba uses a process, developed in the 1960s by scientists in the Republic of South Africa, for the enrichment of uranium in the fissionable 235-isotope. The feed material required by the plant is uranium in the form of uranium hexafluoride (UF_6). It was decided to enlarge the plant in 1978 in order to produce enough enriched uranium to meet the needs of the two Koeberg nuclear reactors near Cape Town.

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valine, an amino acid obtained by hydrolysis of proteins and first isolated by the German chemist Emil Fischer (1901) from casein. It is one of several essential amino acids for mammals; *i.e.,* they cannot synthesize it and require dietary sources. It is synthesized in plants and microorganisms from pyruvic acid (a product of the breakdown of carbohydrates).

Valium: *see* diazepam.

Valkeakoski, city, Hämeen (Häme) *lääni* (province), southwestern Finland, on the western shore of the Mallas Lake, just south-southeast of Tampere. The city is connected to Tampere, Hämeenlinna, and the rest of Finland by railroad, highway, and boat service. Local industry includes pulp and paper milling, machine shops, and textile mills. Factory workers' houses, dating from 1870 to World War I, are part of an open-air museum. The Visavuori Museum is located in the studio of the sculptor Emil Wikström. Pop. (1993 est.) mun., 21,435.

Valkyrie, also spelled WALKYRIE, Old Norse VALKYRJA ("Chooser of the Slain"), in Norse mythology, any of a group of maidens who served the god Odin and were sent by him to the battlefields to choose the slain who were worthy of a place in Valhalla. These foreboders of war rode to the battlefield on horses, wearing helmets and shields; in some accounts, they flew through the air and sea. Some Valkyries had the power to cause the death of the warriors they did not favour; others, especially heroine Valkyries, guarded the lives and ships of those dear to them. Old Norse literature made references to purely supernatural Valkyries and also to human Valkyries with certain supernatural powers. Both types of beings were associated with fairness, brightness, and gold, as well as bloodshed.

Valla, Lorenzo, Latin LAURENTIUS VALLENSIS (b. 1407, Rome, Papal States [Italy]—d. Aug. 1, 1457, Rome), Italian humanist, philosopher, and literary critic who attacked medieval traditions and anticipated views of the Protestant reformers.

Valla was the son of a lawyer employed at the papal court. His family was from Piacenza. Until he was 24 Lorenzo spent most of his time in Rome, studying Latin grammar and rhetoric. Unable to obtain a post as papal secretary in 1430, he left Rome and spent the next five years wandering about northern Italy. He taught rhetoric at the University of Pavia, where he made public his *De voluptate* (*On Pleasure*), a dialogue about the nature of the true good. That work surprised many of its readers by its then-unfashionable defense of the Greek philosopher Epicurus, who maintained that, with the attainment of virtue, a wise man may live a life of prudent pleasure, free from pain. Valla then went on to attack stoicism, the philosophy of the control of the emotions through reason and its advocacy of a simple life. Valla caused a still greater sensation by an attack on the barbarous Latin used by the celebrated 14th-century lawyer Bartolus. The law faculty at Pavia took offense, and Valla found it expedient to leave.

He lived at Milan and Genoa before settling down, in 1435, as royal secretary and historian at the court of Alfonso of Aragon, king of Naples. He remained 13 years in Alfonso's service, and it was during this time that Valla, then in his 30s, wrote most of his important books. His *Declamatio* (*Treatise of Lorenzo Valla on the Donation of Constantine*), written in 1440, attacked the crude Latin of its anonymous author and from that observation argued that the document could not possibly have dated from the time of Constantine. As King Alfonso was at war with Pope Eugenius IV at this time, it was politically convenient to attack the foundation of papal claims to temporal power in Italy. The book was first printed in 1517 in Germany, the same year that Martin Luther posted his Ninety-five Theses on the church at Wittenberg, criticizing papal policies.

Valla wrote other books in his years at Alfonso's court. In his brief dialogue *De libero arbitrio* ("On Free Will"), Valla attacked the stoic philosopher Boethius (480–524/525), who had attempted to reconcile man's free will with God's foreknowledge; and in his *Dialecticae disputationes* ("Dialectical Disputations"), Valla reduced Aristotle's nine "categories" to three (substance, quality, and action, which corresponded to noun, adjective, and verb) and denounced as barbarisms a number of the technical terms of scholastic philosophy, such as "entity" and "quiddity." Valla preferred the language of ordinary people to the jargon of professional philosophers. His "Disputations" was at once a rhetorician's attack on logic and an attempt to reduce philosophical problems to linguistic ones. The *Elegantiae linguae Latinae* ("Elegances of the Latin Language"), printed in 1471, was the first textbook of Latin grammar to be written since late antiquity; it became highly popular in grammar schools all over Europe.

Valla could make even grammar polemical and shocked contemporaries by his criticisms of the prose of the famous Roman rhetorician Cicero. Similarly, his first book, written when he was 20 and now lost, had apparently argued that Quintilian, another Roman rhetorician, was a better stylist than Cicero. Valla also produced a history of the reign of Ferdinand of Aragon, Alfonso's father. Characteristically, he showed most interest in linguistic problems, such as how to write in classical Latin about things that did not exist in Roman times—*e.g.,* cannons and parliaments. For his offenses against the "dignity of history" he was attacked in an *Invective* by Bartolomeo Facio, another humanist in Alfonso's service. Valla responded with his "Recriminations Against Facio," written in dialogue form and recalling the debates among the court humanists, to which the king loved to listen. This work also contains Valla's celebrated emendations to the text of the Roman historian Livy.

Meanwhile, Valla had become embroiled in another controversy, theological this time, over his refusal to believe that the Apostles' Creed had been composed by the Twelve Apostles. As a result, he was denounced by the clergy and investigated by the Inquisition, which found him heretical on eight counts, including his defense of Epicurus and his criticisms of Aristotle's categories. Only Alfonso's personal intervention saved him from the stake.

Valla left Naples in 1448 when Nicholas V, successor to Eugenius IV and a supporter of humanists, appointed him papal secretary, a post in which he was confirmed by Nicholas' successor in 1455. Valla also taught rhetoric in Rome, where he remained until his death. In his 40s, he composed his last major work, *In Novum Testamentum ex diversorum utriusque linguae codicum collatione adnotationes* ("Annotations on the New Testament Collected from Various Codices in Each Language"), with the encouragement and advice of two famous scholars, the cardinals Bessarion and Nicholas of Cusa. The *Adnotationes,* not printed until 1505, applied the methods of humanist philology to a sacred text. Predictably, Valla was attacked for his disrespect to St. Jerome, the presumed author of the Latin translation of the Bible; during the Counter-Reformation the *Adnotationes* were to be placed on the *Index,* the Roman Catholic church's list of condemned books. Valla also translated many works from Greek into Latin. Early in his Naples days he had translated Aesop's fables, and Pope Nicholas commissioned him to translate the historians Thucydides and Herodotus.

Despite his heavy literary commitments, Valla never seemed to lack time or energy to engage in controversies. The Florentine humanist Poggio Bracciolini had criticized the "Elegances," and Valla replied in his *Antidoti in Poggium* ("Antidotes to Poggio"). Both scholars are seen at their worst here, hurling at one another accusations of ignorance, of barbarism, of plagiarism, and even worse. Benedetto Morandi, a notary from Bologna, assailed Valla for his disrespect in arguing that Livy had made mistakes about Roman history; so Valla rebutted with his *Confutatio in Morandum* ("Refutation of Morandi"). In a little dialogue, *De professione religiosorum* ("On Monastic Vows"), Valla criticized the vows of poverty, chastity, and obedience on the grounds that what mattered was "not a vow, but devotion."

Valla's last public appearance was characteristic of his provocative, polemical style. In 1457 he was invited to deliver an encomium of St. Thomas Aquinas to an audience of Dominicans in the Church of Santa Maria sopra Minerva at Rome, to celebrate the saint's anniversary. Valla, however, delivered an antiencomium, a critique of St. Thomas' style and his interest in logic that advocated a return to the theology of the Fathers of the church. It is uncertain whether Valla was a priest or not. He certainly held ecclesiastical benefices. He never married but had three children by his Roman mistress.

An aggressive man, even for that age of intellectual gladiators, Valla made enemies easily. A professional heretic, he was well suited for his role as a critic of authority and orthodoxy. As one colleague observed about his notorious comparison of Cicero and Quintilian: Valla wrote simply to disturb people. There is no doubt about his success in this respect. More than 50 years later, in the age of Luther and of the great European humanist Erasmus, his barbs were still felt. Many of his criticisms of established ideas were pedantic and quibbling, but some were penetrating. He was disliked for his "impudence," "presumption," "temerity," and "sacrilege." In an age when many traditions were held sacred, Valla's sacrilege fulfilled an important intellectual and social function. (U.P.B.)

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Vallabha, also called VALLABHĀCĀRYA (b. 1479, Benares, Jaunpur, India—d. 1531, Benares), Hindu philosopher and founder of the important devotional sect the Vallabhācāryas, also known as the *puṣṭimārga* ("the way of prosperity, or well-being").

Born to a Telegu Brahman family, Vallabha showed precocity in spiritual and intellectual matters from an early age. He initiated his first disciple in 1493 at Mathura, which became the centre of his activities, though he undertook several pilgrimages throughout India, propagating his doctrine of bhakti (devotion) to the god Krishna. It was near Mathura, at the foot of Mount Govardhana, that Vallabha discovered the central cult object of the sect, an image of Krishna called Śrī-Nāthajī.

Vallabhācārya (*ācārya,* "teacher") himself belonged to the Rudra sect established by Viṣnusvāmin, and his philosophical system of pure nondualism (*śuddhādvaita*)—*i.e.,* the identity of God and the universe—closely follows that of the Viṣnusvāmin tradition. God is worshiped not by fasting and physical austerities but by love of him and of the universe. Salvation arises only by virtue of the grace of God. In order to receive divine love, the devotee must surrender himself wholly (*samarpaṇa*) to God's gift of love.

Vallabha was married and had two sons, though he became a *sannyāsin* (ascetic) shortly before his death. His son Viṭṭhala succeeded him as head of the Vallabhācārya sect.

Vallabhācārya, school of Hinduism prominent among the merchant class of North and West India; its members are worshipers of Lord Krishna (Kṛṣna) and followers of the *puṣṭimārga* ("way of prosperity, or well-being"), founded by the 16th-century teacher Vallabha.

The worship of the sect centres around the adventures of the youthful Krishna, whose amorous play with the *gopī*s (wives and daughters of the cowherds) of Vṛndāvana are described in the 10th book of the Sanskrit classic, the *Bhāgavata-Purāṇa.* Daily worship consists of elaborate service to the daily activities god. Special festivals are celebrated according to the seasons of the year, events of Krishna's life, and anniversaries of the sect's founders, Vallabha and his son Viṭṭhala. Participation in the highest form of bhakti (devotion) is attainable only through divine grace (*puṣṭi*); personal efforts such as good deeds or religious observances are not essential.

The Vallabhācārya sect is renowned for the degree of devotion paid its gurus (spiritual leaders), who are considered earthly embodiments of the divine. Vallabha was succeeded as leader of the sect by his son Viṭṭhala (also known as Gosāinjī), and he in turn by his seven sons, each of whom established his own separate temple. The descendants of the seven sons of Viṭṭhala are the present leaders of the sect and are addressed by the title Mahārāja or Mahārāja Gosāinjī.

The main temple of the sect is at Nāthdwārā (Rājasthān), in Gujarāt state, which has installed in it a distinctive image of Krishna called Śrī-Nāthajī, which, according to the tradition of the sect, revealed itself to Vallabha when he was visiting Govardhana Hill, a scene of one of the god's exploits.

Valladolid, province, in the *comunidad autónoma* ("autonomous community") of Castile-León, northwestern Spain. It is bordered by the provinces of León and Palencia (north), by Burgos and Segovia (east), by Segovia, Ávila, and Salamanca (south), and by Zamora (west). It is a great plain with an area of 3,166 square miles (8,201 square km) lying in the basin of the Duero (Portuguese: Douro) River, which crosses it from east to west. Northern Valladolid is part of the so-called Tierra de Campos, known as the "granary of Spain." The most important crops there are wheat, barley, oats, rye, and vegetables; sugar and chicory are grown, and alfalfa and corn (maize) are produced for fodder. The use of irrigation and agricultural mechanization is increasing in the province. Flour milling is important, and there are other industries connected with food, as well as metalworking, textile weaving, chemical manufacture, construction, and tanning, all mainly in the provincial capital, Valladolid (*q.v.*). Wine production is also significant. Besides Valladolid city, the main population centres are Medina del Campo, Íscar, Medina de Ríoseco, Peñafiel and Tordesillas. Pop. (1986 est.) 485,335.

Valladolid, city, capital of Valladolid province, in the *comunidad autónoma* ("autonomous community") of Castile-León, northwestern Spain. The city lies along the Pisuerga River at its confluence with the Esgueva, southwest of Burgos.

The first recorded mention of Valladolid (Moorish Belad Ulid) appears to be in a letter of 1074 from Alfonso VI to Count Pedro Ansúrez granting him the lordship of the place. Under Ansúrez, Valladolid grew into a city of considerable importance. From the reigns of Alfonso VII to Philip II (and again from 1600 to 1606 under Philip III) it was the seat of the Castilian and then of the Spanish court. The Ansúrez lordship was ended in 1208 when Alfonso VIII incorporated Valladolid with the crown lands. The Catholic monarchs Isabella of Castile and Ferdinand of Aragon were married there in 1469.

Valladolid suffered severely during the Peninsular War (1808–14), when many of its ancient buildings were destroyed by the French. Surviving architectural monuments are the collegiate church of Santa Cruz (late 15th century); the university, which has a Baroque facade (1715) by Narciso and Diego Tomé; the house of the counts of Rivadavia (now the Diputación Provincial), in which Philip II was born in 1527; and the Capitanía General palace, a former royal palace with a notable patio. The unfinished cathedral, incorporating parts of a 13th-century structure, was begun in 1585 by Juan de Herrera and was consecrated in 1688.

Other landmarks include the collegiate church of San Gregorio, of the 15th century, with a magnificent late Gothic facade, now housing a famous museum of wood sculpture and carving; and a monument to Christopher Columbus (erected 1905), who died in Valladolid on May 20, 1506.

Valladolid's university (founded 1346) is one of the oldest in Spain. The city has many other educational institutions and is the seat of an archbishop.

Industry (food processing, textiles, engineering) and commerce are the most important sources of employment, though there is some work in forestry and agriculture. Pop. (1985 est.) 335,374.

Valladolid, University of, Spanish UNIVERSIDAD DE VALLADOLID, coeducational state institution of higher learning at Valladolid, in northwestern Spain. Established in the 13th century as an outgrowth of an old episcopal school of Valladolid, the university was recognized by Pope Clement VI in 1346 and was endowed and granted special privileges by the kings of Spain. By the 16th century it drew students from all over Spain, training candidates for posts in the Spanish empire. At first a school of liberal arts and theology, the university soon became known for its courses in canon law. It was reorganized as a state university in the 19th century. The modern university includes faculties of law, science, philosophy and letters, medicine, and economics and political science. There is also a faculty of law at San Sebastián and a faculty of science at Santander.

Vallandigham, Clement L(aird) (b. July 29, 1820, Lisbon, Ohio, U.S.—d. June 17, 1871, Lebanon, Ohio), politician during the American Civil War (1861–65) whose Southern sympathies and determined vendetta against the Federal government and its war policy resulted in his court-martial and exile to the Confederacy.

Admitted to the Ohio bar in 1842, Vallandigham was elected to the state legislature in 1845. While a member of the U.S. House of Representatives (1857–63), he was adamant



Vallandigham
By courtesy of the Library of Congress, Washington, D.C.

against the principles and policies of the newly formed Republican Party, particularly as they related to the slavery issue. Of Southern ancestry, he idealized the Southern way of life, and he assumed leadership of the faction of Midwest Democrats, called Copperheads, who opposed the prosecution of the war against the South—a war they viewed as beneficial only to Eastern interests.

During the Civil War he bitterly attacked the administration of President Abraham Lincoln, charging that it was destroying not only the Constitution but civil liberty as well. He also became commander of the secret, antiwar Knights of the Golden Circle (later Sons of Liberty). In 1863 he made vigorous speeches in Ohio against the war and the government and consequently grew to be one of the most suspected and hated men in the North. He was arrested in May by military authorities for expressing treasonable sympathy with the enemy; tried and found guilty by a military commission, he was sentenced to imprisonment. Soon afterward Lincoln commuted his sentence to banishment behind Confederate lines.

Bored with exile in the South, Vallandigham made his way to Canada, where he continued his campaign of harassment from across the border. In September 1863 the Ohio Peace Democrats nominated him in absentia for governor, but resounding Union military victories at Gettysburg and Vicksburg in July ensured his decisive defeat at the polls. He returned illegally to Ohio in 1864 and took an active part in that year's election campaign. He also wrote part of the national Democratic platform in which the war was denounced as a failure.

After the war Vallandigham criticized the Radical Reconstruction policy of the Republicans as both unconstitutional and tyrannical, but in 1870 he recognized the uselessness of further opposition and urged his party to emphasize financial issues instead. He died the following year after accidentally shooting himself with a firearm that was an exhibit in a murder trial.

Valle, Pietro della (b. April 11, 1586, Rome—d. April 21, 1652, Rome), Italian traveler to Persia and India whose letters detailing his wanderings are valuable for their full descriptions.

Valle vowed to make a pilgrimage to the Holy Land, and on June 8, 1614, he sailed

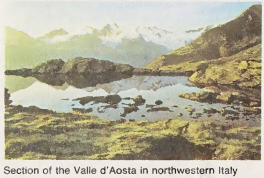
from Venice for Istanbul, where he remained a year, learning Turkish and Arabic. On Sept. 25, 1615, he left for Jerusalem by way of Alexandria, Cairo, and Mount Sinai. After visiting the holy sites, he proceeded to Damascus and Baghdad, where he married a Syrian Christian woman, and to Esfahān, Persia (now in Iran), which he reached early in 1617. He attended the court of Shāh 'Abbās I and then resumed his journey with his wife. She died at Persepolis, Persia (1621), and Valle transported her embalmed remains with him on his journey. He reached Surat in northwestern India in 1623 and, for about a year, continued southward along the coast to Calicut (Kozhikode). By way of Basra, in southern Mesopotamia, and the desert route to Aleppo, Syria, Valle finally reached Rome on March 28, 1626.

In Rome he was appointed a gentleman of the bedchamber by Pope Urban VIII. He recorded his travels in a series of letters published in three volumes: *Turkey* (1650), *Persia* (1658), and *India* (1663). An account of his life and travels is in Wilfrid Blunt, *Pietro's Pilgrimage* (1953).

Valle Central, also called MESETA CENTRAL, highland valley in central Costa Rica, containing most of the country's large cities and about 60 percent of the total population. The area of 3,500 square miles (9,000 square km) is actually formed by two basins separated by low volcanic hills, 3,000 to 5,000 feet (900 to 1,500 m) above sea level. The naturally rich soils are a result of the gradual weathering of volcanic material and basaltic lavas from the four volcanoes overlooking the valley from the Cordillera Central to the north. The subtropical forest of precolonial days gave way around 1850 to coffee cultivation, which has leached the soils and reduced their fertility. The higher and smaller basin is drained by the Reventazon River, which flows into the Caribbean. The Inter-American Highway passes through the region, where the capitals of four provinces (Alajuela, Heredia, San Jose, and Cartago) cluster near the convergence of the provincial boundaries.

Valle d'Aosta, region, northwestern Italy, containing the upper basin of the Dora Baltea River, from its source near Mount Blanc to just above Ivrea. The region is enclosed on the north, west, and south by the Alps and has an area of 1,259 square miles (3,262 square km). Originally the territory of the Salassi, a Celtic tribe, the valley was annexed by the Romans; Aosta (*q.v.*), the capital, was founded in 24 BC. After the fall of the Western Roman Empire in the 5th century, the Valle d'Aosta formed part of the Burgundian and Frankish kingdoms, passing through many hands until it was acquired in the 11th century by the House of Savoy (the future royal house of Italy). Aosta province was formed from part of Torino province in 1927, and the autonomous region of Valle d'Aosta was created in 1945 in recognition of the special French linguistic and cultural orientation of the area. At that time, the southern portion was returned to Torino province.

The busy highway from the Po Valley to the Great and Little St. Bernard passes runs through the region, which is important for dairy products and tourism and has hydroelectric resources. There is some industry in the area. A nationalist group supporting increased use of French in the region gained political and electoral strength throughout the 1970s. Pop. (1986 est.) 113,714.

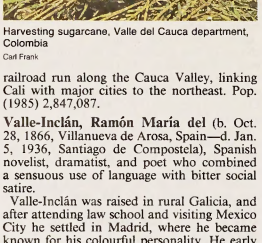


Section of the Valle d'Aosta in northwestern Italy

Marzari—SCALA from Art Resource/EB Inc.

Valle de la Pascua, city, northeastern Guárico state, central Venezuela. Lying in the Llanos (plains), it is an important regional centre for a large cattle-raising area. Its main commodities are livestock products; the dairy industry is also prominent. The city lies on the highway that skirts the southern slopes of the Andes from San Cristóbal, near the Colombian border, to El Tigre, 130 miles (210 km) to the east-southeast. Pop. (1987 est.) 67,913.

Valle del Cauca, department, western Colombia, rising from the Pacific lowlands across the Andean Cordillera Occidental to encompass the valley of the upper Cauca River. It covers an area of 8,548 square miles (22,140 square km). The department is a leading producer of sugar, rice, tobacco, and coffee. Buenaventura is the nation's chief Pacific port, through which the major portion of Colombia's coffee is exported. The Pan-American Highway and the Puerto Berrío–Popayán railroad run along the Cauca Valley, linking Cali with major cities to the northeast. Pop. (1985) 2,847,087.



Harvesting sugarcane, Valle del Cauca department, Colombia

Carl Frank

Valle-Inclán, Ramón María del (b. Oct. 28, 1866, Villanueva de Arosa, Spain—d. Jan. 5, 1936, Santiago de Compostela), Spanish novelist, dramatist, and poet who combined a sensuous use of language with bitter social satire.

Valle-Inclán was raised in rural Galicia, and after attending law school and visiting Mexico City he settled in Madrid, where he became known for his colourful personality. He early came under French Symbolist influence, and his first notable works, the four novelettes known as the *Sonatas* (1902–05), feature a beautifully evocative prose and a tone of refined and elegant decadence. They narrate the seductions and other doings of a Galician womanizer who is partly an autobiographical figure. In his subsequent works Valle-Inclán developed a style that is rich in both popular and literary appeal, as in several plays featuring the patriarchal Don Juan Manuel de Montenegro and his brood of wild sons.

Some of Valle-Inclán's later plays and novels are in the manner he called *esperpento* ("horrible, nauseating persons, or things"). This intentionally absurd and cruelly satirical style is intended to express the tragic meaning of Spanish life—which he saw as a gross deformation of European civilization—through the systematic distortion of classic heroes. The best of his *esperpento* plays are *Luces de Bohemia* (1920; "Lights of Bohemia") and *Los cuernos de Don Friolera* (1921; "Don Friolera's Horns"). His major novels of the later period include two works, *La corte de los milagros* (1927) and *Viva mi dueño* (1928), as well as an unfinished one, *Baza de espadas* (1958), that were part of an unfinished nine-volume cycle of historical novels collectively entitled *El ruedo ibérico* (1927–28; "The Iberian Circle"); the completed works deal with the political corruption and social degradation of Spain in the latter 19th century. Valle-Inclán's novel *Tirano Banderas* (1926) is a vivid portrayal of a Latin-American despot.

Valledupar, capital of César department, northern Colombia. It is situated on a plain between two mountain ranges, the Serrania de Perijá and the Sierra Nevada de Santa Marta. Founded in 1550, the settlement prospered during the colonial era but suffered much damage in 19th-century civil wars. It is now a commercial centre for the agricultural and pastoral hinterland. Factories produce ice and bricks, and there is a sawmill. The city lies on the Santa Marta–Bogotá highway; another road leads north to Riohacha. Valledupar is also served by domestic airlines. Pop. (1985) 142,771.

Vallee, Rudy, byname of HUBERT PRIOR VALLÉE (b. July 28, 1901, Island Pond, Vt., U.S.—d. July 3, 1986, North Hollywood, Calif.), one of the most popular American singers of the 1920s and '30s. His collegiate style as a singing bandleader made him a national figure.

While attending Yale University (Ph.B., 1927), he became a professional musician, playing first drums, then clarinet, then saxophone and working with Vincent Lopez and the London Savoy Havana Band (1924–25), among others. In 1928 he formed his own dance band, first called the Yale Collegians and then renamed the Connecticut Yankees, and concentrated on singing, using a hand megaphone, which became one of his trademarks, to amplify his suave, light-toned voice. For a time he was a prolific broadcaster. Later he moved to other aspects of show business, becoming a nightclub owner, a master of ceremonies in theatres, and an actor in Hollywood, where, beginning as a singer in the film *Vagabond Lover* (1929), he evolved into an accomplished light comedian and a character actor. His last major role was in the stage and film versions (1961–64 and 1967) of the musical *How to Succeed in Business Without Really Trying* (1967). Vallee's radio and stage theme songs were "My Time Is Your Time" and "The Whiffenpoof Song."

Vallejo, city, Solano County, western California, U.S. It lies along San Pablo Bay at the mouth of the Napa River, just north of Oakland. In 1850 General Mariano G. Vallejo offered land for the new state capital of California. Although his offer was accepted and the new town of Vallejo was laid out, the legislature met there for only seven days in January 1852 and for a month in 1853. The establishment of the Mare Island Naval Shipyard in 1854 permitted the town to survive. An agricultural-trade centre, it has developed flour-milling and meat-packing industries. Military installations in the area, including Travis Air Force Base, are important to the economy. The California Maritime Academy was established there in 1929. Inc. city, 1868. Pop. (1990) city, 109,199; Vallejo-Fairfield-Napa PMSA, 451,186.

Vallejo, César (Abraham) (b. March 16, 1892, Santiago de Chuco, Peru—d. April 15, 1938, Paris), Peruvian poet who in exile became a major voice of social change in Spanish-American literature.

Born the 11th child to a family of mixed Spanish and Indian origins, Vallejo as a child witnessed at firsthand hunger and poverty and the injustices done to the Indians. He attended the University of Trujillo (1913–17), where he

studied literature, wrote a thesis, *El romanticismo en la poesia castellana* ("Romanticism in Castilian Poetry"; published 1954), and studied law.

Vallejo's first book of poems, *Los heraldos negros* (1918; "The Black Heralds"), showed him still under the stylistic influence of Parnassianism and Modernism in his exploration of what were to be his major themes: his loss of security when his mother and older brother died; his resulting sense of the futility and inherent limitations of life; and the inability of human beings to achieve their potential because of social oppression and injustice.

In 1920 Vallejo's involvement in political matters concerning Indians led to his imprisonment for nearly three months. This experience heightened his feeling of loss at the death of his mother and contributed to a state of depression that was to torment him the rest of his life. *Escalas melografiadas* (1922; "Musical Scales"), a collection of short stories, and many of the more complex poems of *Trilce* (1922) were conceived during his imprisonment. The major work *Trilce* signaled a complete break with tradition by incorporating neologisms, colloquialisms, typographic innovations, and startling imagery in Vallejo's attempt to express the disparity that he felt existed between human aspirations and the limitations imposed on people by biological existence and social organization.

After publishing *Fabula salvaje* (1923; "Savage Story"), a short psychological novel about the decline of a mentally disturbed Indian, Vallejo left for Paris, never to return to his native land. Life in Paris was difficult for him; he barely made a living from translations, language tutoring, and political writing. But while he felt like an outsider because of his Indian heritage, he succeeded in establishing contacts with leading avant-garde artists. He kept in touch with Peru by publishing articles in *Amauta*, the journal founded by his friend José Carlos Mariátegui, founder of the Peruvian Communist party.

Vallejo came to believe that the language of poetry should be devoid of all traditional devices in its description of the human condition, and that literature should also serve the cause of the masses. Marxism seemed to him to be the only way of rectifying the abuses and injustices he saw in society, and two visits to Russia in 1928 and 1929 served to reinforce his political commitment. He joined the Communist Party in 1931.

Vallejo was expelled from Paris in 1930 as a political militant and went to Madrid. There he wrote the proletarian novel *El tungsteno* (1931; "Tungsten"), showing the brutal exploitation and degradation of Indian workers at a Peruvian tungsten mine. He returned to Paris in 1932, and he then spent two years in Spain during that nation's civil war (1936–39). The Spanish Civil War inspired most of his last important volume of poetry, *Poemas humanos* (1939; *Human Poems*), which presents an apocalyptic vision of an industrial society in crisis and unable to advance beyond a state of mass evil, alienation, and despair.

Most of the poems of the 1930s were published only after Vallejo's death. His fiction is collected in *Novelas y cuentos completos* (1970; "Complete Novels and Stories") and his poetry in *Obra poética completa* (1974; "Complete Poetical Works"). *The Complete Posthumous Poetry* (1978) is an English translation by Clayton Eshleman and José Rubia Barcia.

Books about Vallejo include André Coyné, *César Vallejo* (1968); James Higgins, *Visión del hombre y de la vida en las últimas obras poéticas de Vallejo* (1968; "Vision of Man and Life in the Last Poetical Works of Vallejo"); Angel Flores, ed., *Aproximaciones a César Vallejo*, 2 vol. (1971; "Encounters with César Vallejo"); and Jean Franco, *César Vallejo: The Dialectics of Poetry and Silence* (1976).

Valles, in full CIUDAD DE VALLES, city, eastern San Luis Potosí state, northeastern Mexico. It lies along the Tampaon (or Valles) River, west-southwest of Tampico. Sugarcane, citrus fruits, avocados, coffee, tobacco, and cattle are processed there, and lumbering (principally pine) is also important. The city is a commercial centre and a transportation hub that is easily accessible by highways and by railroad. Pop. (2000 prelim.) 146,411.

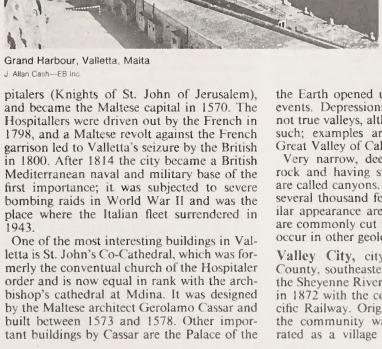
Vallès, Jules (-Louis-Joseph) (b. June 10, 1832, Le-Puy-en-Velay, Fr.—d. Feb. 14, 1885, Paris), French Socialist journalist and novelist, founder of *Le Cri du Peuple* (1871), which became one of France's leading Socialist newspapers.

The son of a provincial schoolteacher, Vallès moved to Paris to pursue his studies and was soon involved in left-wing political activities. He became a popular and controversial journalist in the 1850s, attracting attention with his sympathetic descriptions of the poor and outcast and his attacks on the French bourgeoisie. He became a member of the Commune of Paris of 1871, serving on its education commission. After the suppression of the Commune, Vallès fled to England, returning to France following the amnesty of 1880. Perhaps his best-regarded work is the trilogy of autobiographical novels entitled *Jacques Vingtras* (1879–86).

Valletta, also spelled VALETTA, seaport and capital of Malta, on the northeast coast of the island. The nucleus of the city is built on the promontory of Mount Sceberras that runs like a tongue into the middle of a bay, which it thus divides into two harbours, Grand Harbour to the east and Marsamxett (Marsamuscetto) Harbour to the west. Built after the Great Siege of Malta in 1565, which checked the advance of Ottoman power in southern Europe, it was named after Jean Parisot de la Valette, grand master of the order of Hospitalers (Knights of St. John of Jerusalem), and became the Maltese capital in 1570. The Hospitallers were driven out by the French in 1798, and a Maltese revolt against the French garrison led to Valletta's seizure by the British in 1800. After 1814 the city became a British Mediterranean naval and military base of the first importance; it was subjected to severe bombing raids in World War II and was the place where the Italian fleet surrendered in 1943.

One of the most interesting buildings in Valletta is St. John's Co-Cathedral, which was formerly the conventual church of the Hospitaler order and is now equal in rank with the archbishop's cathedral at Mdina. It was designed by the Maltese architect Gerolamo Cassar and built between 1573 and 1578. Other important buildings by Cassar are the Palace of the Grand Masters (1574), now the residence of the president of the Republic of Malta and the seat of the House of Representatives and containing the armoury of the Hospitalers; the Aragon Auberge, now the Ministry of Education and Culture; the Provence Auberge, now the National Museum; and the Castile and León Auberge, now the office of the prime minister. Of the other *auberges* (lodges built for the *langues*, or nationalities, of the Hospitalers), those of France and Auvergne were destroyed in World War II, and that of Italy was heavily damaged. The National Malta Library was built in the late 18th century; the University of Malta was founded by Pope Clement VIII in 1592; the Manoel Theatre dates from 1731–32; and the National Museum of Fine Arts (opened 1974) is housed in a residence dating from 1571.

Valletta has little industry but is the centre of the large transit trade and the local trade of the islands. Since World War II its naval dockyard has been converted for commercial use. The city's artistic treasures and equable climate sustain a considerable tourist trade. Pop. (1999 est.) 7,100.



Grand Harbour, Valletta, Malta
J. Allan Cash—EB Inc.

valley, elongate depression of the Earth's surface. Valleys are commonly drained by rivers and may be in a relatively flat plain or between ranges of hills or mountains.

A brief treatment of valleys follows. For full treatment, *see* MACROPAEDIA: Continental Landforms.

Valleys formed by the incision of rivers and by slope denudation are typically V-shaped; those formerly occupied by glaciers are characteristically U-shaped. Valley evolution is mainly controlled by climate and rock type; most valleys are in balance with the stream regime flowing through them. Formerly, all valleys were thought to be great chasms in the Earth opened up by cataclysmic tectonic events. Depressions formed in this way are not true valleys, although they are often called such; examples are Death Valley and the Great Valley of California.

Very narrow, deep valleys cut in resistant rock and having steep, almost vertical sides are called canyons. They may reach depths of several thousand feet. Smaller valleys of similar appearance are called gorges. Both types are commonly cut in flat-lying strata but may occur in other geological situations.

Valley City, city, seat (1875) of Barnes County, southeastern North Dakota, U.S., in the Sheyenne River Valley. Settlers went there in 1872 with the coming of the Northern Pacific Railway. Originally called Worthington, the community was renamed and incorporated as a village in 1881. It developed as

an agricultural trade centre. Valley City State College was opened in 1890. Bald Hill Dam, a flood-control project on the Sheyenne River, impounds Lake Ashtabula 11 mi (18 km) northwest. Inc. city, 1883. Pop. (1990) 7,163.

Valley Forge, in U.S. War of Independence, Pennsylvania encampment grounds of the Continental Army under Gen. George Washington from Dec. 19, 1777, to June 19, 1778, a period that marked the triumph of morale and military discipline over severe hardship. Following the American failures at nearby Brandywine and Germantown, Washington led 11,000 regulars to take up winter quarters at Valley Forge on the west bank of the Schuylkill River, 22 miles northwest of Philadelphia, then occupied by the British. The site was considered a defensible one, strategically located on leading trade routes and near farm supplies.

During that unusually harsh winter, the force of Washington's leadership held together the dwindling American Army, which was suffering from the bitter cold, lack of clothes, semi-starvation, gross mismanagement in the commissary and transport departments, Congressional neglect, and public criticism. More adequate money and supplies were forthcoming after the Franco-American Alliance became known in late spring 1778. Despite rampant disease and hundreds of deaths, the Continental Army was reorganized, and it emerged the following June as a well-disciplined and efficient fighting force, largely due to the efficient drilling methods introduced by Baron Frederick von Steuben.

The encampment grounds of more than 2,000 acres are maintained by the National Park Service of the Department of the Interior as the Valley Forge National Historic Park.

Valley of ———: *see under* substantive word (*e.g.,* Kings, Valley of the).

Valleyfield (Canada): *see* Salaberry-de-Valleyfield.

Valli, Romolo (b. Feb. 7, 1925, Reggio Emilia, Italy—d. Feb. 1, 1980, Rome), Italian actor who appeared in leading stage roles and won many awards for his work in motion pictures. He was also well known as a theatre manager and founded the Compagnia dei Giovani with his friend Giorgio de Lullo in 1954.

Valli's first major success came in the early 1950s at the Piccolo Teatro in Milan, and he went on to play in works by classical and modern dramatists. He toured in London and Paris and managed the Spoleto Festival until 1978. Valli had roles in many films, including Luchino Visconti's *Il Gattopardo* (1963; *The Leopard*) and *Death in Venice* (1971), Vittorio De Sica's *Il Giardino dei Finzi-Contini* (1970; *The Garden of the Finzi-Continis*), and Bernardo Bertolucci's *1900* (1975). He was appearing in a new play with his company I Giovani del Teatro Elisio when he was killed in an automobile accident.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Vallière, Louise-Françoise de La Baume le Blanc, duchesse de La: *see* La Vallière, Louise-Françoise de La Baume le Blanc, duchesse de.

Vallombrosa, village, Firenze province, Toscana (Tuscany) region, north central Italy, in a valley on the northern slope of the Monti (mountains) Pratomagno, 21 mi (33 km) southeast of Florence (Firenze). Surrounded by a magnificent forest, it was originally the



The Benedictine monastery (now used for summer schools) on the slopes of the Monti Pratomagno, Vallombrosa, Italy

L. Palmc

site of the hermitage of Sta. Maria d'Acquabella and later that of the Benedictine monastery founded in the 11th century by St. John Gualberto (or Gualbert). Although the monastery was plundered by the troops of the Holy Roman emperor Charles V in 1529 and those of Napoleon in 1808 and finally confiscated in 1866, its buildings (largely 17th century) and rich art works remain. The village is now a summer resort, and the monastery, which served as a school of forestry (1870–1914), is now used for summer schools of the University of Florence.

Valmy, François-Christophe Kellermann, duc de (duke of): *see* Kellermann, François-Christophe.

Valois, historic region of France that gave its name to the second line of the Capetian dynasty; it corresponds to the southeastern quarter of the modern *département* of Oise, with an adjacent portion of Aisne. Under the Merovingian kings (*c.* 500–751) and their successors, the first Carolingians, the county of Valois, or *pagus Vadensis,* with its capital at Vez, was an administrative district; in the post-Carolingian period it became a hereditary countship. Dynastically united with the Vexin (borderland between Île-de-France and Normandy) in the early Capetian period, it passed, with Crépy as capital, in 1077 to the House of Vermandois. In 1214 Philip II Augustus of France annexed Valois to the royal domain. Philip of Valois became king of France in 1328; his descendants ruled until 1589. Under them, Valois was a duchy held by members of the royal family. Louis XIII, a Bourbon king, gave Valois to his brother Gaston, duc d'Orléans, in 1630. Louis XIV gave it in turn to his brother Philippe, likewise duc d'Orléans, in 1661. The latter's descendants held it until the Revolution. In 1790 it was erased in the redivision of France into *départements.*

Valois DYNASTY, the royal house of France from 1328 to 1589, ruling the nation from the end of the feudal period into the early modern age. The Valois kings continued the work of unifying France and centralizing royal power begun under their predecessors, the Capetian dynasty (*q.v.*).

The House of Valois was a branch of the Capetian family, for it was descended from Charles of Valois, whose Capetian father, King Philip III, awarded him the county of Valois in 1285. Charles's son and successor, Philip, count of Valois, became king of France as Philip VI in 1328, and thus began the Valois dynasty. The house subsequently had three lines: (1) the direct line, beginning with Philip VI, which reigned from 1328 to 1498; (2) the Valois-Orléans branch, which consisted of one member, Louis XII (reigned 1498–1515), son of Charles, duc d'Orléans, a descendant of King Charles V; and (3) the Valois-Angoulême branch, beginning with Francis I, son of Charles, count of Angoulême, another descendant of Charles V; it reigned from 1515 to 1574 and was succeeded by the Bourbon dynasty, another branch of the Capetians.

The early kings of the Valois dynasty were occupied primarily with fighting the Hundred Years' War (1337–1453), which broke out under Philip VI (reigned 1328–50). During this period the monarchy was threatened both by the English, who at times controlled much of France, and by the revived strength of feudal lords, such as the Armagnac and Burgundian factions, which challenged the supremacy of the kings. Charles VII (reigned 1422–61) met these threats and began the task of restoring royal power.

The Valois kings gradually increased their authority at the expense of the privileges of the feudal lords. The crown's exclusive right to levy taxes and to wage war was established; and many of the basic administrative institutions that had begun to develop under the Capetians continued to evolve under the Valois; for example, the Parlements (courts) were extended throughout France to dispense royal justice. Their strong position in France enabled three of the Valois kings (Charles VIII, reigned 1483–98; Louis XII, reigned 1498–1515; and Francis I, reigned 1515–47) to undertake the ultimately unsuccessful Italian wars of the late 15th and early 16th centuries. These wars marked the start of Valois rivalry with the Habsburgs (ruling house of the Holy Roman Empire), a rivalry which lasted until the end of the French dynasty.

The French Renaissance occurred during the reigns of Francis I and Henry II (reigned 1547–59). The Wars of Religion (1562–98) weakened the power of the last Valois kings, for militant Roman Catholic and Protestant factions dominated politics.

Valois, Dame Ninette de: *see* de Valois, Dame Ninette.

Valona (Albania): *see* Vlorë.

Valparaíso, region, central Chile, bordering the Pacific Ocean on the west, Argentina on the east, and Santiago metropolitan region on the southeast. It was created in 1974 and encompasses Valparaíso, San Antonio, Quillota, Petorca, San Felipe, Los Andes, and Isla de Pascua (Easter Island) provinces. Valparaíso region has an area of 6,193 sq mi (16,040 sq km) and is Chile's third most populous region. In the north the region is mountainous, interrupted by broad valleys, including the northern reaches of the Central Valley of Chile, which lies between the coastal ranges and the piedmont alluvial slopes of the Andes. Climatically, the region lies in a transitional zone between the arid northern part of Chile and the subhumid central part. Major transverse valleys include those of the Aconcagua and Ligua rivers, their tributaries, and the lower Río Maipo basin.

In the fertile northern valleys where irrigation is employed, especially around San Felipe, and in the westward-draining lowlands near Valparaíso city, the regional capital, alfalfa, grapes and other fruits, vegetables, and cereal grains are grown. Cattle and sheep are pastured in the rangeland in the coastal mountains of southwestern Valparaíso region. The region contains rich mineral resources, particularly copper, kaolin, and salt. It is second in the nation to Santiago metropolitan region in industrial development; leading products are textiles, chemicals, cement, clothing, processed foods, and tobacco. The Concón petroleum refinery and the oil storage tanks at Quintero and Viña del Mar are economically important. The port of San Antonio, south of Valparaíso city, exports copper brought by railroad from the large mine at El Teniente, near Rancagua in O'Higgins region. Highways and an elec-

trified railway link secondary urban centres to Valparaíso city. The Pan-American Highway and the main north-south railroad pass through the northern portion of the region, which was heavily damaged in a 1971 earthquake. A major east-west highway connects the region with Mendoza, Arg., via the Uspallata Pass, site of the famed statue "Christ of the Andes," on the border. Valparaíso also has several popular beach resorts, notably Viña del Mar and Quintero. Portillo, near Mount Aconcagua (22,834 feet [6,960 m]), has become South America's most popular Andean winter resort.

Juan Fernández Islands and Easter Island in the Pacific are administered from Valparaíso city. Pop. (2002 prelim.) 1,384,336.

Valparaíso, capital of Valparaíso *provincia* and *región,* central Chile. It lies on the south side of a broad, open bay of the Pacific, 84 miles (140 km) northwest of the national capital of Santiago. The city stands on the slopes of a semicircular spur of the coastal mountain range that ends in the rocky peninsula of Point Angeles. This point affords good shelter to the bay from southerly and westerly winds but leaves it open to those from the north.



Valparaíso city, with the National Congress building at centre left
Chris Sharp/South American Pictures

Valparaíso was founded in 1536 by a conquistador, Juan de Saavedra, who named it for his birthplace in Spain. Its colonial buildings have survived a succession of pirate raids, severe storms, fires, and earthquakes. Much of the city was rebuilt after a devastating earthquake in 1906; many buildings were again heavily damaged in the 1971 and 1985 earthquakes. After Chilean independence in 1818 and the final breaking of the Spanish mercantile monopoly, the port developed with the birth and evolution of the Chilean navy and the links created by steamship service to Europe. Although Valparaíso has long been one of Chile's largest cities, its population grew relatively slowly during the mid- and late 20th century and even tended to decrease, as inhabitants moved to Viña del Mar and Quilpue.

The commercial quarter of Valparaíso, with its port works, warehouses, banks, and shopping centre, occupies reclaimed land adjacent to the bay, as do the administrative buildings grouped around Plaza Sotomayor. The cathedral, parks, boulevards, theatres, cafés, and a few colonial buildings, notably the Church of La Matriz, are also concentrated in this lower part of the city. The Chilean naval academy buildings and residential quarters are located on the steep slopes and valleys of encircling hills, with an agglomeration of poorer dwellings occupying the highest parts. Funicular railways, elevators, stairways, and zigzag roads connect the lower city with the upper. The adjacent tourist resort of Viña del Mar gradually evolved into a residential suburb.

Chile's bicameral parliament, the National Congress, has been situated in Valparaíso since it was reestablished in 1990. Valparaíso is preeminently a commercial and industrial centre, however. It has foundries as well as factories that produce chemicals, textiles, sugar, paints, clothing, leather goods, and vegetable oils. An oil refinery is at nearby Concón on the mouth of the Aconcagua River. Most of Chile's imports enter through the container port; and, although its exports are a small fraction of the value of the Chilean total, its significance in the country's internal maritime communications is paramount. It is a terminal and major port for several international shipping lines.

Valparaíso is also a cultural centre and is the site of the famed Federico Santa María Technical University (established 1926), the Catholic University of Valparaíso (1928), the University of Valparaíso (1976), and the Natural History and Fine Arts museums.

State railways connect Valparaíso with Santiago, to the southeast, and with all the important cities and ports of Chile from Pisagua to Puerto Montt. Good highways run to the resort towns north and south and to Santiago. Another highway crosses the Andes Mountains to connect Valparaíso with Mendoza, Arg. Internal airlines link the city with other parts of Chile. Pop. (2002 prelim.) 270,242.

Valparaiso, city, seat of Porter county, northwestern Indiana, U.S. It lies just eastsoutheast of Gary. Laid out in 1836 as the county seat, it was first called Portersville but was renamed for Valparaíso, Chile. It was originally a point on the old Sauk Trail, which was a thoroughfare for Sauk Indians traveling to Detroit to engage in the fur trade and, later, to collect annuities from the British for services in the War of 1812. Valparaiso is situated in a dairy and popcorn-seed-growing area. Its manufactures include magnets, steel and packaging products, fire-protection equipment, and food-processing machinery. It is the site of Valparaiso University (1859; Lutheran Church–Missouri Synod) and the university's Brauer Museum of Art. Pines Peak Ski Area, Indiana Dunes State Park and National Lakeshore, and Flint Lake are nearby. Inc. 1865. Pop. (2000) 27,428.

Valsād, also called BULSĀR, city, southeastern Gujarāt state, west-central India. It lies along the Gulf of Cambay (Khambat), south of the city of Surat. Valsād is known for its handloomed cloth, dyes, bricks, and pottery, and it also has a castor-oil-extraction industry. Fruit is grown in the vicinity. One of many minor ports of Gujarāt, Valsād exports cotton and silk fabrics, grain, timber, tiles, and molasses.

Except for a barren coastal stretch, the area around Valsād is intensively cultivated; chief crops include cotton, millet, pulses, and rice. Pop. (2001 prelim.) city, 68,825; metropolitan area, 145,650.

Valsbaai (South Africa): *see* False Bay.

Valtellina, German VELTLIN, upper valley of the Adda River from its sources in the Ortles mountains westward to its entry into Lake Como, largely in Sondrio *provincia,* Lombardia (Lombardy) *regione,* northern Italy. The valley is enclosed by the Bernina Alps (north), the Ortles mountains (northeast), and the Orobie Alps (south) and is traversed by good roads over four well-marked Alpine passes: the Stelvio (9,042 feet [2,756 m]), the Bernina (7,621 feet [2,323 m]), the Aprica (3,858 feet [1,176 m]), and the Umbrail (9,944 feet [3,031 m]).

Historically, the valley was the southern part of ancient Raetia (*q.v.*). It was then the object of dispute between Milan and the bishops of Como from the 6th to the 13th century and between Milan and the Swiss canton of Graubünden in the 16th and 17th centuries. It belonged to Graubünden from 1639 until 1797 and, after being dominated by the French during the Napoleonic Wars, passed to Austrian Lombardy; it was joined to the Kingdom of Italy in 1859. The population of the Valtellina within the diocese of Como is Italian-speaking and Roman Catholic. Vigorous measures have been taken to prevent inundations of the Adda, and the fertile valley supports varied agriculture, forestry, and livestock. The Valtellina is known for its wines, and it has also become important for its hydroelectric plants. Tourism is an increasingly significant economic factor. The chief towns are Sondrio, Tirano, Chiavenna, Morbegno, and Bormio.

value-added tax, government levy on the amount that a business firm adds to the price of a commodity during its production and distribution. Three major types of value-added tax have been identified, depending on the deductions allowed, but only one—called the "consumption" type—is widely used today.

Calculation of the value-added tax of the consumption type can be made in any of three different ways, but virtually every country imposing the tax uses the "invoice," or "credit," method of computation. Using this method, each seller (the party responsible for collecting the tax and paying it to the government) first calculates the sum of all the taxes that he has collected on goods sold; he then totals the sum of all the taxes that he has paid on goods purchased. His net tax liability is the difference between the tax collected and the tax paid.

It is generally assumed that the burden of the value-added tax, like that of other sales taxes, falls upon the final consumer. Although the tax is collected at each stage of the production-distribution chain, the fact that sellers receive a credit for their tax payments causes the tax, in effect, to be passed on to the final consumer, who receives no credit. The tax can be regressive (*i.e.,* the percentage of income paid in tax rises as income falls), but most countries have at least partly avoided this effect by applying a lower rate to necessities than to luxury items.

In 1954 France was the first country to adopt the value-added tax on a large scale. It served as an improvement on the earlier turnover tax, by which a product was taxed repeatedly at every stage of production and distribution, without relief for taxes paid at previous stages. Although easier to administer, such a tax discriminated heavily against industries and sectors in which products were bought and sold several times, encouraging an undesirable concentration of economic power.

In 1968 West Germany adopted the value-added tax, and since then most other western European nations have followed suit, largely as the result of a desire to harmonize tax systems. All members of the European Union are required to implement value-added taxes that conform to a model prescribed by the union. Many countries in South America, Asia, and Africa have also adopted the tax. The U.S. state of Michigan used a value-added tax from 1953 through 1967 and again from 1975.

valve, in anatomy, any of various membranous structures, especially in the heart, veins, and lymph ducts, that function to close temporarily a passage or orifice, permitting movement of a fluid in one direction only. A valve may consist of a sphincter muscle or two or three membranous flaps or folds.

In the heart there are two valves that prevent backflow of blood from the ventricles into the atria. On the right side of the heart is the tricuspid valve, composed of three flaps of tissue; on the left is the two-piece mitral valve. Once blood has left the heart and entered the aorta, its return is prevented by the semilunar valves, which consist of membranous saclike flaps that open away from the heart. If the flow of blood reverses, the flaps fill and are pressed against each other, thus blocking the reentry of blood into the aorta. The valves in the venous system are of this same type. A valve unique to the lower vertebrates is the renal portal valve, which closes to shunt blood past the kidneys, increasing its supply elsewhere when necessary. In the digestive system of mammals

the ileocecal valve, controlled by a sphincter muscle, prevents the return of the contents of the small intestine after they have passed into the colon.

valve, in mechanical engineering, device for controlling the flow of fluids (liquids, gases, slurries) in a pipe or other enclosure. Control is by means of a movable element that opens, shuts, or partially obstructs an opening in a passageway. Valves are of seven main types: globe, gate, needle, plug (cock), butterfly, poppet, and spool.

In the globe valve shown in the Figure (upper left), the movable element M may be a tapered plug or a disk that fits a seat on the valve body; the disk may carry a replaceable rubber or leather washer, as in a household water faucet. In a gate valve, the movable element is a wedge-shaped disk that seats against two tapered faces in the valve body. A needle valve has a long tapered needle fitting in a tapered seat.

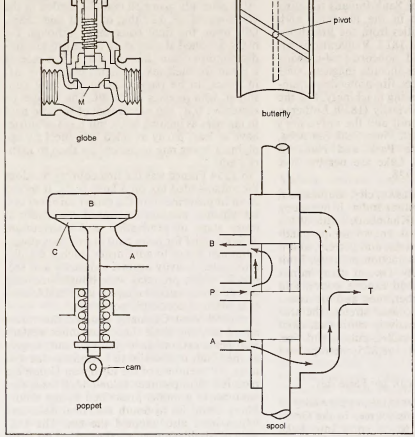
A plug valve, or cock, is a conical plug with a hole perpendicular to its axis fitting in a conical seat in the valve body at right angles to the pipe. By turning the plug the hole is either lined up with the pipe to permit flow or set at right angles to block the passage.

A butterfly valve is a circular disk pivoted along one diameter; the solid lines in the Figure (upper right) show one in the closed position. In the fully open position, shown dotted, the disk is parallel to the direction of flow. The damper in a stovepipe or a warm-air heating system is of this type, which is also used in the intake passage to carburetors on gasoline engines. On hydraulic turbines such valves may be 20 feet or more in diameter.

Some valves operate automatically; check (or nonreturn) valves, for example, are self-acting and permit flow in one direction only. They are made in several types. If the movable element in the globe valve in the Figure were kept on its seat by gravity or a spring, it would permit flow from left to right but not from right to left.

Safety valves, which are usually of the poppet type, open at a predetermined pressure. The movable element may be kept on its seat by a weighted lever or a spring strong enough to hold the valve closed until the pressure is reached at which safe operation requires opening.

On gasoline engines, poppet valves are used to control the admission and rejection of the intake and exhaust gases to the cylinders. In the Figure (lower left), the valve, which consists of a disk with a tapered edge attached to a shank, is held against the tapered seat C by a compressed spring. The valve is raised from its seat by the action of a rotating cam that pushes on the bottom of the shank, permitting gas flow between region A, which leads to the intake or exhaust pipes, and region B, which leads to the cylinder.



Types of valves

In hydrostatic fluid-power systems, in which the working medium is usually pressurized oil, spool valves are employed to regulate the oil flow. The valve shown in the Figure (lower right) provides two flow paths for the output from a pump. In the extreme upper position, as shown, active flow is from the pump port P to the working, or load, port B; discarded fluid from the load passes from port A to the tank or sump port T. In the extreme lower position, the functions of ports A and B are reversed. In the mid or neutral position of the spool, ports A and B are blocked. The movement of the spool may be manually or electrically controlled.

valve, in music, a device, first used in 1815 by musicians Heinrich Stölzel and Friedrich Blühmel of Berlin, that alters the length of the vibrating air column in brass wind instruments by allowing air to pass through a small piece of metal tubing, or crook, permanently attached to the instrument. Descending valves switch in extra tubing, lowering the fundamental pitch; the less common ascending valves cut air off from the tubing, raising the pitch. Valves enable players to produce notes lying outside the harmonic series of an air column the length of the original tubing (in relative pitch, C–c–g–c′–e′–g′–b♭′ [approximately]–c″–d″–e″, etc).

Brass instruments normally have three descending valves; used in combination they can lower the pitch of the instrument six semitones. Two principal switching methods are used: piston and rotary mechanisms.

valve (electronics): *see* electron tube.

Valverde, province, northwestern Dominican Republic. Created on territory removed in 1959 from Santiago province, the 220-sq-mi (570-sq-km) province lies mainly in the fertile and densely populated Valle del Cibao; it is drained by the Yaque del Norte River. The principal economic activity is agriculture; cacao, coffee, tobacco, corn (maize), sugarcane, rice, and fruits are the leading crops. Lumbering and placer gold mining are also carried on. The province is traversed by secondary and main highways linking Mao (*q.v.*), the provincial capital, with other communities in the valley. Pop. (1981) 100,319.

Vāmana, fifth of the 10 incarnations (*avatāras*) of the Hindu god Vishnu. He made his appearance when the demon king Bali ruled the entire universe and the gods had lost their power. One day the dwarf Vāmana visited the court of Bali and begged of him as much land as he could step over in three paces. The King laughingly granted the request. Assuming a gigantic form, Vāmana with one step covered the whole earth, and with the second step the midworld between earth and heaven. As there was nowhere left to go, the demon king lowered his head and suggested Vāmana place his foot on it for the promised third step. Vāmana was pleased, and with the pressure of his foot sent Bali down below to rule the nether world. Vishnu in this form is often identified as Trivikrama (God of the Three Strides).



Vāmana, stone relief from Bādāmi Cave II, Karnataka (formerly Mysore) state, India

By courtesy of the Archaeological Survey of India, New Delhi

The images of Vāmana usually show him already grown to giant size, one foot firmly

planted on earth and the other lifted as if to take a stride. If shown small in stature the sculptures may depict him as a deformed dwarf, or as a brahmachari (monastic student), dressed in the deer skin, loin cloth, and sacred thread, and with the tufted hair of the student.

vampire, in popular legend, a bloodsucking creature, supposedly the restless soul of a heretic, criminal, or suicide, that leaves its burial place at night, often in the form of a bat, to drink the blood of humans. By daybreak it must return to its grave or to a coffin filled with its native earth. Its victims become vampires after death. Although the belief in vampires was widespread over Asia and Europe, it was primarily a Slavic and Hungarian legend, with reports proliferating in Hungary from 1730 to 1735.

Among the various demons of ancient folk tradition, the vampire has enjoyed the most conspicuous and continual literary success in the 20th century, owing largely to the popularity of the Gothic novel *Dracula* (1897) by the British author Bram Stoker. Count Dracula, its "undead" villain from Transylvania, be-



Dracula, the vampire, played by Bela Lugosi in the film *Dracula*, 1931

By courtesy of Universal Pictures: photograph, The Bettmann Archive

came the representative type of vampire. The novel, a play (1927), and a popular series of films made vampire lore common currency. Tod Browning's classic film *Dracula* (1931), starring Bela Lugosi, set the pattern for the dozens of vampire movies that followed in the mid- and late 20th century.

Typically the vampire had a pallid face, staring eyes, and protruding incisor teeth and fed by biting and sucking blood from the victim's throat. Methods for recognizing vampires (they cast no shadow and are not reflected in mirrors) and for warding them off (by displaying a crucifix or sleeping with a wreath of garlic around one's neck) are known to every schoolchild. Vampires can be put to final rest by driving a stake through their hearts, by burning them, or by destroying their daytime resting places.

vampire bat, any of three species of blood-eating bats, family Desmodontidae, native to the New World tropics. Named after the bloodsucking human spirits of folklore, vampire bats are shy, tailless, brown bats that run swiftly and can leap with considerable agility. They are about 6–9 cm (2½–3½ inches) long and weigh about 15–50 g (½–1½ ounces). The three species are the common (*Desmodus rotundus*), white-winged (*Diaemus youngi*), and hairy-legged (*Diphylla ecaudata*) vampire bats.

Vampire bats leave their sheltered roosts after dark and forage low over the ground, feeding on practically any quietly resting warm-blooded animal. They make a small cut with their sharp incisor teeth, often without disturbing their prey, and lap the blood that flows from the incision. They take the blood of mammals and birds, often attack cattle and other domestic animals, and occasionally bite



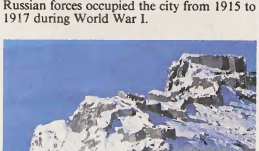
Common vampire bat (*Desmodus rotundus*)

Nina Leen, *Life* © Time Inc.

humans. Their bite wounds are not themselves serious but may transmit rabies or other diseases.

van (in proper names): *see under* substantive word (*e.g.*, Leeuwenhoek, Antonie van; Hulst, Hendrik Christoffell van de), except as below.

Van, city, eastern Turkey. It lies on the eastern shore of Lake Van at an altitude of about 5,750 feet (1,750 m). The city lies in an oasis at the foot of a hill crowned by an ancient ruined citadel. A ruined stone building near the foot of the rocky spur bears cuneiform inscriptions dating from the 8th and 7th centuries BC, when Van was the chief centre of the Urartu Kingdom. After the fall of Nineveh (612 BC) it was occupied in succession by the Medes, Achaemenian Persians, and the kings of Pontus. Rock inscriptions on the citadel hill include one in Old Persian carved on the orders of the Achaemenian king Xerxes I (early 5th century BC). Van was included in the kingdom established by King Tigranes I in the 1st century BC. The Romans and the Sāsānids of Persia fought over it for a time; it became a tributary state to the Arabs in the 7th century; and it prospered under the Armenian Bagratid dynasty in the 8th century. The region fell to the Seljuq Turks after their victory over Byzantium (1071) and was later annexed to the Ottoman Empire in 1543. Russian forces occupied the city from 1915 to 1917 during World War I.



The ruined citadel situated on an isolated ridge of rock above Van, Tur.

Farrell Grehan—Photo Researchers

The mound of Toprakkale, 3 miles (5 km) north of the modern city, is the site of an excavated ancient Urartian city dating from the 8th century BC. Van's local museum contains numerous specimens of Urartian inscriptions and pottery found in the vicinity. Van's trade is mainly in regional products such as skins, grains, fruits, and vegetables. Lake Van, the largest body of water in Turkey, is the focus of a growing tourist trade, and there are air services from Ankara and Istanbul.

The region in which Van is situated is a stock-raising area, specializing in horses; grains, fruits, and vegetables are grown. The region has a large Kurdish population; the Armenian section of the population, which had nationalist aspirations, was deported by government order and was subsequently massacred during World War I. Pop. (1985 prelim.) city, 121,306.

Van, Lake, Turkish VAN GÖLÜ, lake, largest body of water in Turkey and the second largest in the Middle East. The lake is located in the region of eastern Anatolia near the border of Iran. It covers an area of 1,434 square miles (3,713 square km) and is more than 74 miles (119 km) across at its widest point. Known to the ancient Greek geographers as Thospitis Lacus, or Arsissa Lacus, its modern Turkish name, Van Gölü, is derived from Van, or Chauon, the name of the capital of the Urartian kingdom that flourished on the lake's eastern shore between the 10th and 8th centuries BC. Roughly triangular in shape, the lake lies in an enclosed basin; its brackish waters are unsuitable for either drinking or irrigation. The salt water allows for no animal life save the *darekh* (related to the European bleak, a small soft-finned river fish of the carp family), a freshwater fish that has adapted to a saline environment.

Lake Van occupies the lowest part of a vast basin bordered by high mountains to the south, by plateaus and mountains to the east, and by a complex of volcanic cones to the west. At some time during the Pleistocene Epoch (10,000, to about 2,000,000 years ago), a lava flow from the Nemrut volcano extended for nearly 37 miles (60 km) across the southwestern end of the basin, blocking westward drainage to the Murat River and thereby transforming the depression into a lake basin without outlet.

Lake Van is divided into two sections; the main body of water is separated from its much shallower northern extension by a narrow passage. Its shores are generally steep and lined with cliffs; the southern shore is extremely sinuous and eroded. The waters are dotted with islands, including Gadir, the largest, in the north; Çarpanak in the east; and Aktamar and Atrek in the south. The main body of the lake to the south is much deeper than its northern section, with the greatest depths exceeding 330 feet (100 m).

Lake Van's catchment area exceeds 5,790 square miles (15,000 square km); it forms the largest interior basin of Turkey except for that of the central Anatolian region. The lake is fed by rainfall and meltwater as well as by several tributaries, notably the Bendimahi and Zilan rivers, which flow in from the north, and the Karasu and Micinger rivers, which enter the lake from the east. Lake Van experiences a seasonal variation of its water level of about 20 inches (50 cm) per year. It is lowest during the winter months and begins to rise after the spring thaw. With the arrival of additional water from the melted snows of the surrounding mountains, the lake rises to its highest level in July.

The lake has three distinct temperature zones in summer, consisting of an upper layer of warm water, a lower region of cold water, and an intermediate transitional layer. During the winter the surface cools quickly; occasionally the shallow northern sector freezes over. Freezing of the entire lake is retarded by its high salinity. The most abundant salts in the lake are sodium carbonate and sodium sulfate.

A regular passenger boat service plies the lake between the coastal towns; there is a small shipyard at Tuğ on the southwestern shore.

Van Allen, James Alfred (b. Sept. 7, 1914, Mt. Pleasant, Iowa, U.S.), American physicist whose discovery of the Van Allen radiation belts, two zones of radiation encircling the Earth, brought about new understanding of cosmic radiation and its effects upon the Earth.

Van Allen was a naval officer during World War II and helped develop the radio proximity fuse for naval artillery shells. In 1946 he was placed in charge of high altitude research at the Applied Physics Laboratory of Johns Hopkins University, Silver Spring, Md. He supervised the testing and use of captured German V-2 rockets for upper atmosphere exploration and assisted in the development of the Aerobee, one of the first rockets built for research purposes.

Van Allen became professor of physics at the University of Iowa in 1951. He was one of the scientists who proposed a program of worldwide cooperation in research, the International Geophysical Year (IGY) of 1957–58. The instrumentation of the early Explorer satellites, part of the United States' IGY program, was built by Van Allen and his associates. The information on cosmic radiation gathered by these satellites led to the discovery of the Van Allen radiation belts. He later participated in the development of numerous space probes built to study planetary and solar physics.

Van Allen wrote numerous papers and journal articles. He also edited *Scientific Uses of Earth Satellites* (1956) and was an associate editor of the *Journal of Geophysical Research* (1959–64) and *Physics of Fluids* (1958–62). He was elected to the National Academy of Sciences in 1959 and became president of the American Geophysical Union in 1982.

Van Allen radiation belt, doughnut-shaped zones of highly energetic charged particles trapped at high altitudes in the magnetic field of the Earth. The zones were named for James A. Van Allen, the American physicist who discovered them in 1958 using data transmitted by the U.S. Explorer satellite.

The Van Allen belts are most intense over the Equator and are effectively absent above the poles. No real gap exists between the two zones; they actually merge gradually, with the flux of charged particles showing two regions of maximum density. The inner region is centred approximately 3.000 km (1,860 miles) above the terrestrial surface. The outer region of maximum density is centred at an altitude of about 15,000 to 20,000 km (9,300 to 12,-400 miles), though some estimates place it as far above the surface as six Earth radii (about 38,000 km [23,700 miles]).

The inner Van Allen belt consists largely of highly energetic protons, with energy exceeding 30,000,000 electron volts. The peak intensity of these protons is approximately 20,000 particles per second crossing a spherical area of one square cm in all directions. It is believed that the protons of the inner belt originate from the decay of neutrons produced when high-energy cosmic rays from outside the solar system collide with atoms and molecules of the Earth's atmosphere. Some of the neutrons are ejected back from the atmosphere; as they travel through the region of the belt, a small percentage of them decay into protons and electrons. These particles move in spiral paths along the lines of force of the Earth's magnetic field. As the particles approach either of the magnetic poles, the increase in the strength of the field causes them to be reflected. Because of this so-called magnetic mirror effect, the particles bounce back and forth between the magnetic poles. Over time, they collide with atoms in the thin atmosphere, resulting in their removal from the belt.

The outer Van Allen belt contains charged particles of both atmospheric and solar origin, the latter consisting largely of helium ions from the solar wind (steady stream of particles emanating from the Sun). The protons of the outer belt have much lower energies than those of the inner belt, and their fluxes are much higher. The most energetic particles of the outer belt are electrons, whose energies reach up to several hundred million electron volts.

Studies show that intense solar activity causes disruptions of the Van Allen belts, which in turn are linked with such phenomena as auroras and magnetic storms. *See also* aurora; magnetic storm.

Van Buren, city, seat (1839) of Crawford County, western Arkansas, U.S., on the Arkansas River opposite Fort Smith. The site, settled (1818) by Thomas Martin, was later called Phillips Landing (for Thomas Phillips, who bought land rights in 1836). In 1838 it was renamed for U.S. President Martin Van Buren. It developed as a trading post and "fitting-out" point for settlers moving to the West; after 1873 it became a railroad junction point for river traffic. Natural gas, discovered in the 1900s, attracted smelters and glass factories. Parts of the Ozark National Forest lie to the north, and lumbering was once significant. Economic activities now focus mainly on food processing and shipping vegetables, especially spinach. Cyrus Adler, a Jewish educator, was born in Van Buren, which was also the home of the humorist Bob Burns, who invented the musical instrument known as the "bazooka." Inc. 1842. Pop. (1990) 14,979.

Van Buren, Martin (b. Dec. 5, 1782, Kinderhook, N.Y., U.S.—d. July 24, 1862, Kinderhook), eighth president of the United States (1837–41) and one of the founders of the Democratic Party. He was known as the "Little Magician" because of his reputed cunning and skill as a politician.

He studied law and in 1803 began practice in Kinderhook. He served two terms in the New York Senate (1812–20) as a Jeffersonian Republican and during his tenure was appointed



Martin Van Buren, daguerreotype, *c.* 1845–50

By courtesy of Chicago Historical Society

state attorney general. After his election to the U.S. Senate in 1821, he created a group known as the Albany Regency, an informal political organization set up to run New York state during his absence in Washington.

Van Buren regarded himself as a disciple of Thomas Jefferson. In the Senate he supported the doctrine of states' rights, opposed a strong central government, and disapproved of federally sponsored internal improvements. After the election of John Quincy Adams in 1824, Van Buren aided in the formation of a new political amalgam that resulted in the Democratic Party. Made up of factions of the Jeffersonian Republican Party led by Andrew Jackson, William H. Crawford, and John C. Calhoun, it espoused the principles of Jefferson and capitalized on Jackson's popularity.

In 1828 Van Buren resigned his Senate seat and successfully ran for governor of New York. He gave up the governorship within 12 weeks to become President Andrew Jackson's secretary of state. As such, he was criticized for extending the spoils system, but, according to some historians, the criticism was exaggerated. He resigned in 1831 to permit reorganization of the Cabinet and served briefly as minister to Great Britain.

Nominated for the vice presidency in 1832 by the first national convention of the Democratic Party, Van Buren was elected with Jackson on a ticket opposing the established bank system. He became Jackson's choice to succeed him and in 1835 was unanimously nominated for the presidency. Winning the election, he took office in 1837, as a financial panic spread throughout the nation. In 1840 his proposal to remove government funds from state banks and put them in an "independent treasury" passed only after a bitter congressional battle, in which many conservative Democrats deserted to the Whig Party. A costly war with the Seminole Indians in Florida and his failure to support the proposed annexation of Texas also lessened his popularity. The question of the northeast boundary of the United States provoked conflict between the inhabitants of Maine and Canadians bordering the Aroostook River. Armed clashes were halted by Van Buren and a permanent settlement was later negotiated in the Webster–Ashburton Treaty of 1842. One of his last acts in office was to order that no person should work more than 10 hours a day on federal public works.

Unanimously renominated in 1840 by the Democrats, Van Buren was overwhelmingly defeated by the Whig candidate William Henry Harrison. Four years later he failed to win the Democratic nomination. In 1848 he was nominated by the antislavery Democrats ("Barnburners") and then by the Free-Soilers, with whom the Barnburners and "conscience" Whigs united, but he failed to be elected. He retired to his estate, Lindenwald, in Kinderhook.

Van Buren's memoirs, written in 1833, were published in 1920. He also wrote an *Inquiry into the Origin and Course of Political Parties in the United States* (1867). Two biographies are Edward M. Shepard, *Martin Van Buren* (1892), and Robert V. Remini, *Martin Van Buren and the Making of the Democratic Party* (1959).

Van Cortlandt, Stephanus (b. May 7, 1643, New Amsterdam—d. Nov. 25, 1700, New York City), Dutch-American colonial merchant and public official who was the first native-born mayor of New York City and chief justice of the Supreme Court of New York.

Van Cortlandt attended the New Amsterdam school of the Dutch Reformed Church and began a successful and profitable mercantile career under his father's guidance. After the British conquest of New Netherlands in 1664, he succeeded in ingratiating himself with the new rulers and was able to continue his commercial enterprises.

Van Cortlandt started his public career in 1668 as an ensign in the Kings County militia, and he subsequently rose to the rank of colonel. He was appointed a member of the governor's council in 1674. Three years later, he became the first native-born mayor of New York City. When the Dominion of New England was established, he was selected as one of the provincial councillors to serve under Governor Sir Edmund Andros. After James II had been deposed, Jacob Leisler led a revolt against the provincial government in 1689, forcing Van Cortlandt to flee the colony. William and Mary appointed Colonel Henry Sloughter as the new royal governor of New York to displace Leisler, however, and Van Cortlandt was concurrently appointed to Sloughter's council. Van Cortlandt then returned to the colony and subsequently was among the New York aristocrats advocating the prosecution and execution of Jacob Leisler.

Van Cortlandt also served New York in sev-

eral administrative and judicial positions. He was an adviser to the governors on Indian affairs and in 1698 was made commissioner of customs and collector of revenues for the colony. In judicial affairs, he presided over the New York City mayor's court, became a judge in the Kings County courts, and was an associate justice and chief justice of the Supreme Court of New York. During his career, Van Cortlandt amassed vast landholdings, which were incorporated in 1697 into the Manor of Cortlandt.

Van de Graaff, Robert Jemison (b. Dec. 20, 1901, Tuscaloosa, Ala., U.S.—d. Jan. 16, 1967, Boston, Mass.), American physicist and inventor of the Van de Graaff generator, a type of high-voltage electrostatic generator that serves as a type of particle accelerator. This device has found widespread use not only in atomic research but also in medicine and industry.

After working for a time as an engineer with the Alabama Power Company, Van de Graaff went to Paris in 1924 to study at the Sorbonne. There the lectures of Marie Curie turned his interests to atomic physics, and the following year he went to the University of Oxford to do research in the laboratory of the Irish physicist J.S.E. Townsend. While at Oxford, Van de Graaff was impressed with the need for a source of energetic beams of subatomic particles for the study of atomic behaviour. He conceived the idea for the Van de Graaff generator and, upon returning to the United States in 1929, continued to develop it.

Van de Graaff built his first generator in the early 1930s. The device, which is used for producing a very high electrostatic potential, depends for its operation on deposition of a charge on a moving belt of insulating fabric. This charge is conveyed on the belt into a smooth, spherical, well-insulated metal shell, where it is removed, passing to the metal shell. The shell increases in potential until an electric breakdown occurs or until the load current balances the charging rate. Machines of this kind, properly enclosed, have produced potentials of about 13,000,000 volts (13 megavolts). In a related device called the Pelletron accelerator, the moving belt is replaced by a moving chain of metallic beads separated by insulating material. The Pelletron accelerator at the Oak Ridge National Laboratory, Tenn., produces 25 megavolts and will accelerate protons or heavy ions, which are then injected into an isochronous cyclotron for further acceleration.

Van de Graaff became a research associate in 1931 and an associate professor in 1934 at the Massachusetts Institute of Technology (MIT), Cambridge. In 1946 he cofounded the High Voltage Engineering Corporation (HVEC) to manufacture his accelerator, and in 1960 he left MIT to work full time for HVEC.

Van Deman, Esther Boise (b. Oct. 1, 1862, South Salem, Ohio, U.S.—d. May 3, 1937, Rome, Italy), American archaeologist and the first woman to specialize in Roman field archaeology. She established lasting criteria for the dating of ancient constructions, which advanced the serious study of Roman architecture.

Van Deman earned an A.B. (1891) and A.M. (1892) from the University of Michigan in Ann Arbor. After teaching Latin at Wellesley College (Mass.) and the Bryn Mawr School in Baltimore, she received a Ph.D. from the University of Chicago (1898). She then taught Latin at Mount Holyoke College (1898–1901) and Latin and archaeology at Goucher College (1903–06). From 1906 to 1910 she lived in Rome as a Carnegie Institution fellow, and from 1910 to 1925 she was an associate of the Carnegie Institution in Washington, D.C. Between 1925 and 1930 she taught Roman archaeology at the University of Michigan.

While in Rome, Van Deman developed methods for dating ancient Roman building materials. In *The Atrium Vestae* (1909), she publicized her discovery that the size and composition of bricks and mortar used in Roman constructions were indicative of their age. She later extended that method of identification to other kinds of concrete and brick constructions. Her major work, written after she retired and settled in Rome, is *The Building of the Roman Aqueducts* (1933).

Consult the INDEX *first*

Van Deman, Ralph H(enry) (b. Sept. 3, 1865, Delaware, Ohio, U.S.—d. 1952, San Diego, Calif.), U.S. intelligence officer, called "the father of American military intelligence."

Van Deman followed an eclectic educational course before settling on a military career: he took a degree from Harvard, studied law for a year, and then took a medical degree (1893). He served briefly as an army surgeon and then attended the Infantry and Cavalry School at Fort Leavenworth, Kansas. In 1897 he was assigned to the Military Intelligence Division (MID). In 1900, then a captain, he organized the Philippine MID. It was in the Philippines that he developed his expertise in organizing documents and records. He was given his first covert mission, the mapping of lines of communication around Peking, China, in 1906. A year later he was appointed chief of the map section of the MID in Washington, D.C. General Franklin Bell, then chief of staff, who harboured a grudge against intelligence officers in general and Van Deman in particular, forced the virtual disbanding of MID by merging it with the War College.

In 1915 Van Deman returned to Washington from a second tour in the Philippines and found intelligence operations in chaos. In response he created an unofficial group of associates to collect and coordinate intelligence. With the entry of the United States into World War I in 1917, he attempted to reorganize military intelligence. The chief of staff, General Hugh Scott, found the concept of spying so distasteful that he ordered Van Deman to cease all efforts to organize a service. By adroit political maneuvering, however, Van Deman was able to gain sympathetic attention in higher government circles and soon found himself in charge of the reconstituted MID. As organized by Van Deman, military intelligence included the forerunners of the Defense Mapping Service, the Counter-Intelligence Corps (CIC), the Intelligence Command, the Industrial Security organization, the National Security Agency, and the U.S. Army Intelligence Center and School. Among those employed by him were the cryptographer Herbert O. Yardley, John Foster Dulles, later U.S. secretary of state, and Allen Dulles, later director of the Central Intelligence Agency (CIA).

Later in the war Van Deman served in France, and in 1919 he was the senior American intelligence officer and chief of counter-intelligence for the Paris Peace Commission. He retired as a major general in 1929.

Van Deman continued his intelligence work in private life. He created a massive set of files on private citizens whose political affiliations he believed to be potentially subversive. In this enterprise he enjoyed the unofficial cooperation of local police departments, military intelligence organizations, and the Federal Bureau of Investigation (FBI). This loose network survived in many instances after regular intelligence services were severely limited in the 1930s. In 1941 Van Deman was appointed intelligence adviser to the War Department. His work during World War II earned him the Legion of Merit.

After Van Deman's death his files were taken over by a nonprofit research organization called the San Diego Research Library, which made them available not only to government agencies but also to private political groups and candidates, a practice that led to abuses. The files were routinely consulted in the granting of security clearances until 1971, when the practice was halted by executive order.

Van Depoele, Charles Joseph (b. April 27, 1846, Lichtervelde, Belg.—d. March 18, 1892, Lynn, Mass., U.S.), Belgian-born American inventor who demonstrated the practicability of electrical traction (1874) and patented an electric railway (1883).

After immigrating to the United States in 1869, Van Depoele became a successful manufacturer of church furniture and then began to pursue his interest in electricity. In addition to his notable patents of 1874 and 1883, Van Depoele received patents on an electric generator (1880), a carbon commutator brush (1888), an alternating-current electric reciprocating engine (1889), a telpher system (for a car running suspended from cables; 1890), a coal-mining machine (1891), and a gearless electric locomotive (1894). Van Depoele sold his electric-railway patents in 1888 to the Thomson-Houston Electric Company of Lynn, Mass., which soon thereafter was absorbed into the General Electric Company.

van der —— : *see under* substantive word (*e.g.*, Waals, Johannes Diederik van der; Weyden, Rogier van der), except as below.

van der Waals forces, relatively weak electric forces that attract neutral molecules to one another in gases, in liquefied and solidified gases, and in almost all organic liquids and solids. The forces are named for the Dutch physicist Johannes van der Waals, who in 1873 first postulated these intermolecular forces in developing a theory to account for the properties of real gases. Solids that are held together by van der Waals forces characteristically have lower melting points and are softer than those held together by the stronger ionic, covalent, and metallic bonds.

Van der Waals forces may arise from three sources. First, the molecules of some materials, although electrically neutral, may be permanent electric dipoles. Because of fixed distortion in the distribution of electric charge in the very structure of some molecules, one side of a molecule is always somewhat positive and the opposite side somewhat negative. The tendency of such permanent dipoles to align with each other results in a net attractive force. Second, the presence of molecules that are permanent dipoles temporarily distorts the electron charge in other nearby polar or nonpolar molecules, thereby inducing further polarization. An additional attractive force results from the interaction of a permanent dipole with a neighbouring induced dipole. Third, even though no molecules of a material are permanent dipoles (*e.g.*, in the noble gas argon or the organic liquid benzene), a force of attraction exists between the molecules, accounting for condensing to the liquid state at sufficiently low temperatures.

The nature of the attractive force in molecules, which requires quantum mechanics for its correct description, was first recognized (1930) by the Polish-born physicist Fritz London, who traced it to electron motion within molecules. London pointed out that at any instant the centre of negative charge of the electrons and the centre of positive charge of the atomic nuclei would not be likely to coincide. Thus, the fluctuation of electrons makes molecules time-varying dipoles, even though the average of this instantaneous polarization over a brief time interval may be zero. Such time-varying dipoles, or instantaneous dipoles, cannot orient themselves into alignment to account for the actual force of attraction, but

they do induce properly aligned polarization in adjacent molecules, resulting in attractive forces. These interactions, or forces, arising from electron fluctuations in molecules (known as London forces, or dispersion forces) are present even between permanently polar molecules and produce, generally, the largest of the three contributions to intermolecular forces.

Van Der Zee, James, in full JAMES AUGUSTUS JOSEPH VAN DER ZEE (b. June 29, 1886, Lenox, Mass., U.S.—d. May 15, 1983, Washington, D.C.), American photographer whose portraits chronicled the Harlem Renaissance.

Van Der Zee made his first photographs as a boy in Lenox, Mass. By 1906 he had moved to Harlem in New York City and, after a series of jobs in portrait studios, in 1916 Van Der Zee



"A Couple Wearing Raccoon Coats with a Cadillac, Taken on West 127th Street," photograph by James Van Der Zee, 1932; in the CNF Transportation Collection, Palo Alto, Calif.

© Donna Mussenden Van Der Zee; courtesy of CNF Transportation Collection, Palo Alto, Calif.

and his second wife, Gaynella Greenlee, launched the Guarantee Photo Studio in Harlem. His business boomed during World War I and continued to thrive through about 1945. Among his many renowned subjects were poet Countee Cullen, dancer Bill "Bojangles" Robinson, and black-nationalist leader Marcus Garvey. Van Der Zee worked predominantly in the studio and used a variety of props to achieve stylized tableaux vivants. He often retouched negatives and prints heavily to achieve an aura of glamour.

After World War II, Van Der Zee's fortunes declined. By the time his collection of negatives and prints was discovered by a representative of the Metropolitan Museum of Art in New York in 1967, the Van Der Zees were nearly destitute. In early 1969 his photos were featured as part of the museum's successful "Harlem on My Mind" exhibition, which showcased life during the Harlem Renaissance. Van Der Zee won increasing attention throughout the 1970s, and, from late in that decade until his death in 1983, he photographed many celebrities and promoted his work in shows around the country. In 1993 a retrospective of his work was held at the National Portrait Gallery in Washington, D.C.

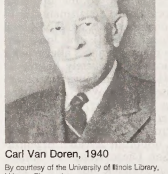
Van Devanter, Willis (b. April 17, 1859, Marion, Ind., U.S.—d. Feb. 8, 1941, Washington, D.C.), associate justice of the United States Supreme Court (1910–37).

After graduating from Cincinnati Law School in 1881, he initially worked for his father's law firm; but in 1884, he moved to Cheyenne, Wyo., to become a railroad attorney. There he became involved in territorial politics, serving on a commission to codify the Wyoming statutes in 1886, as city attorney for Cheyenne, and in the territorial legislature. After two years as chief justice of the territorial Supreme Court, he returned to private practice when Wyoming became a state in 1890. He remained heavily involved in Republican politics.

In 1897 he became an assistant U.S. attorney general, and in 1903 Pres. Theodore Roosevelt named him circuit judge for the eighth circuit. Seven years later, Pres. William Howard Taft appointed him to the U.S. Supreme Court. Van Devanter specialized in the fields in which he had worked in the West: public land, water rights, Native American questions, and admiralty and corporation law. Highly conservative on economic issues, he stayed on after his intended retirement date to become the backbone of the anti-New Deal bloc.

Van Diemen's Land (1642–1855), the southeastern Australian island colony that became the commonwealth state of Tasmania. Named for Anthony van Diemen, governor general of the Dutch East Indies, the island was discovered and named in 1642 by Abel J. Tasman, a celebrated navigator under Van Diemen's command. The first British settlers in the early 19th century retained the name. After being a part of the colony of New South Wales since 1803, Van Diemen's Land became a separate colony in 1825. It achieved self-governing status in 1850. In the first half of the 19th century the administrators, soldiers, and settlers of Van Diemen's Land brutalized and harassed the island's Aborigines to such an extent that the race was virtually extinct by the second half of the 19th century (*see* Black War). Vandiemonians initiated the large-scale colonization of the future colony of Victoria in the mid-1830s. The island was renamed Tasmania in 1855.

Van Doren, Carl (Clinton) (b. Sept. 10, 1885, Hope, Ill., U.S.—d. July 18, 1950, Torrington, Conn.), U.S. author and teacher whose writings range through surveys of literature to novels, biography, and criticism.



Carl Van Doren, 1940

By courtesy of the University of Illinois Library, Urbana–Champaign

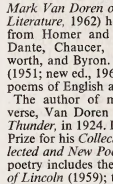
Educated at Columbia University (Ph.D., 1911), Van Doren taught there until 1930 and was one of a group of academicians who helped to establish American literature and history as an integral part of university programs. He also served as managing editor of the *Cambridge History of American Literature* (1917–21) and literary editor of *The Nation* (1919–22) and *Century Magazine* (1922–25).

For his discerning biography *Benjamin Franklin* (1939), Van Doren won a Pulitzer Prize. Other works include *The American Novel* (1921; revised 1940); *American and British Literature Since 1890* (1925), in collaboration with his brother, Mark Van Doren, and revised in 1939; and *What Is American Literature?* (1935). His autobiography, *Three Worlds,* appeared in 1936.

Van Doren, Mark (b. June 13, 1894, Hope, Ill., U.S.—d. Dec. 10, 1972, Torrington, Conn.), U.S. poet, writer, and eminent teacher. He upheld the writing of verse in traditional forms throughout a lengthy period of experiment in poetry. As a teacher at Columbia University for 39 years (1920–59), he exercised a profound influence on generations of students.

After spending his childhood in Urbana, Ill., following in the footsteps of his older brother, Carl, he attended Columbia University and became literary editor of *The Nation,* in New York City (1924–28), and its film critic (1935–38). After receiving his Ph.D. from Columbia, he served as a professor of English there from 1942 to 1959.

Van Doren's literary criticism includes *The Poetry of John Dryden* (1920; rev. ed., 1946), the basis of which was his Ph.D. dissertation at Columbia. He also wrote *Shakespeare* (1939), a volume of essays on the plays; *Nathaniel Hawthorne* (1949); and *The Happy Critic* (1961), a book of essays. Two of his finest studies grew out of a course he taught at Columbia. In *The Noble Voice* (1946; reprinted as *Mark Van Doren on Great Poems of Western Literature,* 1962) he considers 10 long poems, from Homer and Virgil through Lucretius, Dante, Chaucer, Milton, Spenser, Wordsworth, and Byron. His *Introduction to Poetry* (1951; new ed., 1966) examines shorter classic poems of English and U.S. literature.



Mark Van Doren

EB inc.

The author of more than 20 volumes of verse, Van Doren published his first, *Spring Thunder,* in 1924. In 1940 he won the Pulitzer Prize for his *Collected Poems,* reissued as *Collected and New Poems, 1924–1963.* His other poetry includes the verse play *The Last Days of Lincoln* (1959); three book-length narrative poems, *Jonathan Gentry* (1931); *Winter Diary* (1935); and *The Mayfield Deer* (1941). He was the author of three novels—*The Transients* (1935), *Windless Cabins* (1940), and *Tilda* (1943)—and several volumes of short stories; he also edited a number of anthologies.

Van Dyck, Sir Anthony, Van Dyck also spelled VANDYKE, Flemish ANTHONIE VAN DYCK, Anthonie also spelled ANTONIE, or ANTON (b. March 22, 1599, Antwerp—d. Dec. 9, 1641, London), after Rubens, the most prominent Flemish painter of the 17th century. A prolific painter of portraits of European aristocracy, he also executed many works on

religious and mythological subjects and was a fine draftsman and etcher. Appointed court painter by Charles I of England in 1632, he was knighted the same year.

Background and early years. Van Dyck was the seventh of 12 children of Frans van Dyck, a well-to-do silk merchant. At the age of 10, he was apprenticed to Hendrik van Balen, a successful Antwerp painter, and he must soon have come under the influence of Rubens, who after 1608 assumed undisputed leadership of art in Antwerp.

Van Dyck's first surviving work, the portrait of a man, is dated 1613; a self-portrait could not have been done much later. In the figural compositions of the first eight years of his career, he obviously emulated Rubens' melodramatic style, though, instead of using Rubens' technique of enamel-like glazes, he painted directly and with a rather coarse texture. His colour scale is darker and warmer than Rubens'; his lights and shades are more abrupt; and his figures are more angular in their gestures and less harmoniously proportioned. He exaggerated the expression of his figures, from the fierce fanaticism or feverish ecstasy of saints and the brutality of executioners to the voluptuous smiles of satyrs and the drunken stupor of Silenus, companion to Dionysus, the god of wine.

The Belgian patricians and their wives that he painted during his early years generally are rendered in bust or knee length; their hands hold gloves or other articles or fall idly over the back or armrest of a chair. His earliest portraits had neutral backgrounds, but under Rubens' influence he introduced props such as columns to enrich the setting. With consummate skill he rendered details of costume and decor. His portraits, always convincing as likenesses, show the models as calm and dignified. Their expressions are guarded rather than warm.

Van Dyck was precocious. When only 18, he acted as family representative in a lawsuit; before he was 19, his father declared him legally of age. In February 1618 he was inscribed as master in the Antwerp guild. It is uncertain when he entered the studio of Rubens, but on July 17, 1620, a correspondent of Thomas Howard, earl of Arundel, reported that "Van Dyck is still staying with Rubens and his works begin to be appreciated as much as those of his master." In March 1620 Rubens used the assistance of "Van Dyck and some other disciples." In view of Van Dyck's fully developed personal style in these years, however, it is probably more accurate to call him Rubens' collaborator rather than his pupil.

Although the relationship between Rubens and Van Dyck became strained after 1630, there is no evidence that Rubens tried to hamper the career of the young rival. He probably helped him with recommendations on his first trip to England (November 1620 to February 1621), where Rubens' admirer the Earl of Arundel was also Van Dyck's protector.



"Self-Portrait," detail, oil on canvas by Sir Anthony Van Dyck, *c.* 1621; in the Metropolitan Museum of Art, New York City

By courtesy of the Metropolitan Museum of Art, New York City, the Jules S. Bache Collection, 1949

Career in Antwerp and Italy. Apparently unwilling to remain at the court of King James I, despite an annual salary of £100, Van Dyck returned to Antwerp and in October 1621 set out for Italy. There, too, Rubens' recommendations paved his way. His first goal was Genoa, where he was immediately patronized by the same group of aristocratic families for whom Rubens had been active 14 years earlier.

Genoa remained Van Dyck's headquarters, but he is known to have visited Rome, Venice, Padua, Mantua, Milan, and Turin. In 1624 he visited Palermo, where he painted the Spanish viceroy Emanuel Philibert of Savoy. Although everywhere employed with commissions, Van Dyck used the opportunity of his Italian years to study the works of the great Italian painters. A sketchbook in the British Museum testifies to his attraction to the Venetian masters, above all, Titian. He made many rapid sketches of their compositions, occasionally adding notes about colour and spontaneous words of praise. The few figural compositions of Van Dyck's years in Italy show a trend toward coloristic and expressive refinement under the influence of the Venetian school. Recollections of Rubens and of Bolognese masters may be seen in his most accomplished religious work done in Italy, the "Madonna of the Rosary." The Italian portraits, many in full length, stress grandeur and aristocratic refinement. There, he also did his first equestrian portraits. While in earlier portraits the sitters generally look at the beholder, now they often are turned away as if concerned with weightier matters. Some of his Genovese ladies, portrayed in glitter and silk, have a condescending look. In July 1627 Van Dyck was again in Antwerp, where he remained until 1632. The frequent absence of Rubens between 1626, when he entered the diplomatic service, and 1630 on foreign missions may have induced many patrons to turn to Van Dyck. He received numerous commissions for altarpieces and for portraits, which forced him to employ assistants. During this period Van Dyck also began to make small monochrome portraits in oil and drawings in chalk of princes, soldiers, scholars, art patrons, and, especially, of fellow artists, with the view of having them engraved and published. At least 13 of these portraits were etched by Van Dyck himself. The others were engraved. The series, popularly known as Van Dyck's *Iconography*, was first published in 1645–46.

The tendencies first manifested in works done in Italy carry over into the five years Van Dyck now spent in Antwerp. He and his patrons appear to have realized that his talent was suited better to themes involving tender emotion than to themes of violent action. The happiest works of that period show the Virgin as the affectionate mother with the infant Jesus in her arms or as the Mater Dolorosa in lamentation scenes; equally appealing are pictures showing saints in religious transport. In memory of his father, Jan Van Dyck in 1629 painted the crucified Christ with St. Dominic and St. Catherine of Siena, one of his noblest works and a prime example of the spiritual intensity fostered by the Counter-Reformation. Some of Van Dyck's most enchanting stories from mythology or fable were done during these years. His manner of painting was now quite economical. The pigments were put on thinly, in delicate combinations of blue, gray, pink, ochre, and sienna. The emphasis is on mellowness, in colour and tone. Although he continued to give an almost sensuous appeal to textures, such as silk, hair, and human skin, his paintings became increasingly cool and artificial. In this period, bust- and half-length figures were again in the majority, as they had been during his first years in Antwerp. Among his models were many members of the great princely houses of Europe, but some of the finest pictures are of collectors and art patrons, as well as scholars, churchmen, and a great many Antwerp artists. To this group should be added portraits done during his visit to the Continent in 1634–35, among them one of the Abbé Scaglia, the skillful diplomat, for whom Van Dyck also painted one of his last religious pictures, a lamentation (Antwerp). In these portraits a new predilection for rhetorical poses is noticeable. With agile hands, some figures seem to address an audience, in keeping with a Baroque taste in portraiture.

Last years in England. After a brief trip to Holland in February 1632, Van Dyck again went to England, where he became highly successful. King Charles I appointed him "principalle Paynter in ordinary of their Majesties" and knighted him. He gave him a golden chain and settled upon him an annual salary of £200 sterling. Yet, in March 1634 Van Dyck returned once again to Antwerp, ostensibly to settle matters connected with his family estate but probably also to establish contacts with the new Spanish governor expected in the fall of that year. The Antwerp guild of artists appointed him "honorary dean," a title that had been bestowed before only on Rubens. In 1635 Van Dyck was again in England, after about a year's absence.

He lived in Blackfriars in London, outside the jurisdiction of the local guild, where Charles I liked to visit him. During the summer Van Dyck was given a place in Eltham Castle, Kent. His work now consisted almost exclusively of painting portraits, and they are his most popular.

The visual image of English society prior to the revolution of 1648 has forever been shaped by Van Dyck. Charles I himself was frequently portrayed by the master and nowhere perhaps more revealingly than in a beautiful canvas in Paris in which he appears "as he would have wished to live in history: a figure of matchless elegance, of unquestioned authority and high culture, the patron of the arts, and the upholder of the divine right of kings" (E.H. Gombrich, *The Story of Art*, 1950). A portrait showing three views of the King was made to serve for a bust to be made by Gian Lorenzo Bernini; the sculpture perished, however, in 1697.

As in his Italian portraits, full-length renderings prevail, but his English patrons seem more rigid and, as a rule, more prosaic than their Latin counterparts. An unusual feature, reflecting a literary vogue, is allegorical attributes and mythological disguises. Ladies often are pictured with roses or holding a hand under water running from an urn. Portraying himself with a sunflower, Van Dyck expresses emblematically his devotion to the King.

Van Dyck's gift for combining formality and casualness shows up particularly well in portrait commissions involving groups of people. To his last decade belong a little-known picture of of the family of John, count of Nassau-Siegen, and the largest of all his extant paintings (more than 19 feet [580 centimetres] wide), of the family of Philip Herbert, earl of Pembroke. In his several versions of the children of Charles I, among other pictures, he gives to his models all their youthful innocence no matter how gravely dignified their pose.

Van Dyck organized his portrait painting in an efficient manner designed also to increase his prestige. He gave hourly appointments to his sitters, leaving the execution of accessories to his assistants. While the King paid slowly and at times was even forced to reduce the

artist's demands, Van Dyck derived a comfortable income from his many portraits. His life matched in luxury that of his clients. In 1639 he married Mary Ruthven, by whom he had one daughter.

He must have realized, however, that the political fortunes of the Stuart monarchy were declining. He had failed in an ambitious plan to decorate the Banqueting House at Whitehall with a "Procession of the Knights of the Garter" in tapestry, and in September 1640 he again left England, induced possibly by the hope of taking the place of Rubens, who had died in May. In nervous haste he went from Antwerp to Paris, thence back to London, and again to Paris. At the end of November 1641 he returned to London, sick and having failed in his projects. He died shortly thereafter and was buried in St. Paul's.

Assessment. Van Dyck was a handsome man, but his features lacked strength, and he was rather short. Although socially ambitious, he remained devoted to the members of his family and on cordial terms with fellow artists. His manners were suave and ingratiating. According to legend, he inclined to licentiousness and extravagance, but the evidence is inconclusive. Whatever the faults of his character, he certainly was never idle. Only by combining facility of execution with great industry could a man who died at the age of 42 have painted a body of work as large as his. Five hundred of his portraits, apart from many copies from his own hand, are extant.

Van Dyck's influence was pervasive and lasting. Many of the younger Flemish painters owe more to him than to Rubens. Dutch and German portraitists, especially those active in London, among them Sir Peter Lely and Sir Godfrey Kneller, continued his manner, as did several native Englishmen. The style of the great 18th-century English portrait painters, especially that of Thomas Gainsborough, was deeply indebted to Van Dyck, and Spanish painters, who appear to have known Van Dyck's works mainly from engravings, imitated and occasionally even copied the religious compositions of the Flemish artist.

The enduring fame of Van Dyck rests on his portraits. Whether he painted the patricians and artists of Antwerp, the nobles of Genoa, or the court of Charles I, Van Dyck succeeded in idealizing his models without sacrificing any of their individuality. He adopted patterns of portraiture that had been formulated before, chiefly by Hans Holbein, Antonio Moro, Titian, and Rubens, but he invented innumerable variations, never losing sight of the fundamental necessity to retain an impeccable formality no matter how exact the likeness. His reputation was always high, but, whereas formerly the works of his last period were most admired, those of his youth and of his Genovese period have been favoured in the 20th century for their freshness and spontaneity. The interest of scholars and collectors has also turned increasingly toward works neglected before, such as the artist's oil sketches and his many drawings and watercolours, including some of his sensitive studies of landscapes.

(Ju.H.)

MAJOR WORKS. "Self-Portrait" (*c.* 1613; Akademie der Bildenden Künste, Vienna); "Portrait of Jan Vermeulen" (1616; Liechtenstein Collection, Vaduz, Liechtenstein); "Carrying of the Cross" (*c.* 1617; St. Paul's, Antwerp); "Portrait of Cornelis van der Geest" (*c.* 1618–20; National Gallery, London); "The Entry into Jerusalem" (*c.* 1619; Herron Museum of Art, Indianapolis, Ind.); "The Taking of Christ" (*c.* 1620–21; Prado, Madrid); "Isabella Brant, Wife of P.P. Rubens" (*c.* 1621; National Gallery of Art, Washington, D.C.); "Self Portrait" (*c.* 1621; Metropolitan Museum of Art, New York City); "Portrait of Sir Robert Shirley" (1622; Lord Leconfield Collection, Petworth, Sussex, Eng.); "Portrait of François Duquesnoy" (1622–23; Musées Royaux des Beaux-Arts de Belgique, Brussels); "Marchesa Elena Grimaldi; Wife of Marchese Nicola Cattaneo" (*c.* 1623; National Gallery of Art, Washington, D.C.); "Portrait of Emanuel Philibert" (1624; Dulwich College Picture Gallery, London); "Madonna of the Rosary" (*c.* 1624–28; Oratorio del Rosario, Palermo); "Paola Adorno, Marchesa Brignole Sale, and Her Son" (*c.* 1625; National Gallery of Art, Washington, D.C.); "Giovanni Vicenzo Imperiale" (1626; National Gallery of Art, Washington, D.C.); "Portrait of Peter Stevens" (1627; Mauritshuis, The Hague); "Portrait of Anna Wake, Wife of Peter Stevens" (1628; Mauritshuis); "Rinaldo and Armida" (1629; Baltimore Museum of Art); "Christ on the Cross" (*c.* 1630; Church of Saint Michel, Ghent); "Philippe Le Roy, Seigneur de Ravels" (1630; Wallace Collection, London); "Samson and Delilah" (*c.* 1630; Kunsthistorisches Museum, Vienna); "Prince Ruprecht of the Palatinate" (*c.* 1630–31; Kunsthistorisches Museum); "Marie de Raet" (1631; Wallace Collection); "Lamentation for Christ" (1634; Alte Pinakothek, Munich); "Prince Thomas of Savoy" (*c.* 1635; Galleria Sabauda, Turin, Italy); "Charles I in Three Positions" (*c.* 1637; Royal Art Collection, Windsor Castle, England); "Cupid and Psyche" (*c.* 1637; Buckingham Palace, London); "Portrait of Thomas Killigrew and Thomas Carew" (1638; Royal Art Collection, Windsor Castle); "Charles I, King of England" (by 1638; Louvre, Paris); "King Charles on Horseback" (by 1638; National Gallery, London); "Charles I and Henrietta Maria with Their Children" (by 1638; Royal Art Collection, Windsor Castle).

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Van Dyke, Henry (b. Nov. 10, 1852, Germantown, Pa., U.S.—d. April 10, 1933, Princeton, N.J.), U.S. short-story writer, poet, and essayist popular in the early decades of the 20th century.

Educated at Princeton, Van Dyke graduated from its theological seminary in 1877 and became a Presbyterian minister. His early works, "The Story of the Other Wise Man" (1896) and "The First Christmas Tree" (1897), were first read aloud to his congregation in New York as sermons. These quickly brought him recognition. Other stories and anecdotal tales were gathered at regular intervals into volumes. Among these collections were *The Ruling Passion* (1901), *The Blue Flower* (1902), *The Unknown Quantity* (1912), *The Valley of Vision* (1919), and *The Golden Key* (1926).

Van Dyke's popularity also extended to his verse, collected in *Poems* (1920).

van Gogh, Vincent (Willem): *see* Gogh, Vincent (Willem) van.

Van Hise, Charles Richard (b. May 29, 1857, Fulton, Wis., U.S.—d. Nov. 19, 1918, Milwaukee), U.S. geologist who conducted basic geological studies of the Precambrian (570,000,000 to 4,600,000,000 years ago) formations of the Lake Superior region, particularly the iron ores in these formations. These studies were useful for the economic exploitation of the vast iron-ore fields found in that region.

From 1879 Van Hise taught at the University of Wisconsin at Madison, of which he became president in 1903. During his term (which ended with his death), the university's research and extension programs were greatly expanded, and enrollment nearly trebled. He was also deeply concerned with broad social problems, as is seen in *Conservation of Natural Resources in the United States* (1910) and *Concentration and Control: A Solution of the Trust Problem in the United States* (1912).

Van Horne, Sir William Cornelius (b. Feb. 3, 1843, near Joliet, Ill., U.S.—d. Sept. 11, 1915, Montreal), U.S.-born Canadian railway official who directed the construction of Canada's first transcontinental railroad.

Van Horne worked as a telegraph operator on the Illinois Central Railroad. By 1880 he was general superintendent of the Chicago, Milwaukee and St. Paul Railroad system. In 1881 he became general manager of the Canadian Pacific Railway and oversaw the completion of its construction (1885). He rose to be president of the Canadian Pacific in 1889, then served as chairman of the board from 1899 to 1910. His activities expanded to include the promotion of railways and industry in Cuba. He was knighted in 1898.

"De," "la," and similar components of a name, when followed by a space, are alphabetized as separate words (e.g., *De Forest, Lee*). *When they are joined to the following part of a name, the combination is treated as a single word* (e.g., *DeForest, John William*).

Van Loo, Charles-André, also called CARLE VAN LOO, Van Loo also spelled VANLOO (b. Feb. 15, 1705, Nice, Fr.—d. July 15, 1765, Paris), Rococo painter especially known for his elegant portraits of European royalty and fashionable society in the mid-18th century.

He belonged to a noted family of artists of Flemish origin. His elder brother, Jean-Baptiste Van Loo, brought him up, taught him his profession, and took him to Rome. They returned to Paris, where in 1724 they won first prize in the French Royal Academy competition. Van Loo went back to Rome in 1727 and was awarded various distinctions. On his way home to Paris he stopped in Turin and painted works for the king of Sardinia's palaces. After his return to Paris in 1734, he became a professor at the Academy in 1737 and in 1763 was elected director. Van Loo was appointed first painter to the king and shared with François Boucher the favour of Paris society and foreign courts. Mme de Pompadour commissioned him to work for her at her château at Bellevue.

Van Loo was acknowledged to be the leading painter of historical and religious subjects in France during the Rococo period. Though versatile in style and technically facile, he was not particularly original. His precise, detailed genre scenes, somewhat reminiscent of Nicolas Lancret, influenced many painters, notably Johann Heinrich Tischbein.

Van Nu en Straks circle, group of writers associated with an influential Flemish review, *Van Nu en Straks* ("Today and Tomorrow"; 1893–94 and 1896–1901). Though holding a variety of opinions, they strove for an art that should comprehend all human activity and give universal significance to individual feelings. Led by August Vermeylen, they included Prosper van Langendonck, Emmanuel Karel de Bom, and Alfred Hegenscheidt. *Van Nu en Straks* gave Flemish literature a European importance.

van 't Hoff, Jacobus Henricus: *see* Hoff, Jacobus Henricus van 't.

Van Vechten, Carl (b. June 17, 1880, Cedar Rapids, Iowa, U.S.—d. Dec. 21, 1964, New York City), U.S. novelist and music and drama critic, an influential figure in New York literary circles in the 1920s; he was an early enthusiast for the culture of U.S. blacks.

Van Vechten was graduated from the University of Chicago in 1903 and worked as assistant music critic for *The New York Times* (1906–08), then as that paper's Paris correspondent. His elegant, sophisticated novels, *Peter Whiffle, His Life and Works* (1922), *The Tattooed Countess* (1924), and *Nigger Heaven* (1926), were very popular. He also wrote extensively on music and published an autobiography, *Sacred and Profane Memories* (1932), following which he vowed to write no more and to devote his time to photography. His extensive collection of books on black Americana, the James Weldon Johnson Memorial Collection of Negro Arts and Letters, is now at Yale University. He also established the Carl Van Vechten Collection at the New York City Public Library and a collection of music and musical literature (music books) at Fisk University, Nashville, Tenn.

Van Vleck, John H., in full JOHN HASBROUCK VAN VLECK (b. March 13, 1899, Middletown, Conn., U.S.—d. Oct. 27, 1980, Cambridge, Mass.), American physicist and mathematician who shared the Nobel Prize for Physics in 1977 with Philip W. Anderson and Sir Nevill F. Mott. The prize honoured Van Vleck's contributions to the understanding of the behaviour of electrons in magnetic, noncrystalline solid materials.

Educated at the University of Wisconsin, Madison, and at Harvard University, where he received his Ph.D. in 1922, Van Vleck joined the faculty of the University of Minnesota, Minneapolis, in 1924. He taught at Wisconsin from 1928 to 1934, and he then went to Harvard, where he eventually served as chairman of the physics department (1945–49), dean of engineering and applied physics (1951–57), and Hollis professor of mathematics and natural philosophy (1951–69).

Van Vleck developed during the early 1930s the first fully articulated quantum mechanical theory of magnetism. Later he was a chief architect of the ligand field theory of molecular bonding. He contributed also to studies of the spectra of free molecules, of paramagnetic relaxation, and other topics. His publications include *Quantum Principles and Line Spectra* (1926) and *The Theory of Electric and Magnetic Susceptibilities* (1932).

vanadate mineral, any of the many naturally occurring compounds of vanadium (V), oxygen (O), and various metals; most of these minerals are rare, having crystallized under very restricted conditions. Although vanadinite occasionally is mined as a vanadium ore and carnotite as a uranium ore, most vanadates have no economic importance; they are prized by mineral collectors, however, for their brilliant colours.

The structures of the vanadate minerals are complex. Some vanadate minerals contain vanadate tetrahedra (VO_4), in which four oxygen atoms occupy the corners of a tetrahedron surrounding a central vanadium atom. Each vanadate tetrahedron has a net charge of −3, which is neutralized by large, positively charged metal ions (*e.g.*, calcium, manganese, or ferrous iron) outside the tetrahedron. Unlike the similar silicate tetrahedra, which link to form chains, sheets, rings, or frameworks, vanadate tetrahedra are insular. The vanadates containing these tetrahedra are structurally and chemically similar to the phosphate and arsenate minerals; indeed, some vanadium in many of these vanadates often is replaced by phosphorus or arsenic, forming solid-solution series with both the phosphates and the arsenates. Like the phosphate and sulfate minerals, many vanadates are complexes of transition metals, particularly of ferrous iron, manganese, and copper.

Other vanadates, particularly those that contain uranium, contain $V_2O_6^{4-}$ ions, in which two atoms of vanadium are surrounded by eight atoms of oxygen arranged in two square pyramids that share one edge. Very complex clusters also exist but are usually classed with the complex oxide minerals rather than with the vanadate minerals.

vanadic anhydride, vanadium pentoxide, a compound of vanadium and oxygen widely used as an oxidation catalyst, as in the oxidation of unburned hydrocarbons in automobile exhaust (*see* vanadium).

vanadinite, vanadium mineral in the pyromorphite series of the apatite group of phosphates, lead chloride vanadate, $Pb_5(VO_4)_3Cl$. It is a source of vanadium and a minor source of lead. The mineral's typical occurrences are as orange, red, or brown hairlike or barrel-shaped crystals in the oxidized zone of lead deposits as in the Urals, Russia; Transvaal, S.Af.; Chihuahua, Mex.; and Arizona, U.S. Endlichite is a highly arsenious variety; the complete substitution of arsenic for vanadium in the crystal structure forms the mineral



Vanadinite from Globe, Ariz.
Floyd R. Gehsinger

mimetite. For detailed physical properties, *see* vanadate mineral (table).

vanadium (V), chemical element, silvery-white soft metal of Group Vb of the periodic table. It is alloyed with steel and iron for high-speed tool steel, high-strength low-alloy steel, and wear-resistant cast iron.

A brief treatment of vanadium follows. For information on the mining, recovery, and applications of vanadium, *see* MACROPAEDIA: Industries, Extraction and Processing.

Vanadium was discovered (1801) by the Spanish mineralogist Andrés Manuel del Río, who named it erythronium but eventually came to believe it was merely impure chromium. The element was rediscovered (1830) by the Swedish chemist Nils Gabriel Sefström, who named it after Vanadis, the Scandinavian goddess of beauty and youth, a name suggested by the beautiful colours of vanadium's compounds in solution. The English chemist Henry Enfield Roscoe first isolated the metal in 1867 by hydrogen reduction of vanadium dichloride, VCl_2, and the American chemists John Wesley Marden and Malcolm N. Rich obtained it 99.7 percent pure in 1925 by reduction of vanadium pentoxide, V_2O_5, with calcium metal.

Found combined in various minerals, coal, and petroleum, vanadium is the 22nd most abundant element in the Earth's crust. Some commercial sources are the minerals carnotite,

Vanadate minerals

name formula	colour	lustre	Mohs hardness	specific gravity	habit or form	fracture or cleavage	refractive indices	crystal system space group	remarks
carnotite $K_2(UO_2)_2(VO_4)_2 \cdot nH_2O$ ($n = \sim 1$ to 3)	bright yellow to lemon or greenish yellow	dull or earthy	soft	4–5	powder of microscopic platy or lathlike crystals	one perfect cleavage	$\alpha = 1.750$ $\beta = 1.925$ $\gamma = 1.950$	monoclinic $P\frac{2_1}{a}$	structure unknown; synthetic anhydrous carnotite has a layered structure, one which may account for natural carnotite's variable water content and cation exchange properties
descloizite $(Zn,Cu)PbVO_4(OH)$	brownish red to blackish brown; various shades from orange-red to black and green	greasy	3–3½	5.9–6.2	crusts of intergrown crystals; rounded fibrous masses	no cleavage; uneven fracture	desc mott $\alpha = 2.18–2.21$ $\beta = 2.25–2.31$ $\gamma = 2.34–2.33$	orthorhombic Pnam	forms solid solution series with mottramite in which copper replaces zinc in the molecular structure
tyuyamunite $Ca(UO_2)_2(VO_4)_2 \cdot nH_2O$ ($n = \sim 4$ to 9 or 10)	canary yellow; lemon to greenish yellow	waxy; also pearly	~2	variable with water content	compact to cryptocrystalline massive; scales and lathlike crystals; radiating crystal aggregates	one perfect, micalike cleavage		orthorhombic Pnan	structure probably related to carnotite (*see* above)
vanadinite $Pb_5(VO_4)_3Cl$	various shades of yellow, orange, red, and brown	subresinous to subadamantine	~3	6.5–7.1	hairlike or barrel-shaped (frequently hollow) prismatic crystals	uneven to conchoidal fracture	$\omega = 2.628–2.370$ $\varepsilon = 2.505–2.313$	hexagonal $P\frac{6_3}{m}$	forms a solid solution series with mimetite in which arsenic replaces vanadium in the molecular structure

vanadinite, and roscoelite. (Deposits of the important vanadium-bearing mineral patronite occurring in coal at Mina Ragra, Peru, have been materially depleted.) Other commercial sources are vanadium-bearing magnetite and flue dust from smokestacks and boilers of ships burning certain Venezuelan and Mexican oils.

Vanadium is obtained from ores as vanadium pentoxide (V_2O_5) through a variety of smelting, leaching, and roasting processes. The pentoxide is then reduced to ferrovanadium or vanadium powder.

Vanadium metal, sheet, strip, foil, bar, wire, and tubing have found use in high-temperature service, in the chemical industry, and in bonding other metals. Most of the vanadium produced is used with iron as ferrovanadium (about 85 percent vanadium) in making vanadium steels. Vanadium (added in amounts between 0.1 and 5.0 percent) has two effects upon steel: it refines the grain of the steel matrix, and with the carbon present it forms carbides. Thus, vanadium steel is especially strong and hard, with improved resistance to shock. Vanadium compounds (pentoxide and certain vanadates) are used as catalysts in the contact process for manufacturing sulfuric acid; as oxidation catalysts in the syntheses of phthalic and maleic anhydrides; in the manufacture of polyamides such as nylon; and in the oxidation of such organic substances as ethanol to acetaldehyde, sugar to oxalic acid, and anthracene to anthraquinone.

Natural vanadium consists of two isotopes: stable vanadium-51 (99.76 percent) and weakly radioactive vanadium-50 (0.24 percent). Nine artificial radioactive isotopes have been produced. Vanadium dissolves in concentrated sulfuric acid, nitric acid, hydrofluoric acid, and aqua regia. It does not tarnish in air readily but when heated combines with nearly all nonmetals. The oxides corresponding to the four oxidation states are VO, V_2O_3, VO_2, and V_2O_5. The hydrogen-oxygen compounds of vanadium in the two lower oxidation states are basic; in the two higher, amphoteric (both acidic and basic). In aqueous solution the ions exhibit a lavender to blue colour in the +2 to +4 states and a yellow colour in the +5 state.

atomic number	23
atomic weight	50.942
melting point	1,890° C (3,434° F)
boiling point	3,380° C (6,116° F)
specific gravity	5.96 (20° C)
valence	2, 3, 4, 5
electronic config.	2-8-11-2 or $(Ar)3d^34s^2$

Vanadzor, formerly (until 1935) KARAKLIS, or (1935–93) KIROVAKAN, city, northern Armenia. It lies at the confluence of the Pambak, Tandzut, and Vanadzoriget rivers. In 1826 the villages of Bolshoy and Maly Karaklis were merged into the town of Karaklis. Construction of the Tiflis-Karaklis-Alexandropol railway at the end of the 19th century speeded the town's development. In 1935 the name of Karaklis was officially changed to Kirovakan to honour the Soviet official Sergey Kirov. The name Vanadzor was adopted in 1993, after Armenia had gained its independence from the former Soviet Union. Electricity from a nearby hydroelectric station on the Pambak River serves Vanadzor's chemical industries, which produce carbide, ammonia, acetate silk, synthetic corundum, and plastic resin. Other industries include the production of precision tools, chemical machinery, textiles, and foodstuffs. The city was one of several in Armenia that were devastated by an earthquake in 1988. Pop. (1999 est.) 172,700.

Vanbrugh, Sir John (baptized Jan. 24, 1664, London, Eng.—d. March 26, 1726, London),



Sir John Vanbrugh, detail of an oil painting by Sir Godfrey Kneller; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

architect who brought the English Baroque style to its culmination in Blenheim Palace, Oxfordshire. He was also one of the dramatists of the Restoration comedy of manners.

Vanbrugh's grandfather was a Flemish merchant, and his father was a sugar baker in Chester, Cheshire, Eng., where the young Vanbrugh (by tradition) went to the King's School. In 1686 he was commissioned as a foot soldier and in 1690, while visiting Calais, France, was arrested as a suspected English agent. While imprisoned in the Bastille, he wrote the first draft of a comedy. After his release in 1692, he was a soldier again for six years but appears to have seen no active service.

His first comedy, *The Relapse: Or Virtue in Danger,* was written as a sequel to Colley Cibber's *Love's Last Shift.* It opened in 1696 and was highly successful. His next important piece, *The Provok'd Wife* (1697), was also a triumph. In 1698 the churchman Jeremy Collier published an attack on the immorality of the theatre aimed especially at Vanbrugh, whose plays were more robust than those of such contemporaries as William Congreve. Vanbrugh and others retaliated, but to little effect, and he kept silent until 1700. Then came a sequence of free and lively adaptations from the French, more farce than comedy, including *The Country House* (first performed 1703) and *The Confederacy* (1705).

In 1702 Vanbrugh entered another field; he designed Castle Howard, Yorkshire, for Lord Carlisle. His first design was far simpler than the richly articulated palace that resulted. Probably he was untrained, but aptly at hand was Nicholas Hawksmoor, the accomplished clerk of the architect Sir Christopher Wren. Hawksmoor played the assistant to Vanbrugh but was in effect the partner. The two men brought to its peak English Baroque—an architecture concerned with the rhythmic effect of diversified masses, using classical architectural elements to that end. The Vanbrugh-Hawksmoor Baroque manner is often called "heavy," but the heaviness is in the service of the dramatic. The style they evolved was a joint creation: Hawksmoor had already begun to develop it in the 1690s and acted as draftsman, administrator, and architectural detailer, while Vanbrugh is credited with the buildings' general plan and heroic scale.

Through Lord Carlisle, who was head of the Treasury, Vanbrugh became in 1702 comptroller of the queen's works. In 1703 he designed the Queen's Theatre, or Opera House, in the Haymarket. Though a magnificent building, it proved a failure, partly because of its poor acoustics, and he lost considerable money in the venture.

In 1705 Vanbrugh was chosen by John Churchill, 1st Duke of Marlborough, to design the palace at Woodstock, Oxfordshire, which was the nation's gift to that hero of many campaigns. Blenheim Palace, named for Marlborough's most famous victory, was the architectural prize of Queen Anne's reign. Again Hawksmoor was indispensable to Vanbrugh: Blenheim (1705–16) is their joint masterpiece. Any one of its powerful components may have been of Hawksmoor's shaping, but the planning and broad conception were surely Vanbrugh's, and the massive effect was the result of the hero-worshiping soldier-architect. Though the duke approved the plans, the duchess did not; there was trouble over costs and payments, and she caused Vanbrugh's dismissal. He continued to design country houses, however, and in such buildings as Kimbolton Castle, Huntingdon (1707–10), and Kings Weston, Gloucestershire (now in Bristol; c. 1710–14), his style became simpler in its use of decoration and of starkly geometric masses of masonry.

Under George I, Vanbrugh was knighted in 1714 and made comptroller again in 1715. Influenced by the art of fortification and Elizabethan building, Vanbrugh's great last works were Eastbury, Dorset (1718–26); Seaton Delaval, Northumberland (1720–28); and Grimsthorpe Castle, Lincolnshire (1722–26). Without Hawksmoor, he adopted a simple style in these designs, using a few elementary forms with increasing audacity, until in Seaton Delaval he achieved the height of drama with a comparatively small house.

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Vance, Cyrus, in full CYRUS ROBERTS VANCE (b. March 27, 1917, Clarksburg, W.Va., U.S.—d. Jan.12, 2002, New York, N.Y.), American lawyer and public official who was secretary of state from 1977 to 1980 during the administration of President Jimmy Carter.

Vance received his bachelor's degree from Yale University in 1939. Following graduation from the Yale law school in 1942, he enlisted in the navy and served until 1946, after which he joined a Wall Street law firm.

Vance was appointed general counsel for the Department of Defense in 1960. In 1962 he became secretary of the army, and in 1963 President Lyndon B. Johnson named him deputy secretary of defense. Vance was initially a vigorous advocate of U.S. prosecution of the Vietnam War. After he resigned his Pentagon post in mid-1967, however, his views changed, and by 1968 he was urging Johnson to stop the bombing of North Vietnam. In May 1968 Johnson chose Vance as deputy chief delegate to the Paris peace talks on Vietnam. Vance served under Averell Harriman, handling many negotiations himself. In 1969 he returned to private law practice.

Vance reentered public service when Jimmy Carter selected him to head the State Department. Vance sought to continue the policy of détente with the Soviet Union, and he worked to procure the SALT II arms-control treaty of 1979. He played a crucial role in the Camp David Accords between Egypt and Israel in 1978. The following year he oversaw the negotiations in which the United States agreed to give Panama complete control of the Panama Canal by 2000. Vance worked vigorously during 1979–80 to secure the release of captive U.S. diplomats in Iran but resigned from the cabinet over opposition to Carter's abortive rescue mission in the spring of 1980. He returned to private law practice but remained a sought-after negotiator. Vance's *Hard Choices: Critical Years in America's Foreign Policy* was published in 1983.

Vancouver, city, southwestern British Columbia, Canada. It is the major urban centre of western Canada and the focus of one of the country's most populous metropolitan regions. Vancouver lies between Burrard Inlet (an arm of the Strait of Georgia) to the north and the Fraser River delta to the south, opposite Vancouver Island. The city is just north of the U.S. state of Washington. It has a fine natural harbour.

Originally a sawmilling settlement called Granville in the 1870s, it was incorporated as a city in 1886 (after it became the terminus of the first trans-Canada railroad, the Canadian Pacific) and was renamed to honour the English navigator George Vancouver, who had explored and surveyed the coast in 1792. The city recovered from a disastrous fire (1886) to become a prosperous port, aided in part by the opening of the Panama Canal (1914), which made it economically feasible to export grain and lumber from Vancouver to the American east coast and Europe. By the 1930s Vancouver had become Canada's third most populous city (including its metropolitan area population) and its major Pacific coast port. Today it serves as Canada's main business hub for trade with Asia and the Pacific Rim.

The city is the industrial, commercial, and financial heart of British Columbia, with trade and transportation as basic components of its economy. Its ice-free deepwater port, Canada's largest, has extensive docks and grain elevator facilities; it handles freighters, a fishing fleet, and ferries and is connected to mainland Canada and the United States by four rail lines. Major cargoes include grain, coal, sulfur, potash, and forest products. It is also an important cruise ship port. An international airport serves the city, as do roads to the eastern provinces (Trans-Canada Highway) and Seattle, Wash., which is located about 125 miles (200 km) to the south.

Forestry, tourism, and mining are important economic activities; related factors are manufacturing and shipping. Processing of forest and agricultural products and fish also are significant, as is oil refining. Production of metals, chemicals, boats, trucks, and machinery for sawmilling, mining, and pulp and paper processing are major manufacturing activities. Power for sawmilling and plywood and paper manufacturing is provided by hydroelectric developments to the north and by oil and natural gas pipelines from Alberta. The city is gaining high technology industries and becoming a movie production centre.

Vancouver's atmosphere is somewhat British in character with East Asian overtones. Its Chinatown is overshadowed on the Pacific coast only by San Francisco's. Gastown is a restoration (1880s) of the original heart of the city. The business and financial district adjoins the port facilities along Burrard Inlet. Large, attractively landscaped residential suburbs included in the metropolitan area extend to the south and east along the mouth of the Fraser River and encompass the cities of Burnaby, New Westminster, Coquitlam, Port Moody, Port Coquitlam, Surry, Delta, and Richmond. To the north, across Burrard Inlet, are the residential suburbs of North Vancouver and West Vancouver, which are backed by steep mountains up to 10,000 feet (3,000 m) high and are connected to Vancouver by the Lions Gate and Second Narrows bridges.



Lost Lagoon in Stanley Park, Vancouver, B.C.
Tourism Canada

Educational and cultural institutions within the metropolitan area include the University of British Columbia (1908; with a notable Museum of Anthropology on its campus), Simon Fraser University (1963), H.R. MacMillan Planetarium, the Vancouver and Maritime museums, the Vancouver Art Gallery (1931), and B.C. Place Stadium (1983) for sporting events, concerts, and conventions. Vancouver has a symphony orchestra, opera and ballet companies, and a lively theatre community. In 1986 Vancouver celebrated its centennial with a world's fair, known as Expo 86. Canada Place, with its white sail-like roof, was built for the fair. It juts out into Burrard Inlet and houses a convention centre, cruise ship docking facilities, restaurants, shops, and a hotel.

Stanley Park (with its gardens, aquarium, and zoo) occupies 1,000 acres (405 hectares) of the downtown peninsula at the harbour entrance. The 55-acre (22-hectare) VanDusen Botanical Garden excels among many other parks and gardens in the city. Vancouver is home to several professional sports teams, including the Canucks (ice hockey), the Whitecaps (football [soccer]), and the BC Lions (Canadian gridiron football). Cypress and Mount Seymour provincial parks are nearby. Pop. (2001) city, 545,671; metro. area, 1,986,965.

Vancouver, city, seat (1854) of Clark county, southwestern Washington, U.S. It lies at the head of deepwater navigation on the Columbia River, there bridged to Portland, Ore. The oldest continuously inhabited white settlement in the state, it was founded in 1824 as a Hudson's Bay Company post, Fort Vancouver, and served as headquarters of the company's Pacific Northwest operations. The first steamboat (SS *Beaver*) to operate on the Pacific north of San Francisco (1836) was assembled there after arriving under sail from England with engines and paddle wheels as deck cargo. Fort Vancouver, which is now a national historic site, became a U.S. military reservation (Vancouver Barracks) in 1848. Manufacturing, farming, lumbering, and port operations (including the shipping of grain, lumber, paper, cable, and canned foods) provide a diversified economic base. The city is a distribution centre for hydroelectric power produced in the Columbia Basin. It is the site of Clark College (1933) and state schools for the deaf and the blind. Gifford Pinchot National Forest is headquartered in Vancouver. Inc. 1857. Pop. (2003 est.) city, 151,654; (2000) Portland–Vancouver PMSA, 1,918,000; Portland–Salem CMSA, 2,265,223.

Vancouver, George (b. June 22, 1757, King's Lynn, Norfolk, Eng.—d. May 10, 1798, Richmond, Surrey), English navigator who, with great precision, completed one of the most difficult surveys ever undertaken, that of the Pacific coast of North America, from the vicinity of San Francisco northward to present-day British Columbia. At that time he verified that no continuous channel exists between the Pacific Ocean and Hudson Bay, in northeast Canada.

Vancouver entered the Royal Navy at age 13 and accompanied Captain James Cook on his second and third voyages (1772–75 and 1776–80). After nine years' service in the West Indies, he took command of the expedition to the northwest coast of North America for which he is noted. Departing from England on April 1, 1791, he went by way of the Cape of Good Hope to Australia, where he surveyed part of the southwest coast. After stops at Tahiti and the Hawaiian Islands, Vancouver sighted the west coast of North America at 39° 27′ N on April 17, 1792. He examined the coast with minute care, surveying the intricate inlets and channels in the region of Vancouver Island and naming, among others, Puget Sound and the Gulf of Georgia. By August he



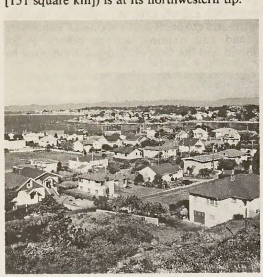
George Vancouver, detail of a portrait by an unknown artist
Brown Brothers

was negotiating with the Spaniards to take over their concession of coastal claims at Nootka Sound, off Vancouver Island. Continuing his coastal exploration in April 1793, he surveyed north to 56° 44′ N and south to below San Luis Obispo, Calif. In 1794 he sailed to Cook's Inlet, off southern Alaska, and, after a fresh survey of much of the coast north of San Francisco, sailed homeward via Cape Horn, reaching England on Oct. 20, 1794. His *Voyage of Discovery to the North Pacific Ocean and round the World...1790–95,* three volumes with an atlas of maps and plates, was published in 1798.

Vancouver Aquarium, aquarium located in Stanley Park, Vancouver, B.C., Can., that has the largest collection of fishes and marine invertebrates in Canada. The collection includes more than 33,500 fishes from about 300 species and nearly 30,000 representatives of approximately 230 different kinds of invertebrates. The aquarium's specialty is marine fish species native to the eastern part of the North Pacific, *i.e.,* off Canada's western coast. The aquarium's marine invertebrate collection is among the most outstanding in the world. One regional exhibit focuses on the giant octopus. Among the other comprehensive displays is one of starfishes from the Canadian coastal region. The aquarium also has an array of reptiles, amphibians, and marine mammals. Some of these mammals have been trained to perform. The aquarium was established in 1956 and is administered by the Vancouver Aquarium Association.

Vancouver Island, island lying off of southwestern British Columbia, Canada, that is the largest island (area 12,079 square miles [31,285 square km]) on the Pacific coast of North America. It is separated from mainland Canada by the straits of Georgia, Johnstone, and Queen Charlotte and from the United States by Juan de Fuca Strait. The island, averaging 50 miles (80 km) in width and extending for 285 miles (460 km) along a northwest-southeast axis paralleling the mainland, is actually the top of a partially submerged mountain system. It has a deeply dissected, heavily wooded, mountainous interior with several peaks of more than 7,000 feet (2,100 m). Flanked on the east by a coastal plain, its coastline, especially on the west, is deeply indented with fjords. Strathcona Provincial Park occupies 541,912 acres (219,304 hectares) in the central

part of the island, while the Pacific Rim National Park (193 square miles [500 square km]) is in three sections along the west coast, and Cape Scott Provincial Park (58 square miles [151 square km]) is at its northwestern tip.

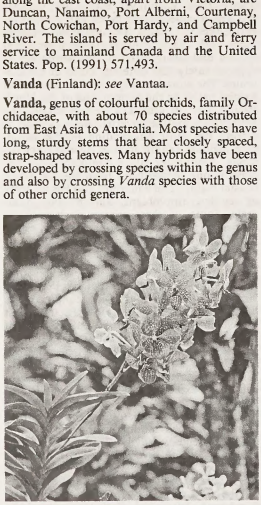


The southeastern tip of Vancouver Island from the outskirts of Victoria, B.C.
Tourism Canada, photograph, R. Halin

First discovered by Captain James Cook (1778), the island was surveyed in 1792 by George Vancouver and was held by the Hudson's Bay Company until it was made a British crown colony in 1849. In 1866 it was united with the mainland colony of British Columbia, which entered (in 1871) the Dominion of Canada as a province, with Victoria (*q.v.*), the island's chief city, as the provincial capital. The island's main industries include lumbering, fishing, mining (coal, iron ore, and copper), agriculture (dairy products, fruits, and vegetables), and tourism. The major population centres, situated predominantly along the east coast, apart from Victoria, are Duncan, Nanaimo, Port Alberni, Courtenay, North Cowichan, Port Hardy, and Campbell River. The island is served by air and ferry service to mainland Canada and the United States. Pop. (1991) 571,493.

Vanda (Finland): *see* Vantaa.

Vanda, genus of colourful orchids, family Orchidaceae, with about 70 species distributed from East Asia to Australia. Most species have long, sturdy stems that bear closely spaced, strap-shaped leaves. Many hybrids have been developed by crossing species within the genus and also by crossing *Vanda* species with those of other orchid genera.



Vanda hybrid
T.E. Benner—Shostal

Vanda flowers usually are flat and have a short spur on the lip. One of the most beautiful species, *V. sanderiana,* is considered to be in a separate genus, *Euanthe,* by some authorities. This many-coloured Philippine flower is often used in hybridization. The bluish-flowered *V. coerulea* and the dark-spotted *V. tricolor* are other well-known species.

Vandal, member of a Germanic people who maintained a kingdom in North Africa from AD 429 to 534 and who sacked Rome in 455. Their name has remained a synonym for willful desecration or destruction.

Fleeing westward from the Huns at the beginning of the 5th century, the Vandals invaded and devastated parts of Gaul before settling in Spain in 409. There the Asdingi Vandals under King Gunderic became the ascendant group after attacks by allies of the Romans had dissipated the Silingi and Alani Vandals. In 429 Gunderic's brother and successor, Gaiseric (*q.v.;* reigned 428–477), settled his people in North Africa, where they became federates of Rome in 435. Four years later Gaiseric threw off Roman overlordship, captured Carthage, and established an independent autocracy. With their rule firmly established in what is now northern Tunisia and northeastern Algeria, the Vandals eventually annexed Sardinia, Corsica, and Sicily, and their pirate fleets controlled much of the western Mediterranean. Under Gaiseric, the Vandals even invaded Italy and captured Rome in June 455. For a fortnight they occupied the city and systematically plundered it, carrying off many valuable works of art.

The Vandals were ardent Arian Christians, and their persecutions of the Roman Catholic church in Africa were at times fierce, particularly during the last years of the reign of Gaiseric's successor, Huneric (reigned 477–484). In 533 the Byzantines under Belisarius invaded North Africa following the deposition by the usurper Gelimer of Huneric's son, Hilderich, who was a close friend of the Byzantine emperor Justinian I. In one campaigning season the Vandal kingdom was destroyed. Rome again ruled the area and restored the churches to the Roman Catholics. The Vandals played no further role in history.

Vandalia, city, seat (1821) of Fayette county, south-central Illinois, U.S., on the Kaskaskia River. Laid out in 1819, it served as the state capital from 1820 to 1839. The State House (1836), the third built in Vandalia before the capital was removed to Springfield, is preserved as a state historic site. Abraham Lincoln and Stephen A. Douglas served in the legislature there, and in the Supreme Court room Lincoln received his license to practice law. A monument in the State House grounds marks what was for many years the western terminus of the Cumberland (National) Road. A basic agricultural economy prevails, and a state correctional centre is just north of the city. Inc. 1821. Pop. (1990) 6,114.

Vandamme, Dominique-René, COUNT (comte) D'UNEBOURG (b. Nov. 5, 1770, Cassel, near Dunkirk, France—d. July 15, 1830, Cassel), French general in the Revolutionary and Napoleonic wars.

Vandamme enlisted in the army in 1786, served in Martinique in 1788, and on returning to France entered into the Revolutionary movement, raising a company of light infantry. He was promoted and eventually made general of brigade, serving in the Low Countries (1794), on the Rhine (1795), and in Germany (1796). In 1799 he was promoted to general of division and served in Holland, Germany, and Switzerland. He was renowned for his tenacity and fearlessness as a fighting general as well as for his frank, rough manners and plundering and dissolute life, but he was a devoted servant of Napoleon. In 1805, for his leadership at the Battle of Austerlitz, he was given the Grand Eagle of the Legion of Honour, and in 1806–07 he commanded a small corps of the Grande Armée. In 1808 he was made Count d'Unebourg. In 1809 he served in the Eckmühl campaign, but in 1812, while commanding the Westphalian contingent, he quarreled with King Jérôme Bonaparte and returned to France.

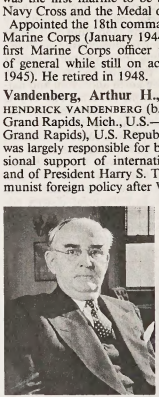
He returned to the army in 1813, but his corps, sent against the line of retreat of the Allies at the Battle of Dresden, surrendered at Kulm. At the end of the war he was forbidden to enter Paris. When Napoleon returned from exile in Elba, Vandamme joined him and was made a peer of France and placed at the head of the III Corps in the army of the north. After the Battle of Waterloo he brought back his corps in good order to Paris and thence to the Loire River. The Restoration first imprisoned and then exiled him. He went to the United States but returned in 1820 to his native village.

Vandegrift, Alexander A., in full ALEXANDER ARCHER VANDEGRIFT (b. March 13, 1887, Charlottesville, Va., U.S.—d. May 8, 1973, Bethesda, Md.), U.S. Marine Corps officer who led the first large-scale U.S. offensive against the Japanese, on Guadalcanal in the Solomon Islands, during World War II.

Commissioned a second lieutenant in the Marine Corps in 1909, Vandegrift had advanced to major general by 1942. Having served in Nicaragua, Haiti, and China, he was prepared for the jungle-warfare techniques required in the Pacific area. When the United States launched a marine amphibious assault against the Solomons in August 1942, Vandegrift surprised Guadalcanal's Japanese defenders with his bold use of concentrated, mobilized firepower. He not only made a successful landing but also managed to hold his position against repeated counterattacks despite diminishing supplies until the marines were relieved by army troops in December. In November 1943 he commanded the 1st Marine Amphibious Corps on Bougainville. He was the first marine to be awarded both the Navy Cross and the Medal of Honor.

Appointed the 18th commandant of the U.S. Marine Corps (January 1944), he became the first Marine Corps officer to hold the rank of general while still on active duty (March 1945). He retired in 1948.

Vandenberg, Arthur H., in full ARTHUR HENDRICK VANDENBERG (b. March 22, 1884, Grand Rapids, Mich., U.S.—d. April 18, 1951, Grand Rapids), U.S. Republican senator who was largely responsible for bipartisan congressional support of international cooperation and of President Harry S. Truman's anticommunist foreign policy after World War II.



Vandenberg
Jerry Cook

Editor of the *Grand Rapids Herald* from 1906, Vandenberg became active in Republican politics and was appointed U.S. senator in 1928—a post he retained through election until his death. While supporting conservative policies in the domestic field, he grew interested chiefly in foreign relations. During the

1930s, he was a spokesman for isolationist sentiment and a bitter critic of President Franklin D. Roosevelt. After the Japanese attack on Pearl Harbor (Dec. 7, 1941), however, he began to revise his picture of world relations and by the war's end had come around to the view that the United States should participate actively in an effective international organization. He expressed this opinion in a notable Senate speech (January 1945) and thus provided valuable Republican support for the United Nations. In the same year, Roosevelt appointed him a delegate to the United Nations Conference on International Organization that met in San Francisco.

As chairman of the Senate Foreign Relations Committee (1946–48), Vandenberg marshaled congressional support for the Truman Doctrine of aid to Greece and Turkey (1947), the Marshall Plan of aid to Europe (1948), and the North Atlantic Treaty Organization (1949), all of which sought to prevent the spread of communism in Europe. Furthermore, in the spring of 1948 he helped defeat a Republican-sponsored measure to inhibit the Reciprocal Trade Agreements program, substituting instead a provision for independent action on the part of the Tariff Commission.

Vanderbijlpark, town, Gauteng province, South Africa, on the Vaal River, southwest of Johannesburg. It was founded in 1942 after it was determined that the South African Iron and Steel Industrial Corporation steelworks at Pretoria could no longer be expanded. Officially declared a town in 1952 when the steelworks were opened, Vanderbijlpark is now the major steel-producing centre of South Africa. Other important metal-processing industries produce castings and equipment for mines and power stations. Educational facilities include an advanced technical institute and a branch campus of the Potchefstroom University for Christian Higher Education. Pop. (1985) 59,-865.

Vanderbilt FAMILY, one of the wealthiest and most prominent families in the United States. The third generation of Vanderbilts—following Cornelius and William Henry Vanderbilt (*qq.v.*)—was led by three of William Henry's four sons: Cornelius (1843–99), William Kissam (1849–1920), and George Washington (1862–1914). Of the three, Cornelius was by far the most devoted to furthering the family's business and investment interests. Following his father's death in 1885, Cornelius took charge of the various railroads and other corporations and of the philanthropic activities. He served on numerous social and civic boards, and he oversaw the granting of enormous sums to Yale University, Columbia University's College of Physicians and Surgeons, the Metropolitan Museum of Art, and many other educational, charitable, and religious organizations.

William Kissam Vanderbilt worked with his brother Cornelius in managing the Vanderbilt investments and enterprises. But he was far less interested in business than were his brother, father, and grandfather. In 1903 William Kissam turned over management of the railroads to an outside firm and thereafter devoted himself to his philanthropic, social, and sporting interests. He was deeply involved in the operation of the Metropolitan Opera, in collecting art, and in racing yachts. In 1895 he retained the America's Cup for the United States at the helm of *Defender*.

George Washington Vanderbilt had the least involvement with the family businesses or investments. He created a huge estate, Biltmore, near Asheville, N.C., and there carried on extensive experiments in scientific farming, stock breeding, and forestry. He gave large gifts to the New York Public Library, Columbia University, and the American Fine Arts Society.

Of the fourth generation, Cornelius' son Cornelius III (1873–1942) was a financier. Other sons Alfred Gwynne (1877–1915) and Reginald Claypoole (1880–1925) were noted for their interest in show horses. William Kissam left two sons—William Kissam (1878–1944) and Harold Stirling (1884–1970)—both associated with the New York Central Railroad. Harold Stirling Vanderbilt was also notable as the inventor of the game of contract bridge and as the skilled yachtsman who won the America's Cup three times.

Cornelius, Jr. (1898–1974), the son of Cornelius III, was a writer who founded a chain of newspapers.

Vanderbilt, Alva (American socialite): *see* Belmont, Alva.

Vanderbilt, Amy (b. July 22, 1908, New York, N.Y., U.S.—d. Dec. 27, 1974, New York City), American journalist and author of *Amy Vanderbilt's Complete Book of Etiquette* (1952), a book that has been called a "guide to gracious living." An acknowledged authority on manners, mores, and etiquette, Vanderbilt took five years to research and write the book, which underwent periodic revisions and sold millions of copies. The book was later retitled *Amy Vanderbilt's Etiquette*.

Called "the successor to Emily Post," Vanderbilt became a part-time reporter for the *Staten Island Advance* when she was 16. She studied in Switzerland and at the Packer Collegiate Institute in Brooklyn before attending New York University for two years to study journalism. She held a variety of jobs in the 1930s and '40s, including one with an advertising agency and another with a public relations firm. From 1954 to 1960 she was the hostess of a television etiquette show, "It's in Good Taste." She had a radio show, "The Right Thing To Do," from 1960 to 1962. She served as official etiquette consultant for a number of agencies and organizations, including the U.S. Department of State. In addition to her book on etiquette, she also wrote books on "everyday etiquette" and cooking.

Vanderbilt, Cornelius (b. May 27, 1794, Port Richmond, Staten Island, N.Y., U.S.—d. Jan. 4, 1877, New York, N.Y.), American shipping and railroad magnate who acquired a personal fortune of more than $100,000,000.

The son of an impoverished farmer and boatman, Vanderbilt quit school at age 11 to work on the waterfront. In 1810 he purchased his first boat with money borrowed from his parents. He used the boat to ferry passengers



Cornelius Vanderbilt
By courtesy of the Library of Congress, Washington, D.C.

between Staten Island and New York City; then, during the War of 1812, he enlarged his operation to a small fleet with which he supplied government outposts around the city.

Vanderbilt expanded his ferry operation still further following the war, but in 1818 he sold all his boats and went to work for Thomas Gibbons as steamship captain. While in Gibbons' employ (1818–29), Vanderbilt learned the steamship business and acquired the capital that he used in 1829 to start his own steamship company.

During the next decade, Vanderbilt gained control of the traffic on the Hudson River by cutting fares and offering unprecedented luxury on his ships. His hard-pressed competitors finally paid him handsomely in return for Vanderbilt's agreement to move his operation. He then concentrated on the northeastern seaboard, offering transportation from Long Island to Providence and Boston. By 1846 the Commodore was a millionaire.

The following year, he formed a company to transport passengers and goods from New York City and New Orleans to San Francisco via Nicaragua. With the enormous demand for passage to the West Coast brought about by the 1849 gold rush, Vanderbilt's Accessory Transit Company proved a huge success. He quit the business only after his competitors—whom he had nearly ruined—agreed to pay him $40,000 (later it rose to $56,000) a month to abandon his operation.

By the 1850s he had turned his attention to railroads, buying up so much stock in the New York and Harlem Railroad that by 1863 he owned the line. He later acquired the Hudson River Railroad and the New York Central Railroad and consolidated them in 1869. When he added the Lake Shore and Michigan Southern Railroad in 1873, Vanderbilt was able to offer the first rail service from New York City to Chicago.

During the last years of his life, Vanderbilt ordered the construction of Grand Central Terminal in New York City, a project that gave jobs to thousands who had become unemployed during the Panic of 1873. Although never interested in philanthropy while acquiring the bulk of his huge fortune, later in his life he did give $1,000,000 to Central University in Nashville, Tenn. (later Vanderbilt University). In his will he left $90,000,-000 to his son William Henry, $7,500,000 to William's four sons, and—consistent with his lifelong contempt for women—the relatively small remainder to his second wife and his eight daughters.

Vanderbilt, William Henry (b. May 8, 1821, New Brunswick, N.J., U.S.—d. Dec. 8, 1885, New York, N.Y.) American railroad magnate and philanthropist who nearly doubled the Vanderbilt family fortune established and in large part bequeathed to him by his father, Cornelius.

A frail and seemingly unambitious youth, William was dismissed by his strong and dynamic father as incompetent to run the family business. The two split on William's decision to marry at age 19, and Cornelius sent his son off to farm on Staten Island. To his father's surprise, William made the farm a profitable operation.

While Cornelius was still concentrating on steamship lines, William became interested in railroads. In 1857 he convinced his father to make him receiver of the bankrupt Staten Island Railroad and a few years later startled his father by putting the line back on a sound financial footing. In 1864 William became vice president of the New York and Harlem Railroad and assumed the same position with the Hudson River Railroad in 1865; both lines were owned by his father.

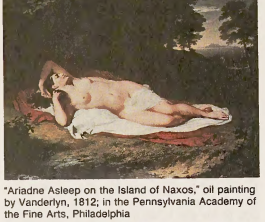
It was not until after the Commodore's death in 1877 that William was fully able to demonstrate his financial and managerial genius. He greatly expanded the New York Central network and acquired the Chicago and North Western; the Nickel Plate (New York, Chicago, & St. Louis); Cleveland, Columbus, Cincinnati, and Indianapolis; and other railroads. He fought regulation of the railroads as he engaged in rate wars and gave special rates to favoured shippers. By the time poor health forced him to resign his railroad presidencies

in 1883, William Henry had nearly doubled the Vanderbilt family fortune.

In addition, he established the Vanderbilt family name in philanthropy. He gave substantial gifts to Vanderbilt University, Columbia's College of Physicians and Surgeons, and other recipients. He built a block-long mansion on Fifth Avenue and filled it with what was claimed to be the finest private collection of paintings and sculpture in the world. In his will he divided his fortune more equitably than had his father, and he left substantial bequests to the Metropolitan Museum of Art, the YMCA, and various churches and hospitals.

Vanderlyn, John (b. Oct. 15, 1776, Kingston, N.Y., U.S.—d. Sept. 23, 1852, Kingston), U.S. painter and one of the first American artists to study in Paris. He was largely responsible for introducing the Neoclassical style to the United States.

As a young man Vanderlyn copied a Gilbert Stuart portrait of Aaron Burr that attracted



"Ariadne Asleep on the Island of Naxos," oil painting by Vanderlyn, 1812; in the Pennsylvania Academy of the Fine Arts, Philadelphia

By courtesy of the Pennsylvania Academy of the Fine Arts, Philadelphia

the attention of Burr. He sponsored Vanderlyn's artistic training, first with Stuart and then, in 1796, at the École des Beaux-Arts, Paris. Vanderlyn returned to New York in 1801, where he did paintings of Niagara Falls. In 1803 Vanderlyn was able to return to Europe, and his best work was done during this period. Vanderlyn returned to the U.S. when he was 40 years of age, and the treatment accorded him was a bitter contrast to his European successes. He did not receive the federal commissions for which he had been hoping. Expecting to duplicate the European popularity of panoramas, he installed his 3,000-foot *Palace and Gardens of Versailles* (1816–19; Metropolitan Museum of Art, New York City) and other works in a rotunda built at his own expense on land leased from the city of New York. Vanderlyn realized little income from the project, and he was embittered when ten years later the city cancelled his lease. He retired to Kingston, N.Y., and supported himself by painting uninspired portraits that were hardly recognizable as coming from his hand. In 1832 he finally received a commission from the U.S. government: a full-length portrait of George Washington (Capitol, Washington, D.C.). Ten years later he received another: "Landing of Columbus" (1842–44; Capitol Rotunda, Washington, D.C.).

Vandervelde, Émile (b. Jan. 25, 1866, Ixelles, Belg.—d. Dec. 27, 1938, Brussels), Belgian statesman and a prominent figure in European Socialism who served in Belgian coalition governments from 1914 to 1937 and was influential in the peace negotiations following World War I.

Vandervelde joined the Belgian Workers' Party in 1889 and became a party leader. He entered Parliament as a Socialist in 1894



Vandervelde
© A.C.L., Brussels

and played a leading role in the international Socialist congresses after 1900. In the years before World War I he was prominent in the Socialist agitation for universal suffrage, granted in Belgium in 1919. He was named minister of state in 1914 and served in the Cabinet throughout the war. In the Paris Peace Conference treaty negotiations (1919–20), he gained inclusion of clauses favouring labour, including one advocating an eight-hour day; as minister of justice, he sponsored major penal reforms (1919).

After the gains of the Workers' Party in the elections of 1925, he was named minister for foreign affairs in a Socialist–Catholic coalition government and helped negotiate the Pact of Locarno (1925) among Germany, Belgium, France, Great Britain, and Italy. He continued as foreign affairs minister in the first two years of Henri Jaspar's ministry but was criticized by opposition parties for advocating limitation of military service to six months and for his antimilitarist stance in foreign policy. He served as minister without portfolio (1935–36) and minister of public health (1936–37) before retiring to become a law professor at the Free University of Brussels.

Vandervelde's works include *Le Collectivisme et l'évolution industrielle* (1900; *Collectivism and Industrial Evolution,* 1907); *Le Socialisme contre l'état* (1918; *Socialism Versus the State,* 1919); and *Le Parti Ouvrier Belge, 1885–1925* (1925; "The Belgian Workers' Party, 1885–1925").

Vandyke, Sir Anthony (painter): *see* Van Dyck, Sir Anthony.

Vane, Sir Henry, THE ELDER (b. Feb. 18, 1589, Hadlow, Kent, Eng.—d. May 1655), English statesman, a prominent royal adviser who played an equivocal role in the events leading to the outbreak of the Civil War between King Charles I and Parliament.

After serving in five Parliaments, he was



Sir Henry Vane, the Elder, detail of a portrait after M.J. van Mierevelt; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

appointed secretary of state by Charles I in February 1640. Three months later Vane announced to the House of Commons that Charles I would waive collection of the unpopular royal levy known as ship money if Parliament would supply the crown with 12 military subsidies. By refusing to accept fewer than 12 subsidies, Vane created a deadlock that led to the dissolution of the Short Parliament by Charles. Vane may have been trying to block a reconciliation between Charles and Parliament, perhaps because he was secretly working against the King.

In 1641 Vane helped bring about the impeachment and execution of the King's chief minister, Thomas Wentworth, the earl of Strafford, by testifying that Strafford had proposed using Irish troops to suppress Charles's Parliamentary opponents. As a result, Charles dismissed Vane from office. He worked for the Parliamentary cause during the Civil War but was not placed on the Council of State in 1650 because of opposition from leading radicals. In 1654 he served in Oliver Cromwell's first Parliament.

Consult the INDEX *first*

Vane, Sir Henry, THE YOUNGER (b. 1613—d. June 14, 1662, London), English Puritan, one of the most capable administrators in Parliament during the Civil Wars between the Parliamentarians and Royalists.

His father, Sir Henry Vane the Elder, was an adviser to King Charles I. Henry the Younger was converted to Puritanism in his youth, and in order to practice his beliefs freely he went to New England in 1635. After serving as governor of Massachusetts for a year (1636–37), he returned to England, where his father obtained for him an appointment as joint treasurer of the navy (1639). Joining the opposition to Charles I in the Long Parliament that convened in November 1640, he supported a bill to abolish the episcopacy, and with his father he helped bring about the impeachment of the King's chief minister, Thomas Wentworth, earl of Strafford. Consequently, Charles I dismissed him from his treasurership.

Vane was the chief English negotiator of the Solemn League and Covenant with Scotland in 1643, and he succeeded John Pym as leader of the House of Commons in 1643. Although he disapproved of the purge of the Presbyterian members of Parliament by the army (1648), he served in the resulting Rump Parliament. A committed republican, he was a prominent member of the Commonwealth's Council of State from 1649 to 1653, but, adhering to the principle of parliamentary sovereignty, he led the opposition to Cromwell's dissolution of the Rump Parliament in April 1653. Withdrawing from politics, he wrote several books of theological speculation, including the obscure, somewhat mystical *Retired Man's Meditations* (1655).

In 1656 Vane was briefly imprisoned for publishing a pamphlet attacking Cromwell's Protectorate. He helped the army overthrow Oliver's son, Richard Cromwell, in 1659 and sat in the restored Rump Parliament. Two years after the Restoration of King Charles II (1660) he was executed for his past Parliamentary activities. J. Willcock's *Life of Sir Henry Vane the Younger* appeared in 1913, and Violet Roe's *Sir Henry Vane the Younger* in 1970.

Vane, John Robert (b. March 29, 1927, Tardebigg, Worcestershire, Eng.), English biochemist, co-recipient with Sune K. Bergström and Bengt Ingemar Samuelsson of Sweden (*qq.v.*) of the 1982 Nobel Prize for Physiology or Medicine.

Vane was graduated from the University of Birmingham and earned a doctorate at the University of Oxford in 1953. He spent two years on the faculty of Yale University before returning to England to join the Institute of Basic Medical Sciences of the University of London. He became research director of

the Wellcome Research Laboratories, Beckenham, Kent, in 1973.

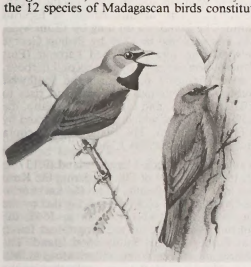
Vane and his two colleagues received the Nobel Prize for their isolation, identification, and analysis of prostaglandins, biochemical compounds that influence blood pressure, body temperature, allergic reactions, and other physiological phenomena in mammals. In demonstrating that aspirin inhibits the formation of prostaglandins associated with pain, fever, and inflammation, Vane provided a physiological rationale for the effectiveness of the world's most widely used drug.

Vane, Sutton, original name VANE SUTTON-VANE (b. Nov. 9, 1888, England—d. June 15, 1963, Hastings, Sussex), English playwright, remembered for his unusual and highly successful play *Outward Bound* (1923), about a group of passengers who find themselves making an ocean voyage on a ship that seems to have no crew. Slowly they realize that they are dead and bound for the other world, which is both heaven and hell.

Vane, who started his career as an actor, was shell-shocked early in World War I. Later in the war he returned to France to perform behind the lines. Back home in England, he began to write plays. Because he could find no one willing to produce his strange *Outward Bound,* he hired a small London suburban house called the Everyman Theatre and mounted the production himself at a total cost of £120. The play was an instant success and was transferred to a leading London theatre. Its success later was duplicated in New York, and it has been twice filmed.

Vänern, largest lake in Sweden, 2,156 square miles (5,585 square km) in area, in the southwestern part of the country. The lake is about 90 miles (145 km) long and as much as 322 feet (98 m) deep, and its surface lies 144 feet (44 m) above sea level. The lake is fed by numerous rivers (the largest being the Klar), and the lake itself drains westward into the Kattegat (strait) via the Göta River, which is a major source of hydroelectric power. Vänern is surrounded by rocky, wooded shores except on the south, where the coast is low and conducive to farming. The lake forms a major link in the Göta Canal, a waterway that crosses Sweden from Göteborg on Sweden's west coast to Stockholm on the east coast. Improvements on the Trollhätte Canal permit seagoing craft entering from the Kattegat to serve such lake ports as Karlstad, Lidköping, Vänersborg, Kristinehamn, Amål, Säffle, and Mariestad. These towns have important industries, such as tanneries, ironworks, and paper mills. Vänern is the third largest lake in Europe, after Ladoga and Onega (both in Russia).

vanga-shrike, also called VANGA, any of the 12 species of Madagascan birds constituting the bird family Vangidae (order Passeriformes). The coral-billed nuthatch is sometimes included. They are 13 to 30 cm (5 to 12 inches) long, with wings and tails of moderate length. The hook-tipped bill is stout and of remarkably variable shape and length, much like the variability among Darwin's finches, which are similarly isolated. Most species are glossy black or blue above and white below; some have white heads or have reddish-brown or gray markings (sexes similar). They make cup nests in trees or brush. The hook-billed vanga-shrike (*Vanga curvirostris*) is a big-billed form that catches tree frogs and lizards. The smallest species is the red-tailed vanga-shrike, or tit-shrike (*Calicalicus madagascariensis*).



(Left) Red-tailed vanga-shrike (*Calicalicus madagascariensis*); (right) coral-billed nuthatch (*Hypositta corallirostris*)
Painting by Murrell Butler

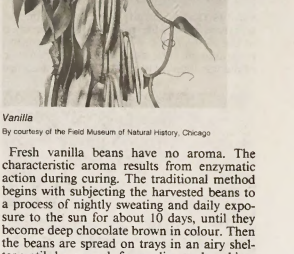
Vanguard, any of a series of unmanned U.S. experimental test satellites. Vanguard I, launched March 1, 1958, consisted of a tiny 3.25-pound (1.47-kilogram) sphere equipped with two radio transmitters. It was the second artificial satellite placed in orbit around the Earth by the United States, the first being Explorer I (Jan 31, 1958). By monitoring Vanguard's flight path, scientists found that the Earth was almost imperceptibly pear-shaped in confirmation of earlier theories. Vanguard II, orbited on Feb. 17, 1959, carried light-sensitive photocells that were designed to provide information about the Earth's cloud cover, but the tumbling motion of the satellite rendered the data unreadable. Vanguard III, the last in the series, was launched several months later. It was used to map the Earth's magnetic field.

Vanguardia Española, La (Spanish: "The Spanish Vanguard"), morning daily newspaper published in Barcelona, one of the largest and most influential newspapers in Spain. It was established in 1881 by Carlos Godó, in whose family it remained, as a political organ favouring the policies of Práxedes Mateo Sagasta, the leader of a liberal political coalition. In its early years *La Vanguardia* was hampered by press censorship. Ramon Godó Lallana assumed direction of the paper in 1897 and began to build it into a leading national daily. *La Vanguardia Española* operated with little government interference in the early part of the 20th century but came again under official control following the fall of the Spanish monarchy in 1931. The paper's political outlook is liberal. It is noted for its coverage of international news—it has more foreign correspondents than any other Spanish journal—and for its sports reporting. The paper was a pioneer in progressive labour policies, early providing vacation employee benefits as sick pay, paid vacations, and pensions. In the late 20th century its circulation was about 190,000 daily and 250,000 Sunday.

vanilla (genus *Vanilla*), any member of a group of tropical climbing orchids, from the pods of which a widely used flavouring agent is extracted. Vanilla had been used to flavour *xocoatl,* the chocolate beverage of the Aztecs, centuries before the Spanish conquistador Hernán Cortés drank it at Montezuma's court, and soon afterward vanilla became popular in Europe. Today it is used in a variety of sweet foods and beverages, particularly chocolate, confections, ice cream, and bakery goods, and in perfumery.

The vanilla beans of commerce are the cured, unripe fruit of *Vanilla planifolia,* Mexican or Bourbon vanilla, which is native to Mexico, Central America, and northern South America; or *Vanilla tahitiensis,* Tahiti vanilla, which is native to Oceania. The principal sources of vanilla are Madagascar, the Comoros, and Réunion, which together furnish about 70 to 75 percent of the world's supply, and Mexico, Uganda, and French Polynesia.

The plant has a long, fleshy climbing stem that attaches itself by aerial rootlets to trees; roots also penetrate the soil. Numerous flowers open a few at a time and last but a day during the blooming season, which lasts about two months. Because of their dainty structure, the blossoms can be naturally pollinated only by a small bee of Mexico; in other countries the flowers are pollinated artificially with a wooden needle as soon as they open. The fruit, a bean pod, reaches its full length of about 8 inches (20 cm) in four to six weeks but may take up to nine months to mature. As soon as they turn golden green at the base, the unripe beans are harvested.



Vanilla
By courtesy of the Field Museum of Natural History, Chicago

Fresh vanilla beans have no aroma. The characteristic aroma results from enzymatic action during curing. The traditional method begins with subjecting the harvested beans to a process of nightly sweating and daily exposure to the sun for about 10 days, until they become deep chocolate brown in colour. Then the beans are spread on trays in an airy shelter until dry enough for grading and packing. Curing and drying requires from four to five months. The best grade of cured bean pods may be covered with tiny crystals of vanillin, which provide the characteristic aroma, sweet, rich, and delicate. This coating, known as *givre,* may be used as a criterion of quality. Vanillin is not naturally present in the fleshy exterior of the pod but is secreted by hair-like papillae in its lining and ultimately becomes diffused through the viscid, oily liquid surrounding the seeds. The cured pods contain about 2 percent vanillin; other organic constituents include vanillic acid (odourless), oleoresin, sugar, gum, calcium oxalate, alcohols, aldehydes, and esters contributing to the full fragrance and flavour. Tahiti beans are reddish brown in colour, of less full flavour than the Mexican or Bourbon product, and contain a small amount of heliotropin, or piperonal, which characterizes their flavour.

Vanilla extract is prepared by crushing the cured, dried vanilla beans and extracting with alcohol. Vanilla flavour is made from oleoresin vanilla, a dark, semisolid concentration of vanilla extract, and alcohol and water. Imitation vanilla is made from commercially synthesized vanillin.

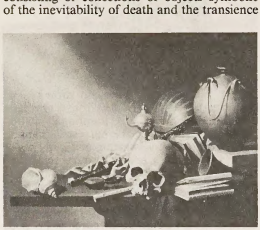
"De," "la," and similar components of a name, when followed by a space, are alphabetized as separate words (e.g., *De Forest, Lee*). *When they are joined to the following part of a name, the combination is treated as a single word* (e.g., *DeForest, John William*).

Vanimo, minor port, northwestern Papua New Guinea. Located on a peninsula surrounded by a white sand beach fronting the Pacific Ocean, Vanimo is about 20 miles (30 km) east of the border with Irian Jaya province, Indonesia. Lying on a well-drained alluvial plain covered with lowland rain forest, the town is a lumbering centre with sawmills and a port for overseas shipment of timber. Some copra is produced

along the coast. Road building has proceeded slowly; the main project is the construction of a coastal road. The town has an airfield. Pop. (1980 prelim.) 3,051.

Vanir, in Norse mythology, race of gods responsible for wealth, fertility, and commerce and subordinate to the warlike Aesir. As reparation for the torture of their goddess Gullveig, the Vanir demanded from the Aesir monetary satisfaction or equal status. Declaring war instead, the Aesir suffered numerous defeats before granting equality. The Vanir sent their gods Njörd and Freyr to live with the Aesir and received Hoenir and Mimir in exchange. The birth of the poet-god Kvasir resulted from the peace ritual in which the two races mingled their saliva in the same vessel.

vanitas (Latin: "vanity"), in art, an important type of still-life painting that flourished in the Netherlands in the early 17th century, consisting of collections of objects symbolic of the inevitability of death and the transience



"Still Life: An Allegory of the Vanities of Human Life," oil painting by Harmen van Steenwyck; in the National Gallery, London

By courtesy of the trustees of the National Gallery, London; photograph, A.C. Cooper Ltd.

and vanity of earthly achievements and pleasures; a *vanitas* painting exhorts the viewer to consider mortality and to repent. The *vanitas* evolved from simple pictures of skulls and other symbols of death and transience frequently painted on the reverse sides of portraits during the late Renaissance. It had acquired an independent status by about 1550, and by 1620 had become a very popular genre. Its development until its decline in about 1650 was centred in Leiden, in the United Provinces of the Netherlands, an important seat of Calvinist learning, with its emphasis on man's sinfulness and its rigid moral code.

Although a few *vanitas* pictures include figures, the vast majority are pure still lifes, containing certain standard elements: symbols of arts and sciences (such as books, maps, and musical instruments), wealth and power (such as purses and jewelry), and earthly pleasures (such as goblets, pipes, and playing cards); symbols of death or transience (such as skulls, clocks, burning candles, soap bubbles, and flowers); and, sometimes, symbols of resurrection and eternal life (usually ears of corn or sprigs of ivy or laurel). The earliest *vanitas* pictures were sombre, somewhat monochromatic compositions of great power, containing only a few objects, usually books and a skull, executed with elegance and precision. As the century progressed, other elements were included, the mood lightened, and the palette became diversified. Objects were often tumbled together in disarray, suggesting the eventual overthrow of the achievements they represent. In later paintings the standard subject matter of the *vanitas* theme became largely a pretext for meticulous virtuosity in the rendering of varied textures and surfaces, but the artistic quality of the genre in no sense declined. Several of the greatest Dutch still-life painters, including David Bailly, Jan Davidsz de Heem, Willem Claesz Heda, Pieter Potter, and Harmen and Pieter van Steenwyck, were masters of the *vanitas* still life, and the influence of the genre can be seen in the iconography and technique of other contemporary painters, including Rembrandt.

Vannes, town, capital of Morbihan *département,* Bretagne region, western France, at the confluence of two streams forming the Vanne River, which opens into the virtually landlocked Golfe du Morbihan about one mile below the town. A market centre, it has spread around the old walled town situated on a hill. The 13th–17th-century ramparts, linked by towers and gates, are well preserved on the east side of the old town above the Rohan stream. The Place Henri IV is bordered by 16th-century gabled houses. The cathedral of Saint-Pierre, burned by the Normans in the 10th century, was rebuilt between the 13th and 19th centuries.

Vannes was the centre of the Veneti tribe who led the unsuccessful Armorican rising against Julius Caesar after the Roman conquest. The Celtic ecclesiastic St. Paternus was consecrated first bishop of Vannes in 466. After a period of rule by independent counts, Vannes came under the yoke of the Franks. In 845 Nominoë, the Breton leader in Armorica, defeated the Frankish king Charles the Bald and established the independent duchy (for a time kingdom) of Brittany. Vannes became part of the duchy in 990. The Estates of Brittany, meeting in Vannes in 1532, ratified the union of the duchy with the French crown. The town is an important agricultural centre, with poultry farming and the production of poultry and cattle foodstuffs. Light industries include the manufacture of tires, prefabricated building material, and metalworking. Vannes' magnificent flower gardens are a tourist attraction. Pop. (1999) 51,759.

Vannic language: *see* Urartian language.

Vannucci, Pietro di Cristoforo (painter): *see* Perugino.

Vanoise National Park, nature reserve, located in the *département* of Savoie, southeastern France, and contiguous with the Gran Paradiso National Park in Italy. The park, created in 1963, is the oldest French national park and occupies 130,565 ac (52,839 ha). The park is dominated by the Massif de la Vanoise, which is bounded by the Isère River to the east and the Arc River to the south. The Pointe de la Grande Casse (12,638 ft [3,852 m]) is the highest peak in the park; there are 107 others that rise above 9,800 ft. Conifers predominate and include larches, firs, spruces, Scots pines, mountain pines, and arollas. Zones of quartzite and schist support rock campions, cowberries, wavy hairgrass, blue-spiked rampions, and round-leaved restharrow. Typical birds are nutcrackers, black grouses, ptarmigans, ring ouzels, golden eagles, and buzzards. Ibex, chamois, marmots, foxes, and badgers are common. Sheep are allowed to graze in the park. More than 350,000 ac adjoining the park have been designated as a peripheral, or buffer, zone and are being developed to accommodate tourists. The peripheral zone includes the nature reserves of Tignes and Val-d'Isère.

Vanolis, Bysshe: *see* Thomson, James.

Vanrisemburgh, Bernard, II, also spelled VAN RISEN BURGH: *see* Risenburgh, Bernard van, II.

Vansittart (of Denham), Robert Gilbert

Vansittart, Baron (b. June 25, 1881, Farnham, Surrey, Eng.—d. Feb. 14, 1957, Denham, Buckinghamshire), British diplomat, author, and extreme Germanophobe.



Vansittart, 1938

BBC Hulton Picture Library

Vansittart was educated at Eton and then trained for diplomatic service. He was first secretary at the Paris Peace Conference (1919–20) and principal private secretary to Lord Curzon (1920–24) and to successive prime ministers (1928–30). As permanent under secretary at the Foreign Office (1930–38), he warned the British government of the growing military power of Germany and insisted that Great Britain should rearm. Vansittart espoused a Germanophobic doctrine—which became known as vansittartism—that held that the conduct of German war leaders from the time of the Franco-German War (1870–71) had had the wholehearted support of the German people and that Germany had to be permanently demilitarized to ensure against future agression.

Vansittart was regarded by Neville Chamberlain as a hindrance to the British government's efforts to reach a settlement with Hitler. During the Czech crisis of 1938 Vansittart was made chief diplomatic adviser to the government, a post of no importance. He retired in 1941 and was raised to the peerage (which became extinct upon his death).

Vansittart wrote novels, verse, and plays, among them *Les Pariahs* (1902) and *Dead Heat* (1939). In his autobiography, *The Mist Procession,* published posthumously in 1958, he could recall no major issue on which his advice was taken, and he described his life as "a story of failure."

Vantaa, Swedish VANDA, city in Uudenmaan *lääni* (Uusima province), southern Finland, just north of Helsinki. Located in the estuary of the Vantaa River, it was incorporated as a city in 1972. Notable landmarks are the church of St. Lauri (1492), the parish of Helsinki Museum, and the Finnish Aviation Museum. Vantaa is connected with Helsinki and Lahti by motorways and railways. It is also an important manufacturing and tourist centre. Pop. (2000 est.) mun., 176,386.

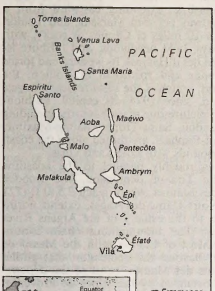
Vanua Lava, volcanic island in the Banks Islands of Vanuatu, southwestern Pacific Ocean, 75 mi (120 km) north-northeast of Espiritu Santo. The island, 15 mi long by 12 mi wide, was first explored in 1859 by Bishop George Selwyn, who located a good harbour (Port Patteson) on the east coast. A second harbour, Vureas (Avareas) Bay, is on the southwest coast. Mt. Suretamati on the island rises to 3,022 ft (921 m) and is an active volcano, the sulfur deposits of which were once worked by a French concern. The island exports copra and cacao. Pop. (1989) 1,366.

Vanua Levu, second largest island (2,137 sq mi [5,535 sq km]) of Fiji, bordering the Koro Sea in the South Pacific, 40 mi (64 km) northeast of the island of Viti Levu. Sighted by the Dutch navigator Abel Tasman in 1643, the volcanic Vanua Levu (meaning Great Land) was formerly called Sandalwood Island. The central mountain range, culminating at Mt. Nasorolevu (3,386 ft [1,032 m]), divides the island into wet (southeastern) and dry (northwestern) sections. Natewa Bay, on the east coast, cuts deeply into the island to make a

peninsula of its southeastern corner, while the south coast is indented by the broad Savusavu and Wainunu bays.

The Ndreketi (Drekiti) is one of several streams in the northwest with level valleys where sugarcane is cultivated. Lambasa (Labasa) on the north coast is the main population centre and port of the island. Vanua Levu exports sugar and copra. Copper ore was mined at Undu Point in the northeast until the supply was exhausted in the mid-1960s. The population of the island comprises slightly more Indians than Melanesians. Pop. (1986) including adjacent islands, 129,154.

Vanuatu, officially REPUBLIC OF VANUATU, Bislama RIPABLIK BLONG VANUATU, French RÉPUBLIQUE DE VANUATU, formerly NEW HEBRIDES, French NOUVELLES-HÉBRIDES, republic consisting of a chain of 13 principal and many smaller islands in the southwestern Pacific Ocean, 500 miles (800 km) west of Fiji and 1,100 miles (1,800 km) east of Australia. The islands extend from north to south for 400 miles (650 km) in an irregular V shape and have a total land area of 4,707 square miles (12,190 square km). They include the Banks Islands (Vanua Lava, Gaua [Santa Maria], Mota, and Mota Lava) and Espiritu Santo, Malo, Aoba, Maéwo, Pentecôte (Pentecost), Malakula, Ambrym, Épi, Éfaté, Erromango, Tanna, and Anatom. The capital is Vila (also



Vanuatu

called Port-Vila) on Éfaté, the main island. The population in 1990 was estimated at 147,000.

A brief treatment of Vanuatu follows. For information about regional aspects of Vanuatu, *see* MACROPAEDIA: Pacific Islands.

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

The land. A diverse relief—ranging from rugged mountains and high plateaus to rolling hills and low plateaus, with coastal terraces and offshore coral reefs—characterizes the islands. Frequent earthquakes indicate structural instability, and there are active volcanoes on several islands, including the Banks group, Tanna, Lopevi, and Ambrym. The highest point is Mount Tabwémasana, 6,165 feet (1,879 m), on Espiritu Santo, the largest island, which has an area of 1,420 square miles (3,680 square km).

The climate is oceanic tropical, moderated by southeast trade winds between May and October. Hurricanes may occur, and in 1987 Vanuatu was ravaged by the worst one in its history, which destroyed or damaged much of the nation's housing. The annual rainfall that Vanuatu receives varies from about 80 inches (2,000 mm) in the south to 160 inches (4,000 mm) in the north. Mean temperatures vary between 72° F (22° C) and 81° F (27° C) at Vila, on Éfaté, in the centre of the chain.

All the islands are well forested; tropical rain forests abound with tall trees, a thick growth of ferns and vines, and orchids at higher elevations. The southern islands, including Erromango and Tanna, have open patches of grassland. Mammals on the islands prior to the arrival of the Europeans included bats, rats, and wild pigs. There are numerous species of birds, including pigeons, parrots, honeyeaters, thrushes, and swiftlets.

The people. The indigenous population, called ni-Vanuatu, is overwhelmingly Melanesian, but there are also small numbers of Europeans, Chinese, Vietnamese, Polynesians, and Micronesians. Most of the islanders live in rural communities; the two main towns are Vila, the country's largest centre of population, and Luganville (also called Santo) on Espiritu Santo Island. The country has a relatively low population density; the most populated islands are Éfaté, Espiritu Santo, Tanna, and Malakula. Many Melanesian languages and dialects are spoken, and most are related to those of Fiji and New Caledonia. The national language is Bislama, an English-based Melanesian pidgin; it is the country's lingua franca and is used in debate in Vanuatu's Parliament. Bislama, English, and French are the official languages. The population is mainly Christian, including Presbyterians, Anglicans, and Roman Catholics. Vanuatu has high birth and death rates. About 45 percent of the population is less than 15 years of age.

The economy. Vanuatu has a developing free-market economy based mainly on agriculture, cattle raising, and fishing. Its gross national product (GNP) is growing less rapidly than the population; the GNP per capita is about average among the countries of Oceania.

Most of the population practices subsistence agriculture or is employed on plantations. Cultivation is generally restricted to the narrow coastal plains and low plateaus. Subsistence crops include coconuts, bananas, yams, cassava, taro, breadfruit, and vegetables. Copra, cocoa, and coffee are the important cash crops. Large numbers of cattle are raised on coconut plantations or on some large cattle ranches on the islands of Espiritu Santo, Éfaté, and Malakula. Raising poultry, pigs, and goats is part of the local economy.

Fishing, an important part of Vanuatu's economy, consists primarily of a Japanese-held company that operates a fleet of fishing vessels; tuna and bonito are frozen for export at a plant on Espiritu Santo. In addition to meat canning and fish freezing, small-scale manufacturing includes the production of soft drinks, building materials, furniture, and aluminum boats. There are manganese deposits on Éfaté and Erromango islands.

Tourism is an increasingly important source of foreign exchange, and, because Vanuatu has no direct taxation, it is becoming a finance centre as well. The nation's major exports are copra, beef and veal, timber, and cocoa. Manufactured goods, foodstuffs, and petroleum are the major imports. Budgetary aid from the United Kingdom and France compensates for much of the traditionally unfavourable balance of trade.

There are all-weather roads on Éfaté and Espiritu Santo; the other large islands have mostly unsealed roads. The main deepwater ports are at Vila and Luganville. Regular shipping services are maintained with New Caledonia, Australia, New Zealand, and Europe. Bauerfield near Vila on Éfaté and Pekoa near Luganville on Espiritu Santo are international airports; many of the other islands have airfields.

Government and social conditions. The constitution, which came into effect upon independence in 1980, provides for a president who is elected for a five-year term by an electoral college comprising the Parliament and the presidents of the Regional Councils. Members of the single-chamber Parliament are elected for four years on the basis of universal suffrage. The prime minister is elected from the Parliament by its members; he heads the Council of Ministers, which he himself appoints from members of the Parliament. The constitution also provides for a National Council of Chiefs, which is concerned with matters relating to custom and tradition. The Supreme Court hears and determines civil and criminal proceedings.

Malaria is the greatest health hazard. The major hospitals are located at Vila and Luganville and are part of a health services network that also includes health centres, clinics, and dispensaries.

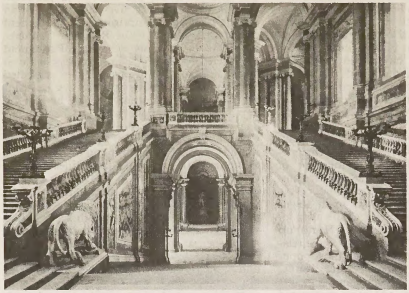
Education is principally conducted in English and French. Primary education is available for almost all children, and there are a number of secondary schools. Vanuatu has a technical-training institution and a teacher-training college. There is one weekly newspaper and a radio station, both out of Vila.

History. Many of the northern islands that now compose Vanuatu have been inhabited by Melanesian peoples for at least 3,000 years; the earliest radio-carbon date for settlement on the southern islands is 420 BC on Tanna. The islands were sighted in 1606 by the Portuguese navigator Pedro Fernández de Quirós. They were rediscovered by the French explorer Louis de Bougainville (1768) and were charted and named (for the Scottish Hebrides Islands) by Captain James Cook (1774). Sandalwood merchants and European missionaries came to the islands in the mid-19th century and were followed by cotton planters, mostly British and French, about 1868. Conflicting British and French interests were resolved by the creation (1887) of a Joint Naval Commission to administer the islands. In 1906 the two nations agreed to the establishment of a condominium government. Anglo-French high commissioners were delegated to exercise their powers through resident commissioners stationed at Vila, the capital of the condominium and now capital of the republic, on Éfaté. Joint sovereignty was held over the indigenous Melanesian people, but each nation retained responsibility for its own nationals according to the protocol of 1914 (ratified 1922). The island group escaped Japanese invasion during World War II and became a major Allied base. After World War II, local political initiatives originated in concern over landownership—more than one-third of the New Hebrides was owned by foreigners. Following the development of local political parties, a short-lived Representative Assembly (1974–77) was elected. Independence was agreed upon at a 1977 conference in Paris attended by British, French, and New Hebrides representatives. Elections were held and a constitution drawn up in 1979. The New Hebrides became independent within the Commonwealth under the name of the Republic of Vanuatu ("Our Land Forever") on July 30, 1980.

Vanvitelli, Luigi (b. May 26, 1700, Naples, Spanish Habsburg domain [Italy]—d. March 1, 1773, Caserta, near Naples), Italian architect whose enormous Royal Palace at Caserta (1752–74) was one of the last triumphs of the Italian Baroque.

Vanvitelli was trained by Niccolò Salvi and worked with him on lengthening the façade of Gian Lorenzo Bernini's Palazzo Chigi

(1664–1745, Rome). He completed several other buildings, including the Chiesa del Gésu (1743–45), before he began work on the Royal Palace. The palace, commissioned by

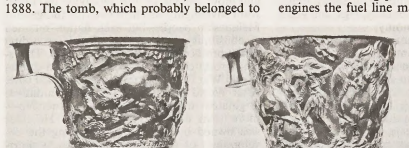


Staircase of the Royal Palace, Caserta, Italy, by Luigi Vanvitelli, 1752
Brogi—Alinari from Art Resource/EB Inc.

the Spanish king of Naples as the summer residence of the Bourbons of Spain, was modelled after the imperial architecture of the palace of Versailles. The quadrilateral building at Caserta, enclosing four courtyards, has 1,200 rooms, a huge chapel, and a theatre. In addition to its celebrated staircase, which is the largest in Italy, the palace offers many magnificent vistas.

Vanvitelli also built the Lazzaretto and Arco Clementino for Pope Clement XII in Ancona; the Chiesa dell'Annunciata (1756/61–1782) in Naples, and the monastery of S. Agostino. He rebuilt Michelangelo's S. Maria degli Angeli in Rome and contributed to other works in Milan, Siena, Pesaro, Macerato, Perugia, Loreto, and elsewhere. Besides designing secular buildings, he built the aqueduct Carolino (1752–64), 25 miles long, which supplies Naples with water.

Vapheio, also spelled VAPHIO, ancient site in Laconia, Greece, on the right bank of the Eurotas River, five miles south of Sparta; the site is known for its tholos tomb, excavated in 1888. The tomb, which probably belonged to



Gold cups depicting (left) bull hunting and (right) a pastoral cattle scene, from the tholos tomb near Vapheio, Laconia, Greece, Minoan, late 16th–early 15th century BC; in the National Archaeological Museum, Athens
Hirmer Fotoarchiv, München

Pharis, contained artifacts typical of the Late Minoan period, *c.* 1500 BC. Most notable is a pair of gold cups that were probably manufactured in Crete in the late 16th or early 15th century BC. One cup depicts bull hunting, and the other bears a pastoral cattle scene.

vaporization, also called EVAPORATION, conversion of a substance from the liquid or solid phase into the gaseous (vapour) phase. If conditions allow the formation of vapour bubbles within a liquid, the vaporization process is called boiling. Direct conversion from solid to vapour is called sublimation.

Heat must be supplied to a solid or liquid to effect vaporization. If the surroundings do not supply enough heat, it may come from the system itself as a reduction in temperature. The atoms or molecules of a liquid or solid are held together by cohesive forces, and these forces must be overcome in separating the atoms or molecules to form the vapour; the heat of vaporization is a direct measure of these cohesive forces.

Condensation of a vapour to form a liquid or a solid is the reverse of vaporization, and in the process heat must be transferred from the condensing vapour to the surroundings. The amount of this heat is characteristic of the substance, and it is numerically the same as the heat of vaporization. *See also* sublimation.

vapour lamp: *see* electric discharge lamp.

vapour lock, partial or complete interruption of the fuel flow in an internal-combustion engine, caused by the formation of vapour or bubbles of gas in the fuel-feeding system. Vapour forms because of fuel boiling in the fuel lines, usually as a result of excessive heating of the engine in hot weather or operation of the vehicle in areas of high altitude, which lowers the boiling point of the fuel. In some engines the fuel line may be routed too close to the exhaust manifold or other parts of the engine which give off intense heat. Allowing the engine to cool usually enables the vapour to recondense and thereby clears the vapour lock.

vapour pressure, pressure exerted by a vapour when the vapour is in equilibrium with the liquid or solid form, or both, of the same substance—*i.e.,* when conditions are such that the substance can exist in both or in all three phases. Vapour pressure is a measure of the tendency of a material to change into the gaseous or vapour state, and it increases with temperature. The temperature at which the vapour pressure at the surface of a liquid becomes equal to the pressure exerted by the surroundings is called the boiling point (*q.v.*) of the liquid.

vapour trail, also called CONDENSATION TRAIL, or CONTRAIL, streamer of cloud sometimes observed behind an airplane flying in clear, cold, humid air. It forms upon condensation of the water vapour produced by the combustion of fuel in the airplane engines. When the ambient relative humidity is high, the resulting ice-crystal plume may last for several hours. The trail may be distorted by the winds, and sometimes it spreads outwards to form a layer of cirrus cloud. On rare occasions, when the air is nearly saturated with water vapour, air circulation at the wing tips of an airplane may cause sufficient pressure and temperature reductions to cause cloud streamers to form.

Var, *département,* Provence-Alpes-Côte-d'Azur region, southeastern France, fronting the Mediterranean. Created in 1790 from a part of the historic province of Provence (*q.v.*), it was reduced in 1860 to an area of 2,316 sq mi (5,999 sq km) by the transfer of the Grasse district to the newly created Alpes-Maritimes *département* in the east. It thus no longer included the Var River, but it retained its name.

The coastline, extending eastward from a point midway between Marseille and Toulon to within 10 miles of Cannes, is rocky, with many bays, bold headlands, and offshore islands (the Îles d'Hyères). Its western end forms the harbour and roadstead of Toulon, the naval port, which is the *département*'s largest town and, since 1974, its capital. Fashionable and picturesque seaside resorts, including Le Lavandou, Saint-Tropez, Sainte-Maxime, and Saint-Raphaël, are dotted along the coast, which abounds with hotels and villas.

Running roughly parallel to the coastline from the Toulon depression, the wooded Monts des Maures, which reach 2,530 ft (771 m) at Notre-Dame-des-Anges, extend northeastward to the estuary of the Argens River at Fréjus. The mountainous chain continues northeast of Cannes with the Massif de l'Estérel. Beyond the depression that girdles the Monts des Maures, most of the *département* is occupied by the Alpes de Provence, which reach a height of 5,626 ft (1,715 m) in the Lachens mountains in the northeast. The pine-clad highlands have frequently been devastated by fire, and large areas are covered with scrub. The Verdon River, with its grand canyon and gorges, flows along the northern border for many miles. Draguignan, in the east centre, is located on the scenic Route Napoléon, which runs over the Alps from the Mediterranean.

The *département* has a mild Mediterranean climate, but in winter the mistral wind brings with it sharp, cold spells. In summer there is usually no rain for more than six weeks, apart from occasional local storms. Small holdings in the lower parts, using irrigation, are intensively cultivated with early vegetables, fruit, and flowers. Mimosa is cultivated along the sheltered coastal strip of the Maures, once a fastness of Moorish pirates from whom it derives its name. During World War II the coast was the scene of Allied landings in 1944. The *département* has two *arrondissements,* Draguignan and Toulon. It is in the educational division of Nice. Pop. (1982) 708,331.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Varāha (Sanskrit: Boar), third of the 10 incarnations (avatars) of the Hindu god Vishnu. When a demon named Hiraṇyākṣa dragged



Varāha, stone sculpture from Jhālrapātan, Rājasthān, India, *c.* 10th century AD; in Jhālawār Archaeology Museum, India
Pramod Chandra

the earth to the bottom of the sea, Vishnu took the form of a boar in order to rescue it. They fought for a thousand years. Then Varāha slew the demon and raised the earth out of the water with his tusks. The myth reflects an earlier creation legend of Prajāpati (Brahmā), who assumed the shape of a boar in order to lift the earth up out of the primeval waters.

In painting and sculpture, Varāha is represented either in full animal form or with the head of a boar and the body of a man. Completely zoomorphic sculptures show him as a colossal boar with the earth, personified as the dark-hued goddess Bhūmidevī, clinging to one of his tusks. As half-human, half-animal, he is often shown standing with one leg bent supporting Bhūmidevī, whose expression, according to Indian canons of representation, should express both shyness and joy.

Varāhamihira, also called VARAHA, or MIHIRA (b. 505, Ujjain, India—d. 587, Ujjain), Indian philosopher, astronomer, and mathematician, author of the *Pañca-siddhāntikā* ("Five Treatises"), a compendium of Greek, Egyptian, Roman, and Indian astronomy.

Varāhamihira's knowledge of Western astronomy was thorough. In five sections, his monumental work progresses through native Indian astronomy and culminates in two treatises on Western astronomy, showing calculations based on Greek and Alexandrian reckoning and even giving complete Ptolemaic mathematical charts and tables.

Although Varāhamihira's writings give a comprehensive picture of 6th-century India, his real interest lay in astronomy and astrology. He repeatedly emphasized the importance of astrology and wrote many treatises on *śakuna* (augury) as well as the *Bṛhaj-Jātaka* ("Great Birth") and the *Laghu-Jātaka* ("Short Birth"), two well-known works on the casting of horoscopes.

Varahran (name of kings of Iran): *see under* Bahrām.

Värälä, Treaty of (1790), settlement ending the Russo-Swedish War begun by Sweden (with British diplomatic support) in 1788. It maintained, in Russia's favour, the territorial dispositions of 1743. *See* Abo, Treaty of.

Varallo, town, Vercelli province, Piemonte (Piedmont) region, northwestern Italy. It lies along the Sesia River, 31 miles (50 km) northwest of Novara. The town is rich in art and churches, among which are San Gaudenzio (restored 1710), with a polyptych by the 16th-century painter Gaudenzio Ferrari, who left his most important works to the community, and Santa Maria delle Grazie (1487–1501), with frescoes by Ferrari. On the nearby Monte Sacro is a sanctuary consisting of the Church of the Assunta (1649) and 45 chapels, with about 1,000 statues and 6,000 frescoed figures (mostly by Ferrari). Varallo has an art school, gallery, and local museum. It is a summer resort with textile, paper, and food industries. Pop. (1998 est.) 7,543.

Vārānasi, also called BENARES, BANARAS, or KĀŚĪ, city, southeastern Uttar Pradesh state, northern India. It is located on the left bank of the Ganges River and is one of the seven sacred cities of the Hindus.

Vārānasi is one of the oldest continuously inhabited cities in the world. Its early history is that of the first Aryan settlement in the middle Ganges valley. By the 2nd millennium BC, Vārānasi was a seat of Aryan religion and philosophy and was also a commercial and industrial centre famous for its muslin and silk fabrics, perfumes, ivory works, and sculpture. Vārānasi was the capital of the kingdom of Kāśi during the time of Buddha (6th century BC), who gave his first sermon at



The widow's *ghāṭ* on the Ganges River, at Vārānasi
J. Allan Cash—Rapho/Photo Researchers

nearby Sārnāth. The city remained a centre of religious, educational, and artistic activities as attested by the celebrated Chinese traveler Hsüan-tsang, who visited it in *c.* AD 635 and said that the city extended for about 3 miles (5 km) along the western bank of the Ganges. Vārānasi subsequently declined during the three centuries of Muslim occupation, beginning in 1194. Many of the city's Hindu temples were destroyed during the period of Muslim rule, and learned scholars fled to other parts of the country. The Mughal emperor Akbar in the 16th century brought some relief to the city's religious and cultural activities. There was another setback during the reign of the Mughal emperor Aurangzeb in the late 17th century, but later the Marāthās sponsored a new revival. Vārānasi became an independent kingdom in the 18th century, and under subsequent British rule it remained a commercial and religious centre.

In 1910 the British made Vārānasi a new Indian state, with Rāmnagar (on the opposite bank) as headquarters but with no jurisdiction over the city of Vārānasi. In 1949, after Indian independence, the Vārānasi state became part of the state of Uttar Pradesh.

Vārānasi has the finest river frontage in India, with miles of ghats, or steps, for religious bathing; an array of shrines, temples, and palaces rises tier on tier from the water's edge. The inner streets of the city are narrow, winding, and impassable for motor traffic; the newer, outer suburbs are more spacious and are laid out more systematically. The sacred city is bounded by a road known as Panchakosi; every devout Hindu hopes to walk this road and to visit the city once in a lifetime and, if possible, to die there in old age. More than 1,000,000 pilgrims visit the city each year.

Among the city's numerous temples, the most venerated are those of Viśvanātha, dedicated to Shiva; that of Sankatmochana, dedicated to the monkey-god Hanumān; and that of Durgā. The Durgā Temple is famous for the swarms of monkeys that inhabit the large trees near it. The Great Mosque of Aurangzeb is another prominent religious building. Two of the more important modern temples are those of Tulasi Mānas and the Viśvanātha on the campus of the Banaras Hindu University. The city has hundreds of other temples. At Sārnāth, a few miles north of Vārānasi, there are ruins of ancient Buddhist monasteries and temples as well as temples built by the Maha Bodhi Society and by the Chinese, Burmese, and Tibetan Buddhists.

Vārānasi has been a city of Hindu learning through the ages. There are innumerable schools and countless Brahman pandits, or learned men, responsible for the continuation of traditional learning. There are also three universities, including the large and important Banaras Hindu University (1915), and more than a dozen colleges and high schools.

The city is also a centre of arts and crafts and of music and dance. Vārānasi is famous for its production of silks and brocades with gold and silver threadwork, as well as for wooden toys, bangles made of glass, ivory work, and brass ware. Pop. (2001 prelim.) 1,100,748.

Varanus, sole genus of the lizard family Varanidae, and composed of the monitor lizards (*see* monitor lizard); one of the Varanidae is *Varanus komodoensis*, the Komodo dragon (*q.v.*).

Varda, Agnès (b. May 30, 1928, Brussels), French still photographer and one of the few successful female motion-picture directors. Her first film, *Le Pointe courte* (1954), was a precursor of the French New Wave films of the 1960s.

Varda became a student at the Sorbonne and the École du Louvre and became a still photographer. As the official photographer of the Théatre National Populaire from 1951 to 1961, she discovered an interest in both theatre and film. Varda's first film, *Le Pointe courte*, proved her to be an original artist. Varda's second feature, *Cleo de cinq à sept* (1961; *Cleo from 5 to 7*), an introspective and intellectual film, displays the influence of the New Wave. It is an intimate account of a pop singer who sees the world around her with a new vision while she waits for the results of a medical examination that will tell her if she is suffering from a terminal illness.

In 1964, Varda directed *Le Bonheur* (*Happiness*), an abstract picture of happiness that was to be her most controversial film. *Les Creatures* was released in 1966, and her most popular films of the next two decades were *L'Une chante l'autre pas* (1976; *One Sings, the Other Doesn't*) and *Sans toit ni loi* (1985; *Without Roof or Law*, or *Vagabond*).

Vardan: *see* Philippicus Bardanes.

Vardar River, German WARDAR, Greek AXIÓS, major river in Macedonia and in Greece. It rises in the Šar Mountains and flows north-northeast past Gostivar and Tetovo (in the Gostivar–Tetovo depression); it then turns sharply to flow southeast past Skopje and Titov Veles into Greece, where it enters the Gulf of Salonika of the Aegean Sea. Of its total length of 260 miles (420 km),

187 miles (300 km) are in Macedonia; its drainage basin is 8,643 square miles (22,387 square km). The river's valley is important as a source of agricultural production and as a part of the Morava–Vardar corridor, a major transportation route between central Europe and the Aegean.

Vardhamāna (Jainist teacher): *see* Mahāvira.

Vardon, Harry (b. May 9, 1870, Grouville, Jersey, Channel Islands—d. March 20, 1937, Totteridge, Hertfordshire, Eng.), British professional golfer who pioneered accurate and reliable hitting techniques that are still the basis of the modern golf swing.

Vardon began playing golf desultorily while working as a manservant for an affluent amateur golfer on the island of Jersey in the English Channel. Realizing both his own talent and the money that could be made in the game, he turned professional golfer at age 20. He subsequently achieved dominance in the sport, winning the British Open in 1896, 1898, 1899, 1903, 1911, and 1914 and the U.S. Open in 1900. The Vardon Trophy, named for him, is awarded annually to the professional with the best scoring average.



Vardon
UPI

Vardon owed his success largely to new methods that revolutionized golf's medium- and long-distance hitting techniques. Prior to him, the traditional style was to drive the ball at great speed and at a low angle, or trajectory, thereby achieving great distances but sacrificing any real ability to aim and control where the ball would come to a stop. Vardon, by contrast, hit the ball high in the air so that it would land at a steep angle and come to a stop quickly, without excessive bouncing and rolling. This method, along with adjustments in his stance and swing, enabled him to land the ball within quite short distances of the flagstick. Vardon became such a trendsetter that his name was adopted for the Vardon, or overlapping, grip, which he helped popularize but did not actually invent.

Vare, Glenna Collett, *née* GLENNA COLLETT (b. June 20, 1903, New Haven, Conn., U.S.—d. Feb. 3, 1989, Gulfstream, Fla.), sportswoman who dominated American women's golf in the 1920s.

As Glenna Collett she won her first U.S. Women's Amateur championship in 1922; she regained this title five times (1925, 1928–30, 1935) and won the French championship in 1925. In the middle 1920s she won 59 of 60 consecutive matches in tournament play. She was a Curtis Cup choice against Britain (1932, 1936, 1938, 1948). Her name was given to the Vare Trophy, awarded annually to the woman professional with the best scoring average.

Varella, Cape (Vietnam): *see* Ke Ga, Point.

Varenius, Bernhardus (Latin), German BERNHARD VAREN (b. 1622, Hitzacker, Hannover [Germany]—d. 1650/51, Leiden, Neth.), a major figure in the revival of geographic learning in Europe, whose scholarly general geography remained the accepted standard authority for more than a century.

After studying medicine, Varenius was attracted to geography by his acquaintance with geographers. In 1649 he published *Descriptio Regni Japoniae* ("Description of the Kingdom of Japan"), which in addition to describing Japan included a Latin translation of an account of Siam (Thailand), possibly by the Dutch navigator Willem Corneliszoon Schouten, and excerpts from the Arab traveler and geographer Leo Africanus on religion in Africa. *Geographia generalis* (1650), his best-known work, sought to lay down the general principles of geography on a wide scientific basis according to the knowledge of the day. It not only was a systematic geography on a scale not previously attempted but also contained a scheme for special, now known as regional, geography. This major work was frequently revised, and the edition of 1672 had improvements by Sir Isaac Newton.

Varennes, Pierre Gaultier de: *see* La Vérendrye, Pierre Gaultier de Varennes.

Varese, city, capital of Varese *provincia,* Lombardia (Lombardy) *regione,* northern Italy. It lies among the Alpine foothills descending to the Lake Varese, north of Milan. The modern Piazza Monte Grappa is a square in the centre of the city. Notable buildings include the basilica of San Vittore (1580–1615), with paintings of the 17th-century Lombard school and a Baroque bell tower; the Municipal Palace (1766–72), a former castle of the dukes of Este with adjacent scenic landscaped public gardens; and the civic museum, displaying prehistoric, Roman, and natural-history exhibits. The environs of Varese include Sacro Mountain, with the pilgrimage church of Santa Maria del Monte (1684) symbolizing the Holy Rosary, and Campo dei Fiori Mountain, site of an important observatory. Industries include the manufacture of leather goods, particularly shoes, together with textiles, machinery, and plastics. Pop. (1990 est.) mun., 88,018.

Varèse, Edgard, original name EDGAR VARÈSE (b. Dec. 22, 1883, Paris—d. Nov. 8, 1965, New York City), French-born American composer and innovator in 20th-century techniques of sound production.

Varèse spent his boyhood in Paris, Villars in Burgundy, and Turin, Italy. After composing without formal instruction as a youth, he later studied under Vincent d'Indy, Albert Roussel, and Charles Widor and was strongly encouraged by Romain Rolland and by Claude Debussy. In 1907 he went to Berlin, where he was influenced by Richard Strauss and Ferruccio Busoni. In 1915 he immigrated to the United States.

Varèse's music is dissonant, nonthematic, and rhythmically asymmetric; he conceived of it as bodies of sound in space. After the early 1950s, when he finally gained access to the electronic sound equipment he desired, he concentrated on electronic music.

Varèse actively promoted performances of works by other 20th-century performers and founded the International Composers' Guild in 1921 and the Pan-American Association of Composers in 1926; these organizations were responsible for performances and premieres of works by Béla Bartók, Alban Berg, Carlos Chávez, Henry Cowell, Charles Ives, Maurice Ravel, Wallingford Riegger, Francis Poulenc,



Varèse
The Bettmann Archive

Anton von Webern, and others. He also founded the Schola Cantorum of Santa Fe (New Mexico) in 1937 and the New Chorus (later, Greater New York Chorus) in 1941 to perform music of past eras, including works of Pérotin, Heinrich Schütz, Claudio Monteverdi, and Marc-Antoine Charpentier.

Varèse's works include *Hyperprism* (1923) for wind instruments and percussion; *Ionisation* (1931) for percussion, piano, and two sirens; and *Density 21.5* (1935) for unaccompanied flute. His *Déserts* (1954) employs tape-recorded sound. In the *Poème électronique* (1958), written for the Philips Pavilion at the Brussels World's Fair, the sound was intended to be distributed by 425 loudspeakers.

Vargas, Getúlio (Dorneles) (b. April 19, 1883, São Borja, Braz.—d. Aug. 24, 1954, Rio de Janeiro), president of Brazil (1930–45, 1951–54), who brought social and economic changes that helped modernize the country. Although denounced by some as an unprincipled dictator, Vargas was revered by his followers as the "Father of the Poor," for his battle against big business and large landowners.

Vargas was born in the state of Rio Grande do Sul, into a family prominent in state politics. Contemplating a military career, he joined the army when he was 16 but soon decided to study law. In 1908, shortly after graduating from the Pôrto Alegre Law School, he entered politics. By 1922 he had been elected to the National Congress, in which he served for four years. In 1926 Vargas became minister of finance in the Cabinet of President Washington Luís Pereira de Souza, a post he retained until his election as governor of Rio Grande do Sul in 1928. From his position as state governor, Vargas campaigned unsuccessfully as reform candidate for the presidency of Brazil in 1930. While appearing to accept defeat, Vargas in October of that year led the revolution, organized by his friends, that overthrew the republic.

For the next 15 years Vargas was chief of state of Brazil, ruling most of that time with-



Vargas, 1951
AP/Wide World

out a congress. He held sole power as provisional president from Nov. 3, 1930, until July 17, 1934, when he was elected president by the constituent assembly. On Nov. 10, 1937, Vargas presided over a coup d'état that destroyed the constitutional government and set up the avowedly totalitarian New State (Estado Novo).

Prior to 1930 the federal government had been in effect a federation of autonomous states, dominated by rural landholders and financed largely by the proceeds of agricultural exports. Under Vargas this system was destroyed. The tax structure was revised to make state and local administrations dependent upon the central authority, the electorate was quadrupled and granted the secret ballot, women were enfranchised, extensive educational reforms were introduced, social-security laws were enacted, labour was organized and controlled by the government, and workers were assured a wide range of benefits, including a minimum wage, while business was stimulated by a program of rapid industrialization. Vargas, however, did not change the private-enterprise system, nor did his social reforms extend in practice to the rural poor.

But on Oct. 29, 1945, Vargas was overthrown by a coup d'état in a wave of democratic sentiment sweeping postwar Brazil. He still, however, retained wide popular support. Although elected as senator from Rio Grande do Sul in December 1945, he went into semiretirement until 1950, when he emerged as the successful presidential candidate of the Brazilian Labour Party. He took office on Jan. 31, 1951.

As an elected president restrained by congress, a profusion of political parties, and public opinion, Vargas was unable to satisfy his labour following or to placate mounting middle-class opposition. Thus, he resorted increasingly to ultranationalistic appeals to hold popular support. By mid-1954 criticism of the government was general, and the armed forces, shocked by scandals within the regime, joined in the call for his withdrawal. Rather than accept forced retirement, Vargas took his life on Aug. 24, 1954. (R.E.P.)

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Vargas Llosa, (Jorge) Mario (Pedro) (b. March 28, 1936, Arequipa, Peru), Peruvian writer whose commitment to social change is evident in his novels, plays, and essays. In 1990 he was an unsuccessful candidate for president of Peru.

Vargas Llosa received his early education in Cochabamba, Bol., where his grandfather was the Peruvian consul. He later attended a series of schools in Peru before entering a military school, Leoncio Prado, in Lima in 1950.

After his first publication, *La huida del Inca* (1952; "The Escape of the Inca"), a three-act play, his stories began to appear in Peruvian literary reviews, and he coedited *Cuadernos de composición* (1956–57; "Composition Book") and *Literatura* (1958–59). He worked as a journalist and broadcaster and attended the University of Madrid. In 1959 he moved to Paris, where he lived until 1966.

Vargas Llosa's first novel, *La ciudad y los perros* (1963; "The City and the Dogs"; Eng. trans. *The Time of the Hero*), was widely acclaimed. Translated into more than a dozen languages, this novel, set in the Leoncio Prado Military School, describes adolescents striving for survival in a hostile and violent environment. The corruption of the military school reflects the larger malaise afflicting Peru.

The novel *La casa verde* (1966; *The Green House*), set in the Peruvian jungle, combines mythical, popular, and heroic elements to capture the sordid, tragic, and fragmented reality of its characters.

Los cachorros (1967; *The Cubs, and Other Stories*) is a psychoanalytical portrayal of an adolescent who has been accidentally castrated. *Conversación en La Catedral* (1969; *Conversation in The Cathedral*) deals with Manuel Odría's regime (1948–56). The novel *Pantaleón y las visitadoras* (1973; "Pantaleón and the Visitors"; Eng. trans. *Captain Pantoja and the Special Service*) is a satire of the Peruvian military and religious fanaticism.

His semiautobiographical novel *La tía Julia y el escribidor* (1977; *Aunt Julia and the Scriptwriter*) combines two distinct narrative points of view to provide a contrapuntal effect.

Vargas Llosa also wrote a critical study of the fiction of Gabriel García Márquez in *García Márquez: Historia de un deicidio* (1971; "García Márquez: Story of a God-Killer"), a study of Gustave Flaubert in *La orgía perpetua: Flaubert y "Madame Bovary"* (1975; "The Perpetual Orgy: Flaubert and 'Madame Bovary'"), and a study of the works of Jean-Paul Sartre and Albert Camus in *Entre Sartre y Camus* (1981; "Between Sartre and Camus").

After living three years in London, he was a writer-in-residence at Washington State University in 1969. In 1970 he settled in Barcelona. He returned to Lima in 1974 and lectured and taught widely throughout the world. A collection of his critical essays in English translation was published in 1978. *La guerra del fin del mundo* (1982; *The War of the End of the World*), an account of the 19th-century political conflicts in Brazil, became a best-seller in Spanish-speaking countries. In 1983 his play *La Señorita de Tacna* (1981; "The Lady of Tacna") was performed in English in New York City. Another play, *La Chunga* (1986; "The Jest"), was also critically acclaimed.

Vargas Llosa in 1990 lost his bid for the presidency of Peru in a runoff against Alberto Fujimori, an agricultural engineer and the son of Japanese immigrants.

vargueno, Spanish BARGUEÑO, wooden cabinet of mixed Spanish and Oriental origin that first appeared in Europe in the late Middle Ages and became a common article of furniture in the Spanish colonial empire from the late 16th century onward. Its major component is a chest with a drop front. The interior is divided into an intricate arrangement of drawers and recesses for holding jewels, documents, and other valuables. The drawers and recesses are inlaid with ivory, silver, or gold and are occasionally stained in bright colours. The exterior is elaborately mounted at the corners and elsewhere in iron or silver, and the front is secured by a heavy padlock or conventional lock.

Originally, the base was another chest divided into two cupboards, but later versions usually stand on a support of baluster legs spanned by intricate arcading after French and Italian Renaissance prototypes. The design of



Vargueno, walnut inlaid with natural and coloured ivory and wood, Spanish, about 1520; in the Victoria and Albert Museum, London

By courtesy of the Victoria and Albert Museum, London

the vargueno was later copied by practitioners of the revived Spanish Colonial style in the United States.

variable star, any star whose observed light varies notably in intensity. The changes in brightness may be periodic, semiregular, or completely irregular.

A brief treatment of variable stars follows. For full treatment, *see* MACROPAEDIA: Stars and Star Clusters.

Variable stars may be classified into three broad types according to the origin and nature of their variability: (1) eclipsing, (2) pulsating, and (3) explosive.

In an eclipsing variable, one member of a double, or binary, star system partially blocks the light of its companion as it passes in front of the latter, as observed from Earth. Each time this happens, the brightness of the entire system fluctuates. Such an eclipsing variable is perhaps best exemplified by the binary star Algol, whose name means "blinking demon."

Unlike eclipsing binaries, the other two types of variable stars are intrinsically variable—that is to say, their own output of radiant energy fluctuates with time. The pulsating variables expand and contract cyclically, causing them to pulsate rhythmically in brightness and size. The Cepheids and RR Lyrae stars are typical examples of such variables. The explosive (or eruptive) variables include novas, supernovas, and similar stars that undergo sudden outbursts of radiant energy, which results in rapid brightening. This increase in brightness lasts only for a short period of time, followed by relatively slow dimming.

Besides these three major classes, there are also several miscellaneous variables: R Coronae Borealis stars, T Tauri stars, flare stars, pulsars (neutron stars), spectrum and magnetic variables, X-ray variable stars, and radio variable stars. By the late 20th century, more than 30,000 variable stars had been catalogued.

variables, separation of, one of the oldest and most widely used techniques for solving some types of partial differential equations. A partial differential equation is called linear if the unknown function and its derivatives have no exponent greater than one and there are no cross-terms—*i.e.,* terms such as ff' or $f'f''$ in which the function or its derivatives appear more than once. An equation is called homogeneous if each term contains the function or one of its derivatives. For example, the equation $f' + f^2 = 0$ is homogeneous but not

linear, $f'' + x^2 = 0$ is linear but not homogeneous, and $f_{xx} + f_{yy} = 0$ is both homogeneous and linear.

If a homogeneous linear equation in two variables has a solution $f(x, y)$ that consists of a product of factors $g(x)$ and $h(y)$, each involving only a single variable, the solution of the equation can sometimes be found by substituting the product of these unknown factors in place of the unknown composite function, obtaining, in some cases, an ordinary differential equation for each variable. For example, if $f(x, y)$ is to satisfy the equation $f_{xx} + f_{yy} = 0$, then by substituting $g(x)h(y)$ for $f(x, y)$, the equation becomes $g_{xx}h + gh_{yy} = 0$, or $-g_{xx}/g = h_{yy}/h$. Because the left side of the latter equation depends only on the variable x and the right side only on y, the two sides can be equal only if they are both constant. Therefore, $-g_{xx}/g = c$, or $g_{xx} + cg = 0$, which is an ordinary differential equation in one variable and which has the solutions $g = a \sin(xc^{1/2})$ or $g = a \cos(xc^{1/2})$. In a similar manner, $h_{yy}/h = c$, and $h = \exp(\pm yc^{1/2})$. Therefore, $f = gh = a \exp(\pm yc^{1/2}) \sin(xc^{1/2})$ or $a \exp(\pm yc^{1/2}) \sin(xc^{1/2})$ are solutions of the original equation $f_{xx} + f_{yy} = 0$. The constants a and c are arbitrary and will depend upon other auxiliary conditions (boundary and initial values) in the physical situation that the solution to the equation will have to satisfy. A sum of terms such as $a \exp(\pm yc^{1/2}) \sin(xc^{1/2})$ with different constants a and c will also satisfy the given differential equation, and, if the sum of an infinite number of terms is taken (called a Fourier series), solutions can be found that will satisfy a wider variety of auxiliary conditions, giving rise to the subject known as Fourier analysis.

The method of separation of variables can also be applied to some equations with variable coefficients, such as $f_{xx} + x^2 f_y = 0$, and to higher-order equations and equations involving more variables.

Varian, Russell H.; and Varian, Sigurd F., in full RUSSELL HARRISON VARIAN and SIGURD FERGUS VARIAN (respectively b. April 24, 1898, Washington, D.C., U.S.—d. July 28, 1959, Juneau, Alaska; b. May 4, 1901, Syracuse, N.Y., U.S.—d. Oct. 18, 1961, Puerto Vallarta, Mex.), brothers who, with William W. Hansen, invented the klystron radio tube, a powerful microwave generator.

Russell Varian received his M.A. in 1927 from Stanford University, Stanford, Calif., and worked in a technical capacity with several organizations, including Humble Oil and Refining Company, Farnsworth Television Company, and Varian Associates.

During the period 1935–39, Russell and his brother, Sigurd, a largely self-taught engineer and pilot, worked with William W. Hansen of Stanford to develop the klystron. Russell Varian and Hansen developed the theoretical basis of the klystron, a novel application of the principle of amplitude modulation to a beam of electrons. Sigurd Varian built the mechanism. The klystron tube was first used in radar detection and guidance systems and was later applied to electron accelerator technology. Russell Varian also invented a magnetometer that was used for the measurement of the Earth's magnetic field by the Vanguard satellite. In 1948 the brothers formed Varian Associates, a firm that produced microwave devices useful in the linear electron accelerator and in detectors of nuclear magnetic resonance.

variance, in statistics, the square of the standard deviation of a sample or set of data, used procedurally to analyze the factors that may influence the distribution or spread of the data under consideration. *See* mean.

variation, in biology, any difference between cells, individual organisms, or groups of organisms of any species caused either by genetic differences (genotypic variation) or by the effect of environmental factors on the expression of the genetic potentials (phenotypic variation). Variation may be shown in physical appearance, metabolism, fertility, mode of reproduction, behaviour, learning and mental ability, and other obvious or measurable characters.

Genotypic variations are caused by differences in number or structure of chromosomes or by differences in the genes carried by the chromosomes. Eye colour, body form, and disease resistance are genotypic variations. Individuals with multiple sets of chromosomes are called polyploid; many common plants have two or more times the normal number of chromosomes, and new species may arise by this type of variation. A variation cannot be identified as genotypic by observation of the organism; breeding experiments must be performed under controlled environmental conditions to determine whether or not the alteration is inheritable.

Environmentally caused variations may result from one factor or the combined effects of several factors, such as climate, food supply, and actions of other organisms. Phenotypic variations also include stages in an organism's life cycle and seasonal variations in an individual. These variations do not involve any hereditary alteration and in general are not transmitted to future generations; consequently, they are not significant in the process of evolution.

Variations are classified either as continuous, or quantitative (smoothly grading between two extremes, with the majority of individuals at the centre, as height in human populations); or as discontinuous, or qualitative (composed of well-defined classes, as blood groups in man). A discontinuous variation with several classes, none of which is very small, is known as a polymorphic variation. The separation of most higher organisms into males and females and the occurrence of several forms of a butterfly of the same species, each coloured to blend with a different vegetation, are examples of polymorphic variation.

variation, musical: *see* musical variation.

variation of parameters (mathematics): *see* parameters, variation of.

varicella: *see* chicken pox.

varicose vein, also called VARIX, vein that is twisted—tortuous—and distended with blood. The term varix is also used for similar abnormalities in arteries and in lymphatic vessels. Varicose veins occur in a number of areas, including the legs; the esophagus, or gullet; the spermatic veins, which return blood from the testes (varicose veins in this area cause a mass in the scrotum that is called a varicocele); the veins of the broad ligaments, *i.e.*, folds of peritoneal membrane that extend from the uterus to the walls of the pelvis; and the veins of the urinary bladder.

Varicose veins in the legs, by far the most common location, result from malfunctioning of the valves in the veins. These valves normally prevent blood from reversing its flow after the movement of the leg muscles has forced the blood upward and from superficial veins to the deep veins. When the valves do not function properly, the blood collects in the superficial veins, distending and twisting them. Weakness of the valves and of the walls of the veins may be inherited. Other possible causes include garments that improperly constrict the legs (*e.g.*, stretch boots that are tight only at the top rather than evenly down the length of the lower leg), enlarged lymph nodes, and tumours of the pelvis. The increase in the number of varices that occurs during pregnancy has awakened the suspicion that abnormalities in endocrine secretion play a role.

Symptoms include a sensation of heaviness and a tendency for the leg muscles to cramp while one is standing. The feet and legs swell at the end of the day. The skin may be inflamed and moist, a condition called weeping eczema. Ulcers may appear around the ankles, and clots may develop in the diseased blood vessels (*see* thrombophlebitis).

Treatment consists of the use of elastic bandages or strong support hose if the affected person is unable to undergo surgery; injection of a sclerosing solution—a solution that hardens the vein and makes it like a cord—directly into the vein, a method used primarily for dealing with minor varices and for treatment of varices that have persisted after most have been corrected by surgery; and surgical treatment, consisting of tying off the affected veins or removing them, a process called stripping. The most recent treatment has been by electrolyte methods. *See also* hemorrhoid.

variegated laurel (plant): *see* croton.

variety (popular theatre): *see* music hall and variety.

Varig, abbreviation of EMPRESA DE VIAÇÃO AEREA RIO GRANDENSE (Portuguese: "Rio Grandense Air Transport Enterprise"), Brazilian airline founded on May 7, 1927, with the assistance of a Berlin trading concern, Kondor Syndicat, which had begun flights in the state of Rio Grande do Sul the previous January. Thereafter, Varig opened several more intrastate routes. Major expansion did not begin until 1953, however, when the Brazilian government guaranteed Varig's service from Rio de Janeiro to New York City (a service inaugurated two years later). In the 1960s the company absorbed a number of smaller Brazilian airlines, including Real (Redes Restaduais Aereas) and Panair do Brasil. Its route network covers the five continents of South America, North America, Europe, Africa, and Asia. Headquarters are in Rio de Janeiro.

variola (disease): *see* smallpox.

variolation, obsolete method of immunizing patients against smallpox by infecting them with substance from the pustules of patients with a mild form of the disease (variola minor). The disease then usually occurs in a less-dangerous form than when contracted naturally. The method was popularized in England in 1721–22 by Lady Mary Wortley Montagu; it has long been known by the Turks, Chinese, and other peoples. In America, Cotton Mather learned of its use in Africa from his slave, Onesimus, who himself had been inoculated. Its use spread in America after 1721, and in 1728 it was introduced into South America. Variolation continued to be opposed by some religious groups and most physicians, who were not convinced of the safety of the method. It was supplanted by vaccination after 1798. In 1842 an act of Parliament in England made the practice of variolation a felony in that country.

variscite, phosphate mineral, hydrated aluminum phosphate ($AlPO_4 \cdot 2H_2O$), which is valued as a semiprecious gemstone and an ornamental material. Both variscite and strengite, a similar mineral in which iron replaces aluminum in the crystal structure, occur as glassy nodules, veins, or crusts, in near-surface deposits: variscite is produced by the action of phosphate-rich waters on aluminous rocks, and strengite by alteration of iron-containing phosphates. Variscite is usually green; strengite, red. Variscite occurs in Germany, Austria, Czech Republic, Zaire, and Australia and in commercially important quantities near Fairfield, Utah, U.S. It also occurs with apatite on islands where phosphatic solutions from guano (seafowl excrement) have altered aluminous igneous rocks. Strengite deposits are



Variscite from Fairfield, Utah
By courtesy of the McFall collection; photograph, Mary A. Root

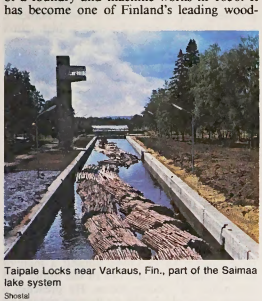
known in Germany, Portugal, Sweden, and the United States. For detailed physical properties, *see* phosphate mineral (table).

Variscite is cut en cabochon (with a round, convex, polished surface) for brooches, earrings, and beads and is frequently substituted for turquoise. It also is carved into bowls or other decorative objects. Because of its porosity, it tends to absorb grease and oil, which discolour it.

varix (medicine): *see* varicose vein.

Varkana (ancient region, Asia): *see* Hyrcania.

Varkaus, city, Kuopion (Kuopio) *lääni* (province), southeastern Finland, on the western branch of the Saimaa lake system, south of the city of Kuopio. Varkaus has been a major industrial centre since the establishment of a foundry and machine works in 1850. It has become one of Finland's leading wood-



Taipale Locks near Varkaus, Fin., part of the Saimaa lake system
Shostal

working and pulp- and paper-manufacturing centres, and most of Finland's lake ships are built there. Pop. (1993 est.) 24,554.

Värmland, *län* (county) of west-central Sweden, extending north from Vänern (lake) and northwest to the Norwegian frontier. It takes in most of the traditional *landskap* (province) of Värmland. Much of its area forms a plateau, reaching a height of 2,267 feet (691 m) at Bränberget in the north. The well-forested region is deeply cut by several rivers and long, narrow lakes. Färmlands are restricted to the valleys and the southern lake-dotted lowland. Värmland has channeled its timber and iron-ore resources into industrialization, namely, iron mining, lumbering, and papermaking. One of the most important industrial towns is Karlstad (*q.v.*), the capital.

Värmland is the setting for the novel *Gösta Berlings saga* (1891) by Nobel Prizewinner Selma Lagerlöf. At Mårbacka, south of Sunne, is the house (now a museum) where Lagerlöf was born, wrote most of her novels, and died. Area 6,789 square miles (17,584 square km). Pop. (1994 est.) 285,220.

Varmus, Harold (Elliot) (b. Dec. 18, 1939, Oceanside, N.Y., U.S.), American virologist and cowinner (with J. Michael Bishop) of the Nobel Prize for Physiology or Medicine in 1989 for their work on the origins of cancer.

Varmus graduated from Amherst (Mass.) College (B.A.) in 1961, from Harvard University (M.A.) in 1962, and Columbia University, New York City (M.D.), in 1966. He then joined the National Cancer Institute, Bethesda, Md., where he studied bacteria. In 1970 he went to the University of California at San Francisco as a postdoctoral fellow. There he and Bishop began the research that was to win them international recognition. Varmus remained on the faculty of the University of California, where he became a professor of biochemistry and biophysics in 1982. In 1993 he was appointed director of the National Institutes of Health.

Varmus and Bishop found that, under certain circumstances, normal genes in healthy cells of the body can cause cancer; these genes are termed oncogenes. Oncogenes ordinarily control cellular growth and division, but, if they are picked up by infecting viruses or affected by chemical carcinogens, they can be rendered capable of causing cancer. This research, carried out with the aid of colleagues Dominique Stehelin and Peter Vogt in the mid-1970s, superseded a theory that cancer is caused by viral genes, distinct from a cell's normal genetic material, that lie dormant in body cells until activated by carcinogens.

varna, Sanskrit VARṆA, any one of the four traditional social classes of Hindu India. Although the literal meaning of the word varna (Sanskrit: "colour") has invited speculation that class distinctions were originally based on differences in degree of skin pigmentation, and though this might have been true between the fairer-skinned Aryans and the darker aboriginals of ancient India, the notion of "colour" may be regarded as a device of classification. Colours were frequently used as classifiers; *e.g.*, the Vedic scripture known as the Yajurveda is divided into two groups of texts, White and Black.

The varnas have been known since the late Rigveda hymn 10.90, in which it is declared that the Brahman (priest), the Kshatriya (nobleman), the Vaisya (commoner), and the Śūdra (serf) issued forth at creation from the mouth, arms, thighs, and feet of the primeval person (*puruṣa*). The set of four contains several groups of contrasts: the Śūdra, surely the aboriginal non-Aryan population, is in contrast with the first three, who are "twice-born" (*dvija*) after undergoing the ceremony of spiritual rebirth (*upanayana*) that initiates them into Aryan manhood. The Śūdras live in servitude to the other three. The Vaisyas, in turn, contrast as common people, grazers, and cultivators with the governing classes—*i.e.*, the secular Kshatriyas, or barons, and the sacerdotal Brahmans. Brahmans and Kshatriyas themselves contrast in that the former are their priests, while the latter have the actual dominion. In the older description, far greater emphasis is placed on the functions of the classes than on hereditary membership, in contradistinction to caste, which emphasizes heredity over function.

The system of the four classes (*cāturvarṇya*) is fundamental to the views the traditional lawgivers held of society. They specified a different set of obligations for each: the task of the Brahman is to study and advise, the baron to protect, the Vaisya to cultivate, and the serf to serve. History shows, however, that the four-class system was more a social model than a reality. The multitudinousness of castes is explained as the result of hypergamous and hypogamous alliances between the four classes and their descendants. Although the Śūdra, in the beginning, clearly comprised the residual class of all non-Aryans, the inclusion of them in the four-varna system bestowed on them a measure of dignity. A move to accommodate still others not so distinguished led to the rather unofficial acceptance of yet a fifth class, the *pañcama* (Sanskrit: "fifth"), which include the "untouchable" classes and others, such as tribal groups, who are outside the system and, consequently, *avarṇa* ("classless").

In modern times, traditional Hindus, awakened to the inequities of the caste system yet loath to abandon the hierarchy described in the four-varna system as fundamental to the good society, have often advocated a return to this clear-cut varna system by reforming castes. Individual castes, in turn, have sought to raise their social rank by identifying with a particular varna and demanding its privileges of rank and honour. *See also* jāti; caste.

Varna, also spelled WARNA, seaport and third largest city in Bulgaria. Lying on the north shore of Varna Bay on the Black Sea coast, the city is sheltered by the Dobrudzhansko plateau, which rises to more than 1,000 feet (300 m) above sea level. A narrow canal (1907) links Varna Lake—a drowned valley into which the Provadiyska River flows—to the Black Sea. The city is an important administrative, economic, cultural, and resort centre. It is a modern city, with wide, tree-lined boulevards, a fine park on the waterfront, and spacious beaches. Along the coast north of Varna are several popular resort towns, including Druzhba, Zlatni Pyassütsi ("Golden Sands"), Albena, and Balchik, the last once the summer retreat of Romanian royalty and aristocracy.

Varna was founded as Odessus by Milesian Greeks in the 6th century BC; later it was Thracian, Macedonian, and Roman. In AD 681 it became part of the First Bulgarian empire (*c.* 679–1018) and was named Varna. During the reign (1218) of Ivan Asen II, it became a thriving centre of trade with Genoa, Venice, and Dubrovnik. After falling under Ottoman domination in 1391, it continued to grow in importance. In 1444, in a pitched battle fought nearby, the Turkish armies of Murad II routed the armies of the last Christian Crusade against the Turks in the Balkans.

The Russians captured Varna in 1828 during the war for the liberation of Greece, but, when they left, the city reverted to the Turks. In 1854 Varna became a base for Anglo-French troops operating against Sevastopol during the Crimean War. It was liberated from the Turks in 1878 and ceded to Bulgaria by the Treaty of Berlin. After the building of the Ruse-Varna railway in 1866 and the rail link to Sofia in 1899, the town expanded further. A modern harbour was constructed in 1906.

The city has regular domestic airline services and, in the summer, international flights. Regular boat and bus services connect the Black Sea towns. Much of Bulgaria's maritime and river transport passes through Varna's harbour, which accommodates vessels up to 20,000 tons. Major export items are livestock, grain, and processed foodstuffs. Industries include flour milling, boatbuilding, and manufacturing.

The city has several universities, a naval academy, an oceanography and fishery-research institute, a medical school, museums, a theatre, an opera house, and an art gallery. The 4th-century Aladzha Monastery, one of the earliest Bulgarian monasteries, overlooks the city from the north; its cells and chapel are carved out of the rock. A 5th/6th-century basilica is a reminder of an ancient Genoese colony. Between 1949 and 1956 Varna was renamed Stalin. Pop. (1992 est.) 316,231.

Varna, Battle of (Nov. 10, 1444), Turkish victory over a Hungarian force, ending the European powers' efforts to save Constantino-

ple (now Istanbul) from Turkish conquest and enabling the Ottoman Empire to confirm and expand its control over the Balkans.

In the early 1440s Ulászló I, the king of Hungary (who was also Władysław III of Poland), sponsored a campaign against Sultan Murad II of the Ottoman Empire to reduce the Turkish threat to Constantinople and to restore Serbia to its prince, George Branković. The Hungarian forces, commanded by Hunyadi, were supported by Pope Eugenius IV and allied with Prince George as well as with Prince János Vlad of Walachia. Together they compelled Murad to conclude a 10-year truce (June 1444), by which he restored a tributary Serbian state and pledged not to cross the Danube River.

Nevertheless, Ulászló, influenced by the pope's legate Julian Cesarini, soon took advantage of the sultan's preoccupation in Anatolia by breaking the truce and renewing his campaign against the Ottomans. Hunyadi resumed his command only with reluctance, and Prince George refused to join Ulászló's crusade. Reinforced only by a Walachian contingent, the Hungarian army marched to Varna, where on Nov. 10, 1444, it clashed with Murad, who had returned from Anatolia with a force three times larger than Ulászló's. Although the Hungarians gained an initial advantage, the Turks eventually killed Ulászló, almost annihilating the Christian army, and forced Hunyadi to flee.

Following the battle, Poland remained without a king for three years. Unhindered by further major interference from the central European powers, the Turks extended their control over the Greek rulers in the Peloponnese, who had cooperated with the crusaders. The Turks also conquered Constantinople (1453) and reabsorbed Serbia (by 1459).

Varnhagen von Ense, Karl August (b. Feb. 21, 1785, Düsseldorf, Pfalz-Neuburg [now in Germany]—d. Oct. 10, 1858, Berlin, Prussia), German writer, diplomat, biographer, and, with his wife, Rahel, a leading figure of a Berlin salon that became a centre of intellectual debate.

Varnhagen began his literary career (1804) by becoming joint editor of a poetry annual. Enlisting in the Austrian army (1809), he was wounded at the Battle of Wagram the same year and later accompanied his superior officer, Prince Bentheim, to Paris. He spent a year in the Prussian civil service (1812) but later resumed his military career. His experiences in Hamburg and Paris as an adjutant are recorded in *Geschichte der Hamburger Ereignisse* (1813; "History of the Hamburg Events"), and his experiences in the Napoleonic Wars are described in *Geschichte der Kriegzüge des Generals von Tettenborn* (1815; "History of the War Platoon of General von Tettenborn").

Entering the Prussian diplomatic service, he was present at the Congress of Vienna (1814–15) and was resident at Karlsruhe until his recall in 1819. In 1814 he married Rahel Levin, whose salon was a gathering place for the writers, diplomats, and intellectuals of the day. Retiring from diplomatic service, Varnhagen became more involved in literature, although he was occasionally recalled for important political assignments.

Varnhagen's biographies include those of General Friedrich Wilhelm von Seydlitz (1834), Sophia Charlotte, queen of Prussia (1837), and General Friedrich Wilhelm Bülow von Dennewitz (1853). His numerous biographies are smoothly written and well organized but rely heavily on anecdote. A collection of his correspondence with the geographer and explorer Alexander von Humboldt has also been compiled.

Varnhagen von Ense, Rahel, *née* LEVIN (b. May 19, 1771, Berlin, Prussia [now in Germany]—d. March 7, 1833, Berlin), German literary hostess from early in the 19th century whose soirees were attended by many of the Romantics, notably Heinrich Heine.

Rahel was from a wealthy Jewish family of Berlin. Her brother Ludwig Robert was a minor playwright. Literary salons presided over by such women as Henriette Herz and Rahel Levin became the centres of social activity for writers and their followers in Berlin. A sudden loss of fortune in 1806 interrupted Rahel's salon activity, but she was able to resume it after she met Karl August Varnhagen von Ense, a minor writer and literary personality, in 1808. They were married in 1814. In 1819 he was dismissed from the diplomatic service because of his liberal politics, and the family returned to Berlin, where Rahel's salon regained its prominence. Many of Rahel Varnhagen's letters were published in 1967. Her husband brought out a collection of her writings, *Rahel: Ein Buch des Andenkens für ihre Freunde,* 3 vol. (1834, reprinted 1971; "Rahel: A Book of Memories for Her Friends").

varnish, liquid coating material containing a resin that dries to a hard transparent film. Most varnishes are a blend of resin, drying oil, drier, and volatile solvent. When varnish dries, its solvent portion evaporates, and the remaining constituents oxidize or polymerize to form a durable transparent film. Varnishes provide protective coatings for wooden surfaces, paintings, and various decorative objects. Varnish protects and enhances the appearance of wooden floors, interior wood paneling and trim, and furniture.

The early varnishes were solutions of natural resins that are the secretions of plants. Among these natural resins are dammar, copal, and rosin (*qq.v.*). The natural varnishes are produced by heating the resins, adding natural oils such as linseed oil, cooking the mixture to the desired viscosity, and then diluting it with turpentine. The resultant coating took three to four days to harden, had a yellow tint, and eventually developed cracks as it aged.

Natural varnishes have largely been replaced by varnishes containing synthetic resins, chief among which are the alkyd, polyurethane, phenolic, vinyl, and epoxy resins. The first synthetic resins used in varnishes, developed by the chemist Leo Baekeland, were phenolic resins similar to Bakelite. Improved through the 1930s and '40s, phenolics were displaced in many uses by alkyds, which eventually became the single most important resin class in the coatings industry, though phenolics continue to be used in marine and floor varnishes. Alkyds are made with an alcohol such as glycerol, a dibasic acid, such as maleic or phthalic acid, and an oil, such as castor, coconut, linseed, or soybean, or a fatty acid. Unlike natural resins, synthetic resins can be manufactured in large quantities and can be chemically tailored with great precision for particular uses. For example, the molecular structure of alkyd resins can be manipulated to vary their viscosity, their hardness, their solubility in water or other substances, and their capacity to mix successfully with various pigments.

varnish tree, also called JAPANESE VARNISH TREE, LACQUER TREE, or WOOD OIL TREE, any of various trees whose milky juice is used to make a varnish or lacquer. The term is applied particularly to an Asian tree (*Rhus verniciflua*), related to poison ivy, that is highly irritating to the skin. On being tapped, the tree exudes a thick, milky emulsion that was possibly used as the first drying oil; it has the peculiar property of drying only in a moist atmosphere. From this exudate comes the lacquer used to produce the highly polished woodenware of China and Japan with hard and durable coats unaffected by water.

Varro, Marcus Terentius (b. 116 BC, probably Reate, Italy—d. 27 BC), Rome's greatest scholar and a satirist of stature, best known for his *Saturae Menippeae* ("Menippean Satires"). He was a man of immense learning and a prolific author. Inspired by a deep patriotism, he intended his work, by its moral and educational quality, to further Roman greatness. Seeking to link Rome's future with its glorious past, his works exerted great influence before and after the founding of the Roman Empire (27 BC).

Varro studied with a prominent Latin scholar and with the philosopher Antiochus of Ascalon at Athens. Though not attracted to a political career, he played some part in the public life of the Roman Republic and rose to the office of praetor. He served with Pompey the Great in Spain (76), became his pro-quaestor there, and also served under him in the war against the pirates (67).

In 59 Varro wrote a political pamphlet entitled *Trikaranos* ("The Three-Headed") on the coalition of Pompey, Julius Caesar, and Crassus. He sided with Pompey in Spain (49) but was pardoned (47) and appointed librarian by Caesar, to whom he dedicated the second part of his *Antiquitates rerum humanarum et divinarum* ("Antiquities of Human and Divine Things"). Under the second triumvirate Varro was outlawed by Mark Antony, and his books were burned, but his property was later restored by Augustus. He spent the rest of his life in study and writing.

Varro wrote about 74 works in more than 600 books on a wide range of subjects: jurisprudence, astronomy, geography, education, and literary history, as well as satires, poems, orations, and letters. The only complete work to survive is the *Res rustica* ("Farm Topics"), a three-section work of practical instruction in general agriculture and animal husbandry, written to foster a love of rural life.

Dedicated to Cicero, Varro's *De lingua Latina* ("On the Latin Language") is of interest not only as a linguistic work but also as a source of valuable incidental information on a variety of subjects. Of the original 25 books there remain, apart from brief fragments, only books v to x, and even these contain considerable gaps.

Of Varro's 150 books of the *Saturae Menippeae,* some 90 titles and nearly 600 fragments remain. The satires are humorous medleys in mixed prose and verse in the manner of the 3rd-century-BC cynic philosopher Menippus of Gadara. The subjects range from eating and drinking to literature and philosophy. In these satires, Varro shows himself a man of the old stamp, making fun of the follies and absurdities of modern times. He preaches a simple life of old-fashioned Roman virtue and piety, opposes luxury and philosophic dogmatism, and shows considerable skill in handling several meters and poetic manners.

The *Res rustica* appears in an edition with an English translation by W.D. Hooper and H.B. Ash in the Loeb Classical Library (1934), which also offers *De lingua Latina* and an English translation by R.G. Kent (1938). There is an edition (1953) of the *Saturae Menippeae* by F. della Corte, who also wrote *Varrone—il terzo gran lume romano* (1954).

Varthema, Lodovico de, de Varthema also spelled DI BARTHEMA, Latin VARTOMANUS, or VERTOMANNUS, (b. *c.* 1465–70, Bologna [Italy]—d. June 1517, Rome, Papal States), intrepid Italian traveler and adventurer whose account of his Middle Eastern and Asiatic wanderings was widely circulated throughout Europe and earned him high fame in his own lifetime. He made significant discoveries (especially in Arabia) and made many valuable observations of the peoples he visited; his ready wit enabled him to handle difficult situations.

He sailed from Venice near the end of 1502,

visited Alexandria and Cairo, proceeded up the Syrian coast, and went inland to Damascus. Then, either adopting Islām or pretending to, he became the first Christian known to have made the holy pilgrimage to Mecca, a journey of gravest danger for a non-Muslim. He completed the trip between April and June 1503 and remained in Mecca about three weeks. In his writings he provides an accurate description of both the town and the religious rituals practiced there. Deserting his Syrian caravan, he then joined a group of Indian pilgrims on their way to India. He was, however, arrested as a Christian spy at Aden and imprisoned for two months. Sent to the palace of the sultan, he gained the intercession of one of the sultan's wives. By this means, and by feigning madness, he was set free. He then made a walking tour of about 600 miles (965 km) through the mountainous southwestern corner of the Arabian peninsula, visiting Ṣan'ā', Yemen.

He next sailed for northwestern India by way of Somaliland but then returned to Arabia. Touching at Ẓufār and Muscat, he went on to Hormuz in the Persian Gulf and spent much of 1504 in southern Persia. At Shīrāz, Persia, he entered into partnership with a merchant whom he knew from his Mecca pilgrimage and who accompanied him on the rest of his Asian travels. Following an unsuccessful attempt to reach Samarkand, the two men returned to Hormuz and embarked for India. Sailing the length of the western coast, they touched at Cambay and at Goa, from where Varthema visited the inland capital of Bijāpur; at Cannanore he detoured to visit Vijayanagar, a great city enjoying its final days of splendour; at Calicut (now Kozhikode) Varthema observed Hindu customs as well as trade and city government. He visited Ceylon and southeastern India and then made his way to the magnificent Myanmar (Burmese) capital at Pegu. From Malacca, on the southern Malay peninsula, he returned to India in the summer of 1505 and, upon reaching Calicut, posed as a Muslim holy man. Eager to return to Europe, Varthema joined the Portuguese garrison at Cannanore, fought for Portugal, and was knighted for his services. In 1507 he sailed for Europe by way of the Cape of Good Hope.

Varthema's account, *Itinerario de Ludouico de Varthema Bolognese* . . . (1510), first appeared in English translation in Richard Eden's *History of Travayle* (1576–77). The Hakluyt Society of London published an English translation, *Travels of Ludovico di Varthema,* in 1863.

Consult the INDEX *first*

Varuṇa, in the Vedic phase of Hindu mythology, the god-sovereign, the personification of divine authority. He is the ruler of the sky realm and the upholder of cosmic and moral law (*ṛta*), a duty shared with the group of gods known as the Ādityas, of whom he was the chief. He is often jointly invoked with Mitra, who represents the more juridical side of their sovereignty, or the alliance between man and man, while Varuṇa represents the magical and speculative aspects, or the relationship between god and man. In later Hinduism, Varuṇa plays a lesser role. He is guardian of the west and is particularly associated with oceans and waters. Thus he is often attended by the river goddesses Gaṅgā and Yamunā. He corresponds closely to the Zoroastrian god Ahura Mazdā.

Varus, Publius Quintilius (d. AD 9), Roman general whose loss of three legions to Germanic tribes in the Battle of the Teutoburg Forest caused great shock in Rome and stemmed Roman expansion beyond the Rhine River.

Varus came of an old patrician family; his father, Sextus Quintilius Varus, was one of the murderers of Julius Caesar and committed suicide after the Battle of Philippi (42 BC). Varus himself, however, came to be related by marriage to the emperor Augustus and thus acquired political influence, becoming consul in 13 BC, proconsul of Africa (7?–6 BC), and then legate in Syria, where he acquired enormous wealth. When Judea rebelled on the death of Herod I the Great (4 BC), Varus marched an army against the insurgents, crushed them, and reestablished direct Roman government.

Augustus eventually sent Varus to the Roman frontiers east of the Rhine, where he functioned as both a civil administrator and a military commander in an attempt to introduce Roman jurisdiction into the recently conquered region.

The Germans, however, found in Arminius, a prince of the Germanic Cherusci tribe, a leader of extraordinary resource. Arminius formed the design of freeing his people from Roman rule and soon came to a secret understanding with influential German chiefs. In September of the year AD 9, Varus, who had been falsely informed that a distant tribe was in revolt, led his legions into the Teutoburg Forest to put down the uprising. Here the Germans were lying in wait for him; and everything was in their favour, the narrow defiles having caused disorder among the troops and the ground having been made muddy by heavy rains. The battle that ensued lasted three days, during which the Romans were altogether destroyed; and Varus killed himself by falling upon his sword.

The aged Augustus was said to have been overcome with grief upon receiving news of the disaster, crying, "Varus, Varus, give me back my legions!" The defeat of Varus was followed by the loss of all Roman possessions east of the Rhine.

varved deposit, any form of repetitive sedimentary rock stratification, either bed or lamination, that was deposited within a one-year time period. This annual deposit may comprise paired contrasting laminations of alternately finer and coarser silt or clay, reflecting seasonal sedimentation (summer and winter) within the year. Varved deposits are to be distinguished from rhythmites, the latter also being made up of paired laminations or beds but with an annual cyclicity that cannot be proved.

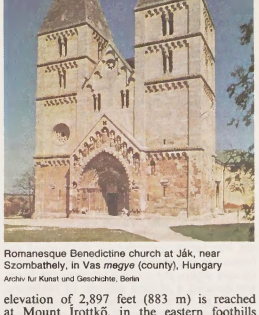
Varved deposits are usually associated with fine-grained sediments, the muds or mudrocks, which include both silt- and clay-grade materials. Laminations in many mudrocks are both thin and laterally persistent over large areas. They may exhibit the right order of thickness, as shown by the rates of sedimentation estimated for times past or observed at present, and have a structure similar to laminations currently being formed. Using this premise, one may deduce that many mudrock laminations are of an annual nature and that the varved deposits depend upon the yearly climatic cycle. This cycle affects temperature, salinity, and silt content of waters as well as the seasonal production of plankton.

Varved deposits are most commonly associated with sedimentation in lakes, particularly those that are located in glacial or proglacial environments. During the summer months sediment is transported into the lake from the surrounding drainage basin as a result of ice melting and outwash. The central part of the lake receives relatively coarse sediment—silt to very fine-grade sand detritus—distributed by currents. The sediment settles to the bottom, with the coarser particles settling faster. In the wintertime the lake may not receive any new sediment input, probably because the lake is ice covered. Thus the finest sediments, the clays, flocculate in the water column and settle out of suspension in the lake. The end product is a coarse- and fine-grained sediment couplet, the sediment being light (summer) and dark coloured (winter), respectively. This couplet is the hallmark of varved deposits. The annual cyclicity of the varved deposits in modern lakes can be proven as seasonal by using pollen analysis or by undertaking carbon-14 dating of the succession. Some varved sediments in the glacigenic environment can display an exponential decrease in thickness of the couplet away from the ice front. This may be a result, in part, of the couplet being deposited by density current and autosuspension mechanisms operating within the water body.

Varved deposits in recent and ancient sedimentary sequences, where they are often termed varvite, frequently display disruption of the fine lamination and couplets by outsize clasts. These clasts are called dropstones and were introduced vertically through the water column into the lake area, where only fine-grained sediments normally accumulate, by ice rafting and melting. This phenomenon of disrupted varvites constitutes the strongest evidence of past glacial activity in a region.

Varved sediments also can be found in nonglacial lakes and marine settings and as a result of aeolian processes. Varved deposits are commonly associated with evaporite sequences where lake sediments display detrital and chemical cycles. These thicker couplets are the product of a cyclic variation in rainfall imposed upon the deposits of a continuously subsiding lake basin.

Vas, *megye* (county), western Hungary, occupying an area of 1,288 square miles (3,337 square km), most of which consists of hill pasture and deciduous forest. A maximum



Romanesque Benedictine church at Ják, near Szombathely, in Vas *megye* (county), Hungary

Archiv fur Kunst und Geschichte, Berlin

elevation of 2,897 feet (883 m) is reached at Mount Írottkő, in the eastern foothills of the Austrian Alps. Őrség district, at the southwestern corner of the *megye,* is the site of a major reclamation project. The cultivation of wheat, potatoes, winter cabbage, and fruit, dairying, and pigraising are the main activities. Major settlements are Szombathely (*q.v.*), the *megye* seat, and Sár-

vár. At Ják, just south of Szombathely, is a large Romanesque twin-towered church dating from 1256. The ancient town of Kőszeg is well known for its many fine old buildings, churches, and a medieval fortress. Pop. (1996 est.) 272,000.

vas deferens (anatomy): *see* ductus deferens.

Vasa (Finland): *see* Vaasa.

Vasa, HOUSE OF, Swedish (and Polish) dynasty descended from an old family of Uppland, related both to the Sture family and to the Bonde family of Sweden's King Charles VIII (d. 1470). Its founder was Gustav Eriksson Vasa, who became regent of Sweden in 1521 and King Gustav I Vasa in 1523. His descendants reigned until 1818, the last being Charles XIII. It was succeeded by the house of Bernadotte.

A grandson of Gustav I Vasa became king of Poland, as Sigismund III Vasa, in 1587 and was concurrently king of Sweden from 1592. On Sigismund's death in 1604, a son, Władysław IV Vasa, was elected to the Polish throne; and an uncle, Charles IX, already regent, received the Swedish crown. The Vasa dynasty in Poland ended a generation later, in 1668, with the resignation of Sigismund's second son, John II Casimir Vasa.

Vasa, Gustav Eriksson (king of Sweden): *see* Gustav I Vasa.

Vasai (India): *see* Bassein.

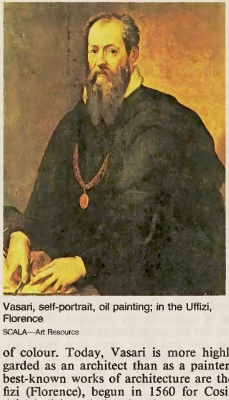
Vasarely, Victor, Hungarian VIKTOR VÁSÁRHELYI (b. April 9, 1908, Pécs, Hung.—d. March 15, 1997, Paris, France), Hungarian-born French painter of geometric abstractions who became one of the leading figures of the Op art (*q.v.*) movement.

Vasarely was trained as an artist in Budapest in the Bauhaus tradition. In 1930 he left Hungary and settled in Paris, where he initially supported himself as a commercial artist but continued to do his own work. During the 1930s he was influenced by Constructivism, but by the 1940s his characteristic style of painting animated surfaces of geometric forms and interacting colours had emerged. His style reached maturity in the mid-1950s and 1960s, when he began using brighter, more vibrant colours to further enhance the suggestion of movement through optical illusion. Representative works include "Sirius II" (1954), "Ondho" (1956–60, Museum of Modern Art, New York City), and "Arny-C" (1967–69).

Vasarely became a naturalized French citizen in 1959. Much of his work is housed in the Vasarely Museum, at the Château de Gourdes, in Vaucluse *département*, southern France. In 1970 he established the Vasarely Foundation, which in 1976 took up quarters near Aix-en-Provence in a building that he designed.

Vasari, Giorgio (b. July 30, 1511, Arezzo, Florence [Italy]—d. June 27, 1574, Florence), Italian Mannerist painter, architect, and writer whose fame as an artist has been overshadowed by the importance of his study of the history of Italian Renaissance art.

When still a child, Vasari was the pupil of Guglielmo de Marcillat, but his decisive training was in Florence, where he enjoyed the friendship and patronage of the Medici family, trained within the circle of Andrea del Sarto, and became a lifelong admirer of Michelangelo. As an artist Vasari was both studious and prolific. Apart from his work at Arezzo, he is best represented by the great fresco cycles in the Palazzo Vecchio, Florence, and in scenes from the life of Pope Paul III in the Cancelleria, Rome (the so-called 100-days fresco). Vasari's paintings are in the style of the Tuscan Mannerists and have often been criticized as being facile, superficial, and lacking a sense



Vasari, self-portrait, oil painting; in the Uffizi, Florence
SCALA—Art Resource

of colour. Today, Vasari is more highly regarded as an architect than as a painter. His best-known works of architecture are the Uffizi (Florence), begun in 1560 for Cosimo I de' Medici, and the church, monastery, and palace built for the Cavalieri di San Stefano in Pisa. These designs show the influence of Michelangelo and are outstanding examples of the Tuscan Mannerist style of architecture. Vasari was also among the founders of the Florentine Accademia del Disegno (1562).

His *Le Vite de' più eccellenti architetti, pittori, et scultori italiani . . .* (1550, 2nd ed., 1568; *The Lives of the Most Eminent Italian Architects, Painters and Sculptors . . .*) was dedicated to Cosimo de' Medici. In it Vasari accepts the Renaissance view of medieval art as the incompetent product of the Dark Ages that separate classical antiquity from the Renaissance and concentrates on the revival of the arts in Tuscany, initiated by Giotto and culminating in the works of Michelangelo, the only living artist mentioned. In a second and much enlarged edition, the painters are mentioned first in the title. This edition, which includes the biographies of a number of artists then living, as well as Vasari's own autobiography, is now much better known than the first edition and has been widely translated.

Vasari's style is eminently readable, and his methods were sometimes analogous to those of the modern art historian. When facts were scarce, however, he did not hesitate to fill in the gaps. The introductions to each of the three main volumes comprise a valuable treatise on the various arts and also give an acute insight into Vasari's theories and prejudices.

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Vasco, País (Spain): *see* Basque Country.

Vasconcelos, José (b. Feb. 28, 1882, Oaxaca, Mex.—d. June 30, 1959, Mexico City), Mexican educator, politician, essayist, and philosopher, whose five-volume autobiography, *Ulises Criollo* (1935; "A Creole Ulysses"), *La tormenta* (1936; "The Torment"), *El desastre* (1938; "The Disaster"), *El proconsulado* (1939; "The Proconsulship"), and *La flama* (1959; "The Flame"), is one of the finest sociocultural studies of 20th-century Mexico. *A Mexican Ulysses* (1962) is an abridgment.

A lawyer, Vasconcelos campaigned for the revolutionary presidential candidates Madero and Villa. After serving as rector of the University of Mexico, he was appointed minister of public education (1920–24), during which time he initiated major reforms in the school system, especially expanding the rural school program. In 1929 he ran unsuccessfully for the presidency of Mexico. Because of his political activism, he was forced to spend several periods of his life living in exile.

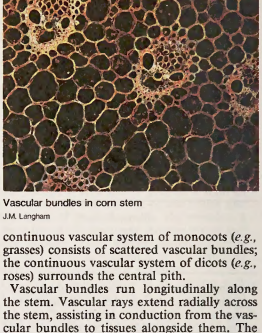
His philosophy, which he called "aesthetic monism," essentially an attempt to deal with the world as a cosmic unity, is set forth in *Todología* (1952). He carried over his philosophy into his writings on Mexico, calling for a synthesis of Mexican life based upon the indigenous culture of the Indians, which transcended what he saw as the narrow limits of Western culture. He is most famous for his autobiography. Among his other principal works are *La raza cósmica* (1925; "The Cosmic Race") and *Bolivarismo y Monroismo* (1934; "Bolivarism and Monroism").

Vasconcelos e Sousa, Luiz de: *see* Castelo Melhor, Luiz de Vasconcelos e Sousa, 3º conde de.

vascular hemophilia: *see* von Willebrand's disease.

vascular system, in plants, assemblage of conducting tissues and associated supportive fibres. Xylem tissue transports water and dissolved minerals to the leaves, and phloem tissue conducts food from the leaves to all parts of the plant.

The condition of the xylem, the woody elements in the stem, defines several categories. The protostele has a solid xylem core; the siphonostele has an open core or one filled with generalized tissue called pith. The dis-



Vascular bundles in corn stem
J.M. Lingham

continuous vascular system of monocots (*e.g.*, grasses) consists of scattered vascular bundles; the continuous vascular system of dicots (*e.g.*, roses) surrounds the central pith.

Vascular bundles run longitudinally along the stem. Vascular rays extend radially across the stem, assisting in conduction from the vascular bundles to tissues alongside them. The vascular tissues and supporting tissues constitute the stele.

Several kinds of vascular bundles are recognized. In the collateral pattern, the phloem lies only on one side of the xylem, usually toward the stem exterior. This arrangement is typical of the dicots, the majority of flowering plants, such as roses, apples, oaks, pines, etc. If phloem is on the outer and inner faces of the xylem, the bundle is bicollateral. A concentric bundle has xylem entirely surrounded by phloem (amphicribal condition) or phloem entirely surrounded by xylem (amphivasal condition). Closed bundles lack cambium and are unable to continue growth laterally. They are typical of monocots, such as grasses, lilies, and palms, in which they are scattered in two or more rings in the stem.

Vase carpet, any of the most widely known group of floor coverings among the "classic" Kermans of the 16th and 17th centuries. At their best these carpets are extremely hand-



Detail of the flowers and vines on the field of a Vase carpet, 17th century; in the Textile Museum, Washington, D.C.

Textile Museum Collection, Washington, D.C.; photograph, Otto E. Nelson—EB Inc

some, combining an elaborate overall repeat pattern of ogival lozenges with a profusion of extravagantly styled blossoms of varied form, in a wide range of rich and harmonious colours. The lozenges are usually produced by three intersecting networks of larger ovals, each created by continuous vine stems, those of each net having a different aspect and colour. The fantastic flowers are placed along the vines in such a way that one is centred in each lozenge. In other examples there is a single lozenge system, each lozenge sometimes having a different ground colour. In most of these carpets there is an ornamental vase form, usually standing on a bracket, in several of the lozenge panels. In the oldest examples the vase has a solid ceramic shape, Chinese in aspect; and it is quite possible that the entire design scheme was developed from a Far Eastern silk pattern, perhaps that of a brocade.

In later carpets the vase shows certain exaggerations and becomes less plausible. The production of carpets in the Vase design seems to have continued into the 18th century. Imitation Vase carpets exist, together with carpets in which the surface has been reknotted in some new design upon an old Kerman double-warped foundation.

vasectomy, severing of the vas deferens in the male reproductive tract to bring about sterility or to prevent infection. The testes in the male produce the sperm cells that fertilize the ovum, or egg, in the process of producing a new organism. Connected to each testis is the epididymis, a structure that serves as a storage sac for sperm. The duct that passes sperm from the testes to the prostate and other reproductive organs is the vas deferens (*see* ductus deferens). The testes, the epididymis, and the beginning of the vas deferens are enclosed in the scrotal sac.

Vasectomy is a relatively simple procedure that can be performed in the physician's office. The scrotum is locally anesthetized, and the vas deferens is isolated by external examination. A small incision is made over the cord, it is clamped in two spots, and severed between the clamps. The two free ends of the vas deferens are then usually cauterized to coagulate the blood and seal off the tubes. The clamps are removed and the small incision is closed with a single stitch.

As a prophylactic, vasectomies are usually performed to prevent further infections from occurring in the epididymes or testes. It is considered much less injurious to the body to produce sterility than to take the risk of losing the functioning testes altogether. After the vas deferens has been severed, the testes still produce hormones that allow the male to perform in a normal sexual manner, and the hormones that support the secondary sex characteristics such as pubic hair, facial hair, and deep voice. Vasectomies are usually performed for the purpose of contraception. The male still emits small quantities of sperm for up to six weeks after the operation. Once the residual supply in the remaining reproductive tract has been depleted or washed out, he is sterile. Surgical attempts to reconnect the cords have a success rate of at least 40 percent, and there is some evidence that greater success may be achieved with improved microsurgical techniques. Nevertheless, sterilization by means of vasectomy should be considered permanent.

Vašek, Vladimír (Czech poet): *see* Bezruč, Petr.

Vasil (Bulgarian personal name): *see under* Basil.

Vasile (Romanian personal name): *see under* Basil.

Vasilikí ware, elaborately shaped handmade pottery from Vasilikí, eastern Crete, produced in the second phase of the Early Minoan period (*c.* 3000–*c.* 2000 BC). The surface of the wares is covered with a red or brown semi-lustrous paint that appears mottled, an effect achieved by uneven firing. *See* Greek pottery.

Vasily (Russian personal name): *see under* Basil, except as below.

Vasily, also spelled VASSILY, English BASIL, name of rulers of Russia, grouped below chronologically and indicated by the symbol •.

• **Vasily I,** in full VASILY DMITRIYEVICH (b. 1371—d. February 1425, Moscow), grand prince of Moscow from 1389 to 1425.

While still a youth, Vasily, who was the eldest son of Grand Prince Dmitry Donskoy (ruled Moscow 1359–89), travelled to the Tatar khan Tokhtamysh (1383) to obtain the Khan's patent for his father to rule the Russian lands as the grand prince of Vladimir. Diplomatically overcoming the challenge of the prince of Tver (now Kalinin), who also sought the patent, Vasily succeeded in his mission. But he was subsequently kept at Tokhtamysh's court as a hostage until 1386 when, taking advantage of Tokhtamysh's conflict with his suzerain Timur Lenk (Tamerlane), he escaped and returned to Moscow.

Despite the hostility caused by his flight, in 1388 Vasily led a Muscovite military contingent in Tokhtamysh's campaign against Timur Lenk in Central Asia; and after returning home he received Tokhtamysh's patent and succeeded his father as grand prince of Moscow and Vladimir (1389). Embarking on a program of aggrandizement for Moscow, Vasily (with permission from Tokhtamysh) annexed the principalities of Nizhny Novgorod (now Gorky) and Murom, thereby increasing Moscow's control over the central Volga region. His efforts to expand westward, however, brought him into conflict with both Lithuania (with which he had maintained cordial relations, particularly after marrying the Grand Duke's daughter Sophia in 1390) and Novgorod. Although he temporarily settled the Muscovite–Lithuanian territorial disputes by placing the border between the two states along the Ugra River, his clashes with Novgorod continued intermittently from 1397 to 1417.

Vasily also remained involved in Tatar politics. In 1395 he raised an army to fight Timur Lenk, who had invaded the Russian lands after defeating Tokhtamysh. Timur Lenk retreated before engaging Vasily in battle, and during the next decade the Muscovite Grand Prince was able to make his state effectively independent of Tatar dominance. In 1408, however, Edigü, who had replaced Tokhtamysh and reorganized the Tatar khanate, laid siege to Moscow and compelled Vasily to resume his tribute payments to the Khan and again recognize Tatar suzerainty.

• **Vasily II,** in full VASILY VASILYEVICH, byname VASILY THE BLIND, Russian VASILY TYOMNY (b. 1415—d. March 27, 1462, Moscow), grand prince of Moscow from 1425 to 1462.



Vasily II, engraving

Novost Press Agency

Although the 10-year-old Vasily II was named by his father Vasily I (ruled Moscow 1389–1425) to succeed him as the grand prince of Moscow and of Vladimir, Vasily's rule was challenged by his uncle Yury and his cousins Vasily the Squint-Eyed and Dmitry Shemyaka. After a long, chaotic, and bitter struggle, during which Vasily not only temporarily lost his throne both to Yury (1434) and to Dmitry Shemyaka (1446–47) but was also blinded by Dmitry (1446), Vasily recovered his position (1447) and ruled Muscovy for another 15 years.

Despite the prolonged internal discord, which finally ended in 1452, Muscovy made great strides toward becoming a large, politically consolidated, powerful Russian state during Vasily's reign. The Russian Church asserted its independence from the patriarch at Constantinople; and the state of Muscovy, in an effort to enlarge its territories, absorbed most of the neighbouring principalities. It gained suzerainty over the Grand Principality of Ryazan (1447) and the city of Vyatka (1460). To pursue his policy of aggrandizement without foreign interference, Vasily concluded a non-aggression pact with Lithuania in 1449. He could not, however, avoid intermittent conflict with the rival Tatar hordes bordering his lands on the south and east, one of which tried unsuccessfully to storm Moscow in 1451. Nevertheless, he welcomed individual Tatars at his court and, encouraging them to enter his service, established a vassal Tatar horde to defend his state's southeastern frontier (*c.* 1453). By the end of his reign he had also substantially reduced the domination of the Tatar khan, who formally remained his suzerain, over Muscovy.

• **Vasily III,** in full VASILY IVANOVICH (b. 1479—d. Dec. 3, 1533, Moscow), grand prince of Moscow from 1505 to 1533. Succeeding his father, Ivan III (ruled Moscow 1462–1505), Vasily completed his father's policy of consolidating the numerous independent Russian principalities into a united Muscovite state by annexing Pskov (1510), Ryazan (1517), and Starodub and Novgorod-Seversk (now Novgorod-Seversky) by 1523. He also strengthened his growing state by capturing Smolensk from

Lithuania in 1514. His forces were defeated by the Lithuanians at Orsha (1514), however, and Muscovy also suffered devastating raids



Vasily III, detail from an engraving
Novosti Press Agency

by Tatars of both the Crimea and Kazan. Nevertheless, Vasily was loyally supported by the metropolitan Daniel, who intrigued in his favour and sanctioned his canonically unjustifiable divorce from his barren first wife (1525). Vasily overcame the opposition of those boyars who objected to his autocratic tendencies and transmitted an enlarged, powerful, centralized state to his son Ivan IV the Terrible.

• **Vasily (IV) Shuysky,** original name VASILY IVANOVICH, KNYAZ (Prince) SHUYSKY, or SHUISKY (b. 1552—d. Sept. 12, 1612, Gostynin, near Warsaw), boyar who became tsar (1606–10) during Russia's Time of Troubles.

A member of an aristocratic family descended from Rurik, the legendary founder of the dynasty that ruled Russia until 1598, Vasily Shuysky achieved prominence in 1591 when he conducted the investigation of the death of Dmitry Ivanovich, the brother and heir of Tsar Fyodor I (ruled Russia 1584–98) and determined that the nine-year-old child had killed himself with a knife while suffering an epileptic fit. In 1605, however, after Boris Godunov, Fyodor's chief adviser and his brother-in-law, had become tsar and a pretender claiming to be Prince Dmitry had appeared, Shuysky reversed himself and, declaring that Dmitry had escaped death in 1591, supported the pretender's claim to the throne. When Boris died in April 1605, Shuysky instigated a movement to murder Boris' son Fyodor II and swore allegiance to the first False Dmitry.

Shortly after Dmitry had been crowned, Shuysky reversed his position again and, accusing the new tsar of being an impostor, engaged in a plot to overthrow him. After a brief



Vasily Shuysky, engraving, 1610
Novosti Press Agency

period of banishment, he organized a group of boyars opposed to the pretender, provoked a popular riot, and assassinated Dmitry. On May 29 (May 19, old style), 1606, Shuysky was named tsar of Russia.

Hoping to avoid challenges from future pretenders, Vasily ordered that the remains of Prince Dmitry be brought to Moscow and had the late tsarevich canonized (June 1606). He also proclaimed his intentions to rule justly and in accord with the boyar Duma (an advisory council). Nevertheless, opposition to his regime mounted. Although he succeeded in suppressing a rebellion of Cossacks, peasants, and gentry (October 1607), he was unable to prevent the second False Dmitry, who had gained support from Poles, anti-Shuysky boyars, and many of the defeated rebels, from establishing a court and government at Tushino that rivalled Vasily's (spring 1608). Only with aid obtained from Sweden was Vasily able to restore his control over northern Russia and force the pretender to withdraw from Tushino (January 1610). But Sweden's intervention provoked a Polish declaration of war against Vasily. When Moscow was threatened by a Polish advance, as well as by a renewed offensive of the second False Dmitry, the Muscovites rioted, and an assembly, consisting of both aristocratic and common elements, deposed Vasily (July 1610), who was forced to take monastic vows.

Vaslui, *judeţ* (district), eastern Romania, occupying an area of 2,046 sq mi (5,300 sq km), bounded on the east by Moldova. The terrain consists of rolling hills. The Elan, Bîrlad, and Tutova rivers drain the district. Vaslui (*q.v.*) city is the district capital. Building materials, timber, wood products, and foodstuffs are manufactured in Vaslui, Huşi, and Fălciu. Bîrlad is a machinery- and textile-production centre that was the residence of the princes of Moldavia during the 14th century. The town is known for its state theatre, museum of history and science, and 17th-century churches. Agricultural activities of Vaslui district include livestock raising and cereal and vineyard cultivation. Negreşti, Ştefan cel Mare, and Dragomireşti are other towns. Highway and railway connections, usually parallelling river courses, extend between the district's major towns. Pop. (1990 est.) 472,000.

Vaslui, town, capital of Vaslui *judeţ* (district), northeastern Romania, on the Bîrlad River. Near Vaslui, in 1475, Stephen (Ştefan) the Great, with 40,000 troops, defeated a Turkish army three times as large. He also built the St John the Baptist church in 1490 and the prince's residence. The town is a trading centre; tiles and bricks are made from local clay soils, and a factory processes edible oils and stock feed. A railway connection and highways extend through the town. Pop. (1989 est.) 73,666.

vasomotor system, in anatomy, the part of the nervous system that supplies the muscle fibres of the walls of blood vessels. Included are the vasoconstrictor and vasodilator nerves, which function to narrow or widen the particular vessels they supply and thus to regulate the amount of blood passing to a particular body part or organ. These nerves are controlled by the vasomotor centre located in the medulla of the brain.

vassa (Pāli: "rains"), the Buddhist monastic retreat observed primarily in Buddhist communities in Southeast Asia during the three-month monsoon period each year.

The tradition that monks—who ordinarily would be mendicant wanderers—gather in monasteries during the rainy season for a time of study and religious discourse may derive from the ancient custom among South Asian ascetics of retreating to a forest grove, usually near a village, during the monsoon when travel was difficult. Residing in their retreat during the rains, they continued to pursue their meditative quest and begged alms from local townspeople. The practice was well known in India by the time of the Buddha (6th century BC), who after his enlightenment is said to have spent the rainy season in a sheltered spot in the forest near Benares.

The Buddha's followers assumed the same practice and after his death continued to gather during the monsoon to recite the rules of Buddhist discipline and to reaffirm their commitment to the Buddha's vision of dharma. As the monastic community (the sangha) became wealthier by virtue of larger and more frequent contributions from the laity, more permanent meditation and study centres, or viharas, were constructed to house the members of the contemplative groups during their annual retreats. With the ascendency of the powerful Mauryan king Aśoka (3rd century BC), who admired and followed the Buddha's teachings, these viharas flourished throughout northeast India. The viharas are the institutional precursors of both the great Buddhist monastic centres, or *Mahāvihāras*, of South and Southeast Asia and of the custom of the annual religious retreat still practiced in Theravāda Buddhist countries today. The *vassa* has been largely forgotten by Mahāyāna Buddhists, especially those in China and Japan.

In Thailand, where all Buddhist males customarily spend some time in a monastery, *vassa* is a favoured period for temporarily experiencing the life of a monk. Seniority as a monk is commonly measured by the number of *vassa* seasons spent in a monastery.

Vassa begins on the first day of the waning moon of the eighth lunar month (usually in July) and ends on the full moon of the eleventh month (usually October). *Vassa* concludes with the *pavāraṇā* ceremony, in which every monk, irrespective of rank or seniority, agrees willingly to receive instruction from any other monk in the monastery if he acts improperly. The lively *kaṭhina* ("cloth") ceremony, in which groups of laymen present gifts to the monks, takes place during the first month following the conclusion of *vassa.*

vassal, in feudal society, one invested with a fief in return for services to an overlord. Some vassals did not have fiefs and lived at their lord's court as his household knights. Certain vassals who held their fiefs directly from the crown were tenants in chief and formed the most important feudal group, the barons. A fief held by tenants of these tenants in chief was called an *arriere-fief,* and, when the king summoned the whole feudal host, he was said to summon it *ban et arriere-ban.* There were female vassals as well; their husbands fulfilled their wives' services.

Under the feudal contract, the lord had the duty to provide the fief for his vassal, to protect him, and to do him justice in his court. In return, the lord had the right to demand the services attached to the fief (military, judicial, administrative) and a right to various "incomes" known as feudal incidents. Examples of incidents are relief, a tax paid when a fief was transferred to an heir or alienated by the vassal, and scutage, a tax paid in lieu of military service. Arbitrary arrangements were gradually replaced by a system of fixed dues on occasions limited by custom.

The vassal owed fealty to his lord. A breach of this duty was a felony, regarded as so heinous an offense that in England all serious crimes, even those that had nothing to do with feudalism proper, came to be called felonies, since, in a way, they were breaches of the fealty owed to the king as guardian of the public peace and order.

The vassals' rights over the fiefs grew larger and larger in course of time, and soon fiefs became hereditary in the sense that investiture

could not be withheld from an heir who was willing to do homage. The rules of inheritance tended to safeguard an undivided fief and preferred the eldest among the sons (primogeniture). This principle was far from absolute; under pressure from younger sons, parts of an inheritance might be set apart for them in compensation (appanages; *q.v.*). Vassals also acquired the right to alienate their fiefs, with the proviso, first, of the lord's consent and, later, on payment of a certain tax. Similarly, they obtained the right to subinfeudate, that is, to become lords themselves by granting parts of their fiefs to vassals of their own. If a vassal died without heir or committed a felony, his fief went back to the lord (*see* escheat).

Vassily (Russian rulers): *see under* Vasily.

Västerås, city and capital of Västmanland *län* (county), east-central Sweden. It lies at the confluence of the Svart River and Lake Mälar, west of Stockholm.

Västerås is Sweden's largest inland port and the centre of its electrical industry. Originally known as Aros ("River Mouth") and later as Västra ("West") Aros, it was already a market centre and a bishopric by the beginning of the Middle Ages. In medieval times it also served as a major export harbour for iron and copper from the Bergslagen mining region. Several national parliaments were held there, including that of 1527, which formally introduced the Reformation into Sweden, and that of 1544, which established the hereditary rights of the Vasa family to the throne. In the city's Gothic cathedral lie the remains of Eric XIV. Beside the Svart River stands a 12th-century castle, now a museum. Pop. (1992 est.) mun., 120,354.

Västerbotten, *län* (county), northern Sweden, extending from the Gulf of Bothnia west to the Norwegian border. Its area comprises the traditional *landskap* (province) of Västerbotten and parts of Ångermanland and Lappland. The terrain rises from the gulf through a forested upland zone and culminates in Mount Norra Stor (5,797 feet [1,767 m]) near the Norwegian frontier. Farming, lumbering, and mining are important economic activities in the *län*. In the past much timber was floated down rivers to such coastal milling centres as Umeå (q.v.), the capital and chief port, and Skellefteå. Deposits of copper, lead, gold, silver, and bismuth mined at Boliden, Rävliden, and Kristineberg are refined at Rönnskär. Area 21,390 square miles (55,401 square km). Pop. (1992 est.) 253,835.

Västergötland, *landskap* (province), southwestern Sweden. It is composed of the administrative *län* (county) of Skaraborg and portions of those of Älvsborg, Göteborg och Bohus, Halland, and Örebro. Lying between Lakes Vättern and Vänern, it is bounded by the traditional *landskap* (provinces) of Östergötland and Närke on the east, Dalsland and Bohuslän on the west, Värmland on the north, and Halland and Småland on the south. Only a small portion of the province's territory fronts on the sea, but this important area includes Göteborg, which is Sweden's second largest city. The scenery in Västergötland varies from wooded uplands in the southern area to ridges in the central and northern parts that rise to heights of more than 1,000 feet (305 m). The name of the province means West Gothland.

Agriculture is predominant in the northern part of the *landskap,* with its fertile plains; rye, wheat, and oats are the chief crops. Industry is important around Göteborg, Borås, and Vänersborg. The province's leading industries include fishing, limestone quarrying, shipbuilding, sugar refining, and the manufacture of textiles, paper, porcelain, and matches. Besides Göteborg, important towns are Mariestad, Vänersborg, Trollhättan, Borås, Skara, Mölndal, Alingsås, Ulricehamn, Lidköping, Skövde, Hjo, Tidaholm, and Falköping. Area 6,438 square miles (16,675 square km). Pop. (1992 est.) 1,147,242.

Västernorrland, *län* (county) of northeast Sweden, on the Gulf of Bothnia. Its area takes in most of the two traditional *landskap* (provinces) of Medelpad and Ångermanland. Rising from the low coastal strip is a heavily forested interior plateau that supplies timber for sawmilling and wood-processing industries. Road and rail have largely replaced the old logging routes to the coastal mills provided by the Angerman River and other streams. Härnösand, the capital, Sundsvall, and Örnsköldsvik are major shipping centres for timber and pulp. There are road, rail, and air connections with Stockholm. Area 8,370 square miles (21,678 square km). Pop. (1992 est.) 261,280.

Västmanland, *län* (county) of central Sweden, extending north of Lake Mälar. Its area includes the southwestern part of the traditional *landskap* (province) of Uppland and the eastern part of Västmanland. A fertile plain in the southeast rises northward to the edge of hilly Bergslagen district and is drained by the Arboga River, the Kolbäcks River, and several smaller rivers. Dairying and market gardening are pursued on the plain, while mining and metalworking are centred on Fagersta, in Bergslagen district. The proximity of iron ore, with lesser deposits of copper, lead, and zinc, influenced the development of Västerås (*q.v.*), the capital, and Köping as engineering centres. Area 2,433 square miles (6,302 square km). Pop. (1992 est.) 259,438.

Vasto, town, Chieti *provincia,* Abruzzi *regione,* south-central Italy. It is a beach resort on the Adriatic Sea, with brickmaking, candlemaking, and agricultural-processing industries. The town, the ancient name of which was Histonium, has an archaeological museum. There is a 13th-century castle, and the town cathedral has a facade and Gothic portal dating from the same period. The palace of the D'Avalo family dates from the 16th century. Pop. (1991 prelim.) mun., 32,810.

Vasubandhu (fl. 4th/5th century AD), Indian Buddhist philosopher and logician, younger brother of the philosopher Asaṅga. His conversion from the Sarvāstivāda to the Mahāyāna Buddhist tradition is attributed to Asaṅga. Vasubandhu refined classical Indian syllogistic logic by distinguishing the procedure for reaching inferences in formal debate (five steps) from the method in personal thought (three steps). He wrote several *śāstras* ("treatises") holding that all seemingly external objects are only mental representations, and he is also reputed to be the author of the *Abhidharmakośa,* a systematization of Sarvāstivāda doctrine written before his conversion.

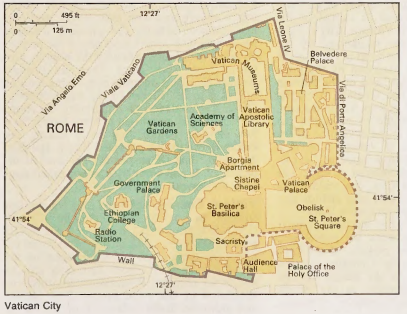
Vāsudeva, in Hindu mythology, the patronymic of Krishna (Kṛṣṇa), who, according to one tradition, was a son of Vāsudeva. The worshipers of Vāsudeva, or Krishna, formed one of the earliest theistic devotional movements within Hinduism. When they merged with other groups, namely the Bhāgavata, they represented the beginnings of modern Vaiṣṇavism, or worship of Lord Vishnu. A significant 2nd-century-BC inscription at Besnagar, near Vidisha (Bhilsa), Madhya Pradesh, refers to a column topped by a figure of Garuḍa (the emblem or mount of Lord Vishnu), erected in honour of Vāsudeva by the Indo-Greek ambassador Heliodorus, who termed himself a "Bhāgavata." Though, in the earliest parts of the great Indian epic the *Mahābhārata,* the divinity of Krishna appears to be still open to doubt, by the time of the writing of the *Bhagavadgītā* (1st–2nd century AD), Vāsudeva-Krishna was clearly identified with the Vedic god Vishnu.

vat dye, any of a large class of water-insoluble dyes, such as indigo and the anthraquinone derivatives, that are used particularly on cellulosic fibres. The dye is applied in a soluble, reduced form to impregnate the fibre and then oxidized in the fibre back to its original insoluble form. Vat dyes are especially fast to light and washing. Brilliant colours can be obtained in most shades. Originated in medieval Europe, vat dyes were so named because of the vats used in the reduction of indigo plants through fermentation.

Vaté (Vanuatu): *see* Éfaté.

Vatican Apostolic Library, Italian BIBLIOTECA APOSTOLICA VATICANA, official library of the Vatican, especially notable as one of the world's richest manuscript depositories. The library is the direct heir of the first library of the Roman pontiffs. Very little is known of this library up to the 13th century, but it appears to have remained only a modest collection of works until Pope Nicholas V (1447–55) greatly enlarged it with his purchase of the remnants of the imperial library of Constantinople (now Istanbul), which had recently been conquered by the Ottoman Turks. Popes Sixtus IV (1471–84) and Julius II (1503–13) further enlarged the library, and under Sixtus V (1585–90) the architect Domenico Fontana erected the library's present building. By the late 20th century the library possessed 65,000 manuscripts (mostly in Latin or Greek) and more than 900,000 printed volumes.

Vatican City, in full STATE OF THE VATICAN CITY, Italian STATO DELLA CITTÀ DEL VATICANO, ecclesiastical state, seat of the



Vatican City

Roman Catholic Church, and an enclave in Rome, situated on the west bank of the Tiber River. The city occupies 109 acres (44 hectares) and is the world's smallest fully independent nation-state. Its medieval and Renaissance walls form its boundaries except on the southeast at St. Peter's Square (Piazza San



St. Peter's Basilica on St. Peter's Square, Vatican City
Colour Library International

Pietro). Of the six entrances, only three—the Piazza, the Arco delle Campane (Arch of the Bells) in St. Peter's Basilica, and the entrance to the Vatican Museums and Galleries—are open to the public. St. Peter's Basilica, built during the 4th century and rebuilt during the 16th century over the tomb of St. Peter the Apostle, is the second-largest religious building (after Yamoussoukro Basilica) in Christendom.

The residence of the pope within the city walls is the Vatican palace. The city has its own telephone system, post office, gardens, observatory, radio station, banking system, and pharmacy, as well as a contingent of Swiss Guards responsible for the personal safety of the pope since 1506. Almost all supplies—including food, water, electricity, and gas—must be imported. There is no income tax and no restriction on the import or export of funds. As the Holy See, it derives its income from the voluntary contributions of more than one billion Roman Catholics worldwide, as well as interest on investments and the sale of stamps, coins, and publications. Banking operations and expenditures have been reported publicly since the early 1980s.

During the period from the 4th century to 1870, the Vatican gained control of territory around Rome and served as capital of the Papal States. In 1929 Vatican City's independent sovereignty was recognized by the then Fascist Italian government in the Lateran Treaty. Sovereignty is exercised by the pope upon his election as the head of the Roman Catholic Church. He has absolute executive, legislative, and judicial powers within the city. In 1984 a major reshuffle of offices in the Roman Curia resulted in the delegation of the routine administration of Vatican City to a pontifically appointed commission of five cardinals headed by the secretariat of state. The inhabitants of Vatican City, the majority of whom are priests and nuns, also include several hundred laypersons who work there.

Vatican cultural life has declined greatly since the Renaissance, when the popes were among Italy's foremost patrons of the arts. The Vatican Museums and Galleries, the frescoes by Michelangelo in the Sistine Chapel, the frescoes by Pinturicchio in the Borgia Apartment, and Raphael's Stanze, or rooms, nevertheless attract critics, artists, and flocks of tourists from throughout the world. The Vatican Apostolic Library contains a priceless collection of some 150,000 manuscripts and 1.6 million printed books, many from the pre-Christian and early Christian times. The Vatican publishes its own influential daily newspaper, *L'Osservatore Romano*, and its press can print books and pamphlets in any of 30 languages. Pop. (2000 est.) 800.

Vatican Council, FIRST, 20th ecumenical council of the Roman Catholic Church (1869–70), convoked by Pope Pius IX to deal with contemporary problems. The Pope was referring to the rising influence of rationalism, liberalism, and materialism. Preparations for the council were directed by a central commission and subcommissions, dominated by members of the Curia (papal bureaucracy), and resulted in 51 schemata, or proposed decrees, of which only 6 actually came before the council. Of the approximately 1,050 bishops and others who were eligible to participate, about 700 attended the formal opening on Dec. 8, 1869; a few more eventually appeared. The council, which was never formally dissolved, promulgated two doctrinal constitutions: *Dei Filius,* a greatly shortened version of the schema on Catholic faith, which deals with faith, reason, and their interrelations; and *Pastor Aeternus,* which deals with the authority of the pope.

The statement on the pope's authority was approved only after long and heated debate both preceding and during the council. The decree states that the true successor of St. Peter has full and supreme power of jurisdiction over the whole church; that he has the right of free communication with the pastors of the whole church and with their flocks; and that his primacy includes the supreme teaching power to which Jesus Christ added the prerogative of infallibility, whereby the pope is preserved free from error when he teaches definitively that a doctrine concerning faith or morals is to be believed by the whole church.

After the discussion on infallibility, the council fathers were permitted to leave Rome for a few months. Before they could return, the Piedmontese troops occupied Rome. On Oct. 20, 1870, Pius IX suspended the council indefinitely. It had completed only a small fraction of the work planned.

Vatican Council, SECOND, 21st ecumenical council of the Roman Catholic Church (1962–65), announced by Pope John XXIII on Jan. 25, 1959, as a means of spiritual renewal for the church and as an occasion for Christians separated from Rome to join in search for reunion. Preparatory commissions appointed by the Pope prepared an agenda and produced drafts (*schemata*) of decrees on various topics. In opening the council on Oct. 11, 1962, the Pope advised the council fathers to try to meet the pastoral needs of the church. Those summoned to the council included all Catholic bishops and certain other church dignitaries. Invited to the council sessions, but without the right to vote, were a number of observers from the major Christian churches and communities separated from Rome and a number of Catholics called auditors.

The work of the preparatory commissions had been done by members of the Curia (the papal bureaucracy); once the council had been opened, however, council fathers from diverse parts of the world were added to the commissions. The revised decrees that grew out of the council discussions and the work of the enlarged commissions tended to have a more progressive viewpoint. The work of the council continued under Pope John's successor, Paul VI, and sessions were convened each autumn until the work of the council was completed on Dec. 8, 1965. Sixteen documents were enacted by the council fathers.

The "Dogmatic Constitution on the Church" reflects the attempt of the council fathers to utilize biblical terms rather than juridical categories to describe the church. The treatment of the hierarchical structure of the church counterbalances somewhat the monarchical emphasis of the first Vatican Council's teaching on the papacy by giving weight to the role of the bishops. The teaching of the constitution on the nature of the laity (those not in holy orders) was intended to provide the basis for the call of lay people to holiness and to share in the missionary vocation of the church. By describing the church as the people of God, a pilgrim people, the council fathers provided the theological justification for changing the defensive and inflexible stance that had characterized much of Catholic thought and practice since the Protestant Reformation.

The "Dogmatic Constitution on Divine Revelation" attempts to relate the role of Scripture and tradition (the postbiblical teaching of the church) to their common origin in the Word of God that has been committed to the church. The document affirms the value of Scripture for the salvation of men while maintaining an open attitude toward the scholarly study of the Bible.

The "Constitution on the Sacred Liturgy" establishes the principle of greater participation by the laity in the celebration of mass and authorizes significant changes in the texts, forms, and language used in the celebration of mass and the administration of the sacraments.

The "Pastoral Constitution on the Church in the World of Today" acknowledges the profound changes humanity is experiencing and attempts to relate the church's concept of itself and of revelation to the needs and values of contemporary culture.

The council also promulgated decrees (documents on practical questions) on the pastoral duties of bishops, ecumenism, the Eastern-rite churches, the ministry and life of priests, the education for the priesthood, the religious life, the missionary activity of the church, the apostolate of the laity, and the media of social communication. Furthermore, declarations (documents on particular issues) on religious freedom, the church's attitude toward non-Christian religions, and on Christian education were produced.

Vatican Museums and Galleries, art collections of the popes since the beginning of the 15th century, housed in the papal palaces and other buildings in the Vatican. The Pio-Clementino Museum (Museo Pio-Clementino or Musei di Scultura) was founded in the 18th century by Pope Clement XIV and enlarged by Pope Pius VI. This museum exhibits the pontifical collection of ancient sculpture that originated with the col-

lection of Pope Julius II. The Chiaramonti Sculpture Gallery (Museo Chiaramonti), established by Pope Pius VII in the 19th century and designed by the sculptor Antonio Canova, is also devoted to ancient sculpture. It has three parts: the museum, in a gallery designed by Bramante; the New Wing (Braccio Nuovo); and the Gallery of Inscriptions (Lapideria) with its unrivalled collection of ancient epigraphy. The Gregorian Etruscan Museum (Museo Gregoriano Etrusco), founded in 1836 by Pope Gregory XVI (reorganized in 1924), houses a collection of objects from Etruscan excavations and objects from the Regolini-Galassi tomb with its collection of Etruscan jewelry. The Egyptian Museum (Museo Gregoriano Egizio), also founded by Gregory XVI, was opened to the public in 1839. The Pinacoteca, founded by Pope Pius VI in 1797, has been housed in its present gallery (commissioned by Pope Pius XI) since 1932. It has an outstanding collection of Italian religious paintings and also includes Russian and Byzantine painting.

In 1956 a modern art collection was initiated, which exhibits secular works by such 19th- and 20th-century artists as Renoir, Seurat, Van Gogh, Rouault, Matisse, and Picasso. In 1973 the Vatican opened its first museum of contemporary art, including the work of both European and U.S. artists, housed in 65 galleries in the Vatican Palace.

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Vatican palace, papal residence in the Vatican north of St. Peter's Basilica. From the 4th century until the Avignonese period (1309–77) the customary residence of the popes was at the Lateran. Pope Symmachus built two episcopal residences in the Vatican, one on either side of the basilica, to be used for brief stays. Charlemagne built the Palatium Caroli on the north of St. Peter's to house his subjects during their visits to Rome. Other buildings added by Leo III and Eugenius III were modernized by Innocent III, who gave them added protection when he built a second fortified wall within that of Leo IV. Nicholas III began the first of the many buildings known today as papal palaces.

In the Renaissance Nicholas V rebuilt the north and west walls of the palace of Nicholas III and founded the Vatican Library (*see* Biblioteca Apostolica Vaticana), making use of such architects as Leon Battista Alberti and Bernardo Rossellino. He also commissioned Fra Angelico to paint the stories of St. Stephen and St. Lawerence in the Chapel of Nicholas V.

Under commission from Sixtus IV, Giovanni dei Dolci built the Sistine Chapel. He also remodelled and decorated the Vatican Library. The rooms remodelled by Alexander VI are called the Borgia Apartments. Under Julius II, Bramante completed the north facade, two of the so-called *logge* (to which Raphael added a third). Raphael was commissioned to decorate the rooms of the Segnatura and of Heliodorus as well as the loggia overlooking the Courtyard of the Maresciallo.

Among the things built for Paul III were the Sala Regia and the Pauline Chapel, both designed by Antonio da Sangallo the Younger. The painters Giorgio Vasari, Taddeo Zucaro, and Daniele da Volterra decorated the Sala Regia; Michelangelo painted the martyrdom of St. Peter and the conversion of St. Paul in the Pauline Chapel (1542–50). The Casino of Pius IV was the work of Pirro Ligorio and Giovanni Salustio Peruzzi; today this building is the seat of the Pontifical Academy of Sciences. The three chapels of St. Stephen, of St. Peter, and of St. Michael, with paintings by Vasari and with stuccoes by Guglielmo della Porta, and the chapel of the Swiss Guards, painted by Giulio Mazzoni and Daniele da Volterra, date from the time of Pius V. Gregory XIII (1572–85) was responsible for the wing closing the north side of the present Courtyard of S. Damaso, containing rooms decorated by Antonio Tempestà and Mathys Bril and for the famous Gallery of Maps, designed by Ottaviano Mascherino, with maps of the regions of Italy from designs by Ignazio Danti. The present apartments along the eastern side of the Courtyard of S. Damaso were built in the time of Sixtus V by Domenico Fontana, who also made a new wing for the Vatican Library including the Sala Sistina, thereby cutting the Belvedere Courtyard in half.

In the Baroque period Urban VIII built the Hall of the Countess Matilda, today called the Matilda Chapel, which was decorated by Pietro da Cortona. Under Alexander VII, Bernini built the Scala Regia. In the late 18th and 19th centuries many of the additions and alterations had to do with the development of the Vatican Museum.

Vatnajökull, extensive ice field, southeastern Iceland, covering an area of 3,200 sq mi (8,400 sq km) with an average ice thickness of more than 3,000 ft (900 m). Generally about 5,000 ft above sea level, in the Öræfajökull (Öraefa Glacier) in the south it rises to 6,952 ft (2,119 m) on Hvannadalshnúkur, the highest peak in Iceland. There are numerous active volcanoes throughout the ice field, the meltwaters of which feed hundreds of rivers, the largest of which are the Thjórsá, Skjálfandafljót, Fjöllum, Jökulsá á Dai, and Lagarfljót. Meltwater and moraine deposition at its southern end, aggravated by glacial bursts caused by hot springs under the ice, long prevented road construction on the narrow strip of land between the ice field and the ocean. Thus the coastal road encircling the island was not completed until the mid-1970s.

Periodic eruptions of Grimsvötn, the largest volcano under the ice field, melt the surrounding ice and create a lake that occasionally breaks through its ice walls, causing catastrophic floods called *jökulhlaupav* ("glacier runs"). During the eruptions of 1934 and 1938, the rate of *jökulhlaupa* discharge reached 65,000 cu yd (50,000 cu m) per second. In the 20th century a *jökulhlaupa* has broken out of Vatnajökull roughly every 5 or 10 years.

Vattel, Emmerich de (b. April 25, 1714, Couvet, Neuchâtel, Switz.—d. Dec. 28, 1767, Neuchâtel), Swiss jurist who, in *Le Droit des gens* (1758; "The Law of Nations"), applied a theory of natural law to international relations. His treatise was especially influential in the United States because his principles of liberty and equality coincided with the ideals expressed in the Declaration of Independence. In particular, his defense of neutrality and his rules for commerce between neutral and belligerent states were considered authoritative in the U.S.

Vattel's work was, as he acknowledged, a popularization of *Jus gentium* (1749; "The Law of Nations"), by the German philosopher Christian Wolff. Vattel, however, rejected Wolff's conception of a regulatory world state, substituting national rights and duties proceeding from his own view of the law of nature.

Vättern, English LAKE VÄTTER, lake in south central Sweden, southeast of Vänern between the administrative counties of Skaraborg and Östergötland and north of the traditional province of Småland. With a length of 81 mi (130 km), a breadth of about 19 mi and an area of 738 sq mi (1,912 sq km), it is Sweden's second largest lake, though only one-third the size of Vänern. It has a maximum depth of 420 ft (130 m) and a surface 289 ft above sea level. The lake, known for its dangerous currents, drains eastward through the Motala Ström into the Baltic Sea.

Vättern is bounded by cliffs to the east and west; there are few harbours and Visingsö (area 9.5 sq mi) is one of the few islands. The region around the lake developed after 1832 with the opening of the Göta Canal, which uses the lake and continues on to Stockholm at Motala, on the northeastern shore. Jönköping, at the southern end, is the largest town on the lake. Tourism is important at Vadstena, on the eastern shore south of Motala, with St. Bridget's Convent (*c.* 1383); Kloster Kyrkan (Convent Church; 1395–1424), also known as the Blue Church from its bluish-gray limestone; and the 16th-century castle of King Gustav I Vasa. On the western shore, Hjo developed as a spa in the late 18th century and still thrives as a lakeside resort.

Vauban, Sébastien Le Prestre de (b. May 15, 1633, Saint-Léger-de-Foucherest [now Saint-Léger-Vauban], Fr.—d. March 30, 1707, Paris), French military engineer who revolutionized the art of siege craft and defensive



Vauban, pastel by Charles Le Brun; in the Bibliothèque de Génie, Paris
Giraudon—Art Resource/EB Inc.

fortifications. He fought in all of France's wars of Louix XIV's reign (1643–1715).

Early career. Vauban was from a family of very modest means that belonged to the petty nobility. In 1651 he became a cadet in the regiment of Louis II de Bourbon, prince de Condé, who was about to rebel against the young Louis XIV.

Vauban's talents were soon revealed. He distinguished himself by defending towns in the Argonne region and in the siege and capture of Sainte-Menehould for Condé. In 1653 he was taken prisoner by the government's forces. Honourably treated, he was soon induced to change sides and to help the royalists to recapture Sainte-Menehould. During a siege in 1654 he was twice wounded. In 1655 he was admitted, as a "king's ordinary engineer," into the corps of officers that was gradually being built up, outside the regular military hierarchy, for specialized work on fortification and siege craft. After taking part in operations against various fortresses and cities between 1655 and 1657, he was engineer in chief at the siege of Gravelines in 1658.

During the interval of peace, from 1659 to 1667, Vauban was employed in demolishing the fortifications of Nancy, in Ducal Lorraine, from 1661 to 1662 and in fortifying Alt-Breisach, a French outpost on the right bank of the Rhine, from 1664 to 1666. In 1663 he was given a company in the King's Picardy regiment. His services in the capture of Tournai, Douai, and Lille in the French invasion of the Spanish Netherlands in 1667 were rewarded with a pension, a lieutenancy

in the Royal Guards, and the governorship of the Lille citadel.

Vauban's growing responsibilities included those as "commissary general of fortifications"—though that title remained with the nominal holder of the office until 1677; he travelled constantly and conducted an immense correspondence with the King and with the war minister, the marquis de Louvois. Vauban's technical memoranda made his systems of fortifications the focus of military studies in Europe for more than a century. In the period of peace from 1668 to 1672 he not only inspected the defenses of Roussillon, the French Low Countries, Picardy, and Lorraine but also was sent to Piedmont (1671) to advise the Duke of Savoy on the defenses of Verue, Vercelli, and Turin—advice that France later had cause to regret.

Innovations in siege craft. Louis's Dutch war of 1672–79 brought conspicuous glory to Vauban because of the King's presence, in supreme command, at sieges that he was directing. At the siege of Maastricht (1673) he used a complete system of "parallels"—*i.e.,* trenches dug parallel or concentric to the perimeter of the defenses and connected by radical zig-zag trenches that made the approach comparatively safe from the defenders' artillery fire. For his success at Maastricht he was promoted and given a grant of money that enabled him to buy the château of Bazoches (near his family's seat of Vauban), and further successes won him the rank of *maréchal de camp* (equivalent to brigadier general) in 1676. At the siege of Valenciennes, in 1677, he persuaded the King, against the advice of Louvois and five marshals, to authorize a daylight assault, partly because the conventional assault in darkness often resulted in the attackers' shooting at one another by mistake. For the capture of Valenciennes he received another grant of money.

In 1680–81 Vauban undertook another great tour of the French frontiers, inspecting or improving fortifications. For Strasbourg (1681) he designed a splendid fortress of the most advanced kind. Having directed the siege of Luxembourg in 1684, he subsequently also redesigned the defenses of that city. His design for the fortification of Landau in Bavaria is sometimes reckoned as his greatest work (1687).

In September 1688, early in the War of the Grand Alliance, in which Louis was opposed by the combined forces of the Netherlands, England, the Holy Roman Empire, and their lesser allies, Vauban was promoted to lieutenant general; and in October, under the command of the dauphin Louis, he took Philippsburg, on the right bank of the Rhine south of Speyer. At this siege he introduced ricochet gunfire, whereby a cannonball was made to bounce forward over parapets and to hit several objectives before its force was spent. At the same time he was advocating use of the socket bayonet, another invention of his. This bayonet was slipped over the muzzle into a socket and did not have to be removed before firing of the musket. He took Mons in 1691 and Namur, rapidly and with few casualties, in 1692. At the siege of Charleroi, in 1693, he was for the first time in command of an infantry division. Diverted to Brest in 1694 to guard against an English threat to Brittany, he returned to the Low Countries for the defense of Namur in 1695 but could not save the city. In 1697 he participated in the siege and capture of Ath and was wounded again.

During the peace of 1698–1701 Vauban reconstructed the defenses of Neuf-Brisach in Alsace, the last of the 160 fortresses on which he worked. By this time his health was failing him, but he still wanted active employment in the War of the Spanish Succession (1701–14). In a letter of 1702 to the King, he asked to be created a marshal of France so as to avoid the embarrassment of having to serve under marshals junior to himself. Louis XIV, knowing (as all Europe did) that many of France's victories were due far more to his discerning patronage of the petty gentleman Vauban than to the performances of higher nobles whose birth alone had hastened their appointment as marshals, created Vauban marshal of France in January 1703. Vauban had, however, never commaded an army in the field—as was customary for marshals of France—and was only really capable of "engineering," which was considered beneath a marshal's dignity. After directing operations for the recapture of Alt-Breisach (1703), he was recalled from service. In 1705 and again in 1706 he offered to help an incompetent general in the siege of Turin, whose fortification he had himself planned, but the offer was rejected. Vauban's last effective commission was to organize an entrenched camp at Dunkerque (1706).

Writings. Vauban was indefatigable. He devoted his time between duties and in convalescence to writing assiduously on matters of public concern. Some of these writings concerned his profession, others were external to it; many were assembled by him in manuscript volumes under the collective title of *Oisivetés* ("Leisures"). His treatises *De l'attaque et de la défense des places* ("On Siege and Fortification"), written in 1705–06, were printed in 1737 and reprinted in 1829 (several interpretations of his systems of fortifications had been published in his lifetime). He wrote also on the expediency of recalling the banished Huguenots to France (1689); on routes for canals and inland navigation; on privateering at sea; on the geography of the Vézelay district; on forestry and pig breeding; on overseas colonies; and on international affairs, with regard to the concessions that could be made, strategically and politically, for a satisfactory peace (1706). His most important "leisure," however, was his *Projet d'une dixme royale* (printed anonymously, 1707; *Project for a Royal Tythe, or General Tax*), suggesting the abolition of nearly all France's existing taxes and the substitution of a tax of 10 percent on all land and trade from which no one should be exempt. He substantiated his arguments with a mass of statistical documentation practically unprecedented and, in so doing, pioneered the use of statistics in economics. But the French government—too deeply committed to the system of tax farming (*i.e.,* selling the right to collect taxes to groups of financiers for a fixed sum), reluctant and even unable to revoke the exemptions of the privileged classes because of dependence on them, and lacking interest in fundamental reforms—suppressed the publication of his book. Vauban was crushed by this refusal but the story that his book made Louis XIV forget his past services is untrue.

Personality. Vauban was of medium height, squarely and solidly built. Although he was unpretentious and straightforward, his martial appearance and unpolished manners disguised his kindness and his truly considerate readiness to help people. On the battlefront, he was always concerned to save soldiers' lives, and he often let other officers take the credit for the fruit of his own courageous efforts. The Duc de Saint-Simon, the outstanding memorialist of the reign of Louis XIV, who never squandered praise, described Vauban as "the most honorable and virtuous man of his age . . . incapable of lending himself to anything false or evil." (R.S.Q.)

BIBLIOGRAPHY. The most comprehensive monograph is P. Lazard. *Vauban, 1633–1707* (1934), well illustrated and covering the development of France's corps of military engineers from its origins to Vauban's time. There is also a shorter life, in French, by A. Rebelliau, *Vauban* (1962). English readers may consult Sir Reginald Theodore Blomfield, *Sebastien le Prestre de Vauban, 1633–1707* (1938), which owes something to Lazard and is quite well illustrated.

Vaucanson, Jacques de (b. Feb. 24, 1709, Grenoble, Fr.—d. Nov. 21, 1782, Paris), prolific inventor of robot devices of significance for modern industry.

Educated at the Jesuit College of Grenoble, Vaucanson developed a liking for machinery at an early age, first in Lyon and later in Paris. In 1738 he constructed an automaton, "The Flute Player," followed the next year by "The Tambourine Player" and "The Duck." The last was especially noteworthy, not only imitating the motions of a live duck, but also the motions of drinking, eating, and "digesting." Appointed inspector of silk manufacture in 1741, Vaucanson's attention was drawn to the problems of mechanization of silk weaving. Several of his improvements were adopted by the industry, but his most important invention was ignored for several decades. Taking into account the inventions of his predecessors, he succeeded in automating the loom by means of perforated cards that guided hooks connected to the warp yarns. Power was to be supplied by falling water or by animals. After Vaucanson's death, his loom was reconstructed and improved by J.-M. Jacquard and became one of the most important inventions of the Industrial Revolution.

To build his machines, Vaucanson invented many machine tools of permanent importance. Toward the end of his life, he collected his own and others' inventions in what became in 1794 the Conservatoire des Arts et Métiers (Conservatory of Arts and Trades) in Paris; it was there that Jacquard found his automatic loom.

Vaucheria, genus of yellow-green algae characterized by oil food reserves and multinucleate tubular branches lacking cross walls except in association with reproductive organs or an injury. Asexual reproduction is by motile zoospores and nonmotile aplanospores; sexual reproduction also occurs. The spherical female sex organ (oogonium) and the slender hook-shaped male sex organ (antheridium) are usually produced on branches close to each other. After the nonmotile egg is fertilized by a biflagellate sperm, the zygote may enter a resting phase for several weeks before germinating into a new plant. Although most species occur in fresh water or are terrestrial, some are marine and others live in ice.

Vaucluse, *département* in Provence-Alpes-Côte-d'Azur region, southeastern France, created in 1793 from the Comtat Venaissin (a papal possession in Provence), the principality of Orange, and a part of Provence (*q.v.*). It is bounded west by the Rhône River and south by the Durance River, below which the Bouches-du-Rhône *département* extends southward to the Mediterranean. The northern boundary runs eastward from a point on the Rhône about 15 mi (25 km) northwest of Orange; just above the border, northwest of Vaison-la-Romaine, the *canton* of Valréas, a small exclave of Vaucluse, is surrounded by the Drôme *département*. With its exclave the Vaucluse *département* has an area of 1,377 sq mi (3,566 sq km).

The western part consists of the lowlands of the Rhône Valley, which are crossed by streams from the Pre-Alpes, including the Aigues, Ouvèze, Nesque, and Sorgue. The west–east blocks of limestone mountains that occupy the eastern part rise steeply from the plain. The northern range to the east of Orange culminates in the majestic Mont Ventoux, (6,263 ft [1,909 m]), the highest point in the *département*. At the west end of the Plateau de Vaucluse, south of Mont Ventoux, Fontaine-de-Vaucluse, famous for its association with the 14th-century Italian poet Petrarch, the Sorgue River issues from underground in the form of a resurgent spring. The

Lubéron mountain chain, extending west–east above the Durance Valley for 25 mi, culminates at a height of 3,691 ft (1,125 m) in the Grand Lubéron.

The mountains are snowy in winter and parched in summer. In the Rhône plain the climate is mild and sunny although in winter the mistral wind brings sudden cold spells. The plain is extensively watered by irrigation channels, some of which date back to the Middle Ages. Fodder crops, vegetables, and fruit are intensively grown. Melons are a speciality of Cavaillon, and the vineyards of the Côtes-du-Rhône are renowned for such wines as Châteauneuf-du-Pape. The great multipurpose Donzère-Mondragon scheme, harnessing the Rhône for power, irrigation, and navigation, lies partly within the *département*. Industry includes canning and the production of fertilizers. Avignon and Orange are centres of tourism. Vaison-la-Romaine has considerable Gallo-Roman ruins. The *département* has three *arrondissements:* Avignon, Apt, and Carpentras. Vaucluse is in the educational division of Aix-en-Provence. Pop. (1982) 427,-343.

Vaud (French), German WAADT, canton, southwestern Switzerland, bordering France and the Jura Mountains to the west and Lake Geneva (Lac Léman) to the south. It has an area of 1,243 sq mi (3,219 sq km). In the west



Vineyards near Aigle, Vaud canton, Switzerland
P. Slatter—Shostal/EB Inc.

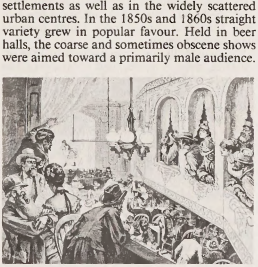
it extends a short way along the shores of Lake Neuchâtel, with a long narrow eastern tongue stretching past Payerne. The Avenches region, a few miles beyond, forms an enclave in Fribourg canton, parts of which, in turn, form enclaves in Vaud. The canton's southeastern part, north and east of the Rhône River, is Alpine, containing Les Diablerets (10,531 ft [3,210 m]), its highest summit, and more than 4 sq mi of glaciers. The central area is hilly and morainic with plains along the lakes.

Vaud was first inhabited in prehistoric times by the lake dwellers and then by the Celtic Helvetii, who while attempting to migrate south were defeated by Julius Caesar in 58 BC. The establishment of Viviscus (Vevey), Lausonium or Lausonna (Lausanne), and other Roman towns followed; in 27 BC the state Civitas Helvetiorum was created, with its capital at Aventicum (Avenches), where important Roman remains have been excavated. There were frequent Alemannic incursions in the 2nd–4th century, and the Burgundians occupied the area in the 5th century, followed by the Merovingian Franks. In 888 the Carolingians made the region part of Jurane Burgundy until 1032. The German Zähringen overlords, who had defeated the rebellious Burgundians, were succeeded in 1218 by the counts of Savoy, who gave political unity to Vaud. The power of Savoy declined in the 15th century and Vaud was overrun by the Bernese, who finally annexed it in 1536 and imposed the Reformation by force. Discontented with Bernese rule, the Vaudois enthusiastically received the French Revolutionary troops in 1798 and proclaimed first the "Lemanic Republic" and, shortly thereafter, the canton of Léman. The present canton of Vaud was set up and joined the Swiss Confederation in 1803; a popular liberal constitution was achieved in 1831 (modified and revised in 1845, 1861, and 1885). In the 19th century, Vaud joined the anti-Jesuit movement, opposed the Sonderbund (separatist league of Catholic cantons), and accepted the new constitution of 1848 for a Swiss federal state.

The population is mainly French speaking and mostly Protestant. Lausanne (*q.v.*), the capital, is the only major city. Vaud is the greatest wine producer in Switzerland (mainly white wines), with vineyards and wineries primarily along Lake Geneva. Wheat is widely grown. Sugar beets are cultivated at Orbe, tobacco in La Broye Valley, and fruit at the foot of the Jura. Pasture and livestock raising are common in the Alps. Limestone and sandstone are quarried in the Jura and salt is mined at Bex. Although Vaud is not widely industrial, many towns specialize in certain products such as watches, various metal items and instruments, chocolate, cigars, and biscuits. The most important activity, however, is tourism, based on lakeside resorts such as Montreux, Vevey, and Lausanne and numerous mountain resorts. Road and rail communications are highly developed. Pop. (1983 est.) 532,589.

vaudeville, light entertainment popular in the United States from the mid-1890s until the early 1930s that consisted of 10 to 15 individual unrelated acts, featuring magicians, acrobats, comedians, trained animals, jugglers, singers, and dancers. It is the counterpart of the music hall and variety in England. The term is probably a corruption of *vaux-de-vire,* satirical songs in couplets, sung to popular airs in the 15th century in the Val-de-Vire (Vau-de-Vire), Normandy, France. It passed into theatrical usage in the early 18th century to describe a device employed by professional actors to circumvent the dramatic monopoly held by the Comédie-Française. Forbidden to perform legitimate drama, they presented their plays in pantomime, interpreting the action with lyrics and choruses set to popular tunes. It eventually developed into a form of light musical drama, with spoken dialogue interspersed with songs, that was popular throughout Europe.

In the United States the development of variety entertainment was encouraged in frontier settlements as well as in the widely scattered urban centres. In the 1850s and 1860s straight variety grew in popular favour. Held in beer halls, the coarse and sometimes obscene shows were aimed toward a primarily male audience.



American frontier vaudeville depicted in "The Western Drama—A Variety Show Entertainment in Cheyenne," illustration from *Frank Leslie's Illustrated Newspaper,* Oct. 13,1877
The Harvard Theatre Collection, Cambridge, Mass.

Tony Pastor, a ballad and minstrel singer, is credited both with giving the first performance of what came to be called vaudeville by the late 19th century and with making it respectable. In 1881 he established a theatre in New York City dedicated to the "straight, clean variety show." His unexpected success encouraged other managers to follow his example. By the 1890s vaudeville was family entertainment and exhibited high standards of performance.

Many future stars were developed under the vaudeville system—*e.g.,* W.C. Fields, juggler and comedian; Will Rogers, cowboy and comic; the famous "American Beauty," Lillian Russell; Charlie Case, monologuist; and Joe Jackson, pantomimist. European music hall artists such as Sir Henry Lauder, Albert Chevalier, and Yvette Guilbert also appeared in vaudeville in the United States.

By the end of the 19th century the era of the vaudeville chain, a group of houses controlled by a single manager, was firmly established. The largest chains were United Booking Office, with 400 theatres in the East and Midwest, and Martin Beck's Orpheum Circuit, which controlled houses from Chicago to California. Beck also built the Palace Theatre in New York, which from 1913 to 1932 was the outstanding vaudeville house in the United States. In 1896 motion pictures were introduced into vaudeville shows as added attractions and to clear the house between shows. They gradually preempted more and more performing time until, after the advent of the "talkies" about 1927, the customary bill featured a full-length motion picture with "added acts" of vaudeville. The great financial depression of the 1930s and the growth of radio and later of television contributed to the rapid decline of vaudevelle and to its virtual disappearance after World War II.

Vaugelas, Claude Favre, seigneur de (lord of), BARON DE PÉROUGES (b. Jan. 6, 1585, Meximieux, Fr.—d. February 1650, Paris), French grammarian and an original member of the Académie Française who played a major role in standardizing the French language of literature and of polite society. A courtier, he was a habitué of the salon of the Marquise de Rambouillet, where his taste and judgment in questions of speech and writing earned the respect of men of letters.

In his *Remarques sur la langue françoise, utiles à ceux qui veulent bien parler et bien escrire* (1647; "Remarks on the French Language, Useful for Those Who Wish to Speak Well and Write Well"), Vaugelas recorded what he considered good usage: the speech of the "soundest" elements of the court and the written language of the most intelligent authors. His contemporaries soon accepted his decisions as authoritative in cases of doubtful or conflicting usage; *parler Vaugelas* meant to speak not merely correctly but elegantly, and the *Remarques* became *la bible de l'usage.*

Vaugelas was sensible enough to realize that good usage changed with changes of interest in society. But when Richelieu took over his literary discussion group of nine to form the Académie Française, he instructed them to create firm rules for the language and to render it pure and eloquent. Vaugelas' dicta were then taken too literally. The rigidity imposed by the Académie was resisted by authors in the second half of the 17th century, and, even some of Vaugelas' contemporaries, not content with the formal language of the court, spiced their writing with language of the common people. Ultimately, however, the Académie eliminated the excesses of Renaissance diction and set a standard of literary taste.

Vaughan, Henry (b. April 17, 1622, Llansantffraed, Breconshire, Wales—d. April

23, 1695, Llansantffraed), Anglo-Welsh poet and mystic remarkable for the range and intensity of his spiritual intuitions.

Educated at Oxford and studying law in London, Vaughan was recalled home in 1642 when the first Civil War broke out, and he remained there the rest of his life.

In 1646 his *Poems, with the Tenth Satyre of Juvenal Englished* was published, followed by a second volume in 1647. Meanwhile he had been "converted" by reading the religious poet George Herbert and gave up "idle verse." His *Silex Scintillans* (1650; "The Glittering Flint," enlarged 1655) and the prose *Mount of Olives: or, Solitary Devotions* (1652) show the depth of his religious convictions and the authenticity of his poetic genius. Two more volumes of secular verse were published, ostensibly without his sanction; but it is his religious verse that has lived. He also translated short moral and religious works and two medical works in prose. At some time in the 1650s he began to practice medicine and continued to do so throughout his life.

Though Vaughan borrowed phrases from Herbert and other writers and wrote poems with the same titles as Herbert's, he was one of the most original poets of his day. Chiefly he had a gift of spiritual vision or imagination that enabled him to write freshly and convincingly, as is illustrated in the opening of "The World":

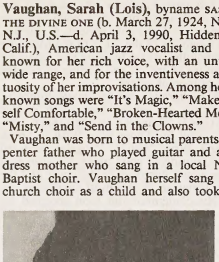
> I saw Eternity the other night
> Like a Great Ring of pure and endless light

He was equally gifted in writing about nature, holding the old view that every flower enjoys the air it breathes and that even sticks and stones share man's expectation of resurrection. The Romantic poet William Wordsworth may have been influenced by Vaughan.

Vaughan's poetry was largely disregarded in his own day and for a century after his death. He shared in the revival of interest in 17th-century metaphysical poets in the 20th century. The standard edition is *Works* (1914; 2nd ed., 1957), edited by L.C. Martin.

Vaughan, Sarah (Lois), byname SASSY, or THE DIVINE ONE (b. March 27, 1924, Newark, N.J., U.S.—d. April 3, 1990, Hidden Hills, Calif.), American jazz vocalist and pianist known for her rich voice, with an unusually wide range, and for the inventiveness and virtuosity of her improvisations. Among her best-known songs were "It's Magic," "Make Yourself Comfortable," "Broken-Hearted Melody," "Misty," and "Send in the Clowns."

Vaughan was born to musical parents, a carpenter father who played guitar and a laundress mother who sang in a local Newark Baptist choir. Vaughan herself sang in the church choir as a child and also took piano lessons throughout the 1930s and studied the organ. In October 1942 she won a talent contest at the Apollo Theater in New York City, singing "Body and Soul." On the recommendation of singer Billy Eckstine, she joined Earl Hines's big band in 1943 as vocalist and second pianist. When Eckstine formed his own band the following year, Vaughan made her first recordings with the group. Both Hines's and Eckstine's bands included musicians who went on to develop bebop, and from the beginning of her career Vaughan was associated with this new jazz. Beginning in 1945 Vaughan performed as a soloist, often with her own trio but also with other jazz groups and bands as well as with symphony orchestras. She toured throughout the world and recorded extensively, and she came to be regarded as one of the greatest of all jazz singers.



Sarah Vaughan
© Herb Snitzer

Vaughan Williams, Ralph (b. Oct. 12, 1872, Down Ampney, Gloucestershire, Eng.—d. Aug. 26, 1958, London), English composer of the first half of the 20th century, founder of the nationalist movement in English music.



Vaughan Williams, portrait by Juliet Pannett, 1957; in the National Portrait Gallery, London
By courtesy of the National Portrait Gallery, London

Vaughan Williams studied at Trinity College, Cambridge, and in London at the Royal College of Music under two major figures of the late 19th-century renaissance of English music, Sir Charles Stanford and Sir Hubert Parry. In 1897–98 he studied in Berlin under the noted composer Max Bruch and in 1909 in Paris under Maurice Ravel. About 1903 he began to collect folk songs, and in 1904–06 he was musical editor of *The English Hymnal,* for which he wrote his celebrated "Sine Nomine" ("For All the Saints"). After artillery service in World War I, he became professor of composition at the Royal College of Music.

His studies of English folk song and his interest in English music of the Tudor period fertilized his talent, enabling him to incorporate modal elements (*i.e.,* based on folk song and medieval scales) and rhythmic freedom into a musical style at once highly personal and deeply English.

Vaughan Williams' compositions include orchestral, stage, chamber, and vocal works. His three *Norfolk Rhapsodies* (numbers 2 and 3 later withdrawn), notably the first in E minor (first performed, 1906), were the first works to show his assimilation of folk song contours into a distinctive melodic and harmonic style. His nine symphonies cover a vast expressive range. Especially popular are the second, *A London Symphony* (1914; rewritten 1915; rev. 1918, 1920, 1934), and the seventh, *Sinfonia Antarctica* (1953), an adaptation of his music for the film *Scott of the Antarctic* (1949). Other orchestral works include the *Fantasia on a Theme by Thomas Tallis* (1910); concerti for piano (later arranged for two pianos and orchestra), oboe, and tuba; and the *Romance* for harmonica and orchestra (1952).

Of his stage works, *The Pilgrim's Progress* (1951) and *Job* (1931), a masque for dancing, reflect his serious, mystical side. *Hugh the Drover* (1924), a ballad opera, stems from his folk song interest. *Riders to the Sea* (1937) is a poignant setting of John Millington Synge's play.

He wrote many songs of great beauty, including *On Wenlock Edge* (1909), set to poems of A.E. Housman and consisting of a cycle for tenor, string quartet, and piano (later arranged for tenor and orchestra) and *Five Mystical Songs* (1911), set to poems of George Herbert. Particularly notable among his choral works are the *Mass in G Minor,* the cantatas *Toward the Unknown Region* (1907) and *Dona Nobis Pacem* (1936; *Grant Us Peace*), and the oratorio *Sancta Civitas* (1926; *The Holy City*). He also wrote many part-songs, as well as hymn and folk-song settings.

Vaughan Williams broke the ties with continental Europe that for two centuries through George Frideric Handel, Felix Mendelssohn, and lesser German composers had made Britain virtually a musical province of Germany. Although his predecessors in the English musical renascence, Sir Edward Elgar, Sir Hubert Parry, and Sir Charles Stanford, remained within the continental tradition, Vaughan Williams, like such nationalist composers as the Russian Modest Mussorgsky, the Czech Bedřich Smetana, and the Spanish Manuel de Falla, turned to folk song as a wellspring of native musical style.

vault, in building construction, a structural member consisting of an arrangement of arches, usually forming a ceiling or roof.

The basic barrel form, which appeared first in ancient Egypt and the Middle East, is in effect a continuous series of arches deep enough to cover a three-dimensional space. It exerts the same kind of thrust as the circular arch and must be buttressed along its entire length by heavy walls with limited openings.

Roman architects discovered that two barrel vaults that intersected at right angles formed a groin vault which, when repeated in series, could span rectangular areas of unlimited



Vault, showing groin construction

length. Because the groin vault's thrusts are concentrated at the four corners, its supporting walls need not be massive and require buttressing only where they support the vault. The groin vault, however, requires great precision in stone cutting, an art that declined in the West with the fall of Rome. Vaulting was continued and improved in the Byzantine Empire and in the Islāmic world.

Medieval European builders developed a modification, the rib vault, a skeleton of arches or ribs on which the masonry could be laid. The medieval mason used pointed arches; unlike round arches, these could be raised as high over a short span as over a long one. To cover rectangular areas, the mason used two intersecting vaults of different widths but of the same height.

Using 19th-century materials, builders could construct large iron skeletons as frameworks for vaults of lightweight materials—for example, the glass-vaulted Crystal Palace of the 1851 Exhibition in London. Because the new materials eliminated weight and thrust problems, the simple barrel vault returned to favour for such structures as railroad terminals and exhibition halls. In many modern frame systems the vault has lost its functional significance and become a thin skin laid over a series of arches. The reinforced-concrete shell vault, a bent or molded slab, is one of the most important innovations. The steel-reinforced shell exerts no lateral thrust and may be supported as if it were a beam.

vaulting, gymnastics exercise in which the athlete leaps over a form that was originally intended to mimic a horse. At one time, the side horse (*q.v.*) was used in the vaulting exercise, with the pommels (handles) removed. Later in the sport's history, a cylindrical form made especially for vaulting was used. The sanctioning body for gymnastic sport, the Fédération Internationale de Gymnastique (FIG), decreed in 2001 that a vaulting table would be introduced to replace the horse, and this table was being phased in to competitive matches. With its curved front, the vaulting table was designed for the greater safety of the gymnast (*see* illustration). Whereas the horse was placed lengthwise on the runway for men and sideways for women, the vaulting table is placed the same for men and women—with the curved front facing the gymnast as he or she approaches.

In men's vaulting the height of the horse or table is raised to 1.35 m (4.43 feet) measured

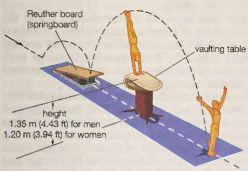


Diagram of vaulting
Encyclopædia Britannica, Inc.

from the floor. A Reuther board, a special type of springboard developed in Germany, is placed in front of the near end of the apparatus. The gymnast takes a run, gathers momentum as he nears the apparatus, rebounds off the springboard, and, supporting his hands on the apparatus, vaults over it. A variety of tricks may be performed—such as vaulting over with straddled legs, with legs together and bent into a squatting position, or with legs straight and the hips bent—as well as handsprings, cartwheels, and other more difficult movements. Each vault is evaluated according to a table of standards of difficulty.

The women's vaulting horse was the same as the men's except that it was lower. Women also used the springboard and performed vaults similar to those done by men, except that the vault was much shorter, since it was performed over the width of the horse rather than its length. The vaulting table is the same height as was the horse, 1.20 m (3.94 feet) high. The vaulting table required more retraining for women than men, especially in the placement of hands as the gymnast sprang over the table.

Vaulting has been an Olympic event for men since the modern games began in 1896; women have competed individually in the event since 1952. For both men's and women's champions, *see* Sporting Record: Gymnastics. *See also* Olympic Games.

Vauquelin, Nicolas-Louis (b. May 16, 1763, Saint-André-d'Hébertot, France—d. Nov. 14, 1829, Saint-André-d'Hébertot), French chemist who discovered the elements chromium (1797) and beryllium (1798).

A peasant's son, Vauquelin went to work in an apothecary shop, where he was befriended by Antoine-François Fourcroy, who made him his laboratory assistant (1783–91). Vauquelin began publishing on his own authority in 1790 and was associated with 376 scientific papers. His teaching and consultative posts date from 1794. In 1809 he succeeded Fourcroy as chemistry professor at the Paris Faculty of Medicine.

Vauquelin detected chromium in a lead ore



Vauquelin, lithograph by François-Séraphin Delpech
H. Roger-Viollet

from Siberia and beryllium in beryl. His other chemical discoveries included quinic acid, asparagine (the first amino acid to be isolated), camphoric acid, and other naturally occurring compounds. In 1827 he was elected to the Chamber of Deputies. Vauquelin is also remembered as the sponsor of Louis-Jacques Thenard, another peasant's son who became a famous chemist.

Vauvenargues, Luc de Clapiers, marquis de (b. Aug. 6, 1715, Aix-en-Provence, France—d. May 28, 1747, Paris), French moralist and essayist whose belief in the individual's capacity for goodness played a part in the shift of opinion away from the pessimistic view of human nature elaborated by such 17th-century thinkers as Blaise Pascal and the duke de La Rochefoucauld. He shared with others of his time a renewed respect for the emotions, thus prefiguring Jean-Jacques Rousseau. He stood out in his day, however, for his exaltation of action, through which he believed fulfillment and dignity were achieved. In this he anticipated the novelist Stendhal. The hero, he believed, is one who is impelled by strong passions to win renown through the performance of great deeds—preferably (but not necessarily) those contributing to the well-being of humanity.

Vauvenargues first sought his own fulfillment in military glory, joining the army and serving in the wars of the Polish (1733–39) and Austrian (1740–48) successions. In 1745, disappointed by the army and broken in health, Vauvenargues reluctantly turned to literature as a way to achieve fame. The rest of his life was spent in Paris in poverty. Among his few friends were Jean-François Marmontel, secretary of the French Academy, and Voltaire. He published one moderately successful book, which grew in esteem with time, *Introduction à la connaissance de l'esprit humain, suivie de réflexions et de maximes* (1746; "Introduction to an Understanding of the Human Mind, Followed by Reflections and Maxims"). It consisted of the title essay and some 700 maxims, aphorisms, and reflections.

He appears to have been a deist in the Voltairian manner, although he opposed Voltaire in the value that he attributed to nonrational and emotional experience. Despite their divergent viewpoints, Voltaire proclaimed the *Maximes* as possibly one of the best books in the French language.

Vaux, Calvert (b. Dec. 24, 1824, London, Eng.—d. Nov. 19, 1895, Brooklyn, New York, U.S.), American architect and landscape gardener. Vaux was educated at Merchant Taylors' School and in the office of Lewis N. Cottingham (1787–1847). In 1850 he went to America and became A.J. Downing's architectural partner. In 1856 and 1866 Vaux was associated with Frederick Law Olmsted in the plans for the improvement of various parks. He designed the Belvidere in Central Park, New York, and built a number of country houses in Newport, besides many town houses and public institutions.

Vaux (of Harrowden), Thomas Vaux, 2nd Baron (b. 1510—d. October 1556), one of the early English Tudor poets associated with Sir Thomas Wyat and the earl of Surrey.

Vaux accompanied the lord chancellor Thomas Cardinal Wolsey on his embassy to France in 1527 and attended King Henry VIII to Calais and Boulogne in 1532. Created a Knight of the Bath at the coronation of Anne Boleyn (1533), he was captain of the Isle of Jersey until 1536.



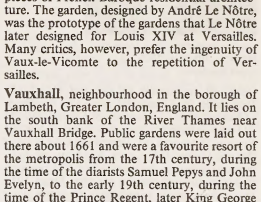
Vaux, engraving by Charles Pye after a drawing by John Thurston after a portrait by Hans Holbein the Younger
BBC Hulton Picture Library

Vaux's two best-known poems, included in Richard Tottel's *Miscellany* (1557), are "The aged lover renounceth love" and "The assault of Cupide upon the fort where the lovers hart lay wounded, and how he was taken." The *Paradyse of daynty devises* (1576) contains 13 poems signed by him.

Vaux-le-Vicomte, château near Melun, France, designed in 1656 by Louis Le Vau for Nicolas Fouquet, who was finance minister to King Louis XIV. The château, finished in 1661, is considered to be one of the masterpieces of French Baroque residential architecture. The garden, designed by André Le Nôtre, was the prototype of the gardens that Le Nôtre later designed for Louis XIV at Versailles. Many critics, however, prefer the ingenuity of Vaux-le-Vicomte to the repetition of Versailles.

Vauxhall, neighbourhood in the borough of Lambeth, Greater London, England. It lies on the south bank of the River Thames near Vauxhall Bridge. Public gardens were laid out there about 1661 and were a favourite resort of the metropolis from the 17th century, during the time of the diarists Samuel Pepys and John Evelyn, to the early 19th century, during the time of the Prince Regent, later King George IV. By 1859 the increasing urbanization of London caused the gardens to be closed and the site built over.

Vava'u Group, northernmost major island cluster of Tonga, in the South Pacific. With a total land area of 46 square miles (119 square km), the group comprises two chains, one



Part of Vava'u Harbour, Tonga
Atlas Photo

coral and the other volcanic. To the east lie uplifted coral islands, including Vava'u Island, the largest (35 sq mi) of the group, rising to 670 ft (200 m). The smaller western volcanic chain is generally wooded and includes Late (6 sq mi), dormant since 1854 and rising to 1,700 ft, the group's highest point. Fonualei, an island 40 mi (64 km) northwest of Vava'u with an active volcano rising to 600 ft, was discovered in 1781 by the Spaniard Francisco Antonio Mourelle, who named it Amargura (Spanish for "bitterness") because of his disappointment at being able to obtain neither food nor fresh water.

Vava'u Island has a fine sheltered harbour and several unique coastal caves. It is the site of Neiafu, the group's administrative headquarters. Its fertile soil yields corn (maize), breadfruit, yams, and copra, the last for export. An airfield at Lupepau'u serves the island. Pop. (1986 prelim.) 15,170.

Vavilov, Nikolay Ivanovich (b. Nov. 25 [Nov. 13, old style], 1887, Moscow—d. Jan. 26, 1943, Saratov, Russian S.F.S.R.), Soviet plant geneticist whose research into the origins of cultivated plants incurred the animosity of T.D. Lysenko, official spokesman for Soviet biology in his time.

Vavilov studied under William Bateson, founder of the science of genetics, at the University of Cambridge and the John Innes Horticultural Institution in London (1913–14). Returning to Russia, he served as professor of botany at the University of Saratov (1917–21) and as director of the Bureau of Applied Botany, Petrograd (St. Petersburg). As head of the All-Union V.I. Lenin Academy of Agricultural Sciences, he established 400 research institutes throughout the country. From 1916 to 1933 he made expeditions to many parts of the world, including Iran, Afghanistan, Ethiopia, China, and Central and South America, amassing an immense collection of plants. He brought to the Soviet Union, for further study and breeding, samples of 50,000 varieties of wild plants and 31,000 wheat specimens.



Vavilov inspecting citrus trees at Maykop, Russia, in 1935
Novosti Press Agency

Observations made during Vavilov's worldwide studies led him to postulate that a cultivated plant's centre of origin would be found in the region in which wild relatives of the plant showed maximum adaptiveness. These conclusions were summarized in *The Origin, Variation, Immunity and Breeding of Cultivated Plants* (Eng. trans. by K.S. Chester, 1951). In 1920 he expanded the theory, stating that the region of greatest diversity of a species of plant represents its centre of origin. He eventually proposed 13 world centres of plant origin.

Widely heralded as one of the greatest contributors to the study of botanical populations, Vavilov was publicly denounced by Lysenko at several successive plant-breeding congresses (1934–39) as a purveyor of "Mendelist–Morganist genetics." His reputation in his own country was destroyed, and he was arrested in 1940 and eventually imprisoned at a concentration camp at Saratov.

Växjö, city and capital of the administrative *län* (county) of Kronoberg, southern Sweden, on Växjösjön (lake). The city was a medieval trading centre; it was burned several times by the Danes, and most of the present buildings were built after 1843. Today Växjö is a railway junction and a manufacturing centre producing matches, furniture, and paper.

Växjö has a cathedral and is the seat of a Lutheran bishopric. In 1716 the botanist Carolus Linnaeus studied at the cathedral school. Near the cathedral is a monument to Esaias Tegnér, the poet, who was bishop of Växjö from 1824 to 1846. The Småland Museum (1867) contains fine displays of glassware and textiles. Pop. (1991 est.) mun., 69,547.

Vazov, Ivan (Minchov) (b. June 27, 1850, Sopot, Bulg.—d. Sept. 22, 1921, Sofia), man of letters whose poems, short stories, novels, and plays are inspired by patriotism and love of the Bulgarian countryside and reflect the main events in his country's history.

Vazov was educated at Sopot and in Plovdiv; he then taught for a time in the provinces. His father sent him to study commerce in Romania, where contact with the émigré leaders of the Bulgarian revolutionary movement led him to resolve to devote his life to the national cause as well as to literature. After the liberation of Bulgaria from the Turks (1878), Vazov was a civil servant and a district judge. In 1880 he settled in Plovdiv, where he edited several newspapers and periodicals. During the anti-Russian regime of Stefan Stambolov, Vazov went into exile in Odessa (1886–89), where he began his greatest novel, *Pod igoto* (1894; *Under the Yoke,* 1894), a chronicle of the trials of the Bulgarians under Ottoman rule. After Stambolov's fall (1894), Vazov was elected to the assembly and during 1898–99 served as minister of education.

His other works include the epic cycle of poems *Epopeya na zabravenite* (pub. 1881–84; "Epic to the Forgotten"); the novella *Nemilinedragi* (1883; "Unloved and Unwanted"); the novels *Nova Zemya* (1896; "New Land"), *Kazalarskata Tsaritsa* (1903), and *Svetoslav Terter* (1907); and the plays *Hashove* (1894), *Kam propast* (1910; "Toward the Abyss"), and *Borislav* (1910).

Vazquez de Ayllón, Lucas: *see* Ayllón, Lucas Vazquez de.

V.C., recipient of the Victoria Cross, the highest military award bestowed in Great Britain. *See* Victoria Cross.

veal, meat of calves slaughtered between 3 and 14 weeks, delicate in flavour, pale grayish white in colour, firm and fine-grained, with velvety texture. It has no marbling, and the small amount of fat covering is firm and white. In modern livestock farming, calves bred to yield high-quality veal are raised indoors under controlled temperatures (60°–65° F [16°–18° C]) and intensively fed on milk, high-protein calf meal, or both. Herbaceous foods are excluded, resulting in an iron deficiency producing the desirable light colour in the meat. Although the meat of an animal from 15 weeks to one year is technically called calf, it is frequently marketed as veal.

Wholesale cuts, usually smaller than comparable beef cuts, vary in different countries. Because of its high amount of connective tissue and low fat content, large cuts of veal require long, slow cooking. Fat in the form of lard or salt pork may be added to avoid dryness. Veal is often served rare in European countries but is usually thoroughly cooked in the U.S. Cuts such as the leg, loin, shoulder, and breast are usually roasted, often boned and stuffed, or braised. Schnitzel, pan-fried cutlets coated with bread crumbs, are a specialty of Germany and Austria. Scallops, small thin slices—called *scallopine* in Italy and *escalopes* or *médaillons* in France—may be cooked in wine or other sauces.

Veblen, Oswald (b. June 24, 1880, Decorah, Iowa, U.S.—d. Aug. 10, 1960, Brooklin, Maine), U.S. mathematician who made important contributions to differential geometry and early topology. Many of his contributions found application to atomic physics and relativity.

Veblen taught mathematics at Princeton University (1905–32) and was appointed professor at the Institute for Advanced Study, Princeton, N.J., in 1932. He became professor emeritus in 1950.

Veblen's work on the axiom systems of projective geometry came about because of his great interest in the foundations of geometry. John Wesley Young collaborated with him on the first volume of *Projective Geometry,* 2 vol. (1910–18; 1965).

The first book to systematically cover the basic ideas of topology was Veblen's *Analysis Situs* (1922), his most influential work and for many years the best available topology text. He also laid the foundations of the Princeton school of topological research.

Soon after the discovery of general relativity, Veblen turned to differential geometry and took a leading part in the development of generalized affine and projective geometry. His work, *The Invariants of Quadratic Differential Forms* (1927), is distinguished by precise and systematic treatment of the basic properties of Riemann geometry. In collaboration with his brilliant student J.H.C. Whitehead, Veblen extended the knowledge of the Riemann metric for more general cases in *The Foundations of Differential Geometry* (1932). This work provided a clear definition of a differentiable manifold (in the large) and inspired others to refine the definition, the refined definition being basic to modern geometrical research.

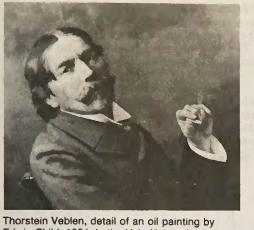
Veblen's belief that "the foundations of geometry must be studied both as a branch of physics and as a branch of mathematics" quite naturally led him to the study of relativity and the search for a geometric structure to form a field theory unifying gravitation and electromagnetism. With respect to the Kaluza-Klein field theory, which involved field equations in five-dimensional space, he provided the first physical interpretation of the fifth coordinate. By regarding the coordinate as a gauge variable, he was able to interpret the theory as one involving four-dimensional space–time.

In connection with this contribution, Veblen provided a new treatment of spinors (expressions used to represent electron spin), which is summarized in *Projektive Relativitätstheorie* (1933; "Projective Relativity Theory").

Veblen played a key role in the formation of the school of mathematics at the Institute for Advanced Study. This role, combined with his tremendous influence in encouraging and developing young mathematicians, represents a contribution equal to that of his mathematical innovations.

Veblen, Thorstein (Bunde) (b. July 30, 1857, Manitowoc County, Wis., U.S.—d. Aug. 3, 1929, near Menlo Park, Calif.), U.S. economist and social scientist who sought to apply an evolutionary, dynamic approach to the study of economic institutions. With *The Theory of the Leisure Class* (1899) he won fame in literary circles, and, in describing the life of the wealthy, he coined phrases—"conspicuous consumption," and "pecuniary emulation"—that are still widely used.

Veblen was of Norwegian stock. He did not learn English until he went to school, and all his life he spoke it with an accent. He was graduated from Carleton College in Minnesota in three years, proving himself a brilliant scholar and a mocking individualist given to railing at



Thorstein Veblen, detail of an oil painting by Edwin Child, 1934; in the Yale University Art Gallery

By courtesy of Yale University Art Gallery, gift of the Associates of Mr. Veblen

established ideas. He went on to Johns Hopkins and Yale to study philosophy, receiving his Ph.D. from Yale in 1884. Unable to find a teaching position, he returned to his father's farm in Minnesota, where he spent most of the next seven years reading. "For days," writes his biographer, "all that one could see of him was the top of his head at the garret window." In 1888 he married Ellen Rolfe, a member of a wealthy and influential family. Still unable to find a job, he entered Cornell in 1891 as a graduate student. There he impressed J. Laurence Laughlin so highly that, when Laughlin was asked to head the economics department at the new University of Chicago in 1892, he took Veblen with him as a fellow in economics. Not until 1896, when Veblen was 39, did he attain the rank of instructor.

His first book, *The Theory of the Leisure Class*, subtitled *An Economic Study of Institutions*, was published in 1899. Still read today, it represents the essence of most of his thinking. Veblen sought to apply Darwin's evolutionism to the study of modern economic life. The industrial system, he wrote, required men to be diligent, efficient, and cooperative, while those who ruled the business world were concerned with making money and displaying their wealth; their outlook was a survival from a predatory barbarian past. Veblen examined with obvious relish the "modern survivals of prowess" in the amusements, fashions, sports, religion, and aesthetic tastes of the ruling class. The book caught the interest of the literary world, most of whom read it as a satire rather than as science, and Veblen soon had a reputation as a social critic extending far beyond his academic horizons.

His reputation did not bring him academic success. He was an indifferent teacher with only contempt for the university ritual of lecture and examination. His most famous course, "Economic Factors in Civilization," ranged over vast fields of history, law, anthropology, and philosophy but paid little attention to orthodox economic theory. In 1904 he published *The Theory of Business Enterprise*, in which he expanded on his evolutionary theme of the incompatibility between the modern industrial process and the irrational ways of business and finance (*i.e.*, on the difference between making goods and making money).

At Chicago Veblen attained only the rank of assistant professor, and he was forced to leave after being charged with marital infidelity. He was appointed to an associate professorship at Stanford in 1906. After three years his personal affairs once more became an issue, and he was forced to resign again. With some difficulty he found a post as a lecturer at the University of Missouri, at a much lower salary, remaining there from 1911 until 1918. He was divorced by Ellen Rolfe and in 1914 married Anne Fessenden Bradley, a divorcee whom he had known for some years. She had two daughters, whom she brought up according to Veblen's utilitarian ideas as expressed in *The Theory of the Leisure Class*.

At Missouri he enjoyed a productive period. In *The Instinct of Workmanship and the State of the Industrial Arts* (1914), he elaborated on his idea that business enterprise was in fundamental conflict with the human disposition to useful effort and that a large proportion of men's energies were wasted through inefficient institutions. The outbreak of World War I served to deepen Veblen's pessimism as to the prospects of the human race. In *Imperial Germany and the Industrial Revolution* (1915), he suggested that Germany had an advantage over democratic states like England and France because its autocracy was able to channel more of the gains of modern technology into the service of the state. He added that the advantage was only temporary because the German economy would eventually develop its own system of conspicuous waste. With *An Inquiry into the Nature of Peace and the Terms of Its Perpetuation* (1917) he acquired an international following. He maintained that modern wars were caused mainly by the competitive demands of national business interests and that an enduring peace could be had only at the expense of "the rights of ownership, and of the price system in which these rights take effect."

In February 1918 he took a job with the Food Administration in Washington, D.C., but his approach to economic problems was of no use to government administrators, and he remained less than five months. In the fall of 1918 he became a contributor to *The Dial*, a literary and political magazine in New York, for which he wrote a series of articles on "The Modern Point of View and the New Order," later published in book form as *The Vested Interests and the State of the Industrial Arts* (1919; republished as *The Vested Interests and the Common Man: The Modern Point of View and the New Order)*.

While his prestige in the literary world had never been higher, Veblen's own life was going badly. His second wife had suffered a nervous collapse that was followed by her death in 1920. Veblen himself had largely to be looked after by a few devoted friends and appeared to be psychologically incapable of conversing with strangers interested in his ideas. For a while he lectured at the New School for Social Research in New York City, his salary being supported by a subsidy from a former student. His last book, *Absentee Ownership and Business Enterprise in Recent Times: The Case of America* (1923), was an ill-written and repetitious examination of corporation finance, in which he stressed again the contradiction between the industrial arts and business enterprise.

In 1926 he gave up teaching and returned to California, living with a stepdaughter in a cabin in the mountains overlooking the sea, where he died.

Veblen's reputation reached its high point in the 1930s, when the economic depression appeared to many to be a vindication of his critical ideas about the business system. The reading public saw him as a political radical or a Socialist, although Veblen was a pessimist who never committed himself to any form of political action. Among economists he has had both admirers and critics, the latter more numerous. The scholarly analysis of modern industrial society owes much more to Veblen's German contemporary Max Weber, whose ideas are more complex than his. Even his closest disciples have found his anthropological and historical approach too sweeping to satisfy their scientific requirements, although they have admired his vast learning and his original insights. One of the most eminent of them, Wesley C. Mitchell, called him "a visitor from another world," saying, "No other such emancipator of the mind from the subtle tyranny of circumstance has been known in social science, and no other such enlarger of the realm of inquiry." (F.S.P.)

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Works about Veblen. Much has been written about Veblen. The basic source for students of Veblen will always be Joseph Dorfman's monumental *Thorstein Veblen and His America* (1934). The best short introduction to Veblen's ideas is Wesley C. Mitchell, "Thorstein Veblen," his introduction to *What Veblen Taught* (1936), a selection from Veblen's writings. For students of economics a good appraisal is J.M. Clark's obituary in the *American Economic Review*, 19:742–745 (1929). A general approach is David Riesman, *Thorstein Veblen: A Critical Interpretation* (1953), which has an extensive bibliography. Veblen's place in intellectual history is depicted in Morton White, *Social Thought in America*, 2nd ed. (1957), an analysis of the leading ideas of Veblen and some of his contemporaries. Douglas F. Dowd (ed.), *Thorstein Veblen: A Critical Reappraisal* (1958), is a collection of essays commemorating the 100th anniversary of Veblen's birth. A useful book is Max Lerner (ed.), *The Portable Veblen* (1948), with a strongly sympathetic introduction by the editor and a bibliography. John P. Diggins, *The Bard of Savagery: Thorstein Veblen and Modern Social Theory* (1978), is a later reassessment of his thought.

Vecchi, Orazio (baptized Dec. 6, 1550, Modena, Duchy of Modena—d. Feb. 19, 1605, Modena), Italian composer best known for his madrigal-comedy *L'Amfiparnaso* and other entertainment music.

Vecchi served as maestro di cappella at the cathedrals of Salò and Modena and as canon at Correggio cathedral before his appointment as maestro at the Modena ducal court (1598). Vecchi composed masses, motets, canzonets, and madrigals. His most original work, *L'Amfiparnaso* (1597), which has been called a "madrigal opera," is a set of 15 pieces, dramatic in nature but not intended to be staged. Although this work stands entirely apart from the path the others took, Vecchi's sense of drama and contrast made him a pioneer of dramatic music.

Vecchio, Palazzo, also called PALAZZO DELLA SIGNORIA, most important historic government building in Florence, having been the seat of the Signoria of the Florentine Republic in the 14th century and then the government centre of the Medici grand dukes of Tuscany. From 1865 to 1871 it housed the Chamber of Deputies of the Kingdom of Italy, and since 1872 it has been the town hall.

The Tuscan Gothic design of the Palazzo Vecchio has been traditionally attributed to Arnolfo di Cambio. It was constructed between 1298 and 1314 and had additions by Giorgio Vasari and Buontalenti in the late 16th century. The former completely reorganized and redecorated much of the interior. On the terrace facing the Piazza della Signoria are several famous examples of Renaissance sculpture: Donatello's "Judith and Holofernes" (1456–57); a copy of Michelangelo's "David" (1504; the original that once stood there is now in the Accademia); and "Hercules and Cacus" (1534) by Baccio Bandinelli.

Vecchio, Palma: *see* Palma, Jacopo.

Vecchio, Ponte (bridge): *see* Ponte Vecchio.

Vecellinus, Spurius Cassius: *see* Cassius Vecellinus, Spurius.

veche, popular assembly that was a characteristic institution in Russia from the 10th to the 15th century. The *veche* probably originated as a deliberative body among early Slavic tribes. As the tribes settled in permanent trading centres, which later became cities, the *veche* remained as an element of democratic rule, sharing power with a prince and an aristocratic council. Although its power varied from city to city, the *veche* generally could accept or reject the prince who "inherited" the city and, by controlling the town's militia, could veto a prince's plans for a military campaign.

In Novgorod, where the *veche* acquired its greatest power, it was able to choose the city's prince, to enter into a contract with him that specifically defined and limited his powers, and to dismiss him. It also elected the major military and civil officials subordinate to the prince. In most areas the *veche* ruled both a city and its dependent villages; the heads of families in the entire region were entitled to participate in its sessions, which could be convoked by the prince, the town officials, or the citizenry. (Usually only the townsmen attended the meetings and the *veche* thus became a representative of urban interests.) The *veche* met irregularly; it had no formal procedural rules, and decisions were reached when one side gave up.

During the 11th and 12th centuries the *veche* acquired its greatest power but gradually lost importance with the decline of the old trading cities in the central Dnepr River region. The political centre of Russia was shifting to the northeastern region, where newer cities lacked the strong urban classes capable of developing their own political organs and of successfully competing with the authority of the princes. After the Mongol invasion of Russia (1240), the *veche* was further weakened; it was suppressed by the Mongols, who wanted to control the townspeople, considered to be the greatest opponents of Mongol rule. The Russian princes also aided the Mongol suppression in order to curtail the power of the institution.

By the middle of the 14th century the *veche* in most Russian cities no longer functioned as an independent, permanent governing body, although it sporadically reappeared in times of crisis. In Novgorod the *veche* survived until 1478, when the Muscovite grand prince Ivan III conquered that city and abolished it; the Pskov *veche* was similarly dissolved in 1510.

Vecheka, byname CHEKA, the first Soviet political police agency and earliest forerunner of the KGB (*q.v.*).

vector analysis, a branch of mathematics that deals with quantities that have both magnitude and direction. Some physical and geometric quantities, called scalars, can be fully defined by specifying their magnitude in suitable units of measure. Thus, mass can be expressed in grams, temperature in degrees on some scale, and time in seconds. Scalars can be represented graphically by points on some numerical scale such as a clock or thermometer. There also are quantities, called vectors, that require the specification of direction as well as magnitude. Velocity, force, and displacement are examples of vectors. A vector quantity can be represented graphically by a directed line segment, symbolized by an arrow pointing in the direction of the vector quantity, with the length of the segment representing the magnitude of the vector.

A brief treatment of vector analysis follows. For full treatment, *see* MACROPAEDIA: Analysis (in Mathematics): *Vector and tensor analysis*.

Vector algebra. A prototype of a vector is a directed line segment AB (*see* Figure 1) that can be thought to represent the displacement of a particle from its initial position A to a new position B. To distinguish vectors from scalars it is customary to denote vectors by boldface letters. Thus the vector AB in Figure 1 can

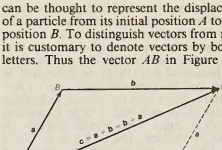

Figure 1: Parallelogram law for addition of vectors

be denoted by $\boldsymbol{a}$ and its length (or magnitude) by $|\boldsymbol{a}|$. In many problems the location of the initial point of a vector is immaterial, so that two vectors are regarded as equal if they have the same length and the same direction.

The equality of two vectors $\boldsymbol{a}$ and $\boldsymbol{b}$ is denoted by the usual symbolic notation $\boldsymbol{a} = \boldsymbol{b}$, and useful definitions of the elementary algebraic operations on vectors are suggested by geometry. Thus, if $AB = \boldsymbol{a}$ in Figure 1 represents a displacement of a particle from A to B and subsequently the particle is moved to a position C, so that $BC = \boldsymbol{b}$, it is clear that the displacement from A to C can be accomplished by a single displacement $AC = \boldsymbol{c}$. Thus, it is logical to write $\boldsymbol{a} + \boldsymbol{b} = \boldsymbol{c}$. This construction of the sum, $\boldsymbol{c}$, of $\boldsymbol{a}$ and $\boldsymbol{b}$ yields the same result as the parallelogram law in which the resultant $\boldsymbol{c}$ is given by the diagonal AC of the parallelogram constructed on vectors AB and AD as sides. Since the location of the initial point B of the vector $BC = \boldsymbol{b}$ is immaterial, it follows that $BC = AD$. Figure 1 shows that $AD + DC = AC$, so that the commutative law

$$\boldsymbol{a} + \boldsymbol{b} = \boldsymbol{b} + \boldsymbol{a} \tag{1}$$

holds for vector addition. Also, it is easy to show that the associative law

$$(\boldsymbol{a} + \boldsymbol{b}) + \boldsymbol{c} = \boldsymbol{a} + (\boldsymbol{b} + \boldsymbol{c}) \tag{2}$$

is valid, and hence the parentheses in (2) can be omitted without any ambiguities.

If s is a scalar, $s\boldsymbol{a}$ or $\boldsymbol{a}s$ is defined to be a vector whose length is $|s|\,|\boldsymbol{a}|$ and whose direction is that of $\boldsymbol{a}$ when s is positive and opposite to that of $\boldsymbol{a}$ if s is negative. Thus, $\boldsymbol{a}$ and $-\boldsymbol{a}$ are vectors equal in magnitude but opposite in direction. The foregoing definitions and the well-known properties of scalar numbers (represented by s and t) show that

$$\begin{aligned} s(t\boldsymbol{a}) &= (st)\boldsymbol{a} \\ (s+t)\boldsymbol{a} &= s\boldsymbol{a} + t\boldsymbol{a} \\ s(\boldsymbol{a}+\boldsymbol{b}) &= s\boldsymbol{a} + s\boldsymbol{b}. \end{aligned} \tag{3}$$

Inasmuch as the laws (1), (2), and (3) are identical with those encountered in ordinary algebra, it is quite proper to use familiar algebraic rules to solve systems of linear equations containing vectors. This fact makes it possible to deduce by purely algebraic means many theorems of synthetic Euclidean geometry that require complicated geometric constructions.

Products of vectors. The multiplication of vectors leads to two types of products, the dot product and the cross product.

The dot or scalar product of two vectors $\boldsymbol{a}$ and $\boldsymbol{b}$, written $\boldsymbol{a} \cdot \boldsymbol{b}$, is a real number $|\boldsymbol{a}|\,|\boldsymbol{b}| \cos(\boldsymbol{a},\boldsymbol{b})$, where $(\boldsymbol{a},\boldsymbol{b})$ denotes the angle between the directions of $\boldsymbol{a}$ and $\boldsymbol{b}$. Geometrically,

$$\begin{aligned} \boldsymbol{a} \cdot \boldsymbol{b} &= |\boldsymbol{a}|\,|\boldsymbol{b}| \cos(\boldsymbol{a},\boldsymbol{b}) \\ &= |\boldsymbol{a}| \times \text{projection of } \boldsymbol{b} \text{ on } \boldsymbol{a}. \end{aligned} \tag{4}$$

If $\boldsymbol{a}$ and $\boldsymbol{b}$ are at right angles then $\boldsymbol{a} \cdot \boldsymbol{b} = 0$, and if neither $\boldsymbol{a}$ nor $\boldsymbol{b}$ is a zero vector then the vanishing of the dot product shows the vectors to be perpendicular. If $\boldsymbol{a} = \boldsymbol{b}$ then $\cos(\boldsymbol{a},\boldsymbol{b}) = 1$, and $\boldsymbol{a} \cdot \boldsymbol{a} = |\boldsymbol{a}|^2$ gives the square of the length of $\boldsymbol{a}$.

The associative, commutative, and distributive laws of elementary algebra are valid for the dot multiplication of vectors.

The cross or vector product of two vectors $\boldsymbol{a}$ and $\boldsymbol{b}$, written $\boldsymbol{a} \times \boldsymbol{b}$, is the vector

$$\boldsymbol{a} \times \boldsymbol{b} = \boldsymbol{n}\,|\boldsymbol{a}|\,|\boldsymbol{b}| \sin(\boldsymbol{a},\boldsymbol{b}), \tag{5}$$

where $\boldsymbol{n}$ is a vector of unit length perpendicular to the plane of $\boldsymbol{a}$ and $\boldsymbol{b}$ and so directed that a right-handed screw rotated from $\boldsymbol{a}$ toward $\boldsymbol{b}$ will advance in the direction of $\boldsymbol{n}$ (*see* Figure 2). If $\boldsymbol{a}$ and $\boldsymbol{b}$ are parallel, $\boldsymbol{a} \times \boldsymbol{b} = 0$.

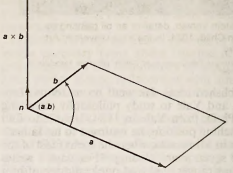

Figure 2: Cross-product formed by multiplication of two vectors

The magnitude of $\boldsymbol{a} \times \boldsymbol{b}$ can be represented by the area of the parallelogram having $\boldsymbol{a}$ and $\boldsymbol{b}$ as adjacent sides. Also, since rotation from $\boldsymbol{b}$ to $\boldsymbol{a}$ is opposite to that from $\boldsymbol{a}$ to $\boldsymbol{b}$,

$$\boldsymbol{a} \times \boldsymbol{b} = -\boldsymbol{b} \times \boldsymbol{a}.$$

This shows that the cross product is not commutative, but the associative law $(s\boldsymbol{a}) \times \boldsymbol{b} = s(\boldsymbol{a} \times \boldsymbol{b})$ and the distributive law

$$\boldsymbol{a} \times (\boldsymbol{b} + \boldsymbol{c}) = \boldsymbol{a} \times \boldsymbol{b} + \boldsymbol{a} \times \boldsymbol{c} \tag{6}$$

are valid for cross products.

Coordinate systems. Since empirical laws of physics do not depend on special or accidental choices of reference frames selected to represent physical relations and geometric configurations, vector analysis forms an ideal tool for the study of the physical universe. The introduction of a special reference frame or coordinate system establishes a correspondence between vectors and sets of numbers representing the components of vectors in that frame, and it induces definite rules of operation on these sets of numbers that follow from the rules for operations on the line segments.

If some particular set of three noncollinear vectors (termed base vectors) is selected, then any vector A can be expressed uniquely as the diagonal of the parallelepiped whose edges are the components of A in the directions of the base vectors. In common use is a set of three mutually orthogonal unit vectors (*i.e.*, vectors of length 1) $\boldsymbol{i}$, $\boldsymbol{j}$, $\boldsymbol{k}$ directed along the axes of the familiar Cartesian reference frame (*see*

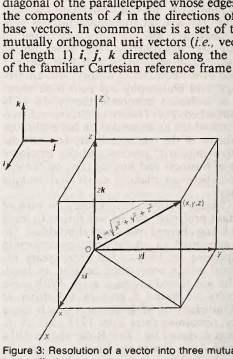

Figure 3: Resolution of a vector into three mutually perpendicular components

Figure 3). In this system the expression takes the form

$$A = xi + yj + zk,$$

where x, y, and z are the projections of A upon the coordinate axes. When two vectors A_1 and A_2 are represented as

$$A_1 = x_1 i + x_2 j + x_3 k$$
$$A_2 = y_1 i + y_2 j + y_3 k,$$

then the use of laws (3) yields for their sum

$$A_1 + A_2 = (x_1 + y_1)i + (x_2 + y_2)j + (x_3 + y_3)k. \quad (7)$$

Thus, in a Cartesian frame, the sum of A_1 and A_2 is the vector determined by $(x_1 + y_1, x_2 + y_2, x_3 + y_3)$. Also, the dot product can be written

$$A_1 \cdot A_2 = x_1 y_1 + x_2 y_2 + x_3 y_3, \quad (8)$$

since

$$i \cdot i = j \cdot j = k \cdot k = 1,$$
$$i \cdot j = j \cdot k = k \cdot i = 0.$$

The use of law (6) yields for

$$A_1 \times A_2 = (x_2 y_3 - x_3 y_2)i + (x_3 y_1 - x_1 y_3)j + (x_1 y_2 - x_2 y_1)k, \quad (9)$$

so that the cross product is the vector determined by the triple of numbers appearing as the coefficients of i, j, and k in (9).

If vectors are represented by 1×3 (or 3×1) matrices consisting of the components (x_1, x_2, x_3) of the vectors, it is possible to rephrase formulas (7) through (9) in the language of matrices. Such rephrasing suggests a generalization of the concept of a vector to spaces of dimensionality higher than three. For example, the state of a gas generally depends on the pressure p, volume v, temperature T, and time t. A quadruple of numbers (p, v, T, t) cannot be represented by a point in a three-dimensional reference frame. But since geometric visualization plays no role in algebraic calculations, the figurative language of geometry can still be used by introducing a four-dimensional reference frame determined by the set of base vectors a_1, a_2, a_3, a_4 with components determined by the rows of the matrix

$$\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

A vector x is then represented in the form

$$x = x_1 a_1 + x_2 a_2 + x_3 a_3 + x_4 a_4,$$

so that in a four-dimensional space, every vector is determined by the quadruple of the components (x_1, x_2, x_3, x_4).

Calculus of vectors. A particle moving in three-dimensional space can be located at each instant of time t by a position vector r drawn from some fixed reference point O. Since the position of the terminal point of r depends on time, r is a vector function of t. Its components in the directions of Cartesian axes, introduced at O, are the coefficients of i, j, and k in the representation

$$r = x(t)i + y(t)j + z(t)k.$$

If these components are differentiable functions, the derivative of r with respect to t is defined by the formula

$$\frac{dr}{dt} = \frac{dx}{dt}i + \frac{dy}{dt}j + \frac{dz}{dt}k = v, \quad (10)$$

which represents the velocity v of the particle. The Cartesian components of v appear as coefficients of i, j, and k in (10). If these components are also differentiable, the acceleration $a = dv/dt$ is obtained by differentiating (10):

$$\frac{d^2r}{dt^2} = \frac{d^2x}{dt^2}i + \frac{d^2y}{dt^2}j + \frac{d^2z}{dt^2}k = a, \quad (11)$$

The rules for differentiating products of scalar functions remain valid for derivatives of the dot and cross products of vector functions, and suitable definitions of integrals of vector functions allow the construction of the calculus of vectors, which has become a basic analytic tool in physical sciences and technology.

Ved-ava, among the Mordvins, the water mother, a spirit believed to rule the waters and their bounty; she is known as Vete-ema among the Estonians and Veen ema among the Finns. The water spirit belongs to a class of nature spirits common to the Finno-Ugric peoples dependent on fishing for much of their livelihood. Fishermen sacrificed to the water spirit as a personification of their concerns, gave her the first of their catch, and observed numerous taboos while fishing. Ved-ava, however, was also responsible for promoting fertility in humans and in livestock. In appearance the water mother reflected general European traditions of the mermaid: long hair that she may be seen combing while seated on a stone, large breasts, the lower part of the body fishlike. She can often be seen or heard playing music to entice people, but seeing Ved-ava generally bodes misfortune, most often drowning. Ved-ava has also been thought of as the spirit of a drowned person. At other times she is simply a personification of the water itself.

Veda, sacred hymn or verse composed in archaic Sanskrit and current among the Indo-European-speaking peoples who entered India from the Iranian regions. No definite date can be ascribed to the composition of the Vedas, some of which possess high literary merit, but the period of about 1500–1200 BC would be acceptable to most scholars. The hymns formed a liturgical body that in part grew up around the cult of the soma ritual and the sacrifice. They extolled the hereditary deities, who for the most part personified various natural and cosmic phenomena, such as fire (Agni), sun (Sūrya and Savitṛ), dawn (Uṣas), storms (the Rudras), war and rain (Indra), honour (Mitra), divine authority (Varuṇa), and creation (Indra, with some aid of Vishnu). Hymns were composed to these deities, and many were recited or chanted during rituals.

The foremost collection, or Saṃhitā, of such hymns, from which the *hotṛ* (chief priest) drew the material for his recitations, is the Rigveda. Sacred formulas known as mantras were recited by the priest responsible for the sacrificial fire and the carrying out of the ceremony; these mantras and verses in time were drawn into Saṃhitās known collectively as Yajurveda. A third group of priests, headed by the *udgātṛ* ("chanter"), performed melodic recitations linked to verses that, although drawn almost entirely from the Rigveda, came to be arranged as a separate Saṃhitā, the Sāmaveda ("Veda of the Chants"). To these three Vedas—Rg, Yajur, and Sāma, known as the *trayī-vidyā* ("threefold knowledge")—is added a fourth, the Atharvaveda, a collection of hymns, magic spells, and incantations that represents a more folk level of religion and remains partly outside the Vedic sacrifice.

The entire corpus of Vedic literature—the Saṃhitās and the expositions that came to be attached to them, the Brāhmaṇas, the Āraṇyakas, and the Upanishads—was considered Śruti, the product of divine revelation. The whole of the literature seems to have been preserved orally (although there must early have been manuscripts to assist memory). Even today several of these works, notably the three oldest Vedas, are recited with subtleties of intonation and rhythm that have been handed down from the early days of Vedic religion (*q.v.*) in India.

vedanā (Sanskrit and Pāli), in the Buddhist chain of dependent origination, the sensation that leads to thirst. *See* pratītya-samutpāda.

Vedānta, one of the six orthodox systems (darshans) of Indian philosophy and the one that forms the basis of most modern schools of Hinduism. The term Vedānta means in Sanskrit the "conclusion" (*anta*) of the Vedas, the earliest sacred literature of India; it applies to the Upanishads, which were elaborations of the Vedas, and to the school that arose out of the "study" (mimaṃsa) of the Upanishads. Thus Vedānta is also referred to as Vedānta-Mīmāṃsā ("Reflection on Vedānta"), Uttara-Mīmāṃsā ("Reflection on the Latter Part of the Vedas"), and Brahma-Mīmāṃsā ("Reflection on Brahma").

The three fundamental Vedānta texts are: the Upanishads (the most favoured being the longer and older ones such as the *Bṛhadāraṇyaka,* the *Chāndogya,* the *Taittirīya,* and the *Kaṭha*); the *Brahma-sūtras* (also called *Vedānta-sūtras*), which are very brief, even one-word interpretations of the doctrine of the Upanishads; and the famous poetic dialogue, the *Bhagavadgītā* ("Song of the Lord"), which, because of its immense popularity, was drawn upon for support of the doctrines found in the Upanishads.

No single interpretation of the texts emerged, and several schools of Vedānta developed, differentiated by their conceptions of the nature of the relationship and the degree of identity between the individual self (atman) and the absolute (brahma). These range from the nondualism (Advaita; *q.v.*) of the 8th-century philosopher Śaṅkara to the theism (Viśiṣṭādvaita; *q.v.*) of the 11th–12th-century thinker Rāmānuja and the dualism (Dvaita; *q.v.*) of the 13th-century thinker Madhva.

The Vedānta schools do, however, hold in common a number of beliefs; transmigration of the self (saṃsāra) and the desirability of release from the cycle of rebirths; the authority of the Veda on the means of release; that Brahman is both the material (*upādāna*) and the instrumental (*nimitta*) cause of the world; and that the self (atman) is the agent of its own acts (karma) and therefore the recipient of the fruits, or consequences, of action (*phala*). All the Vedānta schools unanimously reject both the heterodox (*nāstika*) philosophies of Buddhism and Jainism and the conclusions of the other orthodox (*āstika*) schools (Nyāya, Vaiśeṣika, Sāṃkhya, Yoga, and, to some extent, the Pūrva-Mīmāṃsā).

The influence of Vedānta on Indian thought has been profound, so that it may be said that, in one or another of its forms, Hindu philosophy has become Vedānta. Although the preponderance of texts by Advaita scholastics has in the West given rise to the erroneous impression that Vedānta means Advaita, the nondualistic Advaita is but one of many Vedānta schools.

Vedāntadeśika, also called VEṄKAṬANĀTHA (b. 1268, Tuppule, near Kāñchipuram, Vijayanagar, India—d. 1370, Śrīrangam), leading theologian of the Viśiṣṭādvaita (Qualified Nondualism) school of philosophy and founder of the Vaḍakalai, a subsect of the Śrīvaiṣṇavas, a religious movement of South India.

Vedāntadeśika was born into a distinguished Śrīvaiṣṇava family that followed the teachings of Rāmānuja, an 11th–12th-century saint. A precocious child, Vedāntadeśika was said to have been taken at the age of five to meet the sect's leader, Vātsya Varadācārya, who blessed him, saying he would in time be a great teacher and repudiate all false philosophers. Vedāntadeśika married and had a family but lived on alms in order to devote himself fully to his philosophic and literary efforts. He was a prolific writer in both Sanskrit and Tamil; his more than 100 works include commentaries on Vaiṣṇava scriptures; *Nyāya-pariśud-*

dhi, a comprehensive work on Viśiṣṭādvaita logic; *Yādavābhyudaya,* a poetic work on the life of Krishna; *Saṅkalpa-suryodaya,* an allegorical drama; and devotional hymns.

According to Vedāntadeśika's interpretation of *prapatti* (surrender to the grace of God), some effort is required on the part of the worshiper to secure God's grace, just as the baby monkey must hold to its mother (the *markaṭa-nyāya,* or the "analogy of the monkey"). This view—together with ritual and linguistic differences—became the basis for the split between the two subsects, the Vaḍakalai and the Tengalai, who held that God's grace is unconditioned and that the human soul is as unassertive as a kitten carried by its mother.

Vedda, also spelled VEDDAH, people of Sri Lanka (Ceylon) who were that island's aboriginal inhabitants prior to the 6th century BC. They adopted Sinhala and now no longer speak their own language. Physically they are allied to the Dravidian jungle peoples of southern India and to early populations in Southeast Asia. They have now been largely absorbed into the modern Sinhalese population; in 1911 they were reported to number about 5,300, while by 1964 the government estimated their population at about 800. By the 1970s, they had virtually ceased to exist as a separate community.

The aboriginal material culture and subsistence patterns of the Vedda were extremely simple. They lived in caves and rock shelters, wore bark-cloth clothing, hunted game with bow and arrow, and gathered wild plants and honey. Their religion was essentially a cult of the dead; ancestral spirits were believed to enter the bodies of shamans, through whom they communicated with their descendants.

Vedder, Elihu (b. Feb. 26, 1836, New York, N.Y., U.S.—d. Jan. 29, 1923, Rome, Italy), American-born Romantic painter and illustrator whose reputation is based primarily on paintings derived from dreams and fantasies.

After studying in Paris (1856–61), Vedder returned to the United States at the outbreak of the Civil War. He supported himself by illustrating comic valentines and calisthenics books and by drawing for *Vanity Fair.* It was during this period of hardship that Vedder conceived such fantastic and melancholic works as "The Lair of the Sea Serpent" (1865) and "The Lost Mind" (1864–65). Vedder settled permanently in Rome in 1866 but made frequent trips to the United States. In 1884 he illustrated an edition of *The Rubáiyát of Omar Khayyám,* a work well suited to his imaginative style. He also executed a large lunette mural, "Rome," for the Walker Gallery at Bowdoin College, Brunswick, Maine (1894), and five wall paintings and a mosaic for the Library of Congress (1896–97). His book *Doubt and Other Things* was published shortly before his death.

Vedel, Anders Sørensen (b. Nov. 9, 1542, Vejle, Den.—d. Feb. 13, 1616, Ribe), Danish historian and ballad collector who translated the *Gesta Danorum* of the medieval historian Saxo Grammaticus from Latin into Danish (1575).

Vedel was a clergyman at the royal court. In 1591 he published his *Et hundrede udvalde danske viser,* a collection of 100 medieval Danish folk songs and ballads. Based on oral and manuscript sources, it was the earliest printed collection and remains a principal source of Danish ballads. It was enlarged and republished in 1695 by Peder Syv.

Vedic chant, religious chant of India, the expression of hymns from the Vedas, the ancient scriptures of Hinduism. The practice dates back at least 3,000 years and is probably the world's oldest continuous vocal tradition. The earliest collection, or Saṃhitā, of Vedic texts is the Rigveda, containing about 1,000 hymns. These are chanted in syllabic style—a type of heightened speech with one syllable to a tone. Three levels of pitch are employed: a basic reciting tone is embellished by neighbouring tones above and below, which are used to emphasize grammatical accents in the texts. These Rigveda hymns are the basis for a later collection, the Sāmaveda ("Veda of the Chants"), the hymns of which are sung in a style that is more florid, melodic, and melismatic (one word to two or more notes) rather than syllabic, and the range of tones is extended to six or more.

A simple, numerical system of notation—together with an oral tradition that stresses absolute precision in text, intonation, and bodily gestures—has served to perpetuate this stable tradition and to ensure its uniformity throughout all parts of India. The Vedas are chanted today exactly as they were centuries ago.

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Vedic religion, also called VEDISM, the religion of the ancient Indo-European-speaking peoples who entered India about 1500 BC from the region of present-day Iran; it takes its name from the collections of sacred texts known as the Vedas. Vedism is the oldest stratum of religious activity in India for which there exist written materials. It was the starting point of Hinduism.

Knowledge of Vedic religion is derived from surviving texts and also from certain rites that continue to be observed within the framework of modern Hinduism. The earliest Vedic religious beliefs included some held in common with other Indo-European-speaking peoples, particularly with the early Iranians. Though it is impossible to say when Vedism eventually gave way to classical Hinduism, a decrease in literary activity among the Vedic schools from the 5th century BC onward can be observed, and about this time texts of Hindu character began to appear.

Vedic texts. The only extant Vedic materials are the texts known as the Vedas, which were written down over a period of about 10 centuries, from about the 15th to the 5th century BC, this being the period when Vedism was a living force. The Vedic corpus is written in an archaic Sanskrit. The most important texts are also the oldest ones. They are the four collections (Saṃhitā) that we call the Veda, or Vedas. The Rigveda, or "Veda of Verses," the earliest of these, is composed of about 1,000 hymns addressed to various deities, and mostly arranged to serve the needs of the priestly families who were the custodians of this sacred literature. The Yajurveda, or "Veda of Sacrificial Formulas," contains prose formulas applicable to various cultic rites, along with verses intended for a similar purpose. The Sāmaveda, or "Veda of Chants" is made up of a selection of verses (drawn almost wholly from the Rigveda) that are provided with musical notations and are intended as an aid to the performance of sacred songs. Finally, the Atharvaveda is considered to be either of less worth than or of similar content to the three earlier collections.

To each Veda is attached a body of prose writings of later date called Brāhmaṇas (*c.* 800–600 BC), which are intended to explain the ceremonial applications of the texts and the origin and importance of the sacrificial rites for which the Vedas were supposed to have been composed. Further appendices, the Āraṇyakas (*c.* 600 BC) and the Upaniṣhads (*c.* 700–500 BC), respectively expound the symbolism of the more difficult rites and speculate on the nature of the universe and man's relation to it.

When Vedic religion gradually evolved into Hinduism between the 6th and 2nd centuries BC, these texts taken collectively became the most sacred literature of Hinduism. They are known as Śruti, or the divinely revealed section of Hindu literature, in contrast to the later strata of religious literature known as Smriti, or traditional texts based on human memory. But in modern Hinduism the Śruti, with the exception of the Upanishads and a few hymns of the Rigveda, is now little known, while some of the Smriti texts, notably the *Bhagavadgītā,* are extremely influential.

Mythology. Vedism was a polytheistic sacrificial religion that was very different from its successor, Hinduism. Vedism involved the worship of numerous male divinities who were connected with the sky and natural phenomena. The priests who officiated at this worship were known as Brahmans. The complex Vedic ceremonies, for which the hymns of the Rigveda were composed, centred on the ritual sacrifice of animals and with the pressing and drinking of a sacred intoxicating liquor called soma (*q.v.*). The basic Vedic rite was performed by offering these edibles to a sacred fire, and this fire, which was itself deified as Agni, carried the oblations to the gods of the Vedic pantheon. The greatest deities of Vedism were at the same time material elements of the ritual offering: on the one hand, Agni (*i.e.,* fire), which was equally the fire of the sun, of lightning, of burning wood, and of that which made light for the purpose of religious worship; and on the other hand, Soma, which was simply the deified aspect of the liquid poured in the oblation. The god of highest rank, however, was Indra, a warlike god who conquered innumerable human and demon enemies and vanquished the sun, among other epic feats. Another great deity was Varuṇa, who was the upholder of the cosmic and moral laws. Vedism had many other lesser deities, among whom were gods, demigods, and demons.

Ritual. The ancient Vedic worshipers offered sacrifices to these gods in the hope that they in return would grant abundant numbers of cattle, good fortune, good health, long life, and male progeny, among other material benefits. To ensure the efficacy of their prayers, the people came to believe that their offerings could be made more acceptable to the gods if accompanied by songs of praise and other invocations of the gods' might and power. Thus originated the rites described in the Vedas. Every sacrifice was performed on behalf of an individual, the *yajamāna* ("sacrificer"), who bore the expenses.

The rites of Vedic sacrifice were relatively simple in the early period, when the Rigveda was written down. They required neither temples nor images; the ceremonies took place in an open space that was consecrated afresh for every important occasion. The altar (vedi) was a quadrangle marked out by hollowing or slightly raising the ground. The *agnyādheya* ("installation of the fire") was a necessary preliminary to all the large public rituals and was preceded by the patron's fast. The sacrifices themselves were of two major types—domestic (*gṛhya*) and public (*śrauta,* or *vaitānika*). The domestic rites were observed by the householder himself or with the help of a single priest and were performed over the domestic hearth fire. Some occurred daily or monthly, and others accompanied a particular event, such as the samskaras, sacraments marking each stage of an upper-caste Indian's life, from conception to death. The grand rites performed in public, by contrast, lasted several days or months and could usually be undertaken only by wealthy men or kings. They required the services of many priests and were usually performed at three fire-altars. Most characteristic of the public ceremonies was the soma sacrifice, which ensured the prosperity and well-being of both men and gods. In this basic ritual, a lay sacrificer

was first consecrated, after which juice was pressed three times from the soma plant, part being offered to the fire and part consumed by the priests. Each of the three occasions was preceded and followed by recitations and chants. Edibles such as meat, butter, milk, and barley cake could also be offered to a sacred fire. Animal sacrifice—the killing of a ram—existed either independently or as an integral part of the sacrifice of soma. The celebrated *aśvamedha* (*q.v.*), or "horse-sacrifice," was an elaborate variant of the soma sacrifice. Other ceremonies marked fixed dates of the lunar calendar, such as the full or new moon or the change of seasons.

Development and decline. Over the centuries, the Vedic rites became increasingly complex and governed by innumerable rules, which were embodied, together with the hymns and prayer formulas used, in the Vedas. During the late Vedic period, the complexities of ritual were emphasized to such an extent that only highly trained Brahmans and priests could carry them out correctly, and it was maintained that if rites were improperly or incorrectly performed, they could, unless rectified, bring about disaster or death.

In reaction against this excessive emphasis on ritual (as well as the growing power of the Brahmans), Vedic thought in its late period became more speculative and philosophical in approach, and more refined and subtle in quality. Much speculation was directed toward the search for harmony and for correspondences between macrocosm and microcosm, with the ultimate goal being a reduction of reality to an all-embracing unity by way of successive equations. In the Āraṇyakas, Vedic ritual is interpreted in a symbolic rather than a literal manner, and the Upaniṣhads question the very assumptions on which Vedism rested. The crucial idea that emerged from this period of intense questioning was that of brahma, which tended to become a sort of guiding principle, a sort of universal soul, in which the individual soul, or atman, is merged. The equation of atman (the self) with brahma (ultimate reality) became the basis of Hindu metaphysics. The spread in the 6th century BC of the related concepts of the reincarnation of souls, of karma, and of the attainment of release from this cycle by meditation rather than through sacrifice marked the end of the Vedic period and the appearance of Hinduism.

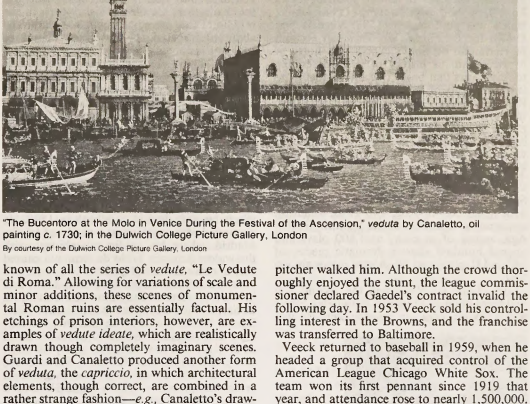
The legacy of Vedic worship is apparent in several aspects of modern Hinduism. The basic stratification of Vedic society into four social classes, or varnas—Brahmans (priests or teachers), Kshatriyas (rulers), Vaiśyas (traders), and Śūdras (non-Aryan serfs)—by and large persisted in later Hinduism. Sacrifices performed according to Vedic rites continue to be performed in India occasionally, and the offering of oblations to a sacred fire (*homa*) is an important element of much modern Hindu worship (*see* yajña). The Hindu rite of initiation (upanayama) is another direct survival of Vedic tradition. Vishnu and Śiva, the major deities of classical Hinduism, also figured in Vedic mythology, though unimportantly.

Vediovis, also spelled VEDIVS (Roman god): *see* Vejovis.

veduta (Italian: "view"), detailed, largely factual painting, drawing, or etching depicting a city, town, or other place. The first *vedute* probably were painted by northern European artists who worked in Italy, such as Paul Brill (1554–1626), a landscape painter from Flanders who produced a number of marine views and scenes of Rome that were purchased by visitors.

Among the most famous of the *vedutisti* are four Venetians. Canaletto (Antonio Canal, 1697–1768), probably the greatest of the *vedutisti,* painted precise views of Venetian architecture that are found in most of the world's major art museums. The Guardi family, Giacomo (1678–1716), Giannantonio (1699–1760), and Francesco (1712–93), produced a great number of views of Venice. The most famous member of the family was Francesco, whose style was based on that of Canaletto, though his treatment is freer. Giovanni Pannini (*c.* 1691–1765/68) was the first artist to concentrate on painting ruins.

To the engraver the attractions of *vedute* were immense. Canaletto issued his etched *vedute* in 1741; and Giambattista Piranesi (1720–78)—etcher, archaeologist, and architect—completed what is probably the best known of all the series of *vedute,* "Le Vedute di Roma." Allowing for variations of scale and minor additions, these scenes of monumental Roman ruins are essentially factual. His etchings of prison interiors, however, are examples of *vedute ideate,* which are realistically drawn though completely imaginary scenes. Guardi and Canaletto produced another form of *veduta,* the *capriccio,* in which architectural elements, though correct, are combined in a rather strange fashion—*e.g.,* Canaletto's drawing in which St. Peter's in Rome is shown rising above the Doge's Palace in Venice, or the etching by William Marlow (1740–1813) of "St. Paul's Cathedral in London with the Grand Canal of Venice."



"The Bucentoro at the Molo in Venice During the Festival of the Ascension," *veduta* by Canaletto, oil painting *c.* 1730; in the Dulwich College Picture Gallery, London

By courtesy of the Dulwich College Picture Gallery, London

Veeck, Bill, byname of WILLIAM LOUIS VEECK (b. Feb. 9, 1914, Hinsdale, Ill., U.S.—d. Jan. 2, 1986, Chicago, Ill.), American professional baseball club executive and owner, who introduced many innovations in promotion.

Veeck grew up with baseball management. His father, a Chicago sportswriter, was president of the National League Chicago Cubs (1919–33), and young Veeck himself sold peanuts and scorecards at Wrigley Field during Cubs home games. He became treasurer for the Cubs in 1940; and in 1941, with Charley Grimm, a former player and manager of the Cubs, he bought the Milwaukee Brewers, then the name of a Cub minor-league property. They helped move the club from last place in 1941 to second place in 1942 and first place in 1943–45, while raising attendance to the highest level then known in the minor leagues. Improvement in team members was accompanied by a number of amusing promotional efforts.

In 1946 Veeck headed a syndicate that bought the franchise of the American League Cleveland Indians, who had not won a pennant since 1920. In the first year, the Indians drew more than 1,000,000 fans for the first time. Veeck then hired Larry Doby, who, as a result, became the first black ever to play in the American League. Shortly afterward pitcher Walked him. Although the crowd thoroughly enjoyed the stunt, the league commissioner declared Gaedel's contract invalid the following day. In 1953 Veeck sold his controlling interest in the Browns, and the franchise was transferred to Baltimore.

Veeck returned to baseball in 1959, when he headed a group that acquired control of the American League Chicago White Sox. The team won its first pennant since 1919 that year, and attendance rose to nearly 1,500,000. Veeck's group sold the ball club in 1969. In 1976 Veeck again headed a group that took control of the White Sox. In 1981, however, he sold the team once more, largely because of the financial difficulties stemming from intense bidding among baseball-team owners for the contracts of free-agent players. Veeck, who believed that baseball's primary function should be to entertain, became disillusioned with what he regarded as an increased emphasis on baseball as a business.

Veeck wrote, with Ed Linn, *Veeck as in Wreck* (1962), *The Hustler's Handbook* (1965), and *Thirty Tons a Day* (1972).

Veeck also signed Satchel Paige, a well-known veteran of the black baseball leagues. The Indians won the pennant and the World Series in 1948. In 1949 the club was sold, and Veeck headed another group that bought the American League St. Louis Browns. In 1951, while still owner of the Browns, Veeck staged his most famous promotion when he had 3-foot 7-inch Ed Gaedel pinch hit. Finding it impossible to throw to Gaedel's strike zone, the

veena (musical instrument): *see* vina.

Vega, also called ALPHA LYRAE, brightest star in the northern constellation Lyra and fourth brightest in the night sky, with a visual magnitude of 0.04. It is also one of the Sun's closer neighbours, at a distance of about 26 light-years. Vega's spectral type is A (white) and its luminosity class V (main sequence). It will become the northern polestar by about AD 14,000 because of the precession of the equinoxes.

Vega, Garcilaso de la, also called EL INCA (b. April 12, 1539, Cuzco, Peru—d. April 24, 1616, Córdoba, Spain), one of the great Spanish chroniclers of the 16th century, noted as the author of distinguished works on the history of the Indians in South America and the expeditions of the Spanish conquistadors.

Vega was the illegitimate son of a Spanish knight and landowner, Sebastian Garcilaso de la Vega, and an Inca Indian princess. Raised

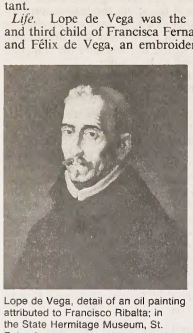
in his father's household in Peru, he absorbed both the traditions of the Incas and the stories told by his father's Spanish associates. He learned Spanish and Latin and was an eyewitness of the civil wars then raging in Peru, which he later recorded in his chronicles.

A highly intelligent youth, he was used by his father as a scribe and agent to govern his vast estates in Peru. In the fall of 1560 he arrived in Spain and came under the protection of his father's brother. In the 1560s he served in the Spanish armies, in which he reached the rank of captain. Later he entered the priesthood, becoming a minor ecclesiastic in 1597.

Vega's literary career started with his translation into Spanish of the Italian Neoplatonic dialogue, *Dialoghi di amore* ("Dialogues of Love"), by the Jewish humanist Léon Hebreo, which was published in 1588. Vega is best known for *La Florida del Yn*ca (an account of Hernando de Soto's expeditions north of Mexico) and his history of Peru, describing the civil wars that broke out among the Spanish conquerors of Peru (Part I, 1608/09; Part II, 1617). Vega's writing places him within the currents of Spanish Renaissance literature, but he should not be confused with the great early 16th-century poet of the same name, to whom he was related.

Vega, Lope de, in full LOPE FÉLIX DE VEGA CARPIO, byname THE PHOENIX OF SPAIN, Spanish EL FÉNIX DE ESPAÑA (b. Nov. 25, 1562, Madrid—d. Aug. 27, 1635, Madrid), outstanding dramatist of the Spanish Golden Age, author of as many as 1,800 plays and several hundred shorter dramatic pieces, of which 431 plays and 50 shorter pieces are extant.

Life. Lope de Vega was the second son and third child of Francisca Fernandez Flores and Félix de Vega, an embroiderer. He was



Lope de Vega, detail of an oil painting attributed to Francisco Ribalta; in the State Hermitage Museum, St. Petersburg
By courtesy of the State Hermitage Museum, St. Petersburg

taught Latin and Castilian in 1572–73 by the poet Vicente Espinel, and the following year he entered the Jesuit Imperial College, where he learned the rudiments of the humanities. Captivated by his talent and grace, the bishop of Avila took him to the Alcalá de Henares (Universidad Complutense) in 1577 to study for the priesthood, but Vega soon left the Alcalá on the heels of a married woman.

On his father's death in 1578, the embroidery shop passed to the husband of one of the poet's sisters, Isabel del Carpio. Vega later adopted the noble name of Carpio in order to give an aristocratic tone to his own. He acquired a humanistic education from his abundant though haphazard readings in erudite anthologies. In 1583 he took part in the Spanish expedition against the Azores.

By this time Vega had established himself as a playwright in Madrid and was living from his comedias (tragicomic social dramas). He also exercised an undefined role as gentleman attendant or secretary to various nobles, adapting his role as servant or panderer according to the situation. By this time, also, the poet's life was already launched on a course of tempestuous passion. The "remote beauty" who took him from the Alcalá was followed by Elena Osorio, an actress of exceptional beauty and maturity. His romantic involvement with her was intense, violent, and marred by Vega's jealousy over Elena's liaison with the powerful gallant Don Francisco Perrenot de Granvelle, nephew of the cardinal de Granvelle. Finally, when Elena abandoned the poet, he wrote such fierce libels against her and her family that he landed in prison. The libel continued in a court case in 1588, which sent him into exile from Castile for eight years. In the middle of this incredible court scandal, Vega abducted Isabel de Urbina (the "Belisa" of many of his poems), the beautiful 16-year-old sister of Philip II's earl marshal. They were forced to marry, and the new husband immediately departed with the Spanish Armada against England. On his return, he passed the remainder of his exile in Valencia, at that time a centre of considerable dramatic activity, and took to the serious writing of plays. Here, too, he engaged in writing *romanceros,* or ballad poetry, which had become fashionable. In 1590 he was appointed secretary to the duke of Alba, whom he followed to Toledo and then to the ducal estate at Alba de Tormes, where his wife died in childbirth in 1595. He auctioned off everything he owned and left for Madrid, where his public concubinage with the widow Antonia Trillo de Armenta caused him another lawsuit (1596).

He had left the duke's service in 1595, and in 1598 he went to the home of the marquês de Sarriá, with whom he remained until 1600. Sometime around 1595 he also met the illiterate and singularly beautiful actress Micaela de Luján, who was to be for nearly 20 years the poet's most peaceful love; she was the "Camila Lucinda" of numerous magnificent verses composed for her by Vega. He took a second wife, Juana de Guardo, the daughter of a wealthy pork butcher, by whom he had two children, Carlos Félix and Feliciana. He was mercilessly pilloried by his literary enemies for such an opportunistic union.

Height of literary productivity. From 1605 until his death he remained a confidential secretary and counselor to the duke of Sessa, with whom he maintained a voluminous and revealing correspondence. In 1608 he was also named to a sinecure position as a familiar of the Inquisition and then prosecutor (*promotor fiscal*) of the Apostolic Chamber. By this time, Vega had become a famous poet and was already regarded as the "phoenix of Spanish wits." In 1609 he published *Arte nuevo de hacer comedias en este tiempo* ("New Art of Writing Plays in This Time"), a poetic treatise in which he defended his own plays with more wit than effectiveness.

In 1610, in the midst of full literary production—on the road to his 500 comedias—Vega moved his household definitively from Toledo to Madrid. In Madrid, Vega was afflicted by painful circumstances that complicated his life in a period when he was still very creative. Juana became ill, miscarried, and lived in precarious health under Vega's constant care; Carlos Félix, his favourite son, also became ill and died, in 1612. Juana died in childbirth with Feliciana, and Micaela de Luján must also have died during that time, since Vega took into his own home the children remaining from this relationship, Marcela and Lope Félix, or Lopito.

These heartbreaks moved the poet to a deep religious crisis. In 1609 he entered the first of several religious orders. From this time on he wrote almost exclusively religious works, though he also continued his theatrical work, which was financially indispensable. In 1614 he entered the priesthood, but his continued service as secretary and panderer to his patron, the duke of Sessa, hindered him from obtaining the ecclesiastical benefits he sought. The duke, fearful of losing Vega's services, succeeded in having one of the poet's former lovers, the actress Lucía de Salcedo, seduce Vega. The duke thus permanently recovered his secretary. Vega thereafter became involved in new and scandalous romantic relationships. In 1627 his verse epic on the life and execution of Mary, queen of Scots, *La corona trágica,* which was dedicated to Pope Urban VIII, brought in reward a doctorate in theology of the Collegium Sapientiae and the cross of the Order of Malta, out of which came his proud use of the title *Frey* ("Brother"). His closing years were full of gloom. His last lover, Marta de Nevares, who shared his life from 1619 until her death in 1632, lost first her sight and then her sanity in the 1620s. The death at sea of his son Lope Félix del Carpio y Luján and the abduction and abandonment of his youngest daughter, Antonia Clara, both in 1634, were blows that rent his soul. His own death in Madrid in August 1635 evoked national mourning.

Works. Vega became identified as a playwright with the comedia, a comprehensive term for the new drama of Spain's Golden Age. Vega's productivity for the stage, however exaggerated by report, remains phenomenal. He claimed to have written an average of 20 sheets a day throughout his life and left untouched scarcely a vein of writing then current. Cervantes called him "the prodigy of nature." Juan Pérez de Montalván, his first biographer, in his *Fama póstuma* (1636), attributed to Vega a total of 1,800 plays, as well as more than 400 *autos sacramentales* (short allegorical plays on sacramental subjects). The dramatist's own first figure of 230 plays in 1603 rises to 1,500 in 1632; more than 100, he boasts, were composed and staged in 24 hours. The titles are known of 723 plays and 44 *autos,* and the texts survive of 426 and 42, respectively.

The earliest firm date for a play written by Vega is 1593. His 18 months in Valencia in 1589–90, during which he was writing for a living, seem to have been decisive in shaping his vocation and his talent. The influence in particular of the Valencian playwright Cristóbal de Virués (1550–1609) was obviously profound. Toward the end of his life, in *El laurel de Apolo,* Vega credits Virués with having, in his "famous tragedies," laid the very foundations of the comedia. Virués' five tragedies, written between 1579 and 1590, do indeed display a gradual evolution from a set imitation of Greek tragedy as understood by the Romans to the very threshold of romantic comedy. In the process the five acts previously typical of Spanish plays have become three; the classical chorus has given way to comment within the play, including that implicit in the expansion of a servant's role to that of confidant; the unities of time, place, and action have disappeared, leaving instead to each act its own setting in time and space; and hendecasyllabic blank verse has yielded to a metrical variety that, seeking to reflect changing moods and situations, also suggests the notable degree of lyricism soon to permeate the drama. The Spanish drama's confusing of tragic effect with a mere accumulation of tragic happenings has deflected the emphasis from in-depth character portrayal to that of complexity of plot, action, and incident, and the resulting emphasis on intrigues, misunderstandings, and other devices of intricate and complicated dramatic plotting have broken down the old divisions between dramatic genres in favour of an essentially mixed kind, tragicomedy, that would itself soon be

known simply as comedia. Finally, from initially portraying kings and princes of remote ages, Virués began to depict near-contemporary Spain and ordinary men and women.

There can be no claiming that Vega learned his whole art from Virués. Bartolomé de Torres Naharro at the beginning of the 16th century had already adumbrated the cloak and sword (*cape y espada*) play of middle-class manners. A decade before Virués, Juan de la Cueva had discovered the dramatic interest latent in earlier Spanish history and its potential appeal to a public acutely responsive to national greatness. In the formation of the comedia this proved another decisive factor on which Vega fastened instinctively.

It was at this point that Vega picked up the inheritance and, by sheer force of creative genius and fertility of invention, gave the comedia its basic formula and raised it to a peak of splendour. The comedia's manual was Vega's own poetic treatise, *El arte nuevo de hacer comedias en este tiempo,* in which he firmly rejected the Classical and Neoclassical "rules," opted for a blend of comedy and tragedy and for metrical variety, and made public opinion the ultimate arbiter of taste.

The comedia was essentially, therefore, a social drama, ringing a thousand changes on the accepted foundations of society: respect for crown, for church, and for the human personality, the latter being symbolized in the "point of honour" (*pundonor*) that Vega commended as the best theme of all "since there are none but are strongly moved thereby." This "point of honour" was a matter largely of convention, "honour" being equivalent, in a very limited and brittle sense, to social reputation; men were expected to be brave and proud and not to put up with an insult, while "honour" for women basically meant maintaining their chastity (if unmarried) or their fidelity (if married). It followed that this was a drama less of character than of action and intrigue that rarely, if ever, grasped the true essence of tragedy.

Few of the plays that Vega wrote were perfect, but he had an unerring sense for the theme and detail that could move an audience conscious of being on the crest of its country's greatness to respond to a mirroring on the stage of some of the basic ingredients of that greatness. Because of him the comedia became a vast sounding board for every chord in the Spanish consciousness, a "national" drama in the truest sense.

In theme Vega's plays range over a vast horizon. Traditionally his plays have been grouped as religious, mythological, classical, historical (foreign and national), pastoral, chivalric, fantastic, and of contemporary manners. In essence the categories come down to two, both Spanish in setting: the heroic, historical play based on some national story or legend, and the cloak and sword drama (*q.v.*) of contemporary manners and intrigue.

For his historical plays Vega ransacked the medieval chronicle, the *romancero,* and popular legend and song for heroic themes, chosen for the most part as throwing into relief some aspect either of the national character or of that social solidarity on which contemporary Spain's greatness rested. The conception of the crown as fount of justice and bulwark of the humble against oppression inspires some of his finest plays. *Peribáñez y el comendador de Ocaña* (*Peribáñez and the Commander of Ocaña*), *El mejor alcalde, el rey* (*The King, the Greatest Alcalde*), and *Fuente Ovejuna* (*All Citizens Are Soldiers*) are still memorable and highly dramatic vindications of the inalienable rights of the individual, as is *El caballero de Olmedo* (*The Knight from Olmedo*) on a more exalted social plane. In *Fuente Ovejuna* the entire village assumes responsibility before the king for the slaying of its overlord and wins his exoneration. This experiment in mass psychology, the best known outside Spain of all his plays, evoked a particular response from audiences in tsarist Russia.

Vega's cloak and sword plays are all compounded of the same ingredients and feature the same basic situations: gallants and ladies falling endlessly in and out of love, the "point of honour" being sometimes engaged, but very rarely the heart, while servants imitate or parody the main action and one, the *gracioso,* exercises his wit and common sense in commenting on the follies of his social superiors. *El perro del hortelano* (*The Gardener's Dog*), *Por la puente Juana* (*Across the Bridge, Joan*), *La dama boba* (*The Lady Nit-Wit*), *La moza de cántaro* (*The Girl with the Jug*), and *El villano en su rincón* (*The Peasant's House Is His Castle*) are reckoned among the best in this minor if still-entertaining kind of play.

All Vega's plays suffer from haste of composition, partly a consequence of the public's insatiable desire for novelty. His first acts are commonly his best, with the third a hasty cutting of knots or tying up of loose ends that takes scant account both of probability and of psychology. There was, too, a limit to his inventiveness in the recurrence of basic themes and situations, particularly in the cloak and sword plays. But Vega's defects, like his strength, derive from the accuracy with which he projected onto the stage the essence of his country and age. Vega's plays remain true to the great age of Spain into which he had been born and which he had come to know, intuitively rather than by study, as no one had ever known it before.

Vega's nondramatic works in verse and prose filled 21 volumes in 1776–79. Much of this vast output has withered, but its variety remains impressive. Vega wrote pastoral romances, verse histories of recent events, verse biographies of Spanish saints, long epic poems and burlesques upon such works, and prose tales, imitating or adapting works by Ariosto and Cervantes in the process. His lyric compositions—ballads, elegies, epistles, sonnets (there are 1,587 of these)—are myriad. Formally they rely much on the conceit, and in content they provide a running commentary on the poet's whole emotional life.

Among specific nondramatic works that deserve to be mentioned are the 7,000-line *Laurel de Apolo* (1630), depicting Apollo's crowning of the poets of Spain on Helicon, which remains of interest as a guide to the poets and poetasters of the day; *La Dorotea* (1632), a thinly veiled chapter of autobiography cast in dialogue form that grows in critical esteem as the most mature and reflective of his writings; and, listed last because it provides a bridge and key to his plays, the *Arte nuevo de hacer comedias en este tiempo.* This verse apology rested on the sound Aristotelian principle that the dramatist's first duty is to hold and satisfy his audience: the comedia, he says in effect, had developed in response to what the Spanish public demanded of the theatre. The treatise provides a clear picture of the principles and conventions of a drama called to be called national in its close identification with the social values and emotional responses of the age.

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vegetable, in the broadest sense, any kind of plant life or plant product, namely "vegetable matter"; in common, narrow usage, the term vegetable usually refers to the fresh edible portion of a herbaceous plant—roots, stems, leaves, flowers, or fruit. These plant parts are either eaten fresh or prepared in a number of ways.

A brief treatment of vegetables and vegetable farming follows. For information on particular vegetables, *see* carrot, potato, and so on. Vegetables are treated in several articles in the MACROPAEDIA. For treatment of vegetable cultivation, *see* Farming and Agricultural Technology. For treatment of the nutrient composition and processing of vegetables, *see* Food Processing.

Virtually all of the more important vegetables were cultivated among the ancient civilizations of either the Old or the New World. Some, such as the cucumber, potato, sweet corn (maize), and onion, have been so changed by cultivation that their wild ancestors can no longer be identified with certainty.

Vegetables are usually classified on the basis of the part of the plant that is used for food. The root vegetables include beets, carrots, radishes, and turnips. Stem vegetables include asparagus and kohlrabi. Among the edible tubers, or underground stems, are potatoes. The leaf and leafstalk vegetables include brussels sprouts, cabbage, celery, lettuce, rhubarb, and spinach. Among the bulb vegetables are garlic, leeks, and onions. The head, or flower, vegetables include artichokes, broccoli, and cauliflower. The fruits commonly considered vegetables by virtue of their use include beans, cucumbers, eggplant, okra, sweet corn, squash, peppers, and tomatoes.

Most fresh vegetables have a water content in excess of 70 percent, with only about 3.5 percent protein and less than 1 percent fat. Vegetables, however, are good sources of minerals, especially calcium and iron, and vitamins, principally A and C.

Modern vegetable farming ranges from small-scale production for local sale to vast commercial operations utilizing the latest advances in automation and technology. Most vegetables are planted by seeding in the fields where they are to be grown, but occasionally they are germinated in a nursery or greenhouse and transplanted as seedlings to the field. During the growing season herbicides, pesticides, and fungicides are commonly used to inhibit damage by weeds, insects, and diseases, respectively. Harvesting operations are usually mechanized in well-developed nations, but the practice of harvesting by hand is still employed in some areas or is used in conjunction with machine operations. Another concern of the vegetable farmer is postharvest storage, which may require refrigerated facilities.

Vegetables may be washed, sorted, graded, cut, and packaged for sale as fresh products. Fresh vegetables are subject to quick aging and spoilage, but their storage life can be extended by such preservation processes as dehydration, canning, freezing, fermenting, or pickling.

vegetable down (plant): *see* bombax cotton.

vegetable horsehair (plant): *see* Spanish moss.

vegetable oyster (plant): *see* salsify.

vegetable sponge (plant): *see* dishcloth gourd.

vegetarianism, the theory or practice of living solely upon vegetables, fruits, grains, and nuts, generally for ethical, ascetic, or nutritional reasons. All forms of flesh (meat, fowl, and fish) are excluded from all vegetarian diets, but some vegetarians use milk and milk products; those in the modern West usually eat eggs also, but most vegetarians in India exclude them, as did those in the classical Mediterranean lands. Vegetarians who avoid all animal products are known as vegans, and those who use milk products are sometimes called lactovegetarians. Among some agricultural peoples, flesh eating has been infrequent except among the privileged classes; such people have rather misleadingly been called vegetarians.

History of vegetarianism. Advocacy of a regular fleshless diet began about the middle of the 1st millennium BC in India and the eastern Mediterranean. In the Mediterranean, avoidance of flesh eating is first recorded as a teaching of Pythagoras of Samos (fl. 530 BC), who alleged the kinship of all animals as one basis for human benevolence toward other creatures. From Plato onward many pagan philosophers (*e.g.,* Epicurus, Plutarch), especially the Neoplatonists, recommended a fleshless diet; the idea was often associated with belief in reincarnation of souls. In India the Buddhists and Jains refused on ethical and ascetic grounds to kill animals for food.

In later centuries the history of vegetarianism diverged significantly between the Indic and the Mediterranean regions. In India itself, though Buddhism gradually declined, the ideal of harmlessness (*ahiṃsā*), with its corollary of a fleshless diet, spread steadily in the 1st millennium AD until many members of the upper castes had adopted it. Beyond India it was carried, with Buddhism, northward and eastward as far as China and Japan. In some countries, fish were included in an otherwise fleshless diet.

West of the Indus, the great monotheistic traditions were less favourable to vegetarianism. The Hebrew Bible, however, records the belief that in Paradise the earliest human beings had not eaten flesh. Ascetic Jewish groups and some early Christian leaders disapproved of flesh eating as gluttonous, cruel, and expensive. Some Christian monastic orders ruled out flesh eating, and its avoidance has been a penance even for lay persons. Many Muslims have been hostile to vegetarianism, yet some Muslim Ṣūfī mystics recommended a fleshless diet for spiritual seekers.

The 17th and 18th centuries in Europe were characterized by a greater interest in humanitarianism and the idea of moral progress, and sensitiveness to animal suffering was accordingly revived. Persons of diverse philosophical views also advocated vegetarianism—for example, Voltaire praised, and Shelley and Thoreau practiced, the diet. In the late 18th century, the utilitarian philosopher Jeremy Bentham argued against the traditional view of animals as mere tools for human use, to be disposed of in any way humans saw fit, by pointing out that animal suffering was no less real, and so no less worthy of moral consideration, than human suffering; and he regarded condoning cruelty to animals as analogous to racism:

> The French have already discovered that the blackness of the skin is no reason why a human being should be abandoned without redress to the caprice of a tormentor. It may one day come to be recognized that the number of the legs, the villosity of the skin, or the termination of the *os sacrum* are reasons equally insufficient for abandoning a sensitive being to the same fate.... The question is not, Can they *reason?* nor, Can they *talk?* but, Can they *suffer?*

Vegetarians of the early 19th century usually condemned the consumption of alcohol as well as flesh and appealed as much to nutritional advantages as they did to ethical sensibilities. As before, vegetarianism tended to be combined with other efforts toward a humane and harmonious way of life.

By the early 20th century vegetarianism in the West was contributing substantially to the drive to vary and lighten the nonvegetarian diet. In some places a fleshless diet was regarded as a regimen for specific disorders. Elsewhere, it was regarded as one element in a wider conception of vegetarianism, which involved a comprehensive reform of life habits in the direction of simplicity and healthfulness.

Although the vegetarian movement was carried forward by ethically inclined individuals, special institutions have grown up to express vegetarian concerns as such. The first vegetarian society was formed in England in 1847 by the Bible Christian sect, and the International Vegetarian Union was founded tentatively in 1889 and more enduringly in 1908. In many Western countries at the end of the 20th century, vegetarian restaurants were commonplace, and large industries were devoted to producing special vegetarian foods (some of which were designed to simulate various kinds of flesh in form and flavour). Today, many vegetarian societies and animal-rights groups, such as People for the Ethical Treatment of Animals (PETA), publish vegetarian recipes and other information on what they consider to be the health benefits and moral virtues of a fleshless diet.

Contemporary debates. In the last half of the 20th century, some ethical philosophers, such as Peter Singer, offered utilitarian-inspired arguments to show that an obligation to respect the well-being of nonhuman animals followed straightforwardly from simple and intuitive moral principles, such as "It is wrong to cause suffering without sufficient justification." On such a principle, for example, one would be morally obliged to save a drowning child from a pond even if doing so would involve muddying one's pants. Considering that animals raised for human food endure some degree of suffering (especially on so-called "factory farms") and that consuming animal flesh is apparently unnecessary for (and, some would argue, even harmful to) human health, it follows, these philosophers argue, that humans ought not to eat animals, unless one considers the gustatory pleasures experienced during flesh eating to be a sufficient justification of the animals' suffering. Proponents of this view also have argued that there is no "morally relevant" difference between humans and animals that would make it morally permissible to eat (or to perform painful experiments on) the latter but not the former. This difference, they claim, cannot be intelligence, because in that case it would be morally permissible to eat severely mentally retarded humans, who are no more intelligent than some animals. Other differences that have been proposed are the ability to use language and the possession of a certain level of self-consciousness.

Some opponents of this conclusion have invoked so-called "contractarian" conceptions of morality, according to which a being is deserving of moral consideration only if he can hypothetically contract to respect the rights and interests of other beings. For contractarians, it is this ability that constitutes the morally relevant difference between humans and animals. The fact that not every human being has, or is able to act on, this ability at all times—*e.g.,* infants and children, the severely mentally retarded, and the victims of certain brain injuries or diseases—has led to much vexed discussion of the exact nature of the contract and of the circumstances in which it can be said that a being has the ability to make one.

Other debates have centred on the question of whether a fleshless diet, and specifically a vegan one, provides all the nutrients necessary for human health. In the West, for example, it was once commonly believed that humans cannot obtain enough protein from a diet based solely on plant foods. However, nutritional studies conducted from the 1970s have cast doubt on this claim, and it is seldom raised today. A more contemporary issue is whether a vegan diet can provide enough vitamin B_{12}, which humans need in tiny amounts (1 to 3 micrograms per day) to produce red blood cells and to maintain proper nerve functioning. Popular vegan sources of B_{12} include nutritional yeasts, certain fortified foods made without animal products (such as cereals and soy milk), and vitamin supplements.

vegetative nervous system: *see* autonomic nervous system.

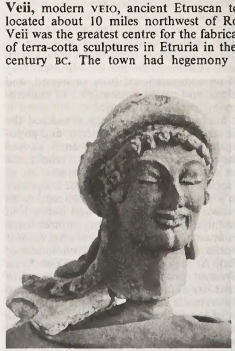
Vegetius, in full FLAVIUS VEGETIUS RENATUS (fl. 4th century AD), Roman military expert who wrote what was perhaps the single most influential military treatise in the Western world. His work exercised great influence on European tactics after the Middle Ages.

A patrician and reformer with little actual military experience, Vegetius lived in an era when cavalry and foreign auxiliary levies had diluted and corrupted the traditional legionary formation, which had been based on a disciplined infantry and cohesive organization. His treatise *Rei militaris instituta,* also called *Epitoma rei militaris,* advocated a revival of the old system but had almost no influence on the decaying military forces of the later Roman Empire. His rules on siege craft, however, were studied during the Middle Ages, and, after the crossbow, the longbow, gunpowder, and the pike had deprived cavalry of much of its shock power, Vegetius' work became, and remained for centuries, the military bible of Europe. Vegetius' emphasis on constant drill, severe discipline, the use of reserves, the gathering of intelligence, encirclement, and the use of terrain features helped to transform Western warfare from a capricious game played by aristocrats to the efficient destructive force it became after the Renaissance.

Veglia (Croatia): *see* Krk.

Vehāri (Pakistan): *see* Vihāri.

Veii, modern VEIO, ancient Etruscan town, located about 10 miles northwest of Rome. Veii was the greatest centre for the fabrication of terra-cotta sculptures in Etruria in the 6th century BC. The town had hegemony over



Hermes, terra-cotta head from Veii, *c.* 500 BC; in the Museo Nazionale di Villa Giulia, Rome

Alinari—Art Resource/EB Inc.

Rome in the 7th and 6th centuries; a subsequent series of wars ended in the destruction of Veii (396 BC). Its destruction was not total, however, and the Romans later reconstructed the city. Under Augustus it was made a *municipium,* and up to the 3rd century AD it continued as a religious centre.

In origin, Veii appears to have been a conglomeration of Villanovan villages during the 9th and 8th centuries BC, the graveyards of which occupied the rocky plains around the city. One of the chambered tombs, the Grotta Campana, contains the oldest known Etruscan frescoes. The ashes of the dead were stored in burial urns surrounded by archaic terra-cotta portrait heads. Nearby are the remains of the Temple of Apollo, home of the terra-cotta statue of the "Apollo of Veii" and also a temple shrine dedicated to the Cremera River.

vein, in geology, ore body that is disseminated within definite boundaries in unwanted rock or minerals (gangue). The term, as used by geologists, is nearly synonymous with the term lode, as used by miners. There are two distinct types: fissure veins and ladder veins.

Fissure veins, the earliest described bedrock deposits, occupy one or more fissures; they are tabular, with two dimensions much greater than the third. Fissure veins are formed in two stages, sometimes greatly separated in time; first the fissure is formed, and then it is filled with ore. There are several varieties: simple, with relatively straight, parallel walls; chambered, with irregular, fragmented walls; dilation, or lenticular, with fat lenses in a string or roughly parallel in schists; sheeted, with several distinct, closely spaced, parallel fractures; and composite, with several roughly parallel fissures and connecting diagonals in partially replaced rock.

Ladder veins are short, rather regularly spaced, roughly parallel fractures that traverse dikes (tabular bodies of igneous rocks) from wall to wall. Their width is restricted to the width of the dike, but they may extend great distances along it. Ladder veins are not as numerous or important as fissure veins.

vein, in human physiology, any of the vessels that, with four exceptions, carry oxygen-depleted blood to the right upper chamber (atrium) of the heart. The four exceptions—the pulmonary veins—transport oxygenated blood from the lungs to the left upper chamber of the heart. The oxygen-depleted blood transported by most veins is collected from the networks of microscopic vessels called capillaries by thread-sized veins called venules.

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

As in the arteries, the walls of veins have three layers, or coats: an inner layer, or tunica intima; a middle layer, or tunica media; and an outer layer, or tunica adventitia. Each coat has a number of sublayers. The tunica intima differs from the inner layer of an artery: many veins, particularly in the arms and legs, have valves to prevent backflow of blood, and the elastic membrane lining the artery is absent in the vein, which consists primarily of endothelium and scant connective tissue. The tunica media, which in an artery is composed of muscle and elastic fibres, is thinner in a vein and contains less muscle and elastic tissue, and proportionately more collagen fibres (collagen, a fibrous protein, is the main supporting element in connective tissue). The outer layer (tunica adventitia) consists chiefly of connective tissue and is the thickest layer of the vein. As in arteries, there are tiny vessels called vasa vasorum that supply blood to the walls of the veins and other minute vessels that carry blood away. Veins are more numerous than arteries and have thinner walls owing to lower blood pressure. They tend to parallel the course of arteries. *See also* artery; capillary.

Veio (Italy): *see* Veii.

Vejle, city and port, seat of Vejle *amtskommune* (county), eastern Jutland, Denmark, located on Vejle Fjord, northwest of Fredericia. Chartered in 1327, it is now an agricultural distribution centre with good harbour facilities. Predominantly a textile-producing centre, it also produces foundry iron, hardware, canned goods, and toys. The church of St. Nikolaj dates from the 13th century, and there is a city museum. The *amtskommune,* on the Little Belt, comprises picturesque, hilly country with beech forests. Fertile soil in the east supports vegetable and dairy farming and cattle breeding. Other cities are Fredericia, Horsens, and Kolding (*qq.v.*). The 10th-century burial mounds of King Gorm and Queen Thyra, with two runic stones in their memory, are at Jelling, 9 miles (14 km) northwest of Vejle. Area *amtskommune,* 1,157 square miles (2,997 square km). Pop. (1999 est.) city, 47,897; min., 54,087; *amtskommune,* 346,182.

Vela, any of a series of 12 unmanned U.S. reconnaissance satellites developed to detect radiation from nuclear explosions in the Earth's atmosphere. Launched from 1963 to 1970, the Vela satellites were supposed to make certain that countries violated the 1963 international treaty banning the testing of nuclear weapons on the ground or in the atmosphere. Although their primary function was military reconnaissance, the Velas made several significant astronomical discoveries, including the detection of a powerful X-ray source between the constellations Centaurus and Lupus.

Each Vela spacecraft carried radiation detectors sensitive to X-ray and gamma-ray emissions. The satellites were always launched in pairs to an orbit of more than 60,000 miles (96,000 km) above the Earth. The first twin craft were orbited on Oct. 17, 1963. By 1967 an advanced version of the satellite had been developed. The new model was equipped with more sophisticated detection instruments and was designed to continually point toward the Earth, unlike the earlier version, which viewed the heavens as well. The first pair of advanced Vela satellites was orbited on April 28, 1967. The last two pairs in the series were launched in 1969 and 1970.

Velasco Alvarado, Juan (b. June 16, 1910, Piura, Peru—d. Dec. 24, 1977, Lima), president of Peru from 1968 until 1975.

Formerly commander in chief of the army, Velasco came to power by overthrowing Pres. Fernando Belaúnde Terry. His revolutionary military government was unique among modern Latin-American military regimes for its reformist and populist character and was responsible for sweeping changes in Peruvian society. The government limited U.S. economic influence in Peru, nationalized transportation, communications, and electric power, and converted millions of acres of privately owned farms into worker-managed cooperatives. Velasco successfully defied U.S. interests in 1968 by seizing the La Brea and Pariñas oil fields without compensating the owners (International Petroleum Co., a subsidiary of Standard Oil Company of New Jersey, later Exxon) and again in 1969, when he ordered U.S. boats fishing within the 200-mile coastal limit captured and fined. Velasco's government also instituted tax reforms and a new constitution and established diplomatic relations with the major communist countries. Under Velasco's rule, Peru advocated the removal of the Organization of American States' sanctions against Cuba and sought Latin-American unity against U.S. power and influence. Velasco was deposed by Gen. Francisco Morales Bermúdez, his prime minister and war minister, in August 1975 in response to popular discontent with the regime's reluctance to allow more political participation and because of illnesses that severely limited Velasco's activity as president.

Velasco Ibarra, José María (b. March 19, 1893, Quito, Ecuador—d. March 30, 1979, Quito), lawyer, major political figure in Ecuador from the 1930s to the '70s, and five times president of Ecuador.

Velasco Ibarra was born into a wealthy family and educated in Quito and Paris. He held various public posts before being elected president as the Conservative Party's candidate in 1933, assuming office in 1934. His economic-development plans, which included the proposed division of large landed estates, failed to win the support of Congress, and he responded by assuming dictatorial powers, imprisoning opposition leaders, and censoring the press. He was deposed in 1935 by army leaders after 11 months in office and went into exile in Colombia until 1944, when he returned to Ecuador at the head of a multiparty coalition to take over the presidency from Carlos Arroyo, who resigned under popular pressure. Economic difficulties and repressive policies caused his liberal supporters to desert him, and again he was forced into exile in 1947. This time he went to Argentina.

He returned to Ecuador and was elected president in 1952 and served his only full four-year term. During this term he reorganized the diplomatic corps and supported price controls, public works, and aid to agriculture and industry. Elected for a fourth time, in 1960, he promised land reform and higher wages. He was deposed again in 1961, reelected to his last term in 1968, and proclaimed a military-backed dictatorship two years later, but he was deposed by the military in 1972 before his term expired. He spent most of the remainder of his life in exile in Argentina, returning a month before he died.

Velasco Ibarra wrote several books on statecraft and in 1952 described himself as a neoliberal representing a "third position between capitalism and communism."

Velázquez, Diego, in full DIEGO RODRÍGUEZ DE SILVA VELÁZQUEZ (baptized June 6, 1599, Seville, Spain—d. Aug. 6, 1660, Madrid), the most important Spanish painter of the 17th century and one of the greatest portraitists in the history of Western art.

Early years. In 1611 in Seville, Velázquez was apprenticed to the Mannerist painter Francisco Pacheco. Velázquez' early illusionistic style resembled the strong modeling and sharp contrasts of light and shade of tenebrism, the technique developed by Caravaggio. His early subjects were mostly religious or genre (scenes of daily life), and he popularized a new type of composition, the bodegón, a kitchen scene with prominent still life.

In 1622, a year after Philip IV came to the throne, Velázquez visited Madrid for the first time, in the hope of obtaining royal patronage. Although at first unsuccessful, the following year he painted a portrait of Philip IV that won him immediate success. Velázquez was appointed court painter to Philip IV in 1623 with a promise that no one else would be allowed to portray the King. Though he continued to paint other subjects, as court painter Velázquez was chiefly occupied with portraying the royal family and its entourage. His position at the court gave him access to the royal collections, rich in paintings by Titian; this Venetian master's royal portraits would exert a major influence on the composition of his own works, such as his full-length portraits of Philip IV (*c.* 1626) and his brother the Infante Don Carlos (*c.* 1626). In these paintings Velázquez modified the detailed description and tenebrism of his Sevillian paintings; only the faces and hands are accentuated and the dark figures stand out against a light background. His realistic approach to the subject is

characteristically Spanish and one that he would preserve throughout his career.

Middle years. After his return from a 1629–31 trip to Italy, during which he studied the art of the great Renaissance masters, Velázquez entered upon the most productive period of his career. He again took up his office as portrait painter and was occasionally called on to represent mythological subjects for the decoration of the royal apartments. From this point on his religious works were rare and individual, such as "The Coronation of the Virgin" (*c.* 1641–42).

For the decoration of the throne room of the new Buen Retiro palace, completed in 1635, Velázquez painted a series of royal equestrian portraits, following a tradition that goes back in Spain to Titian's portrait "Charles V at Mühlberg" (1548) and that was continued by the Peter Paul Rubens. "The Surrender of Breda" (1634–35), Velázquez' famous contribution to the series of military triumphs painted for the same throne room, is his only surviving historical subject. Velázquez based the elaborate composition on a pictorial formula of Rubens, but he grounded it in realism through accurate topographical details and the lifelike portraiture of the principal figures.

Though Velázquez frequently followed traditional compositions, particularly for his royal portraits, it was not from a lack of ability to compose or invent. With his portraits of Philip IV (*c.* 1635), the Infante Fernando (*c.* 1632–35), and Prince Baltasar Carlos (*c.* 1634–35) as huntsman, painted for the King's new hunting lodge, he created a new type of informal royal portrait. The portraits of court dwarfs, painted during the next few years, also display an impartial and discerning eye as well as free and bold brushwork.

At the beginning of 1649 Velázquez left Spain on a second visit to Italy. This time he was on official business to buy artwork for the king. While there, he executed a portrait of Pope Innocent X (1650). The powerful head, the brilliant combinations of crimson of the curtain, the chair, and the cope are painted with fluent technique and almost imperceptible brushstrokes that announce the last stage in Velázquez' development. This portrait, which has long been the artist's most famous painting outside Spain, was copied innumerable times and won him immediate and lasting renown in Italy.

Later years. Velázquez returned to Madrid in the summer of 1651, and by the following year the King appointed him chamberlain of the palace, an office that entailed arranging the royal apartments and the King's journeys. During Velázquez' absence Philip had remarried, and the young queen Mariana of Austria and her children provided new subjects for him to portray. In his portraits of the Queen (1652–53) and of the King's eldest daughter, the Infanta María Teresa (*c.* 1652–53), the royal ladies appear as doll-like figures with their enormous coiffures and farthingale hoops. Velázquez used a free, "sketchy" technique in these late works that allowed him to achieve the effect of form, texture, and ornament without any definition of detail. The portraits of the young infanta Margarita (1659) and Prince Felipe Próspero (1659) are among the most colourful of his works—referencing the work of Rubens—and he most sensitively reveals the childlike character of his sitters behind the facade of royal dignity. Velázquez' late bust portraits of Philip IV (*c.* 1654 and *c.* 1656) are close-up views of the sad and aging monarch and are among the most intimate of all his royal characterizations.

In "Las Meninas" (1656; "The Maids of Honour"), also known as "The Royal Family," Velázquez created the effect of a glance at a casual scene in the artist's studio. In the moment depicted, Velázquez paints the King and Queen, whose reflection is only seen in the mirror in the background, while the Infanta Margarita takes center stage in the composition, surrounded by her attendants. The nearly life-size figures are painted in more or less detail according to their relation to the central figure of the Infanta and to the source of light, creating a remarkable illusion of reality never surpassed by any other artist of his age.

Velázquez' last activity was to accompany the King and court to the French border, in the spring of 1660, to arrange the decoration of the Spanish pavilion for the marriage of the Infanta María Teresa to Louis XIV. After his return to Madrid, Velázquez became ill and died shortly thereafter, leaving few followers. At the beginning of the 19th century, his reputation began to rise in Europe, and since then it has continued to grow on an international scale. Most of his later official works are held in the Prado Museum, Madrid.

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Velázquez de Cuéllar, Diego (b. *c.* 1465, Cuéllar, Spain—d. 1524, Santiago de Cuba, Cuba), conquistador and first Spanish governor of Cuba.

Velázquez sailed to the New World in 1493 on the second voyage of Christopher Columbus. Columbus' eldest son, Diego Columbus, later entrusted Velázquez with the conquest of Cuba under the title of *adelantado* (governor) and, with Hernán Cortés, Velázquez departed for Cuba in 1511. In the next four years he founded the settlements of Baracoa, Bayamo, Santiago de Cuba, and Havana (La Habana). After his conquests were completed about 1514, he encouraged colonization and became governor of Cuba.

Velázquez organized the exploration of the coasts of the Yucatán Peninsula and the Gulf of Mexico led by Hernández de Córdoba (1517) and Juan de Grijalba (1518), and in 1518 he appointed Cortés leader of a new expedition to conquer the mainland of Mexico. Velázquez became suspicious of the independent-minded Cortés and rescinded the order; Cortés sailed without permission in 1519, and Velázquez sent two unsuccessful expeditions against him. One was so badly defeated that its commander, Pánfilo de Narváez, and his army went over to Cortés' side.

Velázquez complained to the Spanish court, but, after Aztec riches started to arrive from Mexico, he was instructed to ignore Cortés.

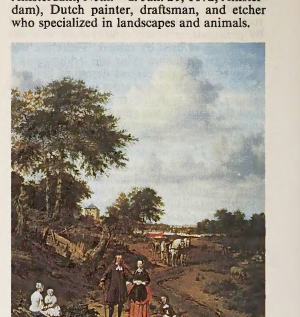
veld (Afrikaans: "field"), open country in southern Africa that is used for pasturage and farmland.

A brief treatment of the veld follows. For full treatment, *see* MACROPAEDIA: Africa.

The major regions of the veld may be distinguished on the basis of elevation: the Highveld is mostly composed of land between 4,000 and 6,000 feet (1,200 and 1,800 m); the Middle Veld regions lie between 2,000 and 4,000 feet (600 and 1,200 m); the Lowveld lies between 500 and 2,000 feet (150 and 600 m). The ecological zones comprising the veld may also be distinguished on the basis of their characteristic vegetation, such as bush veld, thorn veld, or grass veld; however, the boundaries between these different varieties are vague.

The Highveld comprises most of the high plateau country of South Africa, Botswana, Lesotho, and Zimbabwe. Throughout the Highveld, soils tend to be thin, poor, and powdery and thus easily carried away by both wind and water erosion. The Middle Veld encompasses a vast and rather arid region in Northern Cape province of South Africa and neighbouring southern Namibia as well as parts of Northern province (South Africa) and adjacent southwestern Zimbabwe. Most of it has a stony or rock surface. There are two areas of Lowveld, one in Mpumalanga province (South Africa) and Swaziland and the other in southeastern Zimbabwe. The soils of the Lowveld are more fertile than those of the other veld regions because they are well supplied with basic minerals and are more retentive of moisture.

Velde, Adriaen van de (b. Nov. 30, 1636, Amsterdam, Neth.—d. Jan. 21, 1672, Amsterdam), Dutch painter, draftsman, and etcher who specialized in landscapes and animals.



"Landscape with a Family Group," detail of an oil painting by Adriaen van de Velde; in the Rijksmuseum, Amsterdam

By courtesy of the Rijksmuseum, Amsterdam

Adriaen van de Velde was the son of a well-known marine painter, Willem van de Velde the Elder, who was probably his first teacher. He also studied at Haarlem, Neth. The southern atmosphere and the classical quality of van de Velde's forms suggest Italian influences, probably the result of contact with Dutch artists who had been to Rome. He was occasionally called upon to paint the figures in landscapes by Jacob van Ruisdael, Meindert Hobbema, and others. He also executed etchings and drawings of landscapes with animals. Among his most original paintings are beach scenes, such as "View of the Seashore" (Mauritshuis, The Hague).

Velde, Esaias van de (b. 1590/91, Amsterdam, Neth.—buried Nov. 18, 1630, The Hague), painter, draftsman, and etcher who was one of the founders of the realist school of Dutch landscape painting in the early decades of the 17th century.

He arrived in Haarlem in 1610, when such artists as Willem Buytewech, Frans Hals, and Hercules Seghers were active there. He reduced the number of figures and the strong local colours traditional in 16th-century northern landscape painting, achieving a new unity of atmosphere and tone. After 1618 he set- tled at The Hague. Such paintings as "View of Zierikzee" (1618) and etchings such as "The Gallows" exemplify van de Velde's importance for the progressive landscape style of his day. His most important pupil was Jan van Goyen, whose tonal landscapes were strongly influenced by the works of his teacher.



"The Winter Scene," oil painting by Esaias van de Velde, 1623; in the National Gallery, London
By courtesy of the trustees of the National Gallery, London; photograph, A.C. Cooper, Ltd.

His son Esaias van de Velde the Younger was also a painter.

Velde, Henry van de, in full HENRY CLEMENS VAN DE VELDE (b. April 3, 1863, Antwerp, Belg.—d. Oct. 25, 1957, Zürich, Switz.), Belgian architect and teacher who ranks with his compatriot Victor Horta as an originator of the Art Nouveau style, characterized by long sinuous lines derived from naturalistic forms.

By designing furniture and interiors for the Paris art galleries of Samuel Bing in 1896, van de Velde was responsible for bringing the Art Nouveau style to Paris. But he was interested not so much in the style as in the philosophy of William Morris and the Arts and Crafts movement in England. Van de Velde's most vital contributions to modern design were made as a teacher in Germany, where his name became known through the exhibition of furnished interiors at Dresden in 1897.

In 1902 he went to Weimar as artistic adviser to the grand duke of Saxe-Weimar. There he reorganized the Kunstgewerbeschule (arts-and-crafts school) and the academy of fine art and thus laid the foundations for Walter Gropius' amalgamation of the two bodies into the Bauhaus in 1919. Like the progressive German designers at the time, van de Velde was connected with the Deutscher Werkbund, and he designed the theatre for the Werkbund Exposition in Cologne in 1914.

Despite official appointments in Belgium, van de Velde after 1918 made no further contributions to architecture or design. A valuable extract from his *Memoirs* (1891–1901) was published in the *Architectural Review*, 112:143–148 (September 1952).

Veldeke, Heinrich von (German poet): *see* Heinrich von Veldeke.

Velenje, town, northern Slovenia. It lies 12 miles (19 km) northwest of Celje on the Paka River. Velenje was built as a model mine-workers' town with distinct administrative, business, residential, and recreational areas. It is adjacent to a major lignite mine in the Celje coal basin. There is a power plant, a chemical works, an electrical machinery factory, and a mining school. Pop. (1994 est.) 27,142.

Vélez de Guevara, Luis (b. July 1579, Ecija, Spain—d. Nov. 10, 1644, Madrid), Spanish poet, playwright, and novelist who ranks high among the followers of Lope de Vega and displays a gift for creating character. His fantastic satirical novel, *El diablo cojuelo* (1641; "The Crippled Devil"), became well-known from its adaptation by the French dramatist Alain Lesage as *Le Diable boiteux* (1707; *The Devil upon Two Sticks*).

After soldiering in Italy, Vélez held various posts in noble and royal households, becoming a favourite of Philip IV of Spain. He was a remarkably successful playwright, composing more than 400 plays, several of which were based on those of Lope. A careless but entertaining playwright, he was called Quitapesares ("Care Dispeller") by Miguel de Cervantes for the gaiety and animation of his work. Unfortunately his productivity brought him little reward; constantly in debt, he eventually died in poverty.

El diablo cojuelo is an extraordinarily difficult book, abounding in complicated wordplay and written in a tense, equivocal style. The more accessible French version eventually brought it a European audience.

veliger, larva typical of certain mollusks such as marine snails and bivalves. The veliger develops from trochophore (*q.v.*) larva and has large, ciliated lobes (velum) that form from the ciliary ring (prototroch) characteristic of the trochophore stage. The velum, used in swimming and feeding, generally disappears in the adult. During the veliger stage, the mollusk begins to develop a foot and shell.

Veliki Preslav, formerly PRESLAV, town, eastern Bulgaria. It lies at the foot of the Preslav Mountains, 11 miles (18 km) southwest of Shumen. Founded by the Proto-Bulgarians in the 8th century and called Yeski Stambolchuk (Eski Stambul), it served as capital of Bulgaria under Simeon the Great in the 10th century. It is now an agricultural centre specializing in wine, fruit, and pigs. Pop. (1988 est.) 19,710.

Velikiye Luki, also spelled VELIKIE LUKI, or VELIKIJE LUKI, city, Pskov *oblast* (province), western Russia, situated on the Lovat River. Founded by 1166, the city was sacked by Lithuanians in 1198, by King Stephen Báthory of Poland in 1581, and by the Swedes in 1611. Today an important railway junction, it has industries that include locomotive and rolling-stock repair, engineering, and consumer-goods production. Pop. (1994 est.) 116,200.

Veliko Tŭrnovo, formerly (until 1965) TŬRNOVO, also spelled TURNOVO, TĂRNOVO, TRNOVA, TRNOVO, or TIRNOVO, majestic old town in northern Bulgaria. Veliko Tŭrnovo ("Great Tŭrnovo") occupies near-vertical slopes above the 800-foot (240-metre) meandering gorge of the Yantra (Jantra) River. The houses, built in terraces, appear to be stacked one atop the other. The river divides the town into three rocky promontories—Sveta Gora, Tsarevets (Carewec), and Trapezitsa. As the capital of the Second Bulgarian Empire (1185–1396), Tŭrnovo was adorned with great splendour, but most of the relics were destroyed by the Turks or by the earthquake of 1911. Ruins of the medieval town have been excavated on the Trapezitsa and Tsarevets hills; the latter, the home of the Bulgarian tsars, is surrounded by thick walls and defenses and accessible only by a drawbridge. Much of the town has been restored as a national historical and cultural monument, with maximum retention of old architecture and town layout.

Once a prehistoric settlement, Tŭrnovo was later the site of a Roman fortress, probably on Carewec Hill. The Second Bulgarian Empire was proclaimed at Tŭrnovo in 1185, and it remained the imperial capital until 1393, when it was sacked and burned by the Turks. Throughout Ottoman rule it was a cultural and educational centre, a prosperous trading town, and a focus of Bulgarian resistance.

The first Bulgarian constitution was drafted and passed in Tŭrnovo in 1879, and there the independent Kingdom of Bulgaria was proclaimed in 1908 in the Church of the Forty Martyrs (built in 1230 by the emperor Ivan Asen II). Notable also is the 14th-century Church of St. Peter and St. Paul. Among the 11 monasteries located in the area is Sveta Troitsa ("Holy Trinity"). The town has an archaeological museum.

Present-day Veliko Tŭrnovo has a light-industrial base, specializing in foodstuffs and beverages, consumer items, furniture, and textiles. It remains a craft centre. To the northeast is Gorna Oryakhovitsa, the rail junction for Sofia and Varna, site of a regional airport for domestic service, and an important market-gardening centre. Pop. (1993 est.) 67,644.

Velikonda Range, range of hills in southeastern Andhra Pradesh state, southern India. They trend south to south-southeast on the eastern flank of the Eastern Ghāts, which at that point are strongly folded and faulted. The Velikondas are assumed to have been elevated during the Cambrian Period (540 to 505 million years ago). They are relics of ancient mountains that were eroded and dissected by numerous streams. Rivers find their way through the hills by narrow gaps, usually marked by rapids. The main railway from Madras to Bombay runs along the corridor formed by the Penner River between the Velikondas and the Pālkonda hills to the south. The Velikondas reach an elevation of 2,500 to 3,000 feet (750 to 900 m) but are sparsely wooded and almost devoid of human population except for a few scattered groups of aboriginal Chenchus. The valleys, however, are moderately populated. The narrowness of the corridors through the hills has permitted the streams to be dammed and storage tanks to be built, making a certain amount of cultivation and irrigation possible. Peanuts (groundnuts) and jowar (sorghum) are the main crops.

Velikovsky, Immanuel (b. June 10, 1895, Vitebsk, Russia [now in Belarus]—d. Nov. 17, 1979, Princeton, N.J., U.S.), American writer, proponent of controversial theories of cosmogony and history.

Educated at the universities in Edinburgh, Kharkov, and Moscow (M.D., 1921), he practiced medicine in Palestine and then studied psychology in Zürich and (from 1933) Vienna. After examining legends of the ancient Jews and other eastern Mediterranean peoples, he concluded that some tales described actual occurrences and were not mere myths or allegories. In the United States from 1939, he

expanded the geographic scope of his study of ancient documents. In his first book, *Worlds in Collision* (1950), he hypothesized that in historical times an electromagnetic derangement of the solar system caused Venus and Mars to approach the Earth closely, disturbing its rotation, axis inclination, and magnetic field. His later works are *Ages in Chaos* (1952), revising the chronology of the pre-Christian Middle East; *Earth in Upheaval* (1955), adducing geologic and paleontological evidence supporting his belief that catastrophes have overwhelmed the Earth; *Oedipus and Akhnaton* (1960), linking Egyptian history with Greek mythology; and *Peoples of the Sea* (1977), identifying Ramses III with Nectanebo, pharaohs otherwise dated 800 years apart.

The animosity of the American scientific community toward *Worlds in Collision* caused the original publisher, threatened with a boycott of its scientific-textbook division, to turn Velikovsky's work over to a firm not involved in textbook publishing.

Veliky Ustyug, also spelled VELIKY USTIUG, city, Vologda *oblast* (province), northwestern Russia, a port on the Sukhona River. One of the oldest settlements of European Russia, mentioned in documents from 1218, it was an important trading centre on the Moscow-Arkhangelsk road in the 16th century and later was renowned for painting and silverworking. Still noted for silver handicrafts, it now has numerous industries, especially brush making. Fine examples of 17th-century architecture remain. Pop. (1991 est.) 36,200.

VELKD: *see* United Evangelical Lutheran Church of Germany.

Velleius Paterculus (b. *c.* 19 BC—d. after AD 30), Roman soldier, political figure, and historian whose work on Rome is a valuable if amateurish source for the reigns of Augustus and Tiberius.

Velleius Paterculus' father was of equestrian status, and his mother belonged to a distinguished Campanian family. He served as military tribune in Thrace, Macedonia, Greece, and the East, and as prefect of cavalry and legatus he served for eight years (from AD 4) in Germany and in Pannonia under the future emperor Tiberius. He was quaestor in AD 7 and praetor in 15 and was still alive in 30, for he dedicated his work to Marcus Vinicius as consul for that year.

Velleius Paterculus wrote a compendium of Roman history from the origins to AD 29. The period from the death of Julius Caesar to that of Augustus is treated most fully, and the achievements of his old commander, Tiberius, are described in eulogistic terms. Velleius' fulsome adulation of Tiberius does, however, provide a valuable counterbalance to Tacitus' and Suetonius' vicious attacks on that emperor. His style is that of the Silver Age, employing antithesis, epigram, and rhetorical embellishment.

Vellore, city, northern Tamil Nādu state, southern India. Vellore lies along the Pālār River, southwest of Madras. A notable feature of the city is its fort (*see* Vellore Mutiny). The city played an important role during the Marāthā, Muslim, and British wars of the 17th and 18th centuries. Although its cigar and bell-metal manufactures have continued, the city has also developed as a Christian medical centre and contains one of the largest and best-equipped hospitals in India. It has medical and nursing colleges and several other colleges, all affiliated with the University of Madras. Pop. (1991) city, 175,061; metropolitan area, 310,800.

Vellore Mutiny (May 10, 1806), outbreak against the British by South Indian troops, who broke into the fort at Vellore, where the sons of Tippu Sultan of Mysore had been lodged since their surrender at Seringapatam in 1799. The outbreak, though it was encouraged by the Mysore princes, was caused basically by resentment at changes in headgear and shaving style and the prohibition of ornaments and caste marks.

Little effort was made by the British to reassure the men or listen to their grievances, and about 130 British troops were killed before the fort was recovered, within hours, by a force under Colonel Robert Gillespie. The affair alarmed the British because of its connection with the Mysore princes, who were thereupon removed to Calcutta. William Bentinck, the governor of Madras, was recalled for what was really the negligence of the commander in chief.

velocipede, version of the bicycle reinvented in the 1860s by the Michaux family of Paris. Its iron and wood construction and lack of springs earned it the nickname boneshaker. It was driven by pedaling cranks on the front axle. To increase the distance covered for each turn of the cranks, the front wheel was enlarged until, finally, in the ordinary, or penny-farthing, bicycle, the wheel would just go under the crotch of the rider. The penny-farthing nickname came from the smallest and largest British coins of the time, in reference to the disparity in the size of the wheels. By the second half of the 20th century, the original meaning was restricted to those knowledgeable in the history of the bicycle, while to others it referred to a children's tricycle, which duplicates the differentiated wheel size. The velocipede was eventually replaced by the more stable safety bicycle, having a chain-driven rear wheel.

Velociraptor, genus of sickle-clawed dinosaurs that flourished in central and eastern Asia during the Late Cretaceous Period (97.5 million to 66.4 million years ago). It is closely related to the North American *Deinonychus* (*q.v.*) of the Early Cretaceous Epoch (144 million to 97.5 million years ago) in that both reptiles were dromaeosaurs (*q.v.*). Both possessed an unusually large claw on each foot, as well as ossified tendon reinforcements in the tail that enabled them to maintain balance while striking and slashing at prey with one foot upraised. *Velociraptor* was smaller than *Deinonychus,* reaching a length of only 1.8 m (6 feet) and perhaps weighing no more than 45 kg (100 pounds). *Velociraptor* appears to have been a swift, agile predator of small herbivores.

velocity, quantity that designates how fast and in what direction a point is moving. Because it has direction as well as magnitude, velocity is known as a vector quantity and cannot be specified completely by a number, as can be done with time or length, which are scalar quantities. Like all vectors, velocity is represented graphically by a directed line segment (arrow) the length of which is proportional to its magnitude.

A point always moves in a direction that is tangent to its path; for a circular path, for example, its direction at any instant is perpendicular to a line from the point to the centre of the circle (a radius). The magnitude of the velocity (*i.e.,* the speed) is the time rate at which the point is moving along its path.

If a point moves a certain distance along its path in a given time interval, its average speed during the interval is equal to the distance moved divided by the time taken. A train that travels 100 km in 2 hours, for example, has an average speed of 50 km per hour.

During the two-hour interval, the speed of the train in the previous example may have varied considerably around the average. The speed of a point at any instant may be approximated by finding the average speed for a short time interval including the instant in question. The differential calculus, which was invented by Isaac Newton for this specific purpose, provides means for determining exact values of the instantaneous velocity.

velocity, angular: *see* angular velocity.

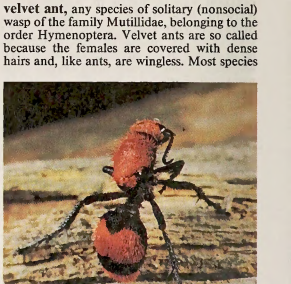
Velsen, *gemeente* (commune), Noordholland *provincie,* western Netherlands. Velsen lies along the North Sea Canal, which connects Amsterdam with the North Sea. The commune embraces IJmuiden (the foreport of Amsterdam), Santpoort, Driehuis, and Velsen-Noord. A major centre of the Dutch steel industry, using raw materials imported by ship, it has blast furnaces and coke ovens, as well as metallurgical, chemical, and paper industries. It was considerably damaged in World War II, and reconstruction included a new town hall (1965). Pop. (1999 est.) 66,077; Velsen-Beverwijk metropolitan area, 137,548.

Veltlin (Italy): *see* Valtellina.

velvet, in textiles, fabric having a short, dense pile, used in clothing and upholstery. The term derives from the Middle French *velu,* "shaggy." Velvet is made in the pile weave, of silk, cotton, or synthetic fibres, and is characterized by a soft, downy surface formed by clipped yarns. The wrong side of the fabric is smooth and shows the weave employed.

Velvets can be made water-repellent and crush-resistant. They are also occasionally patterned or embossed.

velvet ant, any species of solitary (nonsocial) wasp of the family Mutillidae, belonging to the order Hymenoptera. Velvet ants are so called because the females are covered with dense hairs and, like ants, are wingless. Most species



Velvet ant (*Dasymutilla occidentalis*)
Walter Dawn

are brightly coloured, with yellow, orange, or red patterns, ranging in size from about 6 to 20 mm (about 0.25 to 0.80 inch). About 3,000 species are known, and they are most prevalent in the hot, dry regions of the Western Hemisphere.

Only the females have a sting, which is powerful. Both sexes make a squeaking sound by rubbing a special stridulating organ. Although most species are parasites of other bees and wasps, some parasitize flies or beetles. The female lays eggs in the cells in which the host lives—one egg per cell. In cool regions the larvae, which are external parasites on the immature host, pass the winter in the pupal form.

velvet crab, any of certain species in the swimming crab (*q.v.*) group.

velvet grass, also called YORKSHIRE FOG (species *Holcus lanatus*), one of eight perennial grasses constituting the genus *Holcus* (family Poaceae), native to Europe and Africa. It has tufted flower clusters that may be white, green, pink, or purple.

Velvet grass, so called because the entire plant has a velvety feel when touched, was introduced into Australia and North America as a forage species. It now grows as a weed in damp places such as ditches, stream banks, and drainage areas.

velvet water bug, any member of the relatively rare insect family Hebridae (about 120 species) of the order Heteroptera. The small, plump insects are usually less than 3 mm (0.1 inch) long. Their body is covered with fine, velvetlike hairs. They can be found in freshwater habitats throughout the world and may be seen walking or running on the moist ground at the edge of a body of water or on the water surface.

velveteen, in textiles, fabric with a short, dense pile surface and a smooth back, usually made of cotton and resembling velvet. It is made by the filling-pile method, in which the plain or twill weave is used as a base and extra fillings are floated over four or five warps. After weaving, the floats are cut, and their ends are brushed up to form a smooth pile about one-eighth inch long.

The fabric back is smooth and shows the basic weave. Velveteen has more body and is less easily draped than velvet. It imparts warmth and is used for women's and children's garments and also for draperies and bedspreads.

velvetleaf, any of various plants with soft, velvety leaves, particularly *Abutilon theophrasti* (sometimes *A. avicennae*), commonly known



Velvetleaf (*Abutilon theophrasti*)
Walter Dawn

as Indian mallow, an annual, hairy plant of the mallow family (Malvaceae). Native to southern Asia, *A. theophrasti* is cultivated in northern China for its fibre and is widely naturalized in warmer regions of North America, where it is often a weed. It grows 0.6–2.4 m (2–8 feet) tall and has heart-shaped leaves and beaked seed pods.

velvety shore bug, any insect of the family Ochteridae (order Heteroptera), which numbers about 25 species. These insects resemble tiny toads, are about 4 or 5 mm (almost 0.2 inch) long, and live among plants near streams and ponds. As indicated by their common name, the body surface is smooth and velvetlike. The front legs are slender and are developed for running.

Velzna (ancient city, Italy): *see* Volsinii.

vena cava, in air-breathing vertebrates, including humans, either of two major trunks, the anterior and posterior venae cavae, that deliver oxygen-depleted blood to the right side of the heart. The anterior vena cava, also known as the precava, drains the head end of the body, while the posterior vena cava, or postcava, drains the tail, or rear, end. In humans these veins are respectively called the superior and inferior venae cavae. Whereas many mammals, including humans, have only one anterior vena cava, other animals have two.

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

Superior vena cava. Not far below the collarbone and in back of the right side of the breastbone, two large veins, the right and left brachiocephalic, join to form the superior vena cava. The brachiocephalic veins, as their name implies—being formed from the Greek words for "arm" and "head"—carry blood that has been collected from the head and neck and the arms; they also drain blood from much of the upper half of the body, including the upper part of the spine and the upper chest wall. A large vein, the azygos, which receives oxygen-poor blood from the chest wall and the bronchi, opens into the superior vena cava close to the point at which the latter passes through the pericardium, the sac that encloses the heart. The superior vena cava extends down about 7 cm (2.7 inches) before it opens into the right upper chamber—the right atrium of the heart. There is no valve at the heart opening.

Inferior vena cava. The inferior vena cava is formed by the coming together of the two major veins from the legs, the common iliac veins, at the level of the fifth lumbar vertebra, just below the small of the back. Unlike the superior vena cava, it has a substantial number of tributaries between its point of origin and its terminus at the heart. These include the veins that collect blood from the muscles and coverings of the loins and from the walls of the abdomen, from the reproductive organs, from the kidneys, and from the liver. In its course to the heart the inferior vena cava ascends close to the backbone; passes the liver, in the dorsal surface of which it forms a groove; enters the chest through an opening in the diaphragm; and empties into the right atrium of the heart at a non-valve opening below the point of entry for the superior vena cava.

Venaissin (French county and fief): *see* Comtat-Venaissin.

Venantius Fortunatus: *see* Fortunatus, Venantius.

venationes (Latin: "animal hunts"), in ancient Rome, type of public spectacle that featured animal hunts.

Contests between beasts or between men and beasts were staged in an amphitheatre, usually in connection with gladiator shows. The men used in these exhibitions were either captives, condemned criminals, or professional animal hunters. Originating in the 2nd century BC as part of the games of the circus, such displays were immensely popular with the Roman public. Julius Caesar built the first wooden amphitheatre for the exhibition of this spectacle. The popularity of *venationes* became such that the world was searched for lions, bears, bulls, hippopotamuses, panthers, and crocodiles to be displayed at public celebrations and slaughtered. As many as 11,000 animals were exhibited and killed on a single occasion. Although it is uncertain how long the *venationes* were presented, they were still in existence after the shows of gladiators were abolished in the 5th century. Representations of *venationes* appear on coins, mosaics, and tombs of the period.

Vencel (Hungarian personal name): *see under* Wenceslas.

Venda, also called BAVENDA, a Bantu-speaking people inhabiting the region of the Republic of South Africa known from 1979 to 1994 as the Republic of Venda. The area is now part of Northern Transvaal province, and is situated in the extreme northeastern corner of South Africa, bordering on southern Zimbabwe. The Venda have been called a "composite people" because they have historically consisted of a multiplicity of culturally different tribal groups. Apparently the Venda have become more culturally uniform since they settled in their present location after migrating through Zimbabwe from an area farther to the northwest, and almost all now speak the Venda language.

Much of the Venda's countryside in the south features mountains and wide valleys that receive abundant rainfall and are both densely populated and agriculturally productive. The northern area has a hot, dry climate and flat grasslands suitable for stock raising. The rugged Venda habitat was largely responsible for protecting them from invading enemies in the 19th century. Zulu warriors led by Mzilikazi, the eventual founder of the Ndebele (Matabele) people, generally met defeat in their attacks on the inaccessible mountain fortresses of the Venda. The Venda were, in fact, the last of the peoples in the area to come under European control.

Since the era of raids more Venda villages have been situated on the plains, and individual villages no longer need to be nearly self-contained. Agriculture dominates the Venda economy. The principal crops are corn (maize), peanuts (groundnuts), beans, peas, sorghum, and vegetables, and the planting season starts around October. The Venda may have been primarily herders in the past. During the 20th century their cattle holdings—especially the herds of their chiefs—have increased from a few to an appreciable number; they also keep goats, sheep, pigs, and fowl.

The Venda chiefs are traditionally custodians of the land for their people, while local headmen permit household groups to occupy and work tracts of land. Lineages of kinsmen, with membership based on patrilineal descent, are used to reckon inheritance and succession. Cattle are given as bridewealth by a groom in a custom called *lobola*. Matrilineal descent is also observed by the Venda, especially in the religious practice of the ancestor cult. Ancestral spirits, including those of chiefs, are among those thought to inhabit the Venda countryside. Ralu Vhimba is the deity traditionally recognized.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Venda, former republic (though never internationally recognized as such) in southern Africa. It consisted of an enclave within the Transvaal, Republic of South Africa, just south of Zimbabwe. Its capital, formerly at Sibasa, was moved to Thohoyandou when Venda was declared independent in 1979. Venda shared a boundary to the southeast with what was then the non-independent black state of Gazankulu, South Africa, and to the northeast with Kruger National Park.

The Venda people migrated into the region in the early 1700s AD from what is now Zimbabwe and established numerous ruling houses. These came in conflict with the Transvaal republic in the latter half of the 19th century resulting in a campaign against Chief Mphephu by the Transvaal government. The chief was defeated and the Venda area was annexed in 1898. Venda was a distinct administrative unit within South Africa before it became officially independent. In 1962 South Africa designated it a homeland for the Venda-speaking people, and a territorial authority was established. The territory was granted partial self-government in 1973. A

legislative assembly was elected, and Patrick Mphephu became chief minister.

On Sept. 13, 1979, South Africa proclaimed Venda an independent republic, with Mphephu as president. It was the third of South Africa's black states to be granted independence in the 1970s, following Transkei (1976) and Bophuthatswana (1977). The United Nations Security Council met the next week and unanimously condemned the creation of the three black republics as an attempt, on the part of South Africa, to legitimize and perpetuate apartheid. Only South Africa, Transkei, and Bophuthatswana recognized Venda's independence. Under the new South African constitution, which abolished the apartheid system, Venda in 1994 was reincorporated into South Africa as part of the newly created Northern province.

Vendée, coastal *département,* Pays de la Loire *région,* western France. It was created in 1790 from the historic province of Poitou (*q.v.*) and from the *généralité* (a fiscal subdivision) of Poitiers. Vendée is historically renowned for the Wars of the Vendée—counterrevolutionary peasant uprisings at the end of the 18th and beginning of the 19th century. Vendée borders the Atlantic Ocean for most of the distance between the Loire and the Gironde estuaries.

About two-thirds of the *département,* which lies largely in the Armorican Massif, is *bocage* countryside, characterized by numerous trees and by small hedge-bound fields, which are chiefly either under grass or used for growing fodder crops; there are also many cider apple orchards. Farming is devoted primarily to cattle raising and dairying.

In the Gâtine country, extending from northwest to southeast, the hills rise to 945 feet (288 m) and are covered with heath or woods. Inland from the coast in the north and south are extensive marshlands. The marshy Marais Poitevin in the south is drained by canals that are used as thoroughfares by farmers and market gardeners. The coastline stretches for about 125 miles (200 km); offshore there are numerous reefs and sandbanks. Much of the coast is lined with woods, including the Forêt d'Olonne located on sand dunes north of Les Sables d'Olonne, a seaside resort with one of the finest stretches of sand in France. On the coast the climate is mild and rainy. The *département,* which is essentially rural, has three *arrondissements,* La-Roche-sur-Yon (the capital), Fontenay-le-Comte, and Les Sables d'Olonne. Vendée is in the educational division of Nantes. Area 2,595 square miles (6,720 square km). Pop. (1992 est.) 520,680.

Vendée, Wars of the (1793–96), counterrevolutionary insurrections in the west of France during the French Revolution. The first and most important occurred in 1793 in the area known as the Vendée, which included large sections of the *départements* of Loire-Inférieure (Loire-Atlantique), Maine-et-Loire, Deux-Sèvres, and the Vendée proper. In this fervently religious and economically backward region, the Revolution of 1789 was received with little enthusiasm and only a few minor disturbances. The first signs of real discontent appeared with the government's enactment of the Civil Constitution of the Clergy (July 1790) instituting strict controls over the Roman Catholic church.

A general uprising began with the introduction of the conscription acts of February 1793. On March 4 rioting commenced at Cholet, and by the 13th the Vendée was in open revolt. The uprising coincided with rising disaffection in Lyon, Marseille, and Normandy and seriously threatened the Revolution internally at a time when it had just suffered a military defeat at Neerwinden (March 18). The peasant leaders Jacques Cathelineau, Gaston Bourdic, and Jean-Nicolas Stofflet were joined by royalist nobles such as Charles Bonchamps, Marquis de Bonchamps, Maurice Gigost d'Elbée, François-Athanase Charette de La Contrie, and Henri du Vergier, Count de La Rochejaquelein. In May the rebels (about 30,000 strong) took the towns of Thouars, Parthenay, and Fontenay, and their army, which had changed its name from "the Catholic Army" to "the Catholic and Royal Army," turned north and on June 9 took Saumur.

Crossing the Loire River, the Vendéans marched east, seizing Angers (June 18), but failed to capture the important centre of Nantes. There followed two months of confused fighting. By autumn the government forces had been reinforced and placed under a unified command. On October 17 the main Vendéan army (about 65,000) was heavily defeated at Cholet and fled north across the Loire, leaving only a few thousand men under Charette to continue resistance in the Vendée. The Vendéans then marched north to raise the Cotentin region and occupy a few towns. They later retreated south and, after failing to capture Angers (December 3), turned east but were overtaken and defeated at Le Mans (December 12). Perhaps 15,000 were killed in this bloody battle and in the butchery of prisoners that occurred afterward. Still trying to cross the Loire to reenter the Vendée, the main army was finally crushed at Savenay by the Republican forces (December 23).

General warfare was now at an end, but the severe reprisals taken by the Republican commander General Louis-Marie Turreau de Garambouville provoked further resistance. With the recall of Turreau (May) and the rise to power of the moderate Thermidorian faction in Paris (July), a more conciliatory policy was adopted. In December the government announced an amnesty, and on Feb. 17, 1795, the Convention of La Jaunaye granted the Vendée freedom from conscription, liberty of worship, and some indemnities for losses.

Charette again took up arms during a British-backed landing of exiled French nobles at Quiberon Bay, in Brittany (June 1795). The nobles' defeat (July) and the capture and execution of Stofflet (February 1796) and of Charette (March) ended the struggle. In July, General Lazare Hoche announced that order had been restored in the west.

Subsequent, though smaller, royalist risings in the Vendée occurred in 1799, in 1815, and, finally, in 1832, in opposition to the constitutional monarchy of Louis-Philippe.

Consult the INDEX *first*

vending machine, coin-actuated machine through which various goods may be retailed. Vending machines should not be confused with coin-operated amusement games or music machines. The first known commercial use of vending machines came early in the 18th century in England, where coin-actuated "honour boxes" were used to sell snuff and tobacco. These devices were also in use in the British-American colonies later in the century.

The first practical, commercial use of vending machines took place in the United States in 1888, when machines were used to expand the sales of chewing gum into places where gum sales otherwise could not be made, specifically the platforms of the New York City elevated railway. The American industry was limited mainly to penny-candy vending until 1926, when the modern era of automatic selling opened with the appearance of cigarette vending machines. The first soft-drink machine followed in 1937.

As the United States began its defense buildup prior to its entry into World War II, plant managements estimated that people could not work efficiently for 10, 12, or more hours without a refreshment break, and vending machines proved the most practical way of providing refreshments. During the 1940s and '50s the vending machine business was concentrated in plants and factories, and by the end of that period, machines were being used to sell a wide variety of freshly prepared as well as prepackaged foods to replace or supplement traditional in-plant food service facilities. Refrigeration was added to vending machines to sell bottled soft drinks.

The ability of vending machines to sell products at competitive prices around the clock without regard to holidays is now widely recognized. The business has grown beyond plants and factories, and machines are commonly used in schools, colleges and universities, recreation centres, health care facilities, offices, and the like.

Typically, vending service is provided by companies (operators) who own and place machines on premises owned by others. These companies provide complete maintenance and service, as well as products, usually without any cost to the owners of the premises other than perhaps a servicing charge.

Vending machines have been used in Great Britain, continental Europe, and Scandinavia since the 1880s, when they were employed to sell confectionery and tobacco products. In recent years, the vending machine business in those countries has closely paralleled the expansion of vending in the United States. Vending in Japan began in earnest in the 1960s and developed rapidly into a major factor in that country's distribution system.

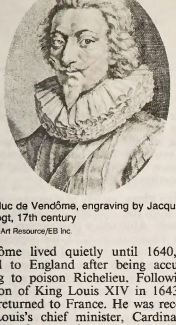
Vendôme, historic town and capital of an *arrondissement* in the *département* of Loir-et-Cher, Centre *région,* north-central France. It lies southwest of Paris and 20 miles (30 km) northwest of Blois. Vendôme stands on the Loir River, which there divides and intersects the town. To the south stands a hill on which are ruins of the 11th-century castle of the counts (later dukes) of Vendôme. The town was extensively damaged during World War II but was thereafter largely restored. The local industry is diversified and includes household appliances, computers, printing, control and measurement apparatus, and food processing.

The Roman Vindocinum was a provincial fortification of Gaul, replaced later by a feudal castle, around which the town arose. Christianity was introduced by St. Bienheuré in the 5th century, and the important Abbey of the Trinity was founded about 1030. When the reign of the Capetian dynasty began, Vendôme was the chief town of a countship belonging to Bouchard, called "the Venerable." The succession passed by various marriages to the houses of Nevers, Penuilly, Montoire, and Bourbon. The countship of Vendôme was raised to the rank of a duchy and peerage of France for Charles de Bourbon (1515); his son Anthony, king of Navarre, was the father of Henry IV, who gave the duchy of Vendôme in 1598 to his natural son César (1594–1665), in whose line the dukedom continued for more than a century. The last of the family in the male line (1654–1712) was Louis XIV's famous general, Louis-Joseph, Duke de Vendôme. Pop. (1990) 18,359.

Vendôme, César, Duke (duc) **de** (b. 1594, Coucy, France—d. Oct. 22, 1665, Paris), leader in several aristocratic revolts during the reign of King Louis XIII of France (ruled 1610–43).

The elder son of King Henry IV by his mistress, Gabrielle d'Estrées, Vendôme was legitimized in 1595 and created Duke de Vendôme in 1598. In 1609 he married Françoise, daughter of Philippe-Emmanuel de Lorraine, Duke de Mercoeur, to whose governorship he succeeded at that time. His participation in the

aristocratic revolts of 1614, 1616, and 1620 increased the animosity of his half brother Louis XIII. An enemy of Louis's powerful first minister, the Cardinal de Richelieu, Vendôme was implicated in an unsuccessful plot (the Chalais conspiracy) in 1626 to assassinate Richelieu. As a result, he and his brother Alexandre, grand prior of France, were imprisoned at Vincennes. Alexandre died in prison (1626), and César was forced to resign Brittany before his release (1630).

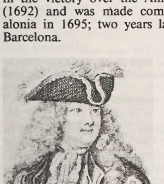


César, duc de Vendôme, engraving by Jacques Honervogt, 17th century
Giraudon—Art Resource/EB Inc

Vendôme lived quietly until 1640, when he fled to England after being accused of plotting to poison Richelieu. Following the accession of King Louis XIV in 1643, Vendôme returned to France. He was reconciled with Louis's chief minister, Cardinal Jules Mazarin, after the first phase (1648–49) of the uprising known as the Fronde, remaining loyal to Mazarin throughout the second phase (1650–53), the revolt of the nobles. He even agreed to the marriage of his elder son, Louis, Duke de Mercoeur, to Mazarin's niece, Laure Mancini. Vendôme led the royal troops against the rebels in Burgundy, of which he was appointed governor in 1650; as admiral he helped to capture the insurgent stronghold of Bordeaux in July 1653. Joining French forces in the ongoing war with Spain, he defeated a Spanish fleet off Barcelona in 1655.

Vendôme, Louis-Joseph, duc de (duke of), also called (until 1669) DUC DE PENTHIÈVRE (b. July 1, 1654, Paris—d. June 15, 1712, Vinaroz, Spain), one of King Louis XIV's leading generals during the War of the Spanish Succession (1701–14).

Vendôme was the son of Louis de Vendôme, Duke de Mercoeur, by his marriage to Cardinal Jules Mazarin's niece, Laure Mancini. Vendôme entered the French Army in 1672 and had risen to the rank of lieutenant general by the outbreak of the War of the Grand Alliance (1689–97) between France and the other major powers. He distinguished himself in the victory over the Allies at Steenkirke (1692) and was made commander in Catalonia in 1695; two years later he captured Barcelona.



Louis-Joseph, duc de Vendôme, detail from an engraving by Nicolas Bonnart I
Giraudon—Art Resource/EB Inc

The dispute over the succession to the Spanish throne brought France and Spain to war with the British, the Austrians, and the Dutch in 1701. Appointed to the command in northern Italy in 1702, Vendôme fought the Austrian commander, Prince Eugene of Savoy, in the bloody but indecisive Battle of Luzzara on August 15. He took Vercelli in 1704 and defeated Prince Eugene at Cassano in August 1705. In May 1706 Vendôme was transferred to the Flanders front, where the British commander John Churchill, 1st Duke of Marlborough, had just won an overwhelming victory at Ramillies. Vendôme made limited gains until he was severely defeated by Marlborough and Prince Eugene at Oudenaarde on July 11, 1708. Vendôme subsequently failed to relieve besieged Lille (in northern France), which fell to the Allies in October. Recalled by Louis XIV, he was temporarily disgraced.

In the autumn of 1710, Vendôme was made commander of the army of King Philip V of Spain. He recaptured Madrid for Philip and on December 9 forced the British general James Stanhope to surrender at Brihuega. The next day he won a major victory over Guido von Starhemberg's Austrian forces at Villaviciosa. As a result of these triumphs, Philip was assured of his throne, and the Austrians were confined to Catalonia. Vendôme was completing the reconquest of Catalonia when he died.

Vendsyssel-Thy, island at the north end of Jutland, Denmark, known as Vendsyssel in the east and Thy in the west. The Limfjorden separates it from the mainland, to which it was attached until 1825, when water erosion cut a channel through the narrow isthmus at Thyborøn. The island has an area of 1,809 square miles (4,685 square km).

Vendsyssel is an open, windswept region. Frederikshavn, the main port, lies on the east coast facing Göteborg, Sweden, across the Kattegat. The island's west coast, curving around the shallow, treacherous Jammerbugt ("Bay of Woe") of the Skagerrak, is lined with white sand beaches and shifting dunes. In the 20th century many seaside vacation cottages have been built among the older fishing villages along the shore. At Skagen (*q.v.*) in the extreme north, where the Kattegat and the Skagerrak meet, the dunes move perceptibly from year to year.

The Thy peninsula curves southwest from Vendsyssel to the Thyborøn channel. Dunes and drift sand, blown inland from the North Sea shore, cover a quarter of the land. Plantations of conifers and marram grass have stabilized much of the shoreline for use as a wildlife sanctuary and holiday resort. Farming and fishing are limited, especially on and near the North Sea, and Thisted on the Limfjorden is the only sizable town. At Hanstholm on the North Sea, a deepwater port was opened in 1967 to accommodate fishing boats and provide employment, and new town development was projected. Pop. (1981) 309,834.

veneer, extremely thin sheet of rich-coloured wood (such as mahogany, ebony, or rosewood) or precious materials (such as ivory or tortoiseshell) cut in decorative patterns and applied to the surface area of a piece of furniture. It is to be distinguished from two allied processes: inlay, in which cutout pieces of decorative wood or other materials—such as metal, leather, or mother-of-pearl—are inset into cavities cut into the main structure of the piece being decorated; and marquetry, or boulle work, which is a more elaborate kind of complex veneering.

There are two main types of veneering, the simplest being that in which a single sheet, chosen for its interesting grain (yew or purple wood, for example), is applied to a whole surface of inferior wood in one unit. In the more complex variation called crossbanding, small pieces of veneer wood are fitted together within a surrounding framework in such a way that the grain changes pattern, thus altering the tone according to the light. This process can produce complex fan shapes, sunbursts, and floral patterns.



Commode, pine veneered with kingwood parquetry, Paris, c. 1710; in the Victoria and Albert Museum, London
By courtesy of the Victoria and Albert Museum, London

When the veneers are made up of small pieces cut from the same larger piece of wood and affixed so that their grain runs in opposite directions in accordance with a formal geometric pattern, the process is known as parquetry.

Veneering allows the use of beautiful woods that because of limited availability, small size, or difficulty in working cannot be used in solid form for making furniture. In addition, it significantly increases the strength of the wood by backing it with a sturdier wood and, through the process of laminating veneers at right angles in successive layers, offsets the cross-grain weakness of the wood.

Modern veneering, which uses special glues and drying and testing equipment, produces a strong and beautiful product. Basically, the process involved in making all veneers is the same. First, the decorative wood is sawn, sliced, shaved, or peeled, sometimes by a rotary machine, into pieces between $1/16$ and $1/32$ inch in thickness. Then the veneer is glued to a prepared, coarser wood and secured by the application of mahogany, zinc, or cardboard presses; for curved and intricately shaped surfaces, molded sandbags are used. Early handcut veneers were thicker than the later machine-sawn product; although they were seldom less than $1/8$ inch in thickness, they were cut by hand to $1/10$ inch in 16th-century southern Europe.

Although the craft of veneering was practiced in classical antiquity, its use lapsed during the Middle Ages. It was revived in the 17th century, reaching its apogee in France and spreading from there to other European countries. Because of their preference for ebony, the French masters of the craft of veneering were known as *ébénistes*, although they later combined veneering with technical variations such as marquetry. By the end of the 17th century, woods such as almondwood, boxwood, cherry wood, and pearwood were used.

The considerable craftsmanship involved in the artistic use of veneers is most evident in the 18th and early 19th centuries, when Chippendale, Hepplewhite, and Sheraton used mahogany and satinwood veneers. Later, exotic woods, various metals, and animal materials such as tortoiseshell—which was also popular with 17th-century Flemish craftsmen—were in vogue. By the mid-19th century, with the introduction of mechanical saws, the veneering process was sometimes used in mass production to cover defects in cheap pine or poplar furniture.

Venera, any of a series of unmanned Soviet planetary probes that were sent to Venus. Venera 2 (launched in 1965) flew to within 25,000 miles (40,200 km) of Venus in Febru-

ary 1966, and Venera 3 crash-landed on its surface the following month, becoming the first spacecraft to strike another planet. Venera 4 (1967) analyzed the chemical composition of Venus' upper atmosphere and provided the scientific community with the first direct measurements for a model of the planet's atmospheric makeup. Venera 5 and 6 (1969) made similar soft landings on Venus, but ceased transmitting data before reaching the surface because of the extreme heat and pressure of the planet's atmosphere. Venera 7 (1970) and Venera 8 (1972) detected the occurrence of certain long-lived radioactive isotopes (chiefly uranium and thorium) on Venus' surface. Venera 9 and 10 (1975) sent back the first closeup photographs of the planet's surface; these images showed that certain parts of Venus were covered with sizable sharp-edged rocks and others with fine-grain dust. Venera 11 and 12 (1978) measured the chemical components of the planet's lower atmosphere.

venerable, Latin VENERABILIS, title or respectful form of address, used from very early times in Europe, especially for certain clergy or for laymen of marked spiritual merit. St. Augustine in some epistles cited the term in reference to bishops, and Philip I of France was styled *venerabilis* and *venerandus* ("reverential"). The venerable by which Saint Bede is commonly known ("the Venerable Bede," or "Bede the Venerable") survives from a contemporary practice of so addressing bishops and abbots and, posthumously, worthy clerics such as Bede.

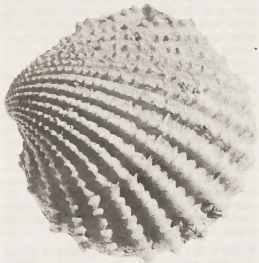
In the Roman Catholic Church, the title "Venerable" is bestowed on a deceased person in the first of three stages leading to beatification (with the title of "Blessed") and canonization (with the title of "Saint"). The candidate to these higher honours becomes "Venerable" when his or her case has been officially accepted by the Sacred Congregation of Rites and when a special papal decree announces the candidacy, asserting that the person had virtues of heroic degree or had suffered martyrdom.

Priests of the Carthusian order (other than the prior-general) are addressed as "Venerable" (rather than "Reverend," as in other orders).

In the Church of England, venerable is the proper title of address for an archdeacon.

venereal disease (VD), any of a number of contagious diseases that are most commonly acquired in sexual intercourse. *See* sexually transmitted disease.

Venericardia, genus of pelecypods (clams) abundant during the Eocene Epoch (the Eocene Epoch began 57.8 million years ago and ended 36.6 million years ago). The shell, composed of two halves (valves), is distinctive in form and generally large. Transverse ribs radiate from the apex of the valves and are broken by a series of concentric growth rings. Internally, the valves are marked by distinctive nodes along the edge and thickenings that form raised bars at the apex; these form the surfaces along which the valves articulate.



Venericardia divergens
By courtesy of the Buffalo Museum of Science, Buffalo, N.Y.

Venetan, group of dialects of Italian spoken in northeastern Italy. It includes the dialects spoken in Venice (Venetian), Verona (Veronese), Treviso (Trevisan), and Padua (Paduan).

Veneti, ancient people of northeastern Italy, who arrived about 1000 BC and occupied country stretching south to the Po and west to the neighbourhood of Verona. They left more than 400 inscriptions from the last four centuries BC, some in the Latin alphabet, others in a native script (*see* Venetic language).

The chief Venetic settlement was Este (later the Roman colony of Ateste), which was also the cult centre of their important divinity Reitia, possibly a goddess of childbirth. The horses bred in Venetia were famous in the Greek world, and there was other commerce both with Greek lands and with the Alps and northern Europe, including some control of the amber route from the Baltic. The Veneti were friendly to Rome throughout and assisted Rome against the Gauls, especially in the war of 225 BC. The colony of Aquileia, founded in 181 BC, protected Venetia from raids by its mountain neighbours, and a century of peace and Romanization followed, though probably much land was bought up by Roman settlers. The towns were given Latin rights in 89 BC and full citizen status in 49 BC.

Veneti, ancient Celtic people who lived in what is now the Morbihan district of modern Brittany. By the time of Julius Caesar they controlled all Atlantic trade to Britain. They submitted to Caesar in 57 BC; but the next winter, disturbed by his interest in Britain, they seized some Roman commissariat officers and, with the support of several maritime states, attempted to regain independence. Caesar built galleys in the Loire River and in the late summer of 56 met the Venetic fleet of more than 200 ships in Quiberon Bay and destroyed it. After his victory Caesar executed the tribal elders and sold the rest of the people. By some means, however, the tribe as such survived and is attested in imperial times.

Venetia, Italian VENEZIA, territory of northeastern Italy and western Slovenia between the Alps and the Po River and opening on the Adriatic Sea. Italians often use the name Veneto for the region around Venice proper (Venezia) and the name Venezia Giulia for the country to the east.

Historically Venetia was the mainland territory under the control of the Republic of Venice from the 14th and 15th centuries, extending from Lake Garda to Dalmatia. After the collapse of the Venetian Republic (1797) and a number of political shifts during the French Revolutionary Wars, Venetia came under Austrian rule and formed the eastern part of the Kingdom of Lombardy–Venetia, set up in 1815. Its boundaries then were, on the west, Lake Garda and the Mincio River and, on the east, Istria (Venetian before 1797) and Gorizia. In 1866 Venetia (in the sense of Veneto) was incorporated into the recently formed Kingdom of Italy.

In the 20th century, changes in the northeastern boundary of Italy resulted in new designations for the historic area of Venetia. After World War I, Italy received from Austria Istria and Gorizia (renamed Venezia Giulia) and the southern Tirol (renamed Venezia Tridentina, although it had never been under Venice's control). These areas, together with the previously annexed Venetia (renamed Venezia Eu-



Venetia, 1815–66

ganea), came to be called commonly the Tre Venezie (Three Venices). After World War II, Italy lost most of Venezia Giulia to Yugoslavia, and the areas now remaining to Italy in the northeast have been reorganized into the regions of Friuli-Venezia Giulia, Veneto, and Trentino-Alto Adige (*qq.v.*).

Venetian glass, variety of glasswares made in Venice from the 13th century, at the latest, to the present. Although a glassblowers' guild existed in Venice from 1224, the earliest extant specimens that can be dated with certainty are from the mid-15th century. The early history of Venetian glass is therefore largely conjectural. It is known that in 1291 the glasshouses moved across the lagoon to the island of Murano (*q.v.*), where they have remained. The



Venetian glass goblet and cover with dragon motif, Venice, 16th century; in the Corning Museum of Glass, Corning, N.Y.
By courtesy of the Corning Museum of Glass, Corning, N.Y.

capture of Constantinople by the crusaders in 1204 and by the Ottomans in 1453 brought an influx of Byzantine glassworkers to Venice. In the 16th century, a period from which a significant number of samples has survived, Venice was no longer a world power; and Venetian glass therefore belongs, along with much of the city's other art, to its period of commercial decline.

In the 15th century efforts were concentrated in the perfection of *cristallo—i.e.,* clear glass



Ewer made of *calcedonio*, Venice, early 16th century; in the Museum für Kunsthandwerk, Frankfurt am Main, Ger.

By courtesy of the Museum fur Kunsthandwerk, Frankfurt am Main, Ger.; photograph, Foto Marburg—Art Resource/ EB Inc.

that approximated rock crystal in appearance. By the 16th century techniques of adding colour to clear glass were mastered as well as those of decolourizing glass from the natural smoky tint of all primitive glass produced by metal in the glass material. Gilding and enamelling were also known. These and other secrets were guarded, and severe penalties were meted out to defecting workmen. Examples from the 16th century include vessels done in millefiori technique, an ancient technique in which canes of different coloured glass are bonded together so that a section reveals many small multicoloured flowerlike beads. Other techniques used were *calcedonio*, a method of simulating marble and other stones; and latticinio, in which rods of opaque, usually white, glass were incorporated in the body of the glass vessel and worked in patterns. Diamond-engraving was made possible in the 16th century by the improvements that had been made in the quality of the glass.

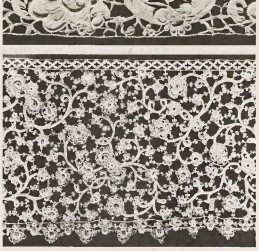
The staple products of Venetian glassblowers in the 16th and 17th centuries were drinking glasses. Their peculiarly Venetian characteristic was the elaborate working of the stem with tools such as pincers while the glass was still malleable. Symmetrical "wings" were drawn outward at each side; these were sometimes further elaborated into animals or masks, and sometimes the stem so bristled with projections that the glass can hardly have been used for drinking at all. This type of drinking glass and some other vessels with elaborately flared bowls are usually called *bouquetiers* ("flower holders").

In spite of the restrictions on the migration of workmen, many Venetian glassmakers did in fact defect, notably to Altare near Genoa. The techniques so jealously guarded became common knowledge; and from the 16th century various countries, including France, Germany, England, and the Netherlands, produced their own versions of Venetian glass types, *façon de Venise* ("Venetian fashion").

In the 18th century competition from other countries, especially Bohemia, caused somewhat of a decline in the prestige of Venetian glass, although 17th-century types continued to be reproduced along with mirrors and beads. In the 19th century little was done that was worthwhile apart from the reproduction of older types. In the 20th century the old techniques such as latticinio were employed with continued skill to produce some tasteless glass, though from *c.* 1961 some good specimens such as plain obelisks and hourglasses were being made. The reproduction of 17th-century types continues.

Venetian needle lace, French POINT DE VENISE, Venetian lace made with a needle from the 16th to the 19th century. Early examples were deep, acute-angled points, each worked separately and linked together by a narrow band, or "footing," stitched with buttonholing. These points were used in ruffs and collars in the 16th and 17th centuries and, from their presence in portraits by Anthony Van Dyck, are known as "vandykes." Geometrical designs began to give way in the late 16th century to more curvilinear patterns. From 1620 Venetian raised lace (in Italian *punto a relievo*, in French *gros point de Venise*) developed distinct from flat Venetian (*point plat de Venise*). The pattern was raised by outlining the design with a cordonnet, a heavier thread, bundle of threads, or horsehair, worked over with buttonholing, so that the curls, scrolls, and conventionalized leaves stood out like relief carving. Rose point (*point de rose*) was less grandiose than *gros point* but even more ornamented with many little loops (picots) and rosettes; lace with more light bars of thread (brides) worked with such motifs as picots and stars like snowflakes was called *point de neige* ("snow lace"). *Point de Venise à réseau* ("Venetian lace with a mesh"), imitated *c.* 1650 from French lace, had a mesh ground instead of bars. Lace making declined in Venice in the early 19th century but was revived in 1872 at nearby Burano.







Venetian needle lace

(Top) *Gros point de Venise* lace from Italy, second half of the 17th century, in the Museum Boymans-van Beuningen, Rotterdam; (centre) *point de rose* lace probably from France, 17th–18th century, in the Museum Boymans-van Beuningen, Rotterdam; (bottom) *point de Venise à réseau* lace, *c.* 1725–35, in the Rijksmuseum, Amsterdam

By courtesy of (top and centre) the Museum Boymans-van Beuningen, Rotterdam, (bottom) the Rijksmuseum, Amsterdam

Venetian school, Renaissance art and artists, especially painters, of the city of Venice. Like rivals Florence and Rome, Venice enjoyed periods of importance and influence in the continuum of western European art, but in each period the outstanding Venetian characteristic has remained constant, a love of light and colour.

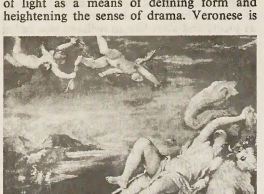
The founder of the dynasty of painters that was most important in Venice during the early Renaissance was Jacopo Bellini (*c.* 1400–70), a pupil of Gentile da Fabriano. Two of his sketchbooks are preserved, and there is reason to suspect that many of the compositions made famous by his sons Gentile (*c.* 1429–1507) and Giovanni (*c.* 1430–1516) and his son-in-law Andrea Mantegna (1431–1506) were derived from him. Gentile Bellini has the distinction of having been for a time (1479–81) painter to the court of Mehmed II in Constantinople, and he also visited Rome, where he filled a now-lost album with studies. Giovanni Bellini was the most important teacher of his generation and included among his pupils were Giorgione (1477–1510), Titian (1488/90–1576), Jacopo Vecchio (*c.* 1480–1528), and Sebastiano del Piombo (*c.* 1485–1547). In short, he instructed the painters of the High Renaissance in Venice. Giovanni Bellini, as well as being the foremost painter in the Republic, was one of the most inventive and original. He was receptive to the interest in landscape that was so integral a part of the contemporary Flemish works then arriving in Venice, and in his many Madonna paintings he used bits and pieces of the natural world to vary and embroider his theme. Bellini's late style is pure High Renaissance. He managed to make a transition that few masters of his generation achieved. Although the circle around Bellini was the most successful and progressive, there were other painters like Vittore Carpaccio (1460–1525/26) and painter families such as the Vivarini and, later, the Bassano who were not as closely allied to him yet were also part of the Venetian school.

The early death of the mysterious Giorgione deprived the Venetian school of its most promising master. There are few paintings by him, and even some of those are thought to have been finished by Titian or Sebastiano. His remaining works are filled with a hazy, brownish light that serves to enhance the romance of their moodiness.

Upon Giovanni Bellini's death, Titian became painter to the Republic and the dominant force in Venetian painting for the next half century. His rich colours and painterly technique were widely imitated. Although interested in both religious and classical subjects, Titian was most sought after for his psychologically penetrating portraits. In 1533 he was knighted and made court painter to the emperor Charles V.

The last masters of this phase of the Venetian school—Jacopo Tintoretto (*c.* 1518–94), Paolo Veronese (1528–88), and El Greco (1541–

1614)—were strongly influenced by Titian. Tintoretto was most interested in Titian's use of dramatic light and the depiction of heightened emotion. He made use of the rapidly receding diagonals and dramatic foreshortenings popular among Mannerist painters but brought to these elements the Venetians' love of light as a means of defining form and heightening the sense of drama. Veronese is



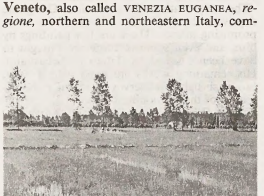
"The Rape of Europa," oil on canvas by Titian, Venetian school, about 1559–62; in the Isabella Stewart Gardner Museum, Boston
By courtesy of the Isabella Stewart Gardner Museum, Boston

best known for the rich colour and inter-weaving compositions that he learned from Titian and used in large paintings crowded with figures. The Spanish style of El Greco may be regarded as an extension of the Venetian school's colouristic tradition, rather than as a mere variety of Mannerism.

The last period of significance for the Venetian school occurred in the 18th century, during which time several painters of quality arose who enjoyed international reputations: Canaletto (1697–1768), Giovanni Battista Tiepolo (1696–1770), and Francesco Guardi (1712–93). Tiepolo was the last important Venetian figure painter and one of the greatest decorative artists of the Rococo. Canaletto and Guardi developed a tradition of landscape painting based on views of Venice.

Venetic language, a language spoken in northeastern Italy before the Christian era. Known to modern scholars from some 200 short inscriptions dating from the 5th through the 1st century BC, it is written either in Latin characters or in a native alphabet derived from Etruscan, the Etruscans having established settlements in the Po Valley in the 6th century BC. Authorities are undecided as to whether Venetic is related to the Italic languages such as Latin or is an independent branch of Indo-European.

Veneto, also called VENEZIA EUGANEA, *regione,* northern and northeastern Italy, com-



Rice fields in the Piave River valley, Veneto, Italy
Eric Carle—Shostal

prising the *provincie* of Venezia, Padova, Rovigo, Verona, Vicenza, Treviso, and Belluno. It is bounded by Trentino-Alto Adige (north), Emilia-Romagna (south), Lombardia (west), Austria (northeast), and Friuli-Venezia Giulia and the Adriatic Sea (east). The northern limit of Veneto is marked by a mountainous area, including the Dolomites, between Lake Garda (southwest) and the Carnic Alps to the northeast. The southern part consists of a fertile plain extending to the Gulf of Venice and drained chiefly by the Po, Adige, Brenta, Piave, and Livenza rivers, the mouths of which form an extensive delta area with shore lagoons.

Veneto is a chief producer of corn (maize), wheat, sugar beets, and hemp. Dairy-cattle fodder and fruit (apples, pears, peaches, cherries), and wine grapes are also grown. There is much irrigation, and considerable land has been reclaimed, especially in the Po River delta. After World War II, large estates were expropriated for distribution to smallholders. The region uses hydroelectric power from the swift streams of the Alpine area.

The larger towns of the plain have textile, silk, lace, hemp, paper, founding, and shipbuilding industries, as well as sugar refining and food processing. Besides Venice, the capital, the principal cities are Verona, Rovigo, Padua, Vicenza, Treviso, and Valdagno. The *regione* has a dense road and rail network and is connected by motorway to Milan and Turin. Venice is connected to the mainland by a road bridge and rail bridge. Area 7,090 square miles (18,364 square km). Pop. (2003 est.) 4,577,408.

Venette, Jean de (b. *c.* 1308, Venette, Fr.—d. *c.* 1369), French chronicler who left a valuable eyewitness report of events of the central France of his time.

Of peasant origin, Jean joined the Carmelite order and was elected prior of the Carmelite convent at Paris in 1339. In 1342 he was appointed provincial of France for the Carmelite order. He also apparently served as a master of theology at the University of Paris. About 1360 he composed a short history of the Carmelites up to 1240. His Latin chronicle, covering the period of 1340–68, was a continuation of the work by Guillaume de Nangis. Although he was interested in the success of the 14th-century Valois dynasty, he displayed an unusually pronounced sympathy for the peasants and was critical of both the monarchy and the feudal lords. An eyewitness of most of the events he recorded, he provided innovative interpretation and lively discussion of the narrative, a characteristic unique among chroniclers at that time. He also wrote an unpublished religious poem, the *Roman des trois Maries* (*c.* 1347).

Venezia (Italy): *see* Venetia; Venice.

Venezia Giulia (region, Italy): *see* Friuli-Venezia Giulia.

Veneziano, Domenico: *see* Domenico Veneziano.

Venezuela, officially BOLIVARIAN REPUBLIC OF VENEZUELA, Spanish RÉPUBLICA BOLIVARIANA DE VENEZUELA, country at the northern extremity of South America. The capital is Caracas. The country's greatest extent is about 650 miles (1,050 km) from north to south and about 800 miles (1,285 km) from east to west. It is bordered to the east by Guyana, to the south by Brazil, and to the west by Colombia. Venezuela fronts the Caribbean Sea to the north and the Atlantic Ocean to the northeast. Area 353,841 square miles (916,445 square km). Pop. (2004 est.) 26,170,000.

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

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



Venezuela

The land. Venezuela may be divided into three broad geographic regions: the Llanos (Plains), a low-lying grassland of central Venezuela occupying about one-third of the country's territory; the Guiana Highlands in the southeast, a sparsely inhabited, often rugged, granite massif comprising more than two-fifths of the country; and the coastal plains and mountains in the north, including (from west to east) ranges of the Andes, a lower transitional mountainous zone, and the Coastal Range. The 5,130-square-mile (13,280-square-kilometre) Lake Maracaibo in the northwestern part of the country is a shallow, partly freshwater inlet of the sea surrounded by swampy lowlands. Highest elevations range from 16,427 feet (5,007 m) in the Venezuelan Andes to roughly 8,200 feet (2,500 m) in the Guiana Highlands and to 9,069 feet (2,765 m) in the Coastal Range.

The Orinoco River (1,700 miles [2,735 km] long) drains most of the Llanos and the Guiana Highlands, emptying into the Atlantic Ocean through a number of distributaries. Tributaries of the Orinoco in the Guiana Highlands descend over gigantic, erosion-resistant mounds known as *tepuis;* Angel Falls, the highest waterfall in the world (3,212 feet [979 m]), descends from one of these *tepuis.* The Orinoco drainage system has great hydroelectric potential, particularly at the Guri Dam on the Caroní River.

The climate in Venezuela, although variable according to elevation, is generally tropical, with the seasons marked more by differences in rainfall than in temperature. At Caracas, for example, the average annual temperature is 72° F (22° C) with an average annual range of about 8° F (4° C). Areas lying behind topographic barriers, such as the northern coastal plains and Caribbean islands, are arid (11 inches [280 mm] annual rainfall at Guaira), whereas the windward mountain slopes of northern Venezuela are generally well watered. Extensive flooding is common in the Llanos during the May-October rainy season, followed by an equally severe dry season.

Venezuela's cultivated land lies mostly in the coastal and Maracaibo lowlands and in intermontane valleys. Forests cover about two-fifths of the country, and grasslands (in the Llanos and the high tablelands of the Guiana Highlands) cover about half. Where it is humid the forests vary from true rainforest in the low-lying Orinoco River basin to semi-tropical evergreen at higher elevations, often characterized by orchids and tree ferns. Wildlife is profuse, although it has retreated before human presence in the north; in that zone, numerous endangered species have been recognized since the mid-1970s.

Venezuela's principal mineral resources are petroleum, amounting to about 6 percent of world reserves, and natural gas, amounting to almost 3 percent. Iron and bauxite reserves,

like petroleum, finance and serve the industrial base of the country; other mineral reserves include gold, diamonds, coal, and salt.

The people. More than two-thirds of Venezuela's population is of mestizo (mixed Indian and white European) ancestry, followed by whites (about one-fifth), blacks (one-tenth), and Indians. Spanish is the chief language, though more than 25 Indian languages are still spoken. Roman Catholicism is the main religion. More than 85 percent of the population is urban, and about one-eighth lives in Caracas and its environs. There is considerable population movement from the rural areas to the cities. Immigration, mostly from Colombia, Spain, Italy, and Portugal, reinforces historic trends. Population density is not high overall, and the Guiana Highlands have a low density of only 6 persons per square mile. More than one-third of the population is younger than 15 years of age. Health standards are good for a developing country, and life expectancy is 70 years for men and 76 for women.

The economy. Venezuela has a developing economy supported by the exploitation of petroleum. Nonetheless, Venezuela has one of the higher gross national products (GNP) per capita in South America. The GNP originates primarily from manufacturing, services, and oil production. The government privatized some companies during the 1990s.

Agricultural land in Venezuela amounts to only about 4 percent of the total land area, and of this, nearly one-third lies fallow. Less than one-tenth of the labour force is employed in agriculture, and the country is a net importer of foods; grains and animal fodder predominate among these imports. Domestic food-crop production includes bananas, corn (maize), rice, and sorghum; the main cash crops are sugarcane, coffee, and cacao. Cattle are the chief livestock.

Forest reserves are enormous, covering most of the southern half of the country, and, despite the presence of valuable hardwoods such as mahogany, are little exploited. Fisheries are likewise little developed, in spite of Venezuela's long coastline; anchovies are the principal fishes caught. Petroleum and natural gas provide most of Venezuela's foreign exchange. Relatively large amounts of high-grade iron ore are mined, as well as bauxite, diamonds, and small amounts of gold.

Manufacturing was originally concentrated in Caracas but has been extended to the northern coastal centres of Maracaibo (foodstuffs and heavy machinery) and Morón (petrochemicals) and to the eastern Orinoco River basin centred on Ciudad Guayana (steel and aluminum complexes).

The transportation sector has road, rail, water, and air services well adapted to current needs. More than one-third of the road network is paved. The railroad network is mainly private and used for industrial purposes such as transporting iron ore from mines in the Guiana Highlands to the steel mills of Ciudad Guayana. La Guaira, the port for Caracas, is the country's main port for imports, and Simón Bolívar Airport, also near Caracas, is Venezuela's busiest international airport.

The national labour force is distributed primarily among public administration, trade, and manufacturing. The oil booms of the 1970s, early '80s and beginning of the 21st century attracted job seekers from surrounding countries, especially Colombia. Venezuela continues to have an active labour-union movement.

Venezuela has enjoyed a positive balance of trade for decades. The major destinations for its exports, largely of crude petroleum and refined petroleum products, are the United States (by far the largest), and Andean Pact countries. Machinery and transport equipment, chemicals, and basic manufactures are the major imports, and the United States is the major import source.

Government and social conditions. The Venezuelan constitution of 1999 vests executive power in the president, who serves a six-year term and is eligible for immediate reelection; the president is also the chief of state and commander of the armed forces. The 165 members of the unicameral National Assembly are elected to five-year terms through a combination of proportional and direct representation. The judiciary is headed by the Supreme Court of Justice, the members of which are appointed to 12-year terms by the National Assembly.

Two of the nation's several political parties dominated politics until 1993: Democratic Action and the Social Christian Party. However, in the 1998 elections these parties virtually collapsed.

The country is divided into 23 states and the federal district, which includes Caracas. Each state is headed by a directly elected governor and has a legislative assembly. The federal district is administered by a mayor.

The public-welfare system is well developed. Social security was established in 1944. Compensation is also provided for maternity and disability. Health services compare favourably with those of more developed countries, although there is a shortage of doctors.

About nine-tenths of Venezuelan adults are literate. School is free and compulsory between the ages of 6 and 15. The country has numerous institutions of higher learning.

Privately owned radio, television, and printed news media sometimes criticize the government but generally practice self-censorship. The circulation of daily newspapers is among the highest in Latin America. Television broadcasting is available to most Venezuelans.

Cultural life. Venezuela's folk and popular culture is regional in character and is represented by figures such as the *llanero,* or *vaquero,* the cowboy of the Llanos; the *maracucho,* the dynamic businessman of the Maracaibo basin; the *guayanés,* the hardy frontiersman following a dream; and the rugged *andino* of the mountains.

History. The pre-Columbian Indian cultures of Venezuela were not part of the better-known civilizations of the Andes or Central America. Rather, they arose in a transitional region connecting the so-called marginal cultures of the Andes with those of the Caribbean and the Amazon River basin. Isolated tribes settled extensively throughout the coastal and Llanos regions for several millennia prior to the arrival of European colonists in the 16th century AD. The Venezuelan coast was sighted by Christopher Columbus in 1498 during his third voyage and the next year was named Venezuela ("Little Venice") by Spanish explorers after observing native Indian villages perched on stilts along the shores of swampy Lake Maracaibo.

For three centuries Venezuela was a Spanish colony. Creoles (native-born whites) owned the colony's agricultural land and worked it using the labour of Indians and imported African slaves. Venezuelan creoles led by Francisco de Miranda and Simón Bolívar spearheaded the South American independence movement of about 1810–25. After the defeat of the Spanish in 1821, Venezuela, together with Colombia and Ecuador, was part of the republic of Gran Colombia, but in 1830 it seceded and became an independent republic. Between 1830 and 1958 Venezuela was largely ruled by a series of military dictators, including generals Antonio Guzmán Blanco (1870–88), Cipriano Castro (1899–1908), and Juan Vicente Gómez (1909–35).

A long-standing border dispute with Guyana (formerly British Guiana) over about two-thirds of Guyana's territory originated in 1844. The territory (mostly tropical rainforest) is still depicted in Venezuelan maps as territory to be reclaimed, despite rulings that have generally favoured the British and Guyanese claims.

Political order and liberal concessions (including the building of roads and schools) under the tyrannical rule of Gómez attracted British, Dutch, and American petroleum interests shortly before and after World War I. By the late 1920s Venezuela had become the world's leading exporter of oil and was second only to the United States in oil production. The oil boom of the 1940s and '50s paid the government huge royalties; some of these funds were used for public works (especially in modernizing Caracas at the expense of rural areas) while intermittent strongman rule continued. The overthrow in 1958 of the military dictator Marcos Pérez Jiménez was followed by democratically elected, mostly left-of-centre administrations. Rómulo Betancourt was the first elected president of Venezuela to serve his full term (1959–64). His programs led to social and economic advancement and the beginnings of political and economic stability. In the decade following Betancourt, democracy seemed to become more firmly established. However, two unsuccessful military coups were attempted in the early 1990s, including one led by Lt. Colonel Hugo Chávez, who was temporarily incarcerated.

Voters in 1998 elected Chávez as president and made his political coalition the largest in the legislature. A new constitution, approved the following year, fundamentally altered the government and changed the country's name to the Bolivarian Republic of Venezuela. Chávez, who was reelected in 2000, placed several military officers in government posts and acted to make Venezuela more diplomatically independent from the United States.

In 1999 a severe rainstorm devastated the northern coast of Venezuela, including parts of the Caracas metropolitan area.

Venezuela, Gulf of, Spanish GOLFO DE VENEZUELA, inlet of the Caribbean Sea in Venezuela and Colombia, extending 75 miles (120 km) north-south and reaching a maximum east-west width of 150 miles (240 km). It is bounded by the Guajira Peninsula on the west and by the Paraguaná Peninsula on the east and is connected with Lake Maracaibo to the south through Tablazo Bay and a channel 35 feet (11 m) deep near the city of Maracaibo. The gulf is surrounded by lowlands with little or no cultivation. It is a shipping route for the petroleum-producing Lake Maracaibo region.

Veniaminov, Ivan Yevseyevich (Russian Orthodox missionary): *see* Innocent Veniaminov, Saint.

Venice, Italian VENEZIA, city, major seaport, and capital of both the *provincia* of Venezia and the *regione* of Veneto, northern Italy. Once the centre of a maritime republic whose influence was felt throughout the Mediterranean world, Venice is now known principally for its canals, art, architecture, and unique romantic atmosphere. Pop. (1998 est.) 293,731.

A brief treatment of Venice follows. For full treatment and a city map, *see* MACROPAEDIA: Venice.

The historic city of Venice lies almost in the centre of a crescent-shaped lagoon that stretches for about 32 miles (51 km) from northeast to southwest. It is built on an archipelago of islets, mud flats, and sandbanks about 2 miles (3 km) long and 1 mile (1.5 km) wide. The limits of the modern city, embracing the perimeter of the lagoon, include 10 principal islands (apart from those of the mother city) and industrial mainland boroughs at Mestre and Marghera.

Tourism and industries related to tourism, such as the production of glass, lace, and textiles, employ a large share of the work. Venetian work force, although some of the work is sea-

sonal. By the beginning of the 21st century these ancient industries were in crisis. Port activities occupy additional workers, but the port of Marghera now handles a greater amount of shipping than does the old city.

Venice's many canals follow the original watercourse among the 118 original islands. The main stream through these isles, the Grand Canal, flows around two wide curves through the city. Ranging in width from about 100 to 225 feet (30 to 70 m) and having a mean depth of 9 feet (2.7 m), the Grand Canal is bordered by many palaces, churches, and a maritime gas station. Until the 19th century, the Grand Canal was crossed only by the Rialto Bridge, which was designed by Antonio da Ponte; two additional bridges now span the Grand Canal.



The Piazzetta, Venice, with (left) San Marco Basilica and the Doges' Palace and (centre background) the Church of San Giorgio Maggiore
Alexis Vaenitzoff—UNESCO

The most famous of Venice's approximately 400 bridges is the Bridge of Sighs, a short, covered passageway between the Doges' Palace (Palazzo Ducale) and the former Venetian Republic's prison.

The architecture of Venice is varied, with Italian, Arabic, Byzantine, Gothic, Renaissance, Mannerist, and Baroque styles all represented. For centuries the social and political centre of Venice was the Piazza San Marco (St. Mark's Square), one of the most famous squares in the world. Arcades line three of its sides; at the eastern end, spiked with the 324-foot (99-metre) Campanile, rises the golden facade of San Marco Basilica. The southern wing of the piazza, called the Piazzetta, is flanked by the Doges' Palace and the Old Library. At its edge lies the entrance to the square, at the point where the Grand Canal meets the broad San Marco Basin. The ornate chambers of the Doges' Palace were decorated by a number of Venice's great artists, and St. Mark's is filled with objects collected by the Venetians in their various conquests.

There are approximately 450 palaces and old houses of significance. Typically they are built on pilings or on stone fill. Few of these houses remain in the hands of the original families. Most of the residences are now office buildings or antique shops, and some of the palaces have been converted into hotels that have gained renown.

Venice's principal art museum, the Accademia on the Grand Canal, occupies the former convent, church, and trade-guild building of Santa Maria della Carità; the works of many famed Venetian artists are displayed there. Some of the Accademia's collection came from the *scuòle,* confraternity (or trade) guilds, two of which still exist as charitable organizations in their original buildings, which have been completely restored with their original decorations and paintings. The Church of Santi Giovanni e Paolo (called San Zanipolo by Venetians), consecrated by the Dominicans in 1430, features a Giovanni Bellini polyptych and a Paolo Veronese ceiling. The Franciscan Santa Maria Gloriosa dei Frari, built in the 13th century, contains the mausoleum for the artist Titian together with his "Assumption," "Pésaro Madonna," and other works. Other notable churches include the Il Redentore, San Giorgio Maggiore, and Le Zitelle.

Venice is also noted for its music, which became increasingly important as the city's commercial power declined. Claudio Monteverdi, a chief pioneer of the opera form, wrote the first opera ever performed in Venice, *Proserpina rapita.* Many operas by such celebrated artists as Giuseppe Verdi, Gioacchino Rossini, and, more recently, Igor Stravinsky were first performed in Venice at La Fenice Theatre, which was seriously damaged by fire in January 1996.

Beginning in the 1950s the deterioration of ancient buildings and other art treasures, which had been a long, slow process related to floods, subsidence, and various other natural phenomena, was accelerated by air pollution resulting from motor vehicle and boat engine exhausts and domestic and industrial smoke. In the mid-1960s the United Nations Educational, Scientific and Cultural Organization (UNESCO) began a worldwide campaign to harness scientific and technical procedures aimed at saving historic Venice. Testing was begun on a prototype for a series of barriers designed to prevent flooding in the city in 1988, but rising water levels and subsidence continued to threaten the city at the beginning of the 21st century. In the late 1990s the city council adopted a plan aimed at preservation and the protection of the environment.

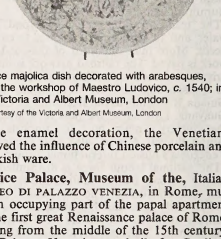
Transportation within Venice is chiefly by water, and virtually every type of small water transport can be seen plying the Venetian canals, including water taxis and buses, red fire boats, police speedboats, and the famous, hand-propelled gondolas. Automobiles are not allowed within the central city; vehicular traffic can reach the old city by causeway but must be left in parking lots provided on the outskirts. A railroad bridge runs alongside the causeway. Air service is centred at Marco Polo International Airport, and motorboat service is provided to transport passengers to the city.

Venice, resort city, Sarasota county, west-central Florida, U.S. It lies along the Gulf of Mexico, about 20 miles (30 km) south of Sarasota. Originally a fishing village settled in the 1870s, it received its name in 1888 by a settler who thought the area resembled the Italian city of Venice. It was later planned (*c.* 1925) as a retirement city for members of the Brotherhood of Locomotive Engineers; the project was abandoned after the stock market crash of 1929, but Venice survived as a small resort noted for tarpon fishing. The city revived after 1960, when it replaced Sarasota as the winter headquarters for the Ringling Bros. and Barnum & Bailey Circus. Light manufacturing augments tourism as the city's economic mainstay. Inc. 1927. Pop. (2000) 17,764.

Venice, Gulf of, Italian GOLFO DI VENEZIA, northern section of the Adriatic Sea (an arm of the Mediterranean Sea), extending eastward for 60 miles (95 km) from the Po River delta, Italy, to the coast of Istria, in Slovenia and Croatia. It receives the Po, Adige, Piave, and Tagliamento rivers. Marshes, lagoons, and sandspits border the gulf's shores as far as Trieste, Italy, where the low plateau of the Istrian Peninsula begins. A northeast wind, called the bora, causes rough seas and creates shipping hazards in the gulf.

The rise of Venice as a maritime power at the northwestern end of the gulf gave special importance to Adriatic shipping routes in the Middle Ages. Modern ports along the gulf, apart from Venice, include Pula and Rovinj (both in Croatia) and Trieste, which is located on a northeastern inlet, the Gulf of Trieste.

Venice majolica, majolica also spelled MAIOLICA, tin-glazed earthenware made at Venice that reached its stylistic zenith in the 16th century. The workshops of Maestro Ludovico (fl. 1540–45), Domenigo da Venezia (fl. 1550–60), and Jacomo da Pesaro (fl. 1543) produced outstanding ware of this type. Venetian potters excelled in painting arrangements of decorative trophies, globes, musical instruments, and other apparatus, executed in a brilliant linear style in a blue-tinged enamel on a bluish white or white ground, highlighted with opaque white. Another typical design was a dense network of intertwining stems and arabesques. In their preference for blue-and-white enamel decoration, the Venetians showed the influence of Chinese porcelain and Turkish ware.



Venice majolica dish decorated with arabesques, from the workshop of Maestro Ludovico, *c.* 1540; in the Victoria and Albert Museum, London
By courtesy of the Victoria and Albert Museum, London

Venice Palace, Museum of the, Italian MUSEO DI PALAZZO VENEZIA, in Rome, museum occupying part of the papal apartment of the first great Renaissance palace of Rome. Dating from the middle of the 15th century, the Palazzo Venezia was built for Cardinal Pietro Barbo, later Pope Paul II. Displayed are fine medieval and Renaissance sculptures and a series of 15th-century carved and inlayed *cassoni,* or chests. Paintings include works attributed to Giovanni Bellini, Giorgione, Taddeo Zuccari, Benozzo Gozzoli, and other Renaissance masters. Sculptures by Andrea Sansovino, Alessandro Vittoria, Alessandro Algardi, Pompeo Leoni, and Giambologna as well as fine examples of 17th-century Chinese

porcelain and tapestries and majolica are also in the collection; it includes many examples of minor decorative arts as well.

Vening Meinesz, Felix Andries (b. July 30, 1887, The Hague, Neth.—d. Aug. 10, 1966, Amersfoort), Dutch geophysicist and geodesist who was known for his measurements of gravity.

Participating in a gravimetric survey of The Netherlands soon after he graduated from Delft Technical University as a civil engineer in 1910, Vening Meinesz devised an apparatus based on pendulums swinging together in opposite phase for use on the unstable subsoil. He later modified this apparatus for use on submarines. His submarine device was used from 1923 until the late 1950s, when spring gravimeters on surface ships superseded it. During his early cruises he discovered striking gravity anomalies in the East Indies.

Vening Meinesz was a professor of geodesy at Delft Technical University from 1938 to 1957. He is also noted for his investigations concerning convection currents within the Earth and for his study of the effect of solar movements on the deformation of the Earth's crust.

Venini, Paolo (b. 1895—d. July 1959, Venice, Italy), Italian glassmaker and designer and manufacturer of glassware, whose works are outstanding for their combination of traditional technique and modern form. His glass factory in Murano contributed to a revival of art-glass manufacture in the 1930s and '40s and employed some of the finest designers of the period, among them Gio Ponti and Tyra Lundgren.

Although Venini was educated to be a lawyer, his family had been in the glassmaking business in Italy since the 18th century. In 1921, after practicing law in Milan for a short time, he bought a partnership in a Murano glass firm, establishing his own Venini and Company four years later. From the beginning Venini's workshop turned out beautiful tableware that was years ahead of the work of other contemporary designers. His own designs were strikingly simple, their purity of outline set off against unusual combinations of colours worked into the glass in bold, stripe-like threads, lattices, grids, and, sometimes, the traditional Venetian millefiore manner. His boldly striped translucent glass lampshades won critical acclaim. His pieces are displayed in museums and considered prime examples of modern glass artistry.

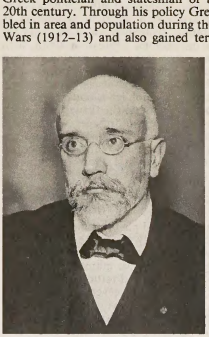
Consult the INDEX *first*

venison (from Latin *venatus,* "to hunt"), the meat from any kind of deer; originally, the term referred to any kind of edible game.

Venison resembles beef and mutton in texture, colour, and other general characteristics. It has virtually the same chemical composition as beef but is less fatty. Lean venison roast, before cooking, contains by weight approximately 75 percent water, 20 percent protein, and 2 percent fat; this protein content is about the same as that of a lean beef rump.

Like most game, deer after being killed should be drained of blood and allowed to cool. Venison may be eaten fresh, but it is generally hung in a cool place for three to five days, and often for six to ten days or more, for aging, or ripening. Aging enhances the tenderness and the palatability of the meat, particularly in older deer. The legs, saddle, loin, and tenderloin are butchered for steaks, chops, or cutlets, which are best cooked only briefly and can be served with a number of sauces and garnishes; the less-desirable parts of the animal, such as the shoulder, shank, and breast, are usually well marinated and are excellent for use in stews. *See also* game.

Venizélos, Eleuthérios (Kyriakos) (b. Aug. 23, 1864, Mourniés, Crete, Ottoman Empire [now in Greece]—d. March 18, 1936, Paris, France), prime minister of Greece (1910–15, 1917, 1924, 1928–30), the most prominent Greek politician and statesman of the early 20th century. Through his policy Greece doubled in area and population during the Balkan Wars (1912–13) and also gained territorially



Venizélos
The Bettmann Archive

and diplomatically after World War I in negotiations with Italy, Bulgaria, and Turkey.

Early career. His father, Kiriakos Venizélos Krivatas, was a Cretan revolutionary who had been deported by Turkey (Crete being then a part of the Ottoman Empire) to the island of Síros for 19 years. At the age of two Eleuthérios left his native village to go to Síros with his family, who had been deported there for a second time after an insurrection against the Ottoman sultan in 1866. Eventually he went to Athens, where he graduated from the Athens University law school.

As leader of the Cretan students in his last year at the university, Venizélos first attracted public attention with his vivid interview of the British statesman Joseph Chamberlain, during his visit to Athens in 1886. On returning to Crete, Venizélos became a lawyer, a journalist, and, a year later, a member of the island's National Assembly and leader of the local parliament's newly formed Liberal Party. During the 1897 Greco-Turkish War, with the support of an army under Colonel Timóleon Vássos, dispatched from Greece, he led an unsuccessful insurrection in Cape Akrotírion, near Khaniá, to secure the union of Crete with Greece. After the intervention of the European great powers, however, Crete's government became autonomous, under the suzerainty of the sultan. When Prince George, second son of King George I of Greece, was made high commissioner of the great European powers in autonomous Crete, Venizélos, at the age of 35, was appointed his minister of justice (1899–1901). He was soon in conflict with the absolutist prince George, however, and, four years later, organized an armed insurrection against his rule, forcing him to leave Crete. Under the new high commissioner, Alékandros Zaímis, a former premier of Greece, Venizélos again became a member of the Cretan government.

Prime minister. In Greece, meanwhile, a group known as the Military League had formed a revolutionary movement and invited Venizélos to Athens to lead it. Venizélos persuaded the league and King George to revise the Greek constitution. In the elections held in August 1910 Venizélos won a seat as a deputy from Athens. In October he became prime minister, embarking immediately on a program of reform. He reorganized the armed forces, created an alliance of the Balkan Christian peoples (Balkan League), and, in the ensuing Balkan Wars of 1912–13, contributed to the final expulsion of the Ottoman Empire from the Balkan Peninsula. Greece, under his premiership, doubled its territory and population by the acquisition of southern Macedonia (Salonika and the hinterland), south Ípiros (Ioánnina Préveza and Árta), Crete, and the Aegean Islands.

At the outbreak of World War I, Prime Minister Venizélos proposed that the Greek army fight the Turks, who were allies of Germany. King Constantine, however, was in sympathy with the Central Powers and opposed him. For two years Venizélos struggled to change the king's mind, but, after the invasion of Greek Macedonia by German-Austrian-Bulgarian armies (1916), he assumed the leadership of an anti-Constantine insurrection in Macedonia, Crete, and the islands. He organized a new panhellenic army in the Macedonian allied front and, following Franco-British intervention, forced Constantine into exile (1917). Greece, reunited under King Alexander, second son of Constantine, and Prime Minister Venizélos, declared war against the Central Powers.

As soon as hostilities ended, Venizélos went to Paris to participate in the peace conferences. During his absence from Greece for almost two years, he acquired a reputation as an international statesman of considerable stature. In July 1919 he reached agreement with the Italians on the cession of the Dodecanese and secured an extension of the Greek area of occupation in Anatolia. The Treaty of Neuilly with Bulgaria (November 1919) and the Treaty of Sèvres with Turkey (August 1920) were triumphs both for Venizélos and for Greece.

Venizélos returned to Athens in September 1920, and King Alexander suddenly died in October. Despite Venizélos' international triumph, the Greek people, in the November 1920 elections, gave a parliamentary majority to a coalition of monarchist parties, and King Constantine was recalled by a plebiscite. The defeat may perhaps be attributed to Venizélos' loss of popularity during his long absence, the continued maintenance of martial law, and the continuing hostilities with Turkey, the government of which was holding out against the impositions of the Treaty of Sèvres. Venizélos abruptly left Greece and exiled himself in Paris.

Following the defeat of the royal army by the Turks (1922) and the subsequent armed insurrection, led by General Nikólaos Plastíras and General Stilianos Gonatas, King Constantine was dethroned (and succeeded by his eldest son, George), and six royalist leaders were executed. Venizélos assumed the leadership of the Greek delegation that negotiated the peace treaty of Lausanne (1923) with the Turks. Within a few months, another insurrection, led by General Ioannis Metaxas, forced George into exile, and Venizélos returned to Greece to become premier again. He fell into disagreement, however, with some Republican leaders who wished to abolish the monarchy, and he exiled himself again (1924). During the second Hellenic Republic (1924–35) he returned to Greece and reassumed leadership of the Liberal Party. In the general election of 1928, he obtained a huge majority, forming his third, and last, four-year cabinet. During this period Venizélos succeeded in restoring normal relations with all of Greece's Balkan neighbours. His domestic position was weakened, however, by the effects of the Great Depression in the early 1930s; and in the elections of 1932 he was defeated.

After his defeat he continued to lead the

Liberals, but the end of his political career came in March 1935, when, after the failure of an attempt to prevent the restoration of the monarchy, he went to Paris, where he died in 1936. (D.P.)

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Veṅkaṭanātha (Indian religious leader): *see* Vedāntadeśika.

Venkataraman, Ramaswamy (b. Dec. 4, 1910, Rajamadam, Madras [now Tamil Nadu], India), Indian politician, government official, and lawyer who was president of India from 1987 to 1992.

Venkataraman studied law at the University of Madras and began his legal practice in 1935. He became involved in India's independence struggle and was consequently jailed by the British (1942–44). After his release he continued to practice law, and in 1950 he was elected to independent India's Provisional Parliament as a member of the Congress Party. He subsequently was a member of the Lok Sabhā (the lower house of the Indian parliament) from 1952 to 1957 and from 1977 onward. From 1957 to 1967 he was minister of industry and labour for the state of Madras. Venkataraman eventually joined the central government, serving as minister of finance and industry (1980–82) and minister of defense (1982–84). After serving as vice president of India (1984–87), he was elected to a five-year term as president in 1987.

Venkataraman Aiyer: *see* Ramana Maharshi.

Venlo, *gemeente* (commune), Limburg *provincie,* southeastern Netherlands. It lies along the Maas (Meuse) River, near the German border. Chartered in 1343, it joined the Hanseatic League in 1364 and was a medieval fortress and trade centre. Venlo is now the centre of "greenhouse" market gardening; vegetables are exported to the Rhineland. The municipality also manufactures electric bulbs, optical instruments, and wood products. Heavily damaged in World War II, its buildings have since been restored. Notable medieval buildings include St. Martin's Church and the town hall. Pop. (2001 est.) 90,500.

Vennberg, Karl (Gunnar) (b. April 11, 1910, Blädinge, Swed.—d. 1995), poet and critic who was the critical–analytical leader in Swedish poetry of the 1940s.

Vennberg was a teacher of Norwegian in a Stockholm folk high school. His influential reviews and critical essays broke the ground for the radical cause of the *40-talslyrik* (1947; "Poetry of the 1940s"), an anthology that he edited together with Erik Lindegren. His two volumes of verse, in which he exposes contemporary deception and self-deception, *Halmfackla* (1944; "Straw Torch") and *Tideräkning* (1945; "Reckoning of Time"), together with Lindegren's collections from these years, are considered the central works of the new Swedish poetry of the 1940s. His later volumes of poetry include *Gatukorsning* (1952; "Intersection"), *Synfält* (1954; "Points of View"), and *Sju ord på tunnelbanan* (1971; "Seven Words in the Subway").

venom, the poisonous secretion of an animal, produced by specialized glands that are often associated with spines, teeth, stings, or other piercing devices. The venom apparatus may be primarily for killing or paralyzing prey or may be a purely defensive adaptation. Some venoms also function as digestive fluids. The venom poisoning of humans is primarily a problem of rural tropical regions, though it occurs worldwide. Many thousands of human deaths due to venom poisoning occur each year.

Most venoms injure humans only when introduced into the skin or deeper tissues, usually through a sting or bite. Venoms are mixtures of toxic enzymes and various other proteins that act on the body in different ways. Neurotoxin venoms act on the brain and nervous system and can cause either nervous excitation (characterized by such symptoms as muscle cramps, twitching, vomiting, and convulsions) or nervous depression (with such symptoms as paralysis and weakening or arrest of respiration and heartbeat). Hemotoxins affect the blood or blood vessels: some destroy the lining of the smaller blood vessels and allow blood to seep into the tissues, producing local or widespread hemorrhages, while others render the blood less coagulable or cause abnormally rapid clotting, leading to circulatory collapse that can be fatal. Still other venoms produce the symptoms of an allergic reaction, resulting in wheals, blisters, and violent inflammation, often followed by death of tissue and muscle spasms.

Most major animal phyla contain venomous species, but relatively few come into harmful contact with humans. These few include certain snakes (*e.g.,* cobras, mambas, vipers, pit vipers, coral snakes, and rattlesnakes); certain fishes (*e.g.,* stingrays, weevers, spiny sharks, scorpion fish, ratfish, and certain catfish); a few lizards (Gila monster); some scorpions and several spiders (*e.g.,* the black widow and brown recluse); some social insects (*e.g.,* the bee, wasp, and certain ants); and various marine invertebrates, including some sea anemones, fire corals, jellyfish, cone shells, and sea urchins. Snakes and spiders inject venom into their victims with their fangs; fishes use venomous spines and scorpions and many insects use stings.

Venom attacks can range in severity from a simple localized inflammation of the skin to almost immediate death, depending on the animal involved and the potency and mode of action of its venom. An attack's severity also depends on the victim's age (children are more severely affected than are adults) and the location of the injury (a venom wound on an arm or leg is usually less serious than a similar one on the head or trunk). *See also* poison.

Venosa, Latin VENUSIA, town and episcopal see, Potenza *provincia,* Basilicata *regione,* southern Italy. It is situated on the lower slope of Mount Vulcano, north of Potenza. Originally a settlement of the Lucanians (an ancient Italic tribe), it was taken by the Romans after the Samnite Wars (291 BC); from its position on the Appian Way it became an important Roman garrison town. The poet Horace was born there, and many of his poems mention places in the vicinity. Stones from the local Roman amphitheatre are built into the walls of the abbey church of Santa Trinità (1059). The church contains the tombs of the Norman soldier of fortune Robert Guiscard, his first wife, and his half brothers. The town's massive 15th-century castle and the cathedral (1470) are also notable, and north of the town are Jewish catacombs with inscriptions from the 4th and 5th centuries.

Venosa is an agricultural centre producing olive oil and paper. Pop. (2001 est.) 12,201.

venous sinus, in human anatomy, any of the channels of a branching complex sinus network that lies between layers of the dura mater, the outermost covering of the brain, and functions to collect oxygen-depleted blood. Unlike veins, these sinuses possess no muscular coat. Their lining is endothelium, a layer of cells like that which forms the surface of the innermost coat of the veins. The sinuses receive blood from the veins of the brain and connect directly or ultimately with the internal jugular vein. Blood from the sinuses, after it leaves the internal jugular vein, flows through the brachiocephalic vein and the superior vena cava to the upper right chamber (atrium) of the heart.

Vent, Îles du, English WINDWARD GROUP, eastern group of islands within the Society Islands, French Polynesia, in the central South Pacific. The group is composed of volcanic islands surrounded by coral reefs. The far larger Tahiti and Moorea (*qq.v.*) lie at the centre of the group. Maiao, covering about 3 square miles (8 square km) and located some 60 miles (95 km) west of Tahiti, is sparsely populated and is cultivated for copra. Tetiaroa, 25 miles (40 km) north of Tahiti, comprises 13 islets, with a total area of 2.5 square miles (6.5 square km). Mehetia (1 square mile [2.6 square km]), 60 miles (95 km) east of Tahiti, is uninhabited. Makatea (*q.v.*), a raised coral atoll and geologically part of the Tuamotu Archipelago, is included within the group for administrative purposes.

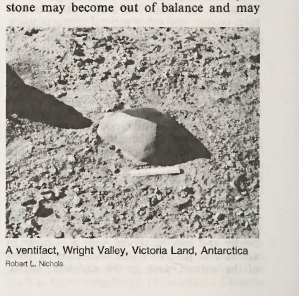
Administratively the Îles du Vent were part of the Society Islands from 1767 until 1946, when they became part of French Polynesia. Coconut plantations are the chief agricultural resource. Tourism is increasingly important to the economy, especially on Tahiti and Moorea. Pop. (1996) 162,686.

Ventidius, Publius (b. before 90 BC, Asculum Picenum, Picenum [now Ascoli Piceno, Italy]—d. soon after 38 BC), Roman general and politician who rose from captivity to military fame, a change of fortune frequently cited by ancient authors.

In his youth, Ventidius was captured by the forces of the Roman general Pompeius Strabo in his native town of Asculum Picenum, which had joined the revolt (90–88) of Rome's Italian allies—peoples in Italy not incorporated into the Roman state. In 89, Ventidius was led in Strabo's triumphal procession at Rome. The prisoner was soon freed, and for years he probably made a living as an army contractor.

Eventually Ventidius' talents were recognized by Julius Caesar, who enlisted his aid during the Civil War (Caesar against Pompey and the Optimates, 49–46) and appointed him praetor for 43. In the struggle for power that followed the assassination of Caesar (44), Ventidius sided with the Caesarian leader Mark Antony. Ventidius' forces reinforced those of Antony, and Antony in turn made Ventidius a consul. Sent by Antony to expel the Parthians from Anatolia and Syria, Ventidius defeated the enemy at the Cilician Gates (mountain pass in present-day southern Turkey) and Mount Amanus in 39 and at Mount Gindarus in 38. He died soon after celebrating a triumph at Rome.

ventifact, stone that has received one or more highly polished, flattened facets as a result of erosion by windblown sand. The facets are cut in sequence and correlate with the dominant wind direction. As one surface is cut, the stone may become out of balance and may



A ventifact, Wright Valley, Victoria Land, Antarctica
Robert L. Nichols

turn to expose another surface to the wind. A ventifact that has been eroded to three curved facets is called a dreikanter. Ventifacts are produced under arid conditions and are generally formed from hard, fine-grained rocks such as obsidian, chert, or quartzite.

ventilating, the natural or mechanically induced movement of fresh air into or through an enclosed space. The supply of air to an enclosed space involves the removal of a corresponding volume of expired air, which may be laden with odours, heat, noxious gases, or dust resulting from industrial processes.

The hazards of poor ventilation were not clearly understood until the early 20th century. Carbon dioxide accumulation, once thought to be the major cause of illness resulting from poor ventilation, has since been revealed to have a minimal effect under most circumstances. A more immediate problem is posed by the increased temperatures and humidity generated by the bodily warmth and exhalations of human occupants.

Natural ventilation results from thermal effects, such as those from a flue, or may be caused by wind, or both. These forces are small and often variable. Their effectiveness is aided by opening or closing windows.

Much greater control can be achieved with mechanical ventilation systems. They typically include a fan (from the standard propeller or disk type to the quieter centrifugal type), a heater, and a filter to remove particulate matter. A mechanically powered inlet of air, when combined with a natural exhaust, tends to cause a slight positive pressure within an enclosed space, so that the air leakage is outward. If such a system is installed in a hospital or in an internal office in a factory having a dust- or fume-laden atmosphere, the office will remain essentially contamination-free.

A mechanical exhaust with a natural air inlet causes a slight negative pressure, so that air leakages are inward. In many cases this type of ventilating system is used to discourage the escape of fumes or smells into surrounding areas of a building. Examples of such systems occur in laboratories forming part of a college teaching block, in a hotel kitchen adjacent to restaurant areas, and in toilet accommodations generally. In industry, compartments and areas that generate grinding dust, paint spray, fumes, and smoke are similarly treated; these undesirable contaminants are then confined to the spaces in question, leaving surrounding areas free from pollution.

Ventimiglia, town, Imperia *provincia,* Liguria *regione,* northwestern Italy. It is situated at the mouth of the Roia River near the French border, just northeast of Nice, France. To the east of the modern town is the ruined Roman town Albium Intemelium, or Albintimilium, with the remains of a theatre. Ventimiglia's town hall houses a collection of Roman antiquities. Ventimiglia was the seat of a county from the 10th century and later of a commune that fell under Genoese domination. Its medieval quarter contains the cathedral with an 11th-century octagonal baptistery, the Romanesque-style Church of San Michele, and 13th-century towers and fortifications. At Mortola Inferiore are the Hanbury Botanical Gardens; nearby are the Grimaldi Caves. The modern town is a resort and international customs station, with a noted flower market. Pop. (1993 est.) mun., 26,051.

Ventnor, town (parish), South Wight district, county of Isle of Wight, Eng. The town lies along the southeastern coast of the Isle of Wight. From a small fishing hamlet it grew in the 19th century into a fashionable resort, noted for its mild climate and long hours of sunshine. The novelist Charles Dickens lived for a time nearby, and the poet Algernon Swinburne is buried in the churchyard. Pop. (1981) 6,450.

Ventôse Decrees, during the French Revolution, laws providing for the confiscation of the property of enemies of the revolution and its distribution to needy patriots. The Ventôse Decrees are sometimes considered to be the most radical expression of social democracy of the revolution. They were passed by the National Convention (revolutionary assembly) on 8 and 13 Ventôse in the year II (February 26 and March 3, 1794) at the request of the idealistic young revolutionary Louis de Saint-Just, a member of the Committee of Public Safety (the executive ruling body). Although undertaken by the government as a political move to secure the support of the popular classes, the Ventôse Decrees failed in this goal because the most pressing need of the lower classes, the problem of obtaining food, was not met. The Ventôse Decrees were not put into effect and were completely abandoned after the fall of Maximilien Robespierre on 9 Thermidor (July 27, 1794).

ventricle, muscular chamber that pumps blood out of the heart and into the circulatory system. Ventricles occur among some invertebrates. Among vertebrates, fishes and amphibians generally have a single ventricle, while reptiles, birds, and mammals have two.

In humans, the ventricles are the two lower chambers of the heart. The walls of the chambers, and particularly the walls of the left ventricle, are far more heavily muscled than the walls of the atria, or upper chambers (*see* atrium), because it is in the ventricles that the major force is exerted in the process of pumping the blood to the bodily tissues and to the lungs. Each opening leading into or away from the ventricles is guarded by a valve. These openings are the following: those from the two upper chambers; the opening from the right ventricle into the pulmonary artery, which transports blood to the lungs; and the opening from the left ventricle into the aorta, the main trunk by which oxygen-rich blood starts its course to the tissues. The interior surfaces of the ventricles are ridged with bundles and bands of muscle, called trabeculae carneae. The papillary muscles project like nipples into the cavities of the ventricles. They are attached by fine strands of tendon to the valves between the atria and ventricles and prevent the valves from opening when the ventricles contract. *See also* heart.

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

ventricular fibrillation, irregular and uncoordinated contraction of the muscle fibres of the ventricles, the heart's lower chambers. Since ventricular fibrillation completely prevents the heart's functioning as a pump, it quickly brings death unless emergency measures restore the circulation of oxygenated blood throughout the body. Ventricular fibrillation may result from myocardial infarction—*i.e.,* a heart attack, involving the death of a section of heart muscle—or from electric shock, deprivation of oxygen, certain serious chemical imbalances in the blood (abnormally high levels of potassium or low levels of calcium), or poisoning with digitalis or epinephrine. Treatment centres on early administration of drugs or, more frequently, of electric shocks to the ventricle. These measures are supplemented by closed chest massage. The massage serves to remove from the heart muscle the accumulated potassium ions and waste products of metabolism. *See also* atrial fibrillation.

ventricular septal defect, opening in the partition between the two ventricles, or lower chambers, of the heart. Such defects are congenital and may be accompanied by other congenital defects of the heart, most commonly pulmonary stenosis.

The partition between the ventricles is thick and muscular except for a small fibrous section called the membranous septum. It is in this membranous portion that most septal defects are found. The condition is diagnosed by recognition of the characteristic heart sounds caused by the defect. If the opening is small, there may be no symptoms and no need for treatment. If it is large, with significant flow of blood from the left ventricle to the right, the treatment is surgical closure of the defect. If the blood flow is from the right ventricle to the left, as indicated by elevated pulmonary blood pressure, surgical repair is not indicated.

ventriloquism, the art of "throwing" the voice, *i.e.,* speaking in such a manner that the sound seems to come from a distance or from a source other than the speaker. At the same time, the voice is disguised (partly by its heightened pitch), adding to the effect. The art of ventriloquism was formerly supposed to result from a peculiar use of the stomach during inhalation—hence the name, from Latin *venter* and *loqui,* "belly-speaking." In fact, the words are formed in the normal manner, but the breath is allowed to escape slowly, the tones being muffled by narrowing the glottis and the mouth being opened as little as possible, while the tongue is retracted and only its tip moves. This pressure on the vocal cords diffuses the sound; the greater the pressure, the greater the illusion of distance.

A figure, or dummy, is commonly used by the ventriloquist to assist in the deception. The ventriloquist animates the dummy by moving its mouth while his own lips remain still, thereby completing the illusion that the voice is the dummy's, not his. When not using a dummy, the ventriloquist employs pantomime to direct the attention of his listeners to the location or object from which the sound presumably emanates.

Ventriloquism is of ancient origin. Traces of the art are found in Egyptian and Hebrew archaeology. Articles of Athenaeus the most celebrated of Greek ventriloquists, who were called, after him, *eurycleides,* as well as *engastrimanteis* ("belly prophets"). Many peoples are adepts in ventriloquism—*e.g.,* Zulus, Maoris, and Eskimo. The first known ventriloquist as such was Louis Brabant, valet to the French king Francis I in the 16th century. Henry King, called the King's Whisperer, had the same function for the English king Charles I in the first half of the 17th century. The technique was perfected in the 18th century. It is also well known in India and China. In Europe and the United States, ventriloquism holds a place in popular entertainment. Notable ventriloquists have included Edgar Bergen in the United States and Robert Lamouret in France.

Ventris, Michael, in full MICHAEL GEORGE FRANCIS VENTRIS (b. July 12, 1922, Wheathampstead, Hertfordshire, Eng.—d. Sept. 6, 1956, near Hatfield, Hertfordshire), English architect and cryptographer who in 1952 deciphered the Minoan Linear B script and showed it to be Greek in its oldest known form, dating from about 1400 to 1200 BC, roughly the period of the events narrated in the Homeric epics.

As a boy, his fascination with the classics led Ventris to study Greek and Latin. A competent and zealous cryptographer at 14, in 1936 he heard the famed archaeologist Sir Arthur Evans lecture on the Linear B script that he had discovered at Knossós, Crete, in about 1900 and how it still baffled linguists and archaeologists. Ventris' determination to solve the puzzle of this peculiar writing dated from that time.

At 18 Ventris published a paper in the *American Journal of Archaeology* supporting

the possibility of a relation between the script and another problematic language, Etruscan. In 1949, following architectural studies that had been interrupted by service in the Royal Air Force during World War II, he began searching in earnest for the key to Linear B. The method by which he achieved success was essentially that of statistical analysis, aided by stray hints from the analysis of various arrangements of syllabic signs. After the publication (1951) of texts in an almost identical script found on the Greek mainland in 1939, Ventris' progress was rapid. In June 1952 he announced over a British radio program that he had found the Linear B to be a very archaic form of Greek.

Joined shortly thereafter by the Cambridge linguist John Chadwick, they assembled dramatic evidence supporting Ventris' theory. In 1953 they published their historic paper, "Evidence for Greek Dialect in the Mycenaean Archives." Their *Documents in Mycenaean Greek* (1956; rev. ed., 1973) was published a few weeks after Ventris' death in an auto accident, and Chadwick's *The Decipherment of Linear B* (1958; 2nd ed., 1968) followed.

Ventspils, German WINDAU, Russian VINDAVA, city and port, western Latvia. It lies at the mouth of the Venta River on the Baltic Sea coast. A settlement existed there in the 2nd millennium BC, and by the 10th century AD it was inhabited by Wends (a Slavic people). In 1242 the Teutonic Knights built a castle there, and in 1378 town status was conferred. A shipyard was established in 1642, and in 1904 Ventspils was reached by the railway. Its port is ice-free and is a major site for the export of oil and chemicals. It has a pipeline from the Volga-Urals oil field (Russia), a fishing fleet, and a large fish cannery. Pop. (1993 est.) 49,000.

Ventura, formally SAN BUENAVENTURA, city, seat (1873) of Ventura county, California, U.S. It lies on the Pacific coast overlooking the Santa Barbara Channel. It is the site of the San Buenaventura Mission, the ninth and last mission founded (1782) by Junípero Serra, which was restored as a historic site. The city of Ventura developed as an agricultural (primarily lemon-growing) centre and later turned to petroleum production, tourism, and diversified manufacturing. Ventura (junior) College was established in 1925. Inc. town, 1866; city, 1906. Pop. (1994 est.) city, 96,288; (1995 est.) Ventura PMSA, 710,018.

Venturi, Robert, in full ROBERT CHARLES VENTURI (b. June 25, 1925, Philadelphia, Pa., U.S.), American architect who proposed alternatives to the Functionalist mainstream of 20th-century American architectural design. He became the unofficial dean of the eclectic movement known as postmodernism.

Venturi studied at the Princeton University School of Architecture (1947–50). After further study at the American Academy in Rome (1954–56), he worked as a designer in the architectural firms of Oscar Stonorov (Philadelphia), Eero Saarinen (Bloomfield Hills, Mich.), and Louis I. Kahn (Philadelphia). After holding partnerships in several firms, he opened a longer-lasting architectural firm with John Rauch in 1964. Venturi's wife, Denise Scott Brown, became a partner in the firm in 1967. From 1957 to 1965 Venturi was a member of the faculty at the University of Pennsylvania School of Architecture.

Venturi's own architectural philosophy, set forth in the influential book *Complexity and Contradiction in Architecture* (1966), called for an eclectic approach to design and an openness to the multiple influences of historical tradition, ordinary commercial architecture, and Pop Art. He championed the ambiguity and paradox, the "messy vitality" of the great architecture of the past over the simple, unadorned, cleanly functional buildings of the International Style. Venturi's manifesto had a profound impact on younger architects who were beginning to find similar constraints and limitations in the Modernist architectural aesthetic.

In *Learning from Las Vegas* (1972), Venturi and coauthors Denise Scott Brown and Steven Izenour took this critique several steps further and analyzed with wry appreciation the neon-lit urban sprawl and the automobile-oriented commercial architecture of Las Vegas. They questioned the Modernists' rejection of the use of applied ornament and decoration and ended the book with a discussion of their own work.

Venturi's buildings frequently exhibit the ironic humour of his theoretical pronouncements. His early buildings incorporated materials and visual references standard to the shopping centre and subdivision but previously shunned by so-called serious architects. During the late 1970s and '80s he turned to historical precedent in his work, which often makes studied allusions to building styles of the past. Formal and stylistic elements are combined with a willful inconsistency that can seem playful, quirky, or even bizarre. Among Venturi's more important commissions were various buildings for the State University of New York at Purchase, Princeton University, and the University of Pennsylvania at Philadelphia. He designed several museums, notably the Seattle Art Museum (1985) and the Sainsbury Wing (1986) of the National Gallery in London, Eng.

venturi tube, short pipe with a constricted inner surface, used to measure fluid flows and as a pump. The 18th–19th-century Italian physicist Giovanni Battista Venturi, observing the effects of constricted channels on fluid flow, designed an instrument with a narrow throat in the middle; fluid passing through the tube speeds up as it enters the throat, and the pressure drops. There are countless applications for the principle—*e.g.,* an automobile carburetor, in which air flows through a venturi channel at whose throat gasoline vapour enters through an opening, drawn in by the low pressure. The pressure differential can also be used to measure fluid flow. *See also* Bernoulli's theorem.

venue, in law, locality in which a criminal offense has occurred or in which a court has jurisdiction to try the offense. The concept of venue involves important issues of public policy in the adjudication of crimes.

Local and general statutes specify the court in which a criminal offense must be tried. If the case is brought before an improper official, either the accused, the prosecutor, or the court itself may move for a change of court, or a change of venue. Such a change involves primarily the transfer of a case to a different locale or jurisdiction rather than merely to a different court. The transfer of a case to a higher court within the same jurisdiction is not a change of venue.

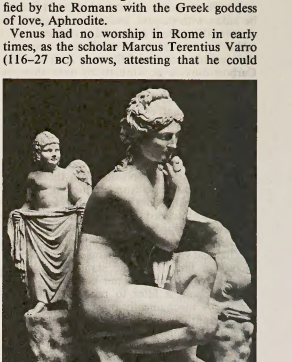
The grounds for a change of venue are specified in the statutes, although much is left to the discretion of the court. Grounds for a change have included newspaper reporting considered to have biased all potential jurors, the danger of violence, racial prejudice, and the convenience of jurors or witnesses.

Generally, the right to request a change of venue must be exercised by the accused, but the prosecution also may obtain a change. The judge may disqualify himself and request a change to another court in another jurisdiction. A codefendant has the right to request a change even if it requires splitting the trial into two or more separate cases.

Venue statutes usually specify that a trial must take place in the district that has subject-matter jurisdiction over the offense. Often this is the district in which the crime was committed or in which a corpus delicti was discovered. If trial is held in an improper court, the defendant cannot later complain if he has failed to request a change. If he makes such a request and it is wrongfully denied, an appeal court can request a new trial.

Venus, ancient Italian goddess associated with cultivated fields and gardens and later identified by the Romans with the Greek goddess of love, Aphrodite.

Venus had no worship in Rome in early times, as the scholar Marcus Terentius Varro (116–27 BC) shows, attesting that he could



Venus with Cupid and a dolphin, classical sculpture; in the Museo Nazionale Romano, Rome
Alinari—Art Resource

find no mention of her name in old records. This is corroborated by the absence of any festival for her in the oldest Roman calendar and by her lack of a flamen (special priest). Her cult among the Latins, however, seems to be immemorial, for she had apparently at least two ancient temples, one at Lavinium, the other at Ardea, at which festivals of the Latin cities were held. Hence, it was no long step to bring her to Rome, apparently from Ardea itself. But how she came to be identified with so important a deity as Aphrodite remains a puzzle.

That Venus' identification with Aphrodite took place fairly early is certain. A contributory reason for it is perhaps the date (August 19) of the foundation of one of her Roman temples. August 19 is the Vinalia Rustica, a festival of Jupiter; hence, he and Venus came to be associated, and this facilitated their equation, as father and daughter, with the Greek deities Zeus and Aphrodite. She was, therefore, also a daughter of Dione, was the wife of Vulcan, and was the mother of Cupid. In myth and legend she was famous for her romantic intrigues and affairs with both gods and mortals, and she became associated with many aspects, both positive and negative, of femininity. As Venus Verticordia, she was charged with the protection of chastity in women and girls. But the most important cause of the identification was the reception into Rome of the famous cult of Venus Erycina—*i.e.,* of Aphrodite of Eryx (Erice) in Sicily—this cult itself resulting from the identification of an Oriental mother-goddess with the Greek deity. This reception took place during and shortly after the Second Punic War. A temple was dedicated to Venus Erycina on the Capitol in 215 BC and a second outside the Colline gate in 181 BC. The latter developed in a way reminiscent of the temple at Eryx with its harlots, becoming the place of worship of Roman

courtesans, hence the title of *dies meretricum* ("prostitutes' day") attached to April 23, the day of its foundation.

The importance of the worship of Venus-Aphrodite was increased by the political ambitions of the *gens Iulia,* the clan of Julius Caesar and, by adoption, of Augustus. They claimed descent from Iulus, the son of Aeneas; Aeneas was the alleged founder of the temple of Eryx and, in some legends, of the city of Rome also. From the time of Homer onward, he was made the son of Aphrodite, so that his descent gave the Iulii divine origin. Others than the Iulii sought to connect themselves with a deity grown so popular and important, notably Gnaeus Pompeius, the triumvir. He dedicated a temple to Venus as Victrix ("Bringer of Victory") in 55 BC. Julius Caesar's own temple (46 BC), however, was dedicated to Venus Genetrix, and as Genetrix ("Begetting Mother") she was best known until the death of Nero in AD 68. But despite the extinction of the Julio-Claudian line, she remained popular, even with the emperors; Hadrian completed a temple of Venus at Rome in AD 135.

As a native Italian deity, Venus had no myths of her own. She therefore took over those of Aphrodite and, through her, became identified with various foreign goddesses. The most noteworthy result of this development is perhaps the acquisition by the planet Venus of that name. The planet was at first the star of the Babylonian goddess Ishtar and thence of Aphrodite. Because of her association with love and feminine beauty, the goddess Venus has been a favourite subject in art since ancient times; notable representations include the statue known as the "Venus de Milo" (*c.* 150 BC) and the painting "The Birth of Venus" (*c.* 1485) by Sandro Botticelli.

Venus, in astronomy, second major planet from the Sun. Named for the Roman goddess of love and beauty, it is, after the Moon, the most brilliant natural object in the nighttime sky. Venus comes closer to Earth than any other planet, approaching to within about 42,000,000 km (26,000,000 miles) at inferior conjunction—*i.e.,* when Venus moves between Earth and the Sun.

A brief treatment of Venus follows. For full treatment, *see* MACROPAEDIA: Solar System.

Venus revolves around the Sun at a mean distance of 108,200,000 km (67,200,000 miles) in a nearly circular orbit. As viewed from Earth, and as it travels around the Sun, Venus undergoes phase changes similar to those of the Moon. It completes one revolution in 225 Earth days but goes through one cycle of phases in 584 days.

The rotation of Venus on its axis is unusual in both its direction and its speed. Unlike the Sun and most of the planets, Venus rotates in retrograde (from east to west). It also turns very slowly, once every 243 Earth days. Because Venus' axis is tilted only 3° toward the plane of its orbit around the Sun, the planet does not have appreciable seasons.

Venus is a near twin of Earth in size and mass. Its equatorial diameter is about 12,104 km (7,521 miles), compared with 12,756 km (7,926 miles) for Earth, and its mass is 81.5 percent of Earth's. These similarities lead to a similarity in density—5.25 grams per cubic cm for Venus, compared with 5.52 for Earth.

In most other respects, however, the two planets bear little resemblance to one another. Venus is completely enveloped by a thick layer of clouds consisting chiefly of droplets of concentrated sulfuric acid; this main cloud deck extends from an altitude of about 48 km (30 miles) up to nearly 70 km (43 miles). Thin hazes extend a few kilometres below the deck's lowest layers and about 20 km (12 miles) above its highest ones.

The composition of Venus' atmosphere is quite different from that of Earth's. Spacecraft measurements indicate that carbon dioxide constitutes more than 96 percent, which accounts for the extreme density of the Venusian atmosphere. Nitrogen makes up another 3.5 percent; trace amounts of argon, water vapour, carbon monoxide, helium, and sulfur dioxide are also present. The dense atmosphere, together with the thick cloud cover, creates an enormous greenhouse effect. Solar energy is trapped so efficiently that Venus has a surface temperature of 464° C (867° F)—the highest among the terrestrial planets. The massive atmosphere also results in a high surface pressure—about 95 bars, or 95 times the atmospheric pressure at Earth's surface.

The circulation of the Venusian atmosphere is unique among the planets. Despite Venus' slow rotation, cloud features in the atmosphere circle the planet in about four days. The wind at the cloud tops blows from east to west at a speed of about 360 km (220 miles) per hour. This enormous velocity decreases markedly with decreasing height such that winds at the surface are quite sluggish—typically less than 4 km (2.5 miles) per hour.

Detailed information on the appearance and composition of Venus' surface was obtained in the 1970s and '80s by robotic Soviet Venera and Vega spacecraft. Photographs revealed plains strewn with flat, slabby rocks and darker, fine-grained soil. Surface measurements by several of the Soviet landers suggested a rock composition similar to basalts found on Earth.

Radar mapping of Venus by the Soviet missions as well as by the U.S. Pioneer Venus and Magellan spacecraft has shown a geologically complex and diverse surface topography. Most of the planet consists of gently rolling plains, although there are several lowland areas and two continent-sized highlands: Ishtar Terra and Aphrodite Terra. On the eastern side of Ishtar lies a huge mountain chain, Maxwell Montes, which rises about 11 km (7 miles) above the mean radius of Venus. Other surface features include impact craters, rift valleys, coronae (circular landforms thought to be created by hot, buoyant blobs of material originating beneath the planet's surface), tesserae (large, elevated regions composed of rugged, complex terrain of uncertain origin), shield volcanoes, and long, sinuous lava-flow channels. Overall, the Venusian topography does not suggest plate-tectonic activity of the kind thought to have shaped much of Earth's surface.

Relatively little is known about the interior of Venus. But, because the planet is much like Earth in overall size, mass, and density and because it presumably formed from similar materials, scientists expect that it evolved at least a crudely similar internal state—*i.e.,* a core of metal (primarily iron and nickel), a mantle of dense rock, and a crust of less-dense rock.

Venus comb, marine snail, a species of murex (*q.v.*).

Venus de Milo, ancient statue of Aphrodite, now in Paris at the Louvre Museum. Carved by a sculptor of Antioch on the Maeander River in about 150 BC, it was found on the Aegean island of Melos in 1820. The general composition derives from a 4th-century Corinthian statue. The action and modernized drapery give the Venus great nobility. The statue is a conspicuous example of the Hellenistic sculptural tradition's academic traits and close reliance on older masterpieces.

Venusia (Italy): *see* Venosa.

Venus's flower basket, any of several sponges of the genus *Euplectella,* especially *E. aspergillum* (class Hyalospongiae, glass sponges). The name Venus's flower basket derives from the sponges' delicate, white, latticelike skeletons. In the living animal the skeleton is covered by a thin layer of cells. *E. aspergillum* is found in a small area of the sea near the Philippine Islands. Similar species occur near Japan and in other parts of the western Pacific Ocean and the Indian Ocean. The animal's skeleton, or "basket," is a curved



Venus's flower basket (*Euplectella*)
E.R. Degginger

tube about 25 cm (10 inches) long. A tuft of fibres at the narrow base attaches the animal to the sea bottom. *Euplectella* species feed on organic debris and microscopic organisms that are drawn into its central cavity through numerous holes in the body wall. The skeleton of Venus's flower basket is a prized curio. In Japan it is regarded as a symbol of eternal love.

Venus's-flytrap (species *Dionaea muscipula*), flowering perennial plant of the sundew family (Droseraceae), notable for its unusual



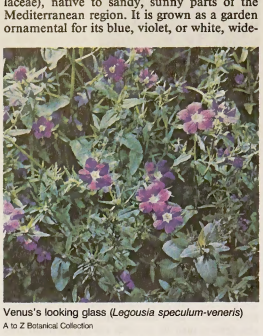
Venus's-flytrap (*Dionaea muscipula*)
Jack Dermid

habit of catching and digesting insects and other small animals. The only member of its genus, the plant is native to a small region of North and South Carolina, U.S., where it is common in damp, mossy areas.

The plant, which grows from a bulblike rootstock, bears a round cluster of small white flowers at the tip of an erect stem 20 to 30 cm (8 to 12 inches) tall. The leaves are 8 to 15 cm (3 to 6 inches) long and are hinged along the midline so that the two nearly circular lobes, with spiny teeth along their margins, can fold together and enclose an insect alighting on them. This action is triggered by pressure on six sensitive hairs, three on each lobe. In normal daytime temperatures the lobes, when stimulated by prey, snap shut in about half a second. Glands on the leaf surface then secrete a red sap that digests the insect's body and gives the entire leaf a red, flowerlike appearance. About 10 days are required for digestion, after which the leaf reopens. The trap dies after capturing three or four insects.

Venus's-hairstone, variety of quartz interspersed with fine crystals of the mineral rutile (*q.v.*).

Venus's looking glass (*Legousia,* or *Specularia, speculum-veneris*), species of annual herb of the bellflower family (Campanulaceae), native to sandy, sunny parts of the Mediterranean region. It is grown as a garden ornamental for its blue, violet, or white, wide-



Venus's looking glass (*Legousia speculum-veneris*)
A to Z Botanical Collection

open, bell-shaped flowers. The long calyx (collection of fused sepals) resembles a mirror handle and is the source of the plant's common name. The basal leaves are egg-shaped, while the stem leaves are narrow. The plant reaches a height of about 22 cm (9 inches).

Venyukovia, also spelled VENJUKOVIA, genus of extinct mammallike reptiles (therapsids) that are found as fossils in Permian deposits in eastern Europe (the Permian Period began 286,000,000 years ago and lasted 41,000,000 years). *Venyukovia* was herbivorous, with primitive teeth; it is thought that *Venyukovia* may well have been the ancestor of an important group of plant-eating therapsids, the Dicynodontia. *Venyukovia* and the dicynodonts did not give rise to more advanced forms, however.

Veracruz, *estado* ("state"), east-central Mexico. Long and narrow, it stretches 430 miles (690 km) along the coast of the Gulf of Mexico and averages 55 miles (89 km) in width. Veracruz is bounded on the north by Tamaulipas state, east by the gulf, southeast by Tabasco and Chiapas states, and west by Oaxaca, Puebla, Hidalgo, and San Luis Potosí states. Its territory consists of low, level sandy strips along the gulf, a zone heavily broken by tidewater streams and lagoons. Inland the land rises to the central plateau, which is cut into rich valleys often covered by dense tropical rainforest. Citlaltépetl (Orizaba), Mexico's highest peak, at 18,701 feet (5,700 m), is located in these highlands. More than 40 rivers cross the state, carrying rich silt and providing hydroelectric power but also causing frequent inundations.

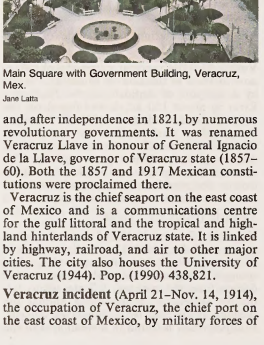
Veracruz is rich in archaeological remains of the pre-Columbian Olmec, Totonac, and Huastec cultures. Part of the coast was explored in 1518 by Juan de Grijalva, although the first landing was made by Hernán Cortés in 1519 at San Juan de Ulúa. Veracruz became a state in 1824.

A massive reclamation project was inaugurated in 1947 by the national government in the Papaloapan River basin. Dams to provide hydroelectric power, irrigation, and flood control were built, and modern farm methods were introduced.

The wealth of the state is based on agriculture, manufacturing, and the production and processing of petroleum at its northern and southern extremities. The state has more than one-fourth of Mexico's petroleum reserves and several of the country's refineries. The state's agricultural products include sugarcane, oranges, bananas, coconuts, and vegetables. Coffee is abundant, while for subsistence the state grows corn (maize) and beans. Pastoral activities furnish cattle and hides for domestic consumption. Forest industries supply rubber, cabinet woods, chicle, orchids, and medicinal plants. Among the state's numerous and varied industries are sugar refining, distilling, chemical processing, metalworking, and textile production. Fisheries in the Gulf of Mexico and processing of the catches form an industry of national importance. Transportation facilities are good, especially in the south. Besides the major seaport of Veracruz city, there are minor ports at Tuxpan and Coatzacoalcos, among others. A major highway and railroad link Veracruz city and the state capital of Jalapa (Xalapa) to Mexico City. Other roads lead eastward to the Yucatán Peninsula, and there are airports in the state's largest cities. Area 27,683 square miles (71,699 square km). Pop. (1992 est.) 6,405,478.

Veracruz, in full VERACRUZ LLAVE, city and port on the Gulf of Mexico, east-central Veracruz *estado* ("state"), east-central Mexico.

Veracruz is built on a hot, low, and barren sandy beach along the Gulf of Mexico only about 50 feet (15 m) above sea level. Hernán Cortés founded La Villa Rica de la Veracruz ("The Rich Town of the True Cross") as the first Mexican municipality in 1519, but the site was twice abandoned because of its rainy, humid, and somewhat unhealthy conditions; the present city dates from about 1599. As the chief link between colonial Mexico and Spain, Veracruz prospered as a port and became the most "Spanish" of Mexican cities, with an admixture of Caribbean creole influences. It was attacked and captured repeatedly—first by privateers, then by French and U.S. forces,



Main Square with Government Building, Veracruz, Mex.
Jane Latta

and, after independence in 1821, by numerous revolutionary governments. It was renamed Veracruz Llave in honour of General Ignacio de la Llave, governor of Veracruz state (1857–60). Both the 1857 and 1917 Mexican constitutions were proclaimed there.

Veracruz is the chief seaport on the east coast of Mexico and is a communications centre for the gulf littoral and the tropical and highland hinterlands of Veracruz state. It is linked by highway, railroad, and air to other major cities. The city also houses the University of Veracruz (1944). Pop. (1990) 438,821.

Veracruz incident (April 21–Nov. 14, 1914), the occupation of Veracruz, the chief port on the east coast of Mexico, by military forces of the United States during the civil wars of the Mexican Revolution.

On April 9, 1914, the crew of the USS *Dolphin,* anchored in the port of Tampico, was arrested after landing in a forbidden area and detained for an hour and a half. The U.S. president Woodrow Wilson demanded a 21-gun salute to the U.S. flag as an apology. When Mexican president Victoriano Huerta refused, Wilson sent a fleet to the Gulf of Mexico.

A report that Germany was dispatching arms to Huerta aboard the merchant vessel *Ypiranga* bound for Veracruz prompted Wilson to order the port seized. The resisting Mexican force failed to stop the invading U.S. Marines and suffered about 200 casualties. Both Huerta and his rival Venustiano Carranza denounced the seizure. The action cut Huerta off from the source of needed munitions (although the arms aboard the *Ypiranga* did reach Huerta), but the United States permitted his opponents to be supplied. By July 1914, the Constitutionalists under Carranza were able to take over the government, and Huerta was forced into exile. On November 14 the U.S. Marines were withdrawn.

Veralden-radien, also called VERALDENOLMAI (Sami: "Ruler of the World"), the deity believed by the Sami (Lapps) to be closest to the starry heaven. Because the deity is associated with *mailmen stytto,* the pillar supporting the heavens, he is also responsible for the continued maintenance of life and is considered a fertility god. Veralden-radien is believed to support all growth. The goddess of childbirth, Madderakka, receives the souls of unborn children from him, while he takes the souls of the departed down to *yahmeaimo,* the Sami realm of the dead. Veralden-radien was also the object of a phallic cult; each autumn a bull reindeer was traditionally sacrificed to him, then its genitalia were tied around his statue and the blood smeared over the statue.

The worship of Veralden-radien has many Scandinavian features, which has led scholars to look for the god's origin among the Germanic peoples. He is often mentioned in connection with the Swedish deity Frey, a fertility god, and the Saxon world-supporting pillar Irminsul, which may have influenced some of the mythological concepts of the Sami.

veranda, in architecture, most frequently, an open-walled, roofed porch attached to the exterior of a domestic structure and usually surrounded by a railing. The word came into English through the Hindi *varandā,* but it is related to the Spanish *baranda,* meaning "railing," and thus most likely entered Hindi via Portuguese explorers of India.

Veranda most often refers to a long porch that extends along more than one outside wall of a house and is used for outdoor activities. In some parts of the United States, however, it is used to mean any kind of porch, and in India it refers to either a long, open porch or an enclosed area in the front of the house where visitors are received.

Veratrum, genus of poisonous herbs of the lily family (Liliaceae). The genus includes about 15 to 45 perennial species, among them the American hellebore and the European hellebore (*see* hellebore) and the false hellebore (*see* skunk cabbage). They bear flowers that are greenish white to brownish purple and are planted as ornamentals. Their poisons have commercial value as insecticides and medicine.

Verāval, city, south-central Gujarāt state, west-central India. Verāval lies on the Arabian Sea coast of the Kāthiāwār Peninsula and is part of the Pātan urban agglomeration. Its port principally handles timber and agricultural products. Matches, textile bobbins, and bone fertilizer are manufactured in the city, and there is offshore fishing. The ruins of the

ancient city and Hindu temple of Somnāth are nearby. Pop. (1991) 93,976.

Verbania, commune, capital of Verbano-Cusio-Ossola *provincia,* Piemonte (Piedmont) *regione,* northern Italy. Verbania is a summer resort on Lake Maggiore (ancient Verbanus Lacus). Formed in 1939 by the union of the towns of Pallanza and Intra, it has botanical gardens, two 16th-century churches (San Secondo and Madonna di Campagna), and the 18th-century Palazzo Dugnani. Pop. (1993 est.) mun., 30,427.

Verbena, genus of plants in the family Verbenaceae that contains several species of garden flowers. *Verbena* consists of about 250 species, almost all of them native to the tropical and subtropical Americas, including 20 in the United States. Two species are indigenous to the Old World. Most verbenas are perennials, though a few are annuals. They usually have opposite leaves that are toothed, lobed, or dissected. The flowers are small to medium-sized and are usually borne on spikes.

The best-known species is the common garden verbena (*V. hortensis,* or *hybrida*), which is



Verbena
© Richard Shiell/Earth Scenes/Animals Animals

derived from various South American species. This square-stemmed, creeping plant bears flat heads of phloxlike flowers that sometimes have yellow eyes. Its flowers range in colour from pure white to pink, red, blue, violet, and yellow and also occur in striped varieties.

verbena, lemon: *see* lemon verbena.

Verbenaceae, the verbena, or vervain, family of plants in the order Lamiales, a worldwide but mainly tropical grouping of about 100 genera and more than 2,600 species, some of which are important for their flowers. Members of the family have opposite or whorled leaves that are usually undivided. The flowers are aggregated in spikes, clusters, or racemes and usually consist of a tube flaring into four or five almost equally cut lobes.

The type genus, *Verbena* (*q.v.*), contains about 250 species, almost all of them native to the Western Hemisphere. Outstanding among the 30 *Petrea* species, all tropical American, is a woody evergreen vine called purple wreath, or sandpaper vine (*P. volubilis*). It bears long, hanging clusters of violet-blue pansylike flowers and has oval leaves so rough as to be likened to sandpaper. The 220 species of the genus *Lippia* bear clusters of white, rose, or purplish flowers. *L. canescens* of South America is a matting ground cover with oblong leaves and small heads of yellow-throated, lilac flowers. *Caryopteris,* with 15 East Asian species, is exemplified by blue spirea, or bluebeard (*C. incana*), an oval-leaved shrub up to 1.5 m tall with clusters of bright blue flowers in the autumn. Other tropical plants such as the Chinese hat plant (*Holmskioldia sanguinea*) and species of pigeon berry, or golden dewdrop (*Duranta*), beauty berry (*Callicarpa*), and glory-bower (*Clerodendrum*) are cultivated as ornamentals. The shrub lemon verbena (*Aloysia triphylla*) is notable for its fragrant oil. The family also includes teak (*Tectona grandis*), an important timber tree of Southeast Asia (*see* teak).

Verbiest, Ferdinand, Chinese name NAN HUAI-JEN (b. Oct. 9, 1623, Pitthem, Spanish Netherlands [now Pittem, Belg.]—d. Jan. 23, 1688, Peking, China), Dutch Jesuit missionary and astronomer who became an influential official in the Chinese government.

At a time when the Chinese were impressed with Western astronomical knowledge, Verbiest, a trained astronomer, took the place of his Jesuit predecessor, Adam Schall von Bell, as director of the Imperial Board of Astronomy. He advised the Chinese emperor in many matters, including the construction of more than 300 cannon when the Ch'ing dynasty was threatened by a rebellion in South China. In 1678 Verbiest served as a translator in Chinese treaty negotiations with the Russians, in the process obtaining from the Russians knowledge of an overland route through Siberia that could be used by Jesuits coming to China from Europe.

Vercelli, Latin VERCELLAE, city, capital of Vercelli *provincia,* Piemonte (Piedmont) *regione,* northwestern Italy. It lies along the Sesia River, southwest of Novara. The chief city of the Libici (a Ligurian tribe), it later became a Roman municipium (town). The Campi Raudii (Raudian Fields) to the south were the scene of Hannibal's first victory on Roman soil (218 BC) and of the Roman general Marius' defeat of the Cimbri in 101 BC. A powerful independent republic in the Middle Ages, Vercelli fell to the Visconti family of Milan in 1335 and to the house of Savoy in 1427. The Spanish occupied it from 1638 to 1659. It was a bishopric from the 4th century and has been an archbishopric since 1817.

The city's notable landmarks include the cathedral (reconstructed 1572), with a valuable library that houses the Vercelli Book, a late 10th-century Old English manuscript; the Romanesque–Gothic-style Basilica of Sant' Andrea (1219–24); and the churches of saints Cristoforo, Paolo, and Francesco. Vercelli was the birthplace of the painter Il Sodoma. It is a rail junction and major rice market in an irrigated agricultural region. Pop. (1999 est.) 47,946.

Vercelli Book, Latin CODEX VERCELLENSIS, Old English manuscript written in the late 10th century. It contains texts of the poem *Andreas,* two poems by Cynewulf, *The Dream of the Rood,* an "Address of the Saved Soul to the Body," and a fragment of a homiletic poem, as well as 23 prose homilies and a prose life of St. Guthlac, the *Vercelli Guthlac.* The book is so named because it was found in the cathedral library at Vercelli, northwestern Italy, in 1822. Marginalia in the manuscript indicate that the manuscript was in English use in the 11th century. It was probably taken to Italy by one of the numerous Anglo-Saxon pilgrims on the way to Rome.

Vercingetorix (d. 46 BC), chieftain of the Gallic tribe of the Arverni whose formidable rebellion against Roman rule was crushed by Julius Caesar.

Caesar had almost completed the subjugation of Gaul when Vercingetorix led a general uprising of the Gauls against him in 52 BC. Vercingetorix, named the king of the Arverni and general of the confederates, used guerrilla warfare to harass Caesar's supply lines and cleverly offered to engage Caesar's forces on terrain unfavourable to the Romans. He successfully held the Arvernian hill-fort of Gergovia against an assault by Caesar. Vercingetorix followed up this victory by an attack on the Roman army, the failure of which compelled him to retreat with 80,000 troops to the prepared fortress of Alesia (in east-central France). Caesar, with a force of 60,000 men, laid siege to the fortress and was able to force its surrender after he had defeated the Gauls' reserve army in the field. Vercingetorix was taken to Rome in chains, exhibited in Caesar's triumph (52), and executed six years later.

Verde, Cape, French CAP VERT, promontory along the coast of Senegal that is the westernmost part of continental Africa. It is shaped like a triangle (about 9 miles [15 km] per side), with the base of the triangle roughly along the north and its apex on the south, the site of Dakar, capital of Senegal. Near Pointe des Almadies, the northwestern tip of the cape, lies Dakar's airport, famous as a transatlantic ferrying point during World War II. *See also* Cape Verde Peninsula.

Verde, Cesário, in full JOSÉ JOAQUIM CESÁRIO VERDE (b. Feb. 25, 1855, Lisbon, Port.—d. July 18, 1886, Lisbon), poet who revived Portuguese poetry by introducing colloquial language and by exploring its capacity for expression at a time when exalted rhetoric was the accepted style. He dealt extensively with themes pertaining to the growth of urban life.

Born into a well-to-do middle-class family, Verde studied at the faculty of arts of the University of Lisbon but left without a degree. Adopting a bohemian life-style, he nevertheless earned a living as a fruit farmer and businessman, publishing poetry in newspapers and literary magazines sporadically until his early death from tuberculosis.

After his death, a friend, the literary critic António da Silva Pinto, collected and published his poems as *O livro de Cesário Verde 1873–1886* (1887; "The Book of Cesário Verde").

Verdi, Giuseppe, in full GIUSEPPE FORTUNINO FRANCESCO VERDI (b. Oct. 9/10, 1813, Roncole, near Busseto, duchy of Parma [Italy]—d. Jan. 27, 1901, Milan, Italy), leading Italian composer of opera in the 19th century, noted for operas such as *Rigoletto* (1851), *Il trovatore* (1853), *La traviata* (1853), *Don Carlos* (1867), *Aida* (1871), *Otello* (1887), and *Falstaff* (1893) and for his *Requiem Mass* (1874).

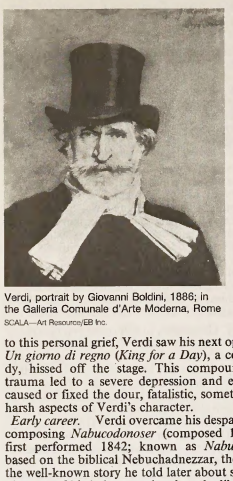
Early years. Verdi's father, Carlo Giuseppe Verdi, an innkeeper and owner of a small farm, gave his son the best education possible in a tiny village. The child must have shown unusual talent, for he was given lessons from his fourth year, a spinet was bought for him, and by age 9 he was standing in for his teacher as organist in the village church. He attended the village school and at 10 the *ginnasio* (secondary school) in Busseto.

A little later he composed music (now lost) for the town church and the largely amateur orchestra. One of Busseto's leading citizens, Antonio Barezzi, a merchant and fanatical music enthusiast, became a second father to the young prodigy, taking him into his home, sending him to study in Milan, and in 1836 giving him his daughter Margherita in marriage. Refused by the Milan Conservatory—he was past the admission age and played the piano poorly—Verdi studied privately with an associate of La Scala opera house (Teatro alla Scala). Milan was the intellectual and operatic centre of Italy, and in the years 1832–35 Verdi seems to have learned much about literature and politics there as well as counterpoint and the elements of opera. Later, after his great success with *Nabucco,* he attended the literary salons in the city and made lasting friendships with some cultivated aristocrats.

Barezzi's plan was for Verdi to return to Busseto as music director, but when this post fell open in 1833 a furious political storm devel-

oped leading to long delays. Soured by this, Verdi nonetheless took a compromise position and stayed from March 1836 to October 1838, teaching and composing a great deal, though all he published was a set of songs in 1838.

Needless to say, he had his eye on greater things. The music that he had written during these years must have impressed the right people, for after some difficulty he succeeded in getting an opera, *Oberto, conte di San Bonifacio,* produced at La Scala in March 1839. It succeeded well enough to travel to Genoa and Turin and to gain him a commission for three more operas. His rising career was deflected by tragedy: in 1840 his young wife died, following the deaths of two infant children. In addition



Verdi, portrait by Giovanni Boldini, 1886; in the Galleria Comunale d'Arte Moderna, Rome
SCALA—Art Resource/EB Inc.

to this personal grief, Verdi saw his next opera, *Un giorno di regno* (*King for a Day*), a comedy, hissed off the stage. This compounded trauma led to a severe depression and either caused or fixed the dour, fatalistic, sometimes harsh aspects of Verdi's character.

Early career. Verdi overcame his despair by composing *Nabucodonoser* (composed 1841, first performed 1842; known as *Nabucco*), based on the biblical Nebuchadnezzar, though the well-known story he told later about snapping out of his lethargy only when the libretto fell open at "Va, pensiero"—by that time one of his most beloved works—is no longer credited. *Nabucco* succeeded as sensationally as *Un giorno* had failed abjectly, and Verdi at age 28 became the new hero of Italian music. Within a decade the work had traveled as far as St. Petersburg and Buenos Aires, Arg. While its musical style is primitive by the composer's later standards, *Nabucco*'s raw energy has kept it alive a century and a half later.

There followed a period (1843–49) during which Verdi drove himself like a galley slave, as he himself put it, and to the detriment of his health, to produce nearly two operas a year. His aim was to make enough money for early retirement as a gentleman farmer. To "produce" an opera meant, at that time, to negotiate with an impresario, secure and edit (often heavily) a libretto, find or approve the singers, compose the music, supervise rehearsals, conduct the first three performances, deal with publishers, and more—all this while shuttling from one end of Italy to the other in the days before railroads.

Though masterpieces were unlikely to emerge from a schedule like this, Verdi's next two operas were, amazingly, just as wildly successful: *I Lombardi alla prima crociata* (1843; *The Lombards on the First Crusade*) and *Ernani* (1844). The latter became the only work of the "galley-slave" period to gain a steady place in the opera repertory worldwide.

Not until his adaptation of *Macbeth* (1847), was Verdi inspired to fashion an opera that is as gripping as it is original and, in many ways, independent of tradition. Just as the biblical theme had contributed to the grandeur of *Nabucco,* so the tragic theme of Shakespeare's drama called forth the best in him. Verdi knew the value of this work and revised it in 1865, excising some of its crudities; but its greatest number, the harrowing sleepwalking scene of Lady Macbeth, could be left just as it was written in 1847.

By that time he was receiving lucrative commissions from abroad—from London *(I masnadieri*) and Paris (*Jérusalem,* a thorough revision of *I Lombardi,* 1847). *La battaglia di Legnano* (1849; *The Battle of Legnano*), a tale of love and jealousy set against the Lombard League's victory over Frederick Barbarossa in 1176 CE, was Verdi's emphatic response to the Italian unification movement, or Risorgimento, to, which spilled over into open warfare in 1848, the year of revolutions. Greeted ecstatically at the time, this opera later faded.

It is often said that in the earlier operas, too, choruses and other numbers calling for liberation or revolt were taken metaphorically as revolutionary rallying cries, and evidently this did happen on isolated occasions. However, it was only after unification in 1861, when the conte di Cavour, seeking to involve as many important Italians as possible, persuaded the composer to stand for the Chamber of Deputies—which he attended faithfully but soon resigned from—that Verdi came to be widely celebrated as a national hero. "Va, pensiero," the song of the enslaved Hebrews in *Nabucco,* assumed the status of an unofficial national anthem. It could still be heard at Italian communist rallies in the 1990s.

The early middle years. The prima donna who created Abigaille in *Nabucco,* Giuseppina Strepponi, ultimately became his second wife. Her love, support, and practical assistance on behalf of Verdi, over 50 years, was boundless, though he was not an easy husband.

Born in 1815, Strepponi had a successful, if short, career. Living for a time with her agent, in effect as common-law wife, she had borne three children, none of whom were brought up by her. When her voice began to deteriorate she set up as a teacher in Paris, where Verdi fell in love with her in 1847 while there to produce *Jérusalem*. They were soon living together, though they did not marry until 1859. Strepponi seems to have felt herself unworthy to be Verdi's wife, a feeling that one suspects Verdi may have shared on some level.

The new richness of Verdi's musico-dramatic characterization may have developed out of his relationship with Strepponi. She is often evoked in connection with the sympathetic and radiant portrayal of Violetta in *La traviata* (*The Fallen Woman*—a translation, to be sure, for Violetta the courtesan had fallen a great deal farther than Strepponi the singer). Yet Verdi showed scant sympathy for the real-life woman when he determined to move back with her to Sant'Agata, where small-town outrage at their liaison reached a peak. For some time he refused to allow her to accompany him on his travels, which left her alone in a very hostile environment.

In the meantime he had composed three operas that remain his best known and best loved: *Rigoletto* (1851), *Il trovatore* (1853; *The Troubadour*), and *La traviata* (1853). The tunes were better than any he had written before, the drama tighter and more exciting, and the characterization altogether original. *Rigoletto* makes an important technical advance toward a coherent presentation of the drama in music, especially in the famous third act. Even greater is the contrast of style in *La traviata,* with its intimate mood and lyrical pathos.

By this time he had honed his skills as a competitor in the rapacious marketplace that was 19th-century Italian opera—or, as he always saw it, the grim site of major battles, endless skirmishes, and equivocal victories. He drove hard bargains, complained bitterly at every reverse, stonewalled, and sued. He tried to insist that his operas be performed exactly as written.

He met his match with the censors, especially after 1848. The plot of *Le roi s'amuse,* the play by Hugo that inspired *Rigoletto,* features a curse that was deemed blasphemous and the attempted murder of a king that was politically taboo; only after the king was demoted to a duke and various other modifications were made could the text be approved. *Traviata* experienced problems of another kind. With *La Dame aux camélias* ("The Lady of the Camellias"), Alexandre Dumas *fils* had just caused a considerable scandal in Paris, and Verdi's operatic version, though at first performed in 17th-century costumes, too obviously broke from operatic convention in setting a present-day subject, and a risqué one at that. For this reason and the miscasting of a stout singer as the consumptive heroine, the first performance was a rare Verdi fiasco. After minor revisions and a new production, the opera carried all before it.

The later middle years. Verdi had become an international celebrity, and the change in his status was reflected in his art. From 1855 to 1870 he devoted himself to the Parisian operatic standard, which demanded spectacular dramas on subjects of high seriousness in five acts with a ballet. He was pointedly challenging Giacomo Meyerbeer (*q.v.*), the one European composer more renowned and wealthier than he was, on Meyerbeer's own ground. While these operas show advances and include superb scenes, none of them is as satisfactory as a whole as any of the three great operas of the early 1850s.

His first essay in the new manner, *Les Vêpres siciliennes* (1855; *The Sicilian Vespers*), is a rather cold piece that has had only lukewarm success from its premiere on. Two pieces for Italian theatres, *Simon Boccanegra* (1857) and *Un ballo in maschera* (1859; *A Masked Ball*), affected to a lesser extent by the grand operatic style, show the enrichment of Verdi's power as an interpreter of human character and as a master of orchestral colour. *Boccanegra*, despite a gloomy and excessively complex plot, includes powerful scenes and creates a special windswept atmosphere appropriate to its Genoese pirate protagonist. (Verdi often spoke of the unique *tinta* ["colour"] of each of his operas.) Much more successful with the public was *Ballo,* a romantic version of the assassination of Gustav III of Sweden—even though censorship once again made nonsense of the story.

In 1862 Verdi represented Italian musicians at the London Exhibition, for which he composed a cantata to words by the up-and-coming poet and composer Arrigo Boito. In opera the big money came from foreign commissions, and in the same year his next work, *La forza del destino* (*The Force of Destiny*), was produced at St. Petersburg. Verdi had long wanted to tackle the epic narrative extending over many years and many locations, with scenes of high life and low. This he managed in *Forza,* which also includes the most extended religious scene in a Verdi opera and his first substantial comic role, that of the irascible Friar Melitone. Verdi finally surpassed Meyerbeer (at least according to opinion at the turn of the 21st century—though not at the time) with *Don Carlos* (1867), a setting of a play by Friedrich von Schiller that is for once worthy of the original. Despite its problematic ending, *Don Carlos* is regarded by some as Verdi's masterpiece, or at least his masterpiece prior to the Shakespeare operas of his last years.

Verdi felt that both operas with foreign commissions required revision for Italian theatres;

this he accomplished for *Forza* in 1869 and *Don Carlo* (as it is now usually called) in 1884 and 1887. He needed none with the piece in which at last he fashioned a libretto exactly to his needs, *Aida*. Verdi wrote a detailed scenario—much simpler than those of the previous two operas—employing Antonio Ghislanzoni, a competent poet, to turn it into verse, the metres of which were often dictated by the composer. Commissioned by the khedive of Egypt to celebrate the opening of Cairo's new Opera House in 1869, *Aida* finally premiered there in 1871 and went on to receive worldwide acclaim. Verdi had achieved the grandeur and the gravitas of the Parisian style without its excess padding and without any weak spots, and onto it he had grafted an emotional intensity that only he could furnish.

Late years. When Gioacchino Rossini, the most revered figure in modern Italian music, died in 1868, Verdi proposed that a requiem mass in his honour be composed by himself and a dozen of his contemporaries. The project collapsed and Angelo Mariani, who was to have conducted the performance, seemed to Verdi less than wholehearted in his support. Verdi, who could not bear being thwarted, visited his wrath on the unfortunate Mariani, who was the most distinguished Italian conductor of the day and, until then, had been one of his closest friends. The quarrel shows both Verdi and Giuseppina at their worst. Verdi could never forgive an injury, real or imagined, as attested to by his lifelong hatred of La Scala and its audience, which had rejected *Un giorno di regno,* and his contempt for the town of Busseto. The breach with Mariani widened when the conductor refused to go to Cairo to direct the first performance of *Aida*. He pleaded illness and was indeed suffering terribly from cancer, of which he died in 1873. Things reached a very ugly pitch when a scurrilous newspaper story accused Verdi of stealing Mariani's fiancée, the soprano Teresa Stolz.

Although little is known for certain, Giuseppina's private papers reveal her great distress. She worked valiantly to preserve the marriage, persevering in the most cordial relations possible with Stolz, who finally made some kind of break when she left Italy in 1876. Apparently Giuseppina had put her foot down. But two years later Stolz resumed visits to Sant'Agata, and it was clear the relationship had not blown over. Letters from Verdi that somehow escaped destruction speak of his love for Stolz. She was present at the composer's deathbed.

In 1873, while waiting in a Naples hotel for a production of *Aida,* Verdi wrote a string quartet, the only instrumental composition of his maturity. In the same year, he was moved by the death of the Italian patriot and poet Alessandro Manzoni to compose a requiem mass in his honour. He was able to incorporate into it the final movement ("Libera me") that he had written for the abortive Rossini mass. One of the masterpieces in the oratorio tradition, often heard in concert series into the 21st century, the Manzoni Requiem is an impressive testimony to what Verdi could do outside of the field of opera.

After 1873 the maestro considered himself retired, at long last. He settled in at Sant'Agata, where the same iron hand and obsessive attention to detail that he had applied to operatic rehearsals came to control all aspects of his farming enterprise. A 20-year program of enlargement and improvement of his estates made him a major landholder and a very wealthy man. He funded major charities, of which the best known is the Casa di Riposo per Musicisti, a home for aged musicians that is still in operation in Milan.

His unintended and unimagined return to the stage was entirely due to the initiative of his publisher, Giulio Ricordi. Reluctant to allow his most profitable composer to rest on his laurels, Ricordi contrived a reconciliation with Arrigo Boito, who had offended Verdi by some youthful criticism. A proposal that Boito should write a libretto based on Shakespeare's *Othello* attracted the old composer, and, as a sort of test, the now-prominent man of letters and composer of the opera *Mefistofele* agreed to revise the unsatisfactory libretto of *Simon Boccanegra*. The latter opera is still performed because of Boito's revision of 1881. The Othello project then took shape, very slowly, on and off, until the opera finally opened at La Scala in 1887. In his 74th year, Verdi, stimulated by a libretto far superior to anything he had previously set, had produced his tragic masterpiece. In *Otello* the drama is absorbed into a continuous and flexible musical score vastly advanced in style over that of *Aida*, reflecting every aspect of the characters and every nuance of the action.

After a rapturous tour with *Otello* throughout Europe, Verdi once more retreated to Sant'Agata, declaring that he had composed his last opera. Yet Ricordi and Boito, who had grown very close to the old man, managed to intervene one more time. With infinite skill, Boito converted Shakespeare's *The Merry Wives of Windsor,* strengthened with passages from the Henry IV plays, into the perfect comic libretto, *Falstaff,* which Verdi set to fresh and mercurial music. This, his last dramatic work, produced at La Scala in 1893, avenged the cruel failure of Verdi's only other comedy in the same theatre 50 years earlier.

Even after *Falstaff* Verdi still interested himself in composition. His list of works ends with sacred music for chorus: a *Stabat Mater* and a *Te Deum* published, along with the somewhat earlier and slighter *Ave Maria* and *Laudi alla Vergine Maria,* under the title *Quattro pezzi sacri* (*Four Sacred Pieces*) in 1898. After a long decline Giuseppina had died in 1897, and Verdi died four years later.

Assessment. Verdi appeared on the operatic scene just as the Italian bel canto tradition of Rossini, Vincenzo Bellini, and Donizetti, in the quarter-century from about 1815 to 1845, entered its waning phase. He transformed it and dominated Italian opera alone for another 30 years. It was a period of constant experimentation, constant refinement of musical and dramatic means—a process that seems to have continued underground to germinate the two transcendent Shakespeare operas written 20 years after his supposed retirement.

At first it was mainly his vigour and dramatic intelligence that distinguished his operas, works that audiences could feel were continuing safely in his predecessors' footsteps. But step by step Verdi modified the rigid conventions of bel canto opera, which showed off singers at the expense of dramatic values. Verdi's genius was to dismantle the system while still giving the singers (and their audiences) melody and brilliance in ample measure. All of this was in the service of drama, and drama, as he saw it, emerged from the interaction of people in striking, usually dire situations—people who were characterized unforgettably by Verdi's music.

His operas move rapidly, with unerring dramatic rhythm. He developed a whole new musical vocabulary, which broadened the role of the orchestra without compromising the primacy of the voice. He introduced a range of subject matter never before touched in opera; the later Verdi could be subtle, gentle, and atmospheric as well as powerful. Generations of listeners the world over, in and out of the opera house, have loved Verdi's melodies. The best of them serve the drama, capturing his characters' emotions with a warmth and directness achieved by few other composers.

(D.Hus./Jo.K.)

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(Jo.K.)

verdin, North American songbird of the family Remizidae (*q.v.*).

Verdon River, river, southern France. It flows for 125 miles (200 km), mainly through Alpes-de-Haute-Provence *département,* into the Durance River. The Verdon is famous for its gorges, including its "Grand Canyon," which may be seen from the scenic road that runs 12 miles (20 km) between Pont de l'Artuby and Aiguines.

Verdun, city, Montréal region, southern Quebec province, Canada. It lies on the Île de Montréal (Montreal island), overlooking the St. Lawrence River. Granted in 1672 to Zacharie Dupuis, a French military pioneer, it was named after his birthplace of Saverdun, France. Verdun, now a southern suburb of Montreal city, is primarily residential and has few industries. Inc. village, 1875; town, 1907; city, 1912. Pop. (1996) 59,714.

Verdun, town, Meuse *département,* Lorraine *région,* northeastern France, on the Meuse River. Most of the town is on the left bank, near the Citadel. Practically destroyed in World War I, it was rebuilt with wide streets. A cathedral, dating from the 11th century, rising on the highest point of the town, has been restored.

Verdun was a Gallic fortress before Roman times. It was there in 843 that three grandsons of Charlemagne divided his empire in the Treaty of Verdun. Conquered by German invaders in the 10th century, it was later linked with Metz and Toul to form the Trois-Évêchés (Three Bishoprics) territory. In 1552 the French king Henry II took over the three bishoprics, and France's ownership was confirmed in 1648 by the Peace of Westphalia. In 1792 Verdun was besieged by the Prussians and yielded only a few weeks before the French victory at Valmy. The Prussians captured it again in 1870 and held it until 1873. With the loss of Alsace-Lorraine to the German Empire in 1871, the German frontier was fixed barely 30 miles (50 km) away. In response, France heavily fortified the hills around Verdun.

In World War I the ring of fortresses around Verdun became the primary objective of the great German offensive of 1916. The long battle fought in the vicinity is commemorated by numerous monuments, including the Ossuaire de Douaumont and the Monument de la Victoire. During World War II in September 1944 it was heavily bombed by the Germans after its liberation by American forces. There are more than 70 cemeteries in the area, and war museums are in the Citadel and in the restored 17th-century Hôtel de Ville.

The town has some foundries, factories producing furniture, and food-processing industries. Pop. (1999) 25,509.

Verdun, Battle of (Feb. 21–July, 1916), one of the most devastating engagements of World War I, in which the French repulsed a major German offensive.

German General Erich von Falkenhayn believed in a strategy of attrition and argued that

Germany should bleed France to death by choosing a point of attack "for the retention of which the French would be compelled to throw in every man they have." The fortress of Verdun and its surrounding fortifications along the Meuse River was the point selected. The Germans massed huge amounts of artillery and troops for the attack, which the French knew was impending but believed would occur elsewhere. Thus, Verdun was unprepared when one of the heaviest bombardments of the war rained down on the area. From the offensive's start on February 21, the Germans advanced with little opposition for four days until they reached Fort Douaumont, which they took. French reinforcements arrived just in time and with them General Henri Pétain, who took command and managed to slow the German advance by several French counter-attacks. In March and April the hills and ridges west of the Meuse and north of Verdun were bombarded, attacked, counterattacked, taken, and retaken. In June the Germans again assaulted the heights along the Meuse but were unable to maintain an advantage. By July they realized that their plan to seize Verdun and undermine France's will to resist had failed with a terrible loss of men—about 400,000 French casualties and nearly as many German—and material for both sides. From October until the end of the year, the French took the offensive and regained the forts and territory they had lost earlier.

Verdun, Treaty of (August 843), treaty partitioning the Carolingian empire among the three surviving sons of the emperor Louis I the Pious. The treaty was the first stage in the dissolution of the empire of Charlemagne and foreshadowed the formation of the modern countries of western Europe. Louis I had carefully planned his three elder sons' inheritances; but from 829 onward his attempts to allocate substantial territory to the future Charles II the Bald, his young son by a second wife, led to revolts by Charles's half brothers. After Louis's death (840) open warfare broke out; Louis's third son, Louis the German, allied with Charles in attacking the eldest son, the emperor Lothair I. Defeated at Fontenoy, in present Belgium (June 841), and driven from Aix-la-Chapelle (Aachen, Ger., 842), Lothair sued for peace. At Verdun (in present northeastern France) the following year, Lothair was confirmed in possession of the imperial title and received Francia Media, a long central strip of territory including parts of modern Belgium, The Netherlands, western Germany, eastern France, Switzerland, and much of Italy. Louis the German received Francia Orientalis, the land east of the Rhine River. Charles received Francia Occidentalis, the remainder of modern France.

verdure tapestry, also called GARDEN TAPESTRY, type of tapestry decorated with a design based on plant forms. It is not known exactly when the first verdure tapestries were made, but, by the 16th century, tapestries with formal designs derived from foliage had become immensely popular. In the last half of the 17th century, landscapes were incorporated into their design.

Such famous tapestry factories as Aubusson and Lille in France specialized in the production of verdures, especially those of small dimensions used as upholstery and pillow covers. Verdure tapestry should not be confused with *menues verdure,* or millefleur tapestry, since the floral decoration of millefleur tapestries serves merely as a backdrop for the figurative elements of the design.

Verdy, Violette, original name NELLY GUILLERM (b. Dec. 1, 1933, Pont-l'Abbé, Brittany, France), French ballerina and dance director, who was awarded the French Order of Arts and Letters in 1973 and the Dance Magazine Award in 1968.

Verdy began dancing as a child, most notably with Madame Rousanne and later Victor Gsovsky, both in Paris. She made her debut with Les Ballets de Champs-Elysees in 1945 and danced with Roland Petit's Ballets de Paris in 1950 and in 1953–54. Verdy then performed with the London Festival Ballet (1954–55), La Scala, Milan (1955–56), and the American Ballet Theatre (1957–58) and was principal ballerina in the New York City Ballet (1958–77).

Roles in many ballets were created for Verdy, notably in Roland Petit's *Le Loup* (1953), George Balanchine's *Jewels* (1967), and Jerome Robbins' *Dances at a Gathering* (1969). She also appeared in motion pictures, including *Ballerina* (1949) and *The Glass Slipper* (1954). Verdy stopped performing in 1976 to become the director of the Paris Opéra Ballet, and in 1980 she became artistic codirector of the Boston Ballet.

Vere FAMILY, noted English family that held the hereditary office of lord great chamberlain from 1133 to 1779 and the earldom of Oxford from 1142 to 1703.

The family derived its name from the village of Ver, near Bayeux, in France. Its founder, Aubrey de Vere (*c.* 1040–1112), was a Norman who came to England with William the Conqueror and was granted lands by the latter in Essex, Suffolk, Cambridgeshire, and Middlesex. His son Aubrey de Vere II (*c.* 1090–1141) was made lord great chamberlain of England in 1133. His son Aubrey de Vere III (*c.* 1110–1194) was created Earl of Oxford in 1142.

Robert (1362–92), the 9th Earl of Oxford, was a favourite of King Richard II. John (1442–1513), the 13th Earl of Oxford, was a Lancastrian leader in the Wars of the Roses and crowned King Henry VII in 1485. Two of the grandsons of John, the 15th earl, were notable soldiers who were known as the "fighting Veres"; Sir Francis (1560–1609) commanded the English troops in the Netherlands that fought against Spain in the service of the United Provinces, while his younger brother Sir Horace (1565–1635) fought in Germany during the Thirty Years' War. Edward (1550–1604), the 17th Earl of Oxford, was a poet and dramatist who squandered much of the family's wealth; he has sometimes been proposed as the real author of William Shakespeare's plays.

After the death (1625) of Henry, the 18th earl, the office of lord great chamberlain passed to a distant cousin, Robert de Vere, whose descendants held the office until it passed to coheiresses in 1779. Aubrey de Vere (1627–1703) became the 20th and last Earl of Oxford in the Vere family. He died in 1703 without male issue, and his daughter Diana married Charles Beauclerk, 1st Duke of St. Albans, who was an illegitimate son of King Charles II by the actress Nell Gwyn. Their third son, Vere Beauclerk, was created Baron Vere of Hanworth in 1750, and his fourth son, Aubrey, succeeded as 5th Duke of St. Albans in 1787.

Vere, Edward de: *see* Oxford, Edward de Vere, 17th Earl of.

Vere, John de: *see* Oxford, John de Vere, 13th Earl of.

Vere, Robert de: *see* Oxford, Robert de Vere, 9th Earl of.

Vereenigde Oost-Indische Compagnie (Netherlands): *see* Dutch East India Company.

Vereeniging, town, Gauteng province, South Africa. It lies along the Vaal River, south of Johannesburg, at the Orange Free State border. Its name, which means "association," refers to the coal-mining association that owned the town when it was founded in 1892. Peace negotiations to end the South African War took place there in 1902, and the resulting treaty was named after the town. The community was incorporated as a town in 1912. Vereeniging's access to abundant coal and water from the Vaal River has enabled it to become one of South Africa's main heavy industrial centres, with plants manufacturing assorted iron and steel products, glass, and bricks and tiles. Large local thermal power stations transmit electricity through the national grid. Demonstrations in 1960 denouncing pass laws at the nearby township of Sharpeville led to the shooting deaths of 69 blacks. Pop. (1985) 60,584.

Vereeniging, Peace of (May 31, 1902), treaty that ended the South African War (*q.v.*), or Boer War; it was signed in Pretoria, after initial Boer approval in Vereeniging, between representatives of the British and ex-republican Boer governments. It ended the independence of the South African Republic (*i.e.,* Transvaal) and the Orange Free State, which came under British military administration. A general amnesty was declared, burghers were to be disarmed, and a commission was appointed with a grant of £3,000,000 to reconstruct the Transvaal. Clause VIII left the question of a voting franchise for nonwhites to be settled after the defeated Boers had been granted self-government. Thus, black Africans were left without the vote (except in the Cape Colony) when South Africa was unified in 1910.

Vereinigte Evangelisch-Lutherische Kirche Deutschlands (German Lutheran churches): *see* United Evangelical Lutheran Church of Germany.

Vérendrye, Pierre Gaultier de Varennes, sieur de la: *see* La Vérendrye, Pierre Gaultier de Varennes, et de.

Vereshchagin, Vasily Vasilyevich, Vereshchagin also spelled VERESTCHAGIN (b. Oct. 14 [Oct. 26, New Style], 1842, Cherepovets, Russia—d. March 31 [April 13], 1904, Port Arthur [now Lü-shun], China), Russian painter noted for his war scenes.

Vereshchagin attended the St. Petersburg Academy and studied in Paris. Devoting his life to travel, he acquired subjects for paintings from on-the-spot impressions in the Caucasus, in the Crimea, along the Danube River, and in Turkistan with the Russian army. In the Balkans during the Russo-Turkish War (in which he was wounded), Vereshchagin was provided with the themes for some of his famous war pictures. He also painted in Syria and in Palestine and between 1885 and 1903 traveled in Russia, the United States, and Japan. He died during the Russo-Japanese War, aboard the flagship of Admiral Stepan Osipovich Makarov.

Vereshchagin's paintings of scenes during the invasion of Russia by Napoleon in 1812 enjoyed extraordinary popularity; innumerable reproductions of them were made. The pacifist and humanitarian movement of the time made use of his painting of a pyramid of skulls ("Apotheosis of War," 1871; State Tretyakov Gallery, Moscow). His works are to be seen in Moscow at the State Tretyakov Gallery and in St. Petersburg at the State Museum of Russian Art.

Verethraghna, also called BAHRĀN, in Zoroastrianism, the spirit of victory. Together with Mithra, the god of truth, Verethraghna shares martial characteristics that relate him to the Vedic war-god Indra. In Zoroastrian texts, Verethraghna appears as an agent of Mithra and Rashnu, the god of justice, and as the means of vengeance for Mithra in his capacity of god of war.

Verethraghna was an especially popular deity in Sāsānian Iran, where five kings bore

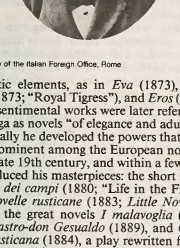
his name. The 14th *yasht,* or hymn, of the Avesta, the sacred book of Zoroastrianism, is dedicated to Verethraghna, and the 20th day of the month is named for him.

Verethraghna: *see under* Bahrām.

Verga, Giovanni (b. Sept. 2, 1840, Catania, Sicily—d. Jan. 27, 1922, Catania), novelist, short-story writer, and playwright, most important of the Italian *verismo* (Realist) school of novelists (*see* verismo). His reputation was slow to develop, but modern critics have assessed him as one of the greatest of all Italian novelists. His influence was particularly marked on the post-World War II generation of Italian authors; a landmark film of the Neorealist cinema movement, Luchino Visconti's *Terra trema* (1948; *The Earth Trembles*), was based on Verga's novel *I malavoglia.*

Born to a family of Sicilian landowners, Verga went to Florence in 1869 and later lived in Milan, where the ideas of other writers much influenced his work. In 1893 he returned to Catania.

Starting with historical and patriotic novels, Verga went on to write novels in which psychological observation was combined with



Verga
By courtesy of the Italian Foreign Office, Rome

romantic elements, as in *Eva* (1873), *Tigre reale* (1873; "Royal Tigress"), and *Eros* (1875). These sentimental works were later referred to by Verga as novels "of elegance and adultery." Eventually he developed the powers that made him prominent among the European novelists of the late 19th century, and within a few years he produced his masterpieces: the short stories of *Vita dei campi* (1880; "Life in the Fields") and *Novelle rusticane* (1883; *Little Novels of Sicily*), the great novels *I malavoglia* (1881) and *Mastro-don Gesualdo* (1889), and *Cavalleria rusticana* (1884), a play rewritten from a short story, which became immensely popular as an opera (1890) by Pietro Mascagni.

Verga wrote with terse accuracy and an intensity of human feeling that constitute a distinctively lyrical Realism. His realistic representations of the life of the poor peasants and fishermen of Sicily are particularly notable, and indeed, his strong feeling for locale helped start a movement of regionalist writing in Italy. His stories most commonly treated man's struggle for material betterment, which Verga saw as foredoomed. D.H. Lawrence translated several of his works into English, including *Cavalleria rusticana* and *Mastro-don Gesualdo.* Another notable English translation is *The House by the Medlar Tree* (1953), Eric Mosbacher's version of *I malavoglia.*

Vergara, Baldomero Espartero, príncipe de (prince of): *see* Espartero, Baldomero.

vergeboard (architecture): *see* bargeboard.

Vergennes, Charles Gravier, comte de (count of) (b. Dec. 28, 1719, Dijon, Fr.—d. Feb. 13, 1787, Versailles), French foreign minister who fashioned the alliance with the North American colonists that helped them throw off British rule in the U.S. War of



Vergennes, detail from an engraving
Giraudon—Art Resource

Independence; at the same time, he worked, with considerable success, to establish a stable balance of power in Europe.

Vergennes's father was president of the Parlement (high court of justice) of Dijon. He accompanied his uncle, the diplomat Théodore Chevignard de Chavigny, on embassies to Portugal and Germany in the 1740s, and in 1750 he was made ambassador to Trier (now in Germany). After serving on an embassy to Hanover (1752), Vergennes became ambassador to Ottoman Turkey in 1754. Two years later France, in alliance with its traditional enemy, Austria, went to war against Prussia and Great Britain (Seven Years' War, 1756–63). During the conflict, Vergennes ably defended French policies to the Turks, who were bitterly anti-Austrian. After the war, Vergennes, on orders from his government, set about stimulating tensions between Turkey and Russia. He was recalled to Paris at the outbreak of the Russo-Turkish War (1768–74).

Appointed ambassador to Sweden in 1771, Vergennes assisted King Gustav III (ruled 1771–92) in the coup d'état (August 1772) by which Gustav greatly strengthened his authority at the expense of the Swedish nobles. In June 1774 the newly crowned French monarch Louis XVI recalled Vergennes and made him minister of foreign affairs.

As early as December 1775, eight months after the outbreak of the U.S. War of Independence, Vergennes was advocating that France provide secret financial assistance to the insurgent American colonists. In this way, he hoped to strike a blow at Great Britain that would avenge France's defeat in the Seven Years' War. His schemes were vigorously opposed by the comptroller general, Anne-Robert-Jacques Turgot, who claimed that such aid would strain French finances, but by the time Turgot fell from power, in May 1776, Vergennes had won the support of the king. In February 1778 he concluded an alliance with the colonists, and France then declared war on Great Britain. Although French volunteers and a French fleet helped the colonists gain their decisive victory at the Battle of Yorktown in 1781, Vergennes did not try to regain former French territory in North America when he negotiated peace with Great Britain in 1783.

Meanwhile, Vergennes sought to prevent the Holy Roman emperor Joseph II from using the Franco-Austrian alliance as a means of gaining French support for Austrian expansion into Bavaria. When Joseph went to war with Prussia over this issue (War of the Bavarian Succession, 1778–79), Vergennes helped mediate the peace settlement. In addition, he blocked Joseph's attempts (1784–85) to exchange the Austrian Netherlands for Bavaria and to force the Dutch to open the Scheldt River to Austrian shipping. In the months immediately preceding his death, Vergennes concluded commercial treaties with Great Britain and Russia.

Vergerio, Pietro Paolo, byname VERGERIO THE ELDER, Italian VERGERIO IL VECCHIO (b. July 23, 1370, Capodistria, Istria [now Koper, Slovenia]—d. July 8, 1444/45, Budapest), Italian educator whose treatises on Humanistic education greatly influenced educational methods and curriculum in Renaissance Italy.

Vergerio studied at Padua, Florence, and Bologna and obtained degrees in the arts and medicine. From 1390 to 1406 he was professor of logic at Padua. It was during this period (1392?) that he composed *De ingenuis moribus et liberalibus studiis* ("On the Manners of a Gentleman and Liberal Studies"), the most influential of Italian Renaissance educational treatises, which passed through 40 editions before 1600; in it he advocated Latin as the core of liberal education and the revival of the study of Greek, as well as the pursuit of a broad range of academic subjects and physical education.

From 1406 to 1417 Vergerio was papal secretary to popes Innocent VII and Gregory XII and then entered the service of the Holy Roman emperor Sigismund, for whom he translated the *Anabasis* of Arrian into Latin. Among his several other works are *On Restoring Unity in the Church* and a *Life of Petrarch.*

Articles are alphabetized word by word, not letter by letter

Vergerio, Pietro Paulo, byname VERGERIO THE YOUNGER, Italian VERGERIO IL GIOVANE (b. 1497/98, Capodistria, Rep. of Venice [now Koper, Slovenia]—d. Oct. 4, 1565, Tübingen, Bohemia [Germany]), Italian reformer and most famous of "Old Catholic" bishops in the 16th century who accepted the principles of the Reformation while retaining a historic Roman Catholic episcopate and not withdrawing from the Church.

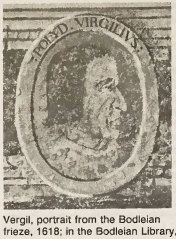
Educated in jurisprudence at Padua, Vergerio practiced law in Padua, Verona, and Venice but soon turned to an ecclesiastical career, becoming papal nuncio in Germany in 1533; while on visits to Germany he met Martin Luther. He next was awarded a bishopric in Croatia, then in Capodistria, but returned in 1540 to active papal diplomacy. By this time, however, he was under suspicion for Protestant persuasions, and in 1544 and again in 1549 he was denounced before the Venetian inquisition. In the second trial he was convicted of heresy, but he had fled Italy and settled in the Swiss Grisons (1549–53), where he was consecrated in a bishopric, without communion with Rome. Thereafter, he traveled about Europe, notably Württemberg, Prussia, and Poland, all the while publishing polemics and urging reforms.

Verghina, also spelled VERGINA, archaeological site and ancient capital of Macedonia in Imathía *nomós* (department), northern Greece. It is situated on a plateau 47 miles (75 km) southwest of Thessaloníki, at the eastern foot of the Vermion Mountains, on the southern edge of the Haliakmon plain. Surrounded by oak and beech forests, it is named after a legendary queen of ancient Beroea (present Véroia, capital of the *nomós*). Verghina was built on a city site from the Stone Age and was first called Balla. The palace of Palatista, partly destroyed by fire, dates from the reign of Antigonus Gonates III (*c.* 263–221 BC), who defeated Cleomenes III, king of Sparta (died *c.* 219 BC). Near the palace there is an Iron Age cemetery that dates from the 10th to 7th centuries BC. Most of the early royal tombs in Macedonia are intricate subterranean structures built of limestone, usually with a vaulted roof. The later temple tomb of the 3rd century is constructed of marble and limestone. A Macedonian necropolis at Verghina contained objects such as silver jewelry, gold and

iron swords, bronze ornaments, brooches in geometric shapes, and various weapons.

Vergil (Roman poet): *see* Virgil.

Vergil, Polydore, original name POLIDORO VERGILIO (b. *c.* 1470, Urbino, Urbino and Pesaro—d. April 18, 1555, Urbino), Italian-born Humanist who wrote an English history that became required reading in schools and influenced the 16th-century English chroniclers Edward Hall and Raphael Holinshed and, through them, Shakespeare.



Vergil, portrait from the Bodleian frieze, 1618; in the Bodleian Library, Oxford

By courtesy of the Bodleian Library, Oxford

Vergil was educated in Padua and perhaps in Bologna. After he was ordained priest, he was given various appointments in England by the papal chancery, initially in 1502 as subcollector of Peter's Pence (a contribution to the pope). In 1508 he was made archdeacon of Wells. He became friends with such English Humanists as Sir Thomas More, William Grocyn, and John Colet, and remained in England, with periodic visits to Italy, until 1550, when he returned to Urbino.

Among Vergil's important works were *Proverbiorum libellus* (1498), known as the *Adagia,* a collection of proverbs and aphorisms with comments and moralistic reflections; *De rerum inventoribus* (1499), a popular, often reprinted treatise on inventions; and particularly the *Anglicae historia libri XXVI* ("Twenty-six Books of English History"), which began publication in 1546 and was finally collected in its complete form in 1651 (partial Eng. trans., *Three Books of Polydore Vergil's English History Comprising the Reigns of Henry VI, Edward IV, and Richard III,* 1844). This history was of great influence, both because an order of the Privy Council in 1582 made it required reading in English schools and because of its effect on the English historians Hall and Holinshed; the last-named in particular was a favourite source of material for Shakespeare.

Vergilius Maro, Publius (Roman poet): *see* Virgil.

Verginius Rufus, Lucius (b. AD 15—d. 97), Roman governor of Germania Superior who, in May 68, put down a rebellion against Nero led by the Gallic governor Vindex. When Galba, the governor of Nearer Spain, succeeded Nero as emperor after Nero committed suicide in June, Verginius, favoured by his troops to be Nero's successor, was relieved of his command by the new emperor.

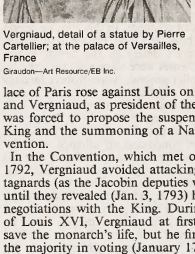
The son of an undistinguished Roman knight, Verginius was three times consul. After the emperor Otho's suicide (April 69), Verginius was again offered the empire by Otho's troops but declined. Under the Flavian emperors he devoted himself to writing. He was a close friend of the younger Pliny, and the historian Tacitus delivered the oration at his funeral.

Vergne, Marie-Madeleine Pioche de la: *see* La Fayette, Marie-Madeleine (Pioche de la Vergne), comtesse de.

Vergniaud, Pierre-Victurnien (b. May 31, 1753, Limoges, Fr.—d. Oct. 31, 1793, Paris), eloquent spokesman for the moderate Girondin faction during the French Revolution.

The son of an army contractor, Vergniaud attended college in Paris and in 1781 became an advocate in the Parlement (high court of justice) of Bordeaux. Although he was a capable lawyer, he was so indolent that he refused to take cases unless he was in need of money.

Vergniaud greeted the outbreak of the Revolution with enthusiasm. In 1790 he attracted widespread attention by pleading the case of a soldier who had been involved in a riot against a landlord. Elected to the administration of the Gironde *département* (1790), he looked on with approval as the revolutionary National Assembly in Paris abolished France's feudal institutions and restricted the hitherto absolute powers of King Louis XVI. Vergniaud took a seat with the other Girondin deputies in the Legislative Assembly, which succeeded the National Assembly on Oct. 1, 1791, and he spoke with eloquence in favour of war with Austria. After war was declared (April 20, 1792), he exposed Louis XVI's counter-revolutionary intrigues and suggested (July 3) that the King should be deposed. Nevertheless, unlike their Jacobin rivals, Vergniaud and the other Girondins were unwilling to form ties with the disenfranchised lower classes. Faced with the threat of popular insurrection in Paris, Vergniaud attempted secretly to come to terms with the King in late July. The popu-



Vergniaud, detail of a statue by Pierre Cartellier; at the palace of Versailles, France

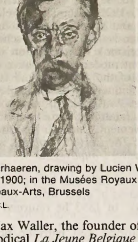
Giraudon—Art Resource/EB Inc.

lace of Paris rose against Louis on August 10, and Vergniaud, as president of the Assembly, was forced to propose the suspension of the King and the summoning of a National Convention.

In the Convention, which met on Sept. 20, 1792, Vergniaud avoided attacking the Montagnards (as the Jacobin deputies were called) until they revealed (Jan. 3, 1793) his previous negotiations with the King. During the trial of Louis XVI, Vergniaud at first sought to save the monarch's life, but he finally joined the majority in voting (January 1793) for the death sentence. On June 2, 1793, Parisian insurgents, in alliance with the Montagnards, forced the convention to place Vergniaud and 28 other Girondin leaders under house arrest. Vergniaud continued to defy his opponents but made no attempt to escape from Paris. Imprisoned on July 26, he was condemned by the Revolutionary Tribunal on October 30 and guillotined the following day. Eugène Lintilhac's *Vergniaud* was published in 1920.

Verhaeren, Émile (b. May 21, 1855, Saint Amand lez-Puers, Belg.—d. Nov. 27, 1916, Rouen, Fr.), foremost among the Belgian poets who wrote in French. His work, by its strength and range, has been compared to that of Victor Hugo and Walt Whitman.

Verhaeren was educated at Brussels and Ghent and during 1875–81 studied law at Louvain, where he became acquainted with



Verhaeren, drawing by Lucien Wolles, *c.* 1900; in the Musées Royaux des Beaux-Arts, Brussels

A.C.L.

Max Waller, the founder of the influential periodical *La Jeune Belgique* (1881). He became one of the group in Brussels who brought about the literary and artistic renaissance of the 1890s.

His first book, a collection of violently naturalistic poems (*Les Flamandes*, 1883), created a sensation. Verhaeren was an art critic as well as a poet, and many of the poems in his first collection concerned paintings. It was followed by short stories, but his reputation as a lyric poet was confirmed by a succession of works: *Les Moines* (1886), *Les Soirs* (1887; *The Evening Hours,* 1918), *Les Débâcles* (1888), *Les Flambeaux noirs* (1890), *Au Bord de la route* (1891; later retitled *Les Bords de la route*), *Les Apparus dans mes chemins* (1891), and *Les Campagnes hallucinées* (1893).

In 1895, Verhaeren's growing concern for social problems inspired *Les Villages illusoires* and *Les Villes tentaculaires*. *Les Heures claires* (1896; *The Sunlit Hours,* 1916), an avowal of his love for his wife, led to the series of his major works, among which the most outstanding are *Les Visages de la vie* (1899), *Les Forces tumultueuses* (1902), *Les Tendresses premières* (1904, the first part of the five-part *Toute la Flandre*), *La Multiple Splendeur* (1906), *Les Rythmes souverains* (1910), and *Les Blés mouvants* (1912). During that period he also published books on art, two further collections of personal lyrics to his wife, and plays—*Les Aubes* (1898; *The Dawn,* 1898), *Le Cloître* (1900; *The Cloister,* 1915), *Philippe II* (1901; Eng. trans., 1916), and *Hélène de Sparte* (1912; *Helen of Sparta,* 1916).

The qualities most noted in Verhaeren's considerable poetic output—more than 30 collections—are vigour and breadth of vision. His unusually strong lyrical gifts of vitality and originality are expressed in a fresh, unpolished language of great power and flexibility. His three main themes are Flanders, human energy (expressed in the desire for progress, for the brotherhood of man, and for the emancipation of the working classes), and his tender, understanding love for his wife. It is perhaps in the poems celebrating domestic joys that he is most moving. More generally popular are those glorifying Flanders—the greatness of its painters and the pleasures of its common people—and those that exalt the triumph of human intelligence over matter and praise the epic beauty of the industrial age.

His plays in verse, although often showing dramatic power and poetic inspiration, are criticized for an excessively rhetorical style and are rarely produced. His works on art show sympathy with those painters—Rembrandt, Rubens, and others—who depict life at its boldest, most dramatic, and most colourful.

verifiability principle, a philosophical doctrine fundamental to the school of Logical Positivism holding that a statement is meaningful only if it is either empirically verifiable or else tautological (*i.e.*, such that its truth arises entirely from the meanings of its terms). Thus, the principle discards as meaningless the metaphysical statements of traditional philosophy as well as other kinds of statements—such as ethical, aesthetic, or religious principles—asserted as true but neither tautological nor known from experience. Such statements may have meaning in the sense of being able to influence feelings, beliefs, or conduct but not in the sense of being true or false and hence of imparting knowledge. According to the principle, then, a nontautological statement has meaning only if some set of observable conditions is relevant to determining its truth or falsity; so stated, it reflects the view that the meaning of a statement is the set of conditions under which it would be true.

Disagreement among Positivists has arisen over the kinds of conditions that qualify as observable for purposes of verification and the exact nature of their relevance to the truth or falsity of statements. While Hans Reichenbach has maintained that verifying observations must be physically possible or compatible with the known laws of science, it has been more widely held that they need only be logically possible or conceivable in a noncontradictory way. Early exponents of the view that observation reports provide an indubitably certain foundation for knowledge held that verifiability requires that a statement be logically entailed by some finite set of observation reports. Later Positivists, having abandoned this view, have required of a verifiable statement only that it be made evident or supported or rendered probable by the relevant set of observations.

The principal criticism of the verifiability principle has been that, because it is not an empirical proposition, it is itself on its own terms either meaningless or else tautologically true as an arbitrary definition of meaningfulness. In response, it has been argued both that the principle is indeed a tautology, though a nonarbitrary one in that it reflects actual usage and that it is strictly meaningless but to be taken as a recommendation for the conduct of scientific inquiry.

verisimilitude, the semblance of reality in dramatic or nondramatic fiction. The concept implies that either the action represented must be acceptable or convincing according to the audience's own experience or knowledge or, as in the presentation of science fiction or tales of the supernatural, the audience must be enticed into willingly suspending disbelief and accepting improbable actions as true within the framework of the narrative.

Aristotle in his *Poetics* insisted that literature should reflect nature—that even highly idealized characters should possess recognizable human qualities—and that what was probable took precedence over what was merely possible.

Following Aristotle, the 16th-century Italian critic Lodovico Castelvetro pointed out that the nondramatic poet had only words with which to imitate words and things but the dramatic poet could use words to imitate words, things to imitate things, and people to imitate people. His influence on the French neoclassical dramatists of the 17th century is reflected in their preoccupation with *vraisemblance* and their contribution of many refinements in respect to appropriate diction and gesture to the theory.

The concept of verisimilitude was incorporated most fully by Realist writers of the late 19th century, whose works are dominated by well developed characters who very closely imitate real people in their speech, mannerisms, dress, and material possessions.

verismo (Italian: "realism"), literary realism as it developed in Italy in the late 19th and early 20th centuries. Its primary exponents were the Sicilian novelists Luigi Capuana and Giovanni Verga. The realist movement arose in Europe after the French Revolution and the realist influence reached Capuana and Verga particularly through the writings of Balzac and Zola in France and of the *scapigliatura milanese (see scapigliatura,* "Milanese bohemianism") group in Italy. *Verismo*'s overriding aim was the objective presentation of life, usually of the lower classes, using direct, unadorned language, explicit descriptive detail, and realistic dialogue.

Capuana initiated the movement with the short stories *Profili di donne* (1877; "Studies of Women") and the novel *Giacinta* (1879) and other psychologically oriented, clinically rendered works, which were objective almost to the point of excising human emotion. Works by his friend Verga, of which the best-known are *I malavoglia* (1881; *The House by the Medlar Tree,* 1953) and *Mastro-don Gesualdo* (1889), described with more emotional warmth the dismal conditions in early 19th-century Sicily.

Like Capuana and Verga, most other *veristi* described the life they knew best, that of their native towns or regions. Thus the best of the minor writers of the movement were regionalists: the Neapolitan novelist Matilde Serao, the Tuscan Renato Fucini, and Grazia Deledda, the novelist of southern Italy who received the Nobel Prize for Literature in 1926.

Verismo faded from the scene in the 1920s but emerged after World War II in a new and explosively vital form, *neorealismo* (Neorealism).

verismo (Italian: "realism"), a style of Italian opera writing that flourished in the last decade of the 19th century. It was marked by melodramatic, often violent plots with characters drawn from everyday life. Musical devices included passionate declamation by solo voices and emotionally charged harmonies and melodies. The leading exponents were Pietro Mascagni (*Cavalleria rusticana,* 1890; *Rustic Chivalry*) and Ruggero Leoncavallo (*Pagliacci,* 1892; *The Clowns*). Another example is Umberto Giordano's *Andrea Chénier* (1896). Puccini was influenced by verismo, particularly in *Tosca* (1900), and occasional veristic operas were written in the 20th century, *e.g.,* Ermanno Wolf-Ferrari's *I gioielli della Madonna* (1911; *The Jewels of the Madonna*).

Veríssimo, Érico Lopes (b. Dec. 17, 1905, Cruz Alta, Braz.—d. Nov. 28, 1975, Porto Alegre), novelist, literary historian, and critic whose writings in Portuguese and in English on Brazilian literature introduced readers throughout the world both to the literary currents of modern Brazil and to his country's social order and cultural heritage.

Born into an old Portuguese family of the Rio Grandedo, Veríssimo interrupted his schooling because of family financial losses and worked as a clerk in a store and in a bank and as a partner in a pharmacy before becoming assistant editor of a publishing house in Pôrto Alegre in 1930.

Veríssimo's first novel, *Clarissa* (1933), immediately met with critical and popular acclaim; it was followed by a series of best-selling and widely translated novels, including *Caminhos Cruzados* (1935; *Crossroads,* 1943), *Olhai os Lírios do Campo* (1938; *Consider the Lilies of the Field,* 1947), and *O Resto É Silêncio* (1943; *The Rest Is Silence,* 1946). These novels, experimental in technique and use of language, reveal Veríssimo's deep preoccupation with the individual in a changing social structure.

Fluent in English, Veríssimo taught Brazilian literature in the United States for a time. The series of lectures he gave at the University of California (Berkeley), 1943–44, was published in English in *Brazilian Literature: An Outline* (1945). He returned to the United States to visit, and he served (1953–56) in Washington, D.C., as director of the Department of Cultural Affairs of the Pan-American Union of the Organization of American States.

Veríssimo's best known and most ambitious work, the trilogy *O Tempo e o Vento* (1949–62; partial Eng. trans., *Time and the Wind,* 1951), traces the history of a Brazilian family through several generations to the late 20th century. It is perhaps the most faithful portrayal of the gaucho.

Verkhoyansk, also spelled VERCHOIANSK, or VERCHOJANSK, town, Yakutiya, far northeastern Russia, on the Yana River near its confluence with the Sartang. Founded as a fort in 1638 and today a minor centre of tin and gold mining, Verkhoyansk is noted chiefly for its exceptionally low winter temperatures, with a January average of −56° F (−49° C). Its minimum, −89.7° F (−67.6° C), is only surpassed by Oymyakon on the Indigirka as the lowest ever recorded outside Antarctica. Pop. (1991 est.) 1,900.

Verkhoyansk Mountains, also spelled VERKHOIANSK, or VERCHOJANSK, Russian VERKHOYANSKY KHREBET, mountains of Yakutiya, far northeastern Russia, extending for 700 mi (1,100 km) in a huge arc parallel to, and east of, the lower Lena River to the Laptev Sea. The range represents a major anticlinal structure, created in a period of folding. Its height generally exceeds 3,300 ft (1,000 m), reaching a maximum of 7,838 ft (2,389 m). The mountains are in sparse tundra vegetation of mosses and lichens. No routes cross the range, and the area is virtually uninhabited.

Consult the INDEX *first*

Verlaine, Paul(-Marie) (b. March 30, 1844, Metz, Fr.—d. Jan. 8, 1896, Paris), French lyric poet first associated with the Parnassians and later known as a leader of the Symbolists. With Stéphane Mallarmé and Charles Baudelaire he formed the so-called Decadents.



Verlaine, detail from "Un Coin de table," oil painting by Henri Fantin-Latour, 1872; in the Louvre, Paris

Giraudon—Art Resource

Life. Verlaine was the only child of an army officer in comfortable circumstances. He was undoubtedly spoiled by his mother. At the Lycée Bonaparte (now Condorcet) in Paris, he showed both ability and indolence and at 14 sent his first extant poem ("La Mort") to the "master" poet Victor Hugo. Obtaining the *baccalauréat* in 1862, with distinction in translation from Latin, he became a clerk in an insurance company, then in the Paris city hall. All the while he was writing verse and frequenting literary cafés and draw-

ing rooms, where he met the leading poets of the Parnassian group and other talented contemporaries, among them Mallarmé, Villiers de L'Isle-Adam, and Anatole France. His poems began to appear in their literary reviews; the first, "Monsieur Prudhomme," in 1863. Three years later the first series of *Le Parnasse contemporain,* a collection of pieces by contemporary poets (hence the term Parnassian), contained eight contributions by Verlaine.

The same year, his first volume of poetry appeared. Besides virtuoso imitations of Baudelaire and Leconte de Lisle, *Poèmes saturniens* included poignant expressions of love and melancholy supposedly centred on his cousin Élisa, who married another and died in 1867 (she had paid for this book to be published). In *Fêtes galantes* personal sentiment is masked by delicately clever evocations of scenes and characters from the Italian commedia dell'arte and from the sophisticated pastorals of 18th-century painters, such as Watteau and Nicolas Lancret, and perhaps also from the contemporary mood-evoking paintings of Adolphe Monticelli. In June 1869 Verlaine fell in love with Mathilde Mauté, aged 16, and they married in August 1870. In the delicious poems written during their engagement (*La Bonne Chanson*), he fervently sees her as his long hoped-for saviour from erring ways. When insurrectionists seized power and set up the Paris Commune, Verlaine served as press officer under their council. His fear of resultant reprisals from the Third Republic was one factor in his later bohemianism. Incompatibility in his marriage was soon aggravated by his infatuation for the younger poet Arthur Rimbaud, who came to stay with the Verlaines in September 1871.

Verlaine abandoned his wife and infant son, Georges, in July 1872, to wander with Rimbaud in northern France and Belgium and write "impressionist" sketches for his next collection, *Romances sans paroles* ("Songs Without Words"). The pair reached London in September and found, besides exiled Communard friends, plenty of interest and amusement and also inspiration: Verlaine completed the *Romances,* whose opening pages, especially, attain a pure musicality rarely surpassed in French literature and embody some of his most advanced prosodic experiments; the subjects are mostly landscape or regret or vituperation of his estranged wife. The collection was published in 1874 by his friend Edmond Lepelletier; the author himself was then serving a two-year sentence at Mons for wounding Rimbaud with a revolver during an emotional storm in Brussels on July 10, 1873.

Contrition, prison abstinence, and pious reading (some in English, along with admiring study of Shakespeare and Dickens) seem to have produced a sincere return to Roman Catholicism in the summer of 1874, after his wife had obtained a separation. Leaving prison in January 1875, he tried a Trappist retreat, then hurried to Stuttgart to meet Rimbaud, who apparently repulsed him with violence. He took refuge in England and, for over a year, taught French and drawing at Stickney and Boston in Lincolnshire, then at Bournemouth, Hampshire, impressing all by his dignity and piety and gaining an appreciation of English authors as diverse as Tennyson, Swinburne, and the Anglican hymn writers. In 1877 he returned to France.

From this period (1873–78) date most of the poems in *Sagesse* ("Wisdom"), which was published in October 1880 at the author's expense (as were his previous books). They include outstanding poetical expressions of simple Catholic Christianity as well as of his emotional odyssey. Literary recognition now began. In 1882 his famous "Art poétique" (probably composed in prison eight years earlier) was enthusiastically adopted by the young Symbolists. He later disavowed the Symbolists, however, chiefly because they went further than he in abandoning traditional forms: rhyme, for example, seemed to him an unavoidable necessity in French verse.

In 1880 Verlaine made an unsuccessful essay at farming with his favourite pupil, Lucien Létinois, and the boy's parents. Lucien's death in April 1883, as well as that of the poet's mother (to whom he was tenderly attached) in January 1886, and the failure of all attempts at reconciliation with his wife broke down whatever will to "respectability" remained, and he relapsed into drink and debauchery. Now both famous and notorious, he was still writing in an attempt to earn a living but seldom with the old inspiration.

Jadis et naguère ("Yesteryear and Yesterday") consists mostly of pieces like "Art poétique," written years before but not fitting into previous carefully grouped collections. Similarly, *Parallèlement* comprises bohemian and erotic pieces often contemporary with, and technically equal to, his "respectable" ones. Verlaine frankly acknowledged the parallel nature of both his makeup and his muse. In *Amour* new poems still show the old magic, notably passages of his lament for Lucien Létinois, no doubt intended to emulate Tennyson's *In Memoriam,* but lacking its depth. Prose works such as *Les Poètes maudits,* short biographical studies of six poets, among them Mallarmé and Rimbaud; *Les Hommes d'aujourd'hui,* brief biographies of contemporary writers, most of which appeared in 1886; *Mes Hôpitaux,* accounts of Verlaine's stays in hospitals; *Mes Prisons,* accounts of his incarcerations, including the story of his "conversion" in 1874; and *Confessions, notes autobiographiques* helped attract notice to ill-recognized contemporaries as well as to himself (he was instrumental in publishing Rimbaud's *Illuminations* in 1886 and making him famous). There is little of lasting value, however, in the rest of the verse and prose that Verlaine turned out in an unsuccessful effort to keep the wolf from a door shared usually with aging prostitutes such as Philomène Boudin and Eugénie Krantz, prominent among the muses of his decadence. During frequent spells in hospitals, doctors gave him devoted care and friendship. He was feted in London, Oxford, and Manchester by young sympathizers, among them the critic Arthur Symons, who arranged a lecture tour in England in November 1893. Frank Harris and Cranmer Byng published articles and poems by Verlaine in *The Fortnightly Review* and *The Senate.* Relief pensions from admirers (1894) and the state (1895) were also recognition, however tardy or insufficient, of the esteem he attracted as a poet and a friend. He died in Eugénie Krantz's lodgings in January 1896.

Assessment. One of the most purely lyrical of French poets, Verlaine was an initiator of modern word-music and marks a transition between the Romantic poets and the Symbolists. His best poetry broke with the sonorous rhetoric of most of his predecessors and showed that the French language, everyday clichés included, could communicate new shades of human feeling by suggestion and tremulous vagueness that capture the reader by disarming his intellect; words could be used merely for their sound to make a subtler music, an incantatory spell more potent than their everyday meaning. Explicit intellectual or philosophical content is absent from his best work. His discovery of the intimate musicality of the French language was doubtless instinctive, but, during his most creative years, he was a conscious artist constantly seeking to develop his unique gift and "reform" his nation's poetic expression. (V.P.U.)

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Vermeer, Johannes, Johannes also rendered JAN (baptized Oct. 31, 1632, Delft, Neth.—buried Dec. 16, 1675, Delft), Dutch artist who created paintings that are among the most



"Woman Holding a Balance," oil on canvas by Johannes Vermeer, *c.* 1664; in the National Gallery of Art, Washington, D.C.

Image © 2005 Board of Trustees, National Gallery of Art, Washington, D.C., Widener Collection; photograph, Richard Carafelli

beloved and revered images in the history of art. Although only about 36 of his paintings survive, these rare works are among the greatest treasures in the world's finest museums. Vermeer began his career in the early 1650s by painting large-scale biblical and mythological scenes, but most of his later paintings—the ones for which he is most famous—depict scenes of daily life in interior settings. These works are remarkable for their purity of light and form, qualities that convey a serene, timeless sense of dignity. Vermeer also painted cityscapes and allegorical scenes.

Early life. Delft, where Vermeer was born and spent his artistic career, was an active and prosperous place in the mid-17th century, its wealth based on its thriving Delftware factories, tapestry-weaving ateliers, and breweries. Within Delft's city walls were picturesque canals and a large market square, which was flanked by the imposing town hall and the soaring steeple of the Nieuwe Kerk ("New Church"). It was also a venerable city with a long and distinguished past. Delft's strong fortifications, city walls, and medieval gates had furnished defense for more than three centuries and, during the Dutch revolt against Spanish control, had provided refuge for William I, prince of Orange, from 1572 until his death in 1584.

Vermeer was baptized in the Nieuwe Kerk. His father, Reynier Jansz, was a weaver who produced a fine satin fabric called *caffa*; he was also active as an art dealer. By 1641 the family was sufficiently prosperous to purchase a large house containing an inn, called the "Mechelen," on the market square. Vermeer inherited both the inn and the art-dealing business upon his father's death in October 1652. By this time, however, Vermeer must have decided that he wanted to pursue a career as a painter.

In April 1653 Vermeer married Catherina Bolnes, a young Catholic woman from the so-called Papenhoek, or Papist's Corner, of Delft. This union led him to convert from the Protestant faith, in which he was raised, to

Catholicism. Later in that decade, Vermeer and his wife moved into the house of her mother, Maria Thins, who was a distant relative of the Utrecht painter Abraham Bloemaert.

Artistic training and early influences. Surprisingly little is known about Vermeer's decision to become a painter. He registered as a master painter in the Delft Guild of Saint Luke on Dec. 29, 1653, but the identity of his master(s), the nature of his training, and the period of his apprenticeship remain a mystery.

Since Vermeer's name is not mentioned in Delft archival records during the late 1640s or early 1650s, it is possible that, as with many aspiring Dutch artists, he traveled to Italy, France, or Flanders. He also may have trained in some other artistic centre in the Netherlands, perhaps Utrecht or Amsterdam. In Utrecht Vermeer would have met artists who were immersed in the boldly expressive traditions of Caravaggio, among them Gerrit van Honthorst. In Amsterdam he would have encountered the impact of Rembrandt van Rijn, whose powerful chiaroscuro effects enhanced the psychological intensity of his paintings.

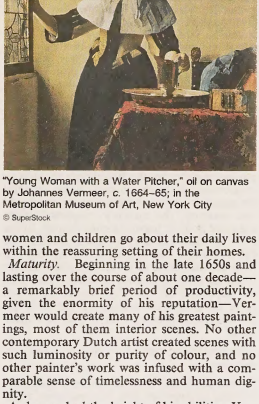
Stylistic characteristics of both pictorial traditions—the Utrecht school and that of Rembrandt—are found in Vermeer's early large-scale biblical and mythological paintings, such as "Diana and Her Companions" (1655–56) and "Christ in the House of Mary and Martha" (*c.* 1655). The most striking assimilation of the two traditions is apparent in Vermeer's "The Procuress" (1656). The subject of this scene of mercenary love is derived from a painting by the Utrecht-school artist Dirck van Baburen in the collection of Vermeer's mother-in-law, while the deep reds and yellows and the strong chiaroscuro effects are reminiscent of Rembrandt's style of painting. The dimly lit figure at the left of the composition is probably a self-portrait in which Vermeer assumes the guise of the Prodigal Son, a role that Rembrandt had also played in one of his own "merry company" scenes.

In the early 1650s Vermeer might also have found much inspiration back within his native Delft, where art was undergoing a rapid transformation. The most important artist in Delft at the time was Leonard Bramer, who produced not only small-scale history paintings—that is, morally edifying depictions of biblical or mythological subjects—but also large murals for the court of the prince of Orange. Documents indicate that Bramer, who was Catholic, served as a witness for Vermeer at his marriage. Although it would appear that Bramer was, at the very least, an early advocate for the young artist, nowhere is it stated that he was Vermeer's teacher.

Another important painter whom Vermeer must have known in Delft during this period was Carel Fabritius, a former Rembrandt pupil. Fabritius's evocatively pensive images and innovative use of perspective seem to have profoundly influenced Vermeer. This connection was noted by the poet Arnold Bon, who, in writing about Fabritius's tragic death in 1654 in the Delft powder-house explosion, noted that "Vermeer masterfully trod in [Fabritius's] path." However, while Vermeer was aware of Fabritius's work, there is no evidence to suggest that he studied with Fabritius.

Whatever the circumstances of his early artistic education, by the second half of the 1650s Vermeer began to depict scenes of daily life. These "genre" paintings are those with which he is most often associated. Gerard Terborch, an artist from Deventer who masterfully rendered texture in his depictions of domestic activities, may well have encouraged Vermeer to pursue scenes of everyday life. Certainly Terborch's influence is apparent in one of Vermeer's earliest genre paintings, "Girl Reading a Letter at an Open Window" (*c.* 1657), in which he created a quiet space for the young woman to read her letter. Unlike the characteristically dark interiors of Terborch, however, Vermeer bathed this remarkably private scene in a radiant light that streams in from an open window. The painting also reveals Vermeer's developing interest in illusionism, not only in the inclusion of a yellowish green curtain hanging from a rod stretching across the top of the painting but also in the subtle reflections of the woman's face in the open window.

Vermeer's interior scenes during this period were also influenced by the work of Pieter de Hooch, a leading genre painter in Delft at the time. De Hooch was a master of using perspective to create a light-filled interior or courtyard scene in which figures are comfortably situated. Although no documents link Vermeer and de Hooch, it is highly probable that the two artists were in close contact during this period, since the subject matter and style of their paintings during those years were quite similar. Vermeer's "The Little Street" (*c.* 1657–58) is one such work: as with de Hooch's courtyard scenes, Vermeer has here portrayed a world of domestic tranquillity, where



"Young Woman with a Water Pitcher," oil on canvas by Johannes Vermeer, *c.* 1664–65; in the Metropolitan Museum of Art, New York City

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women and children go about their daily lives within the reassuring setting of their homes.

Maturity. Beginning in the late 1650s and lasting over the course of about one decade—a remarkably brief period of productivity, given the enormity of his reputation—Vermeer would create many of his greatest paintings, most of them interior scenes. No other contemporary Dutch artist created scenes with such luminosity or purity of colour, and no other painter's work was infused with a comparable sense of timelessness and human dignity.

As he reached the height of his abilities, Vermeer became renowned within his native city of Delft and was named the head of the painters' guild in 1662. Although no commissions for Vermeer's paintings are known, it does appear that during this and other periods he sold his work primarily to a small group of patrons in Delft. For example, over two decades after Vermeer's death, no fewer than 21 of his paintings were sold from the estate of Jacob Dissius, a Delft collector.

Themes. During the height of his career, in paintings depicting women reading or writing letters, playing musical instruments, or adorning themselves with jewelry, Vermeer sought ways to express a sense of inner harmony within everyday life, primarily in the confines of a private chamber. In paintings such as "Young Woman with a Water Pitcher" (*c.* 1664–65), "Woman with a Pearl Necklace" (*c.* 1664), and "Woman in Blue Reading a Letter" (*c.* 1663–64), he utilized the laws of perspective and the placement of individual objects—chairs, tables, walls, maps, window frames—to create a sense of nature's underlying order. Vermeer's carefully chosen objects are never placed randomly; their positions, proportions, colours, and textures work in concert with his figures. Radiant light plays across these images, further binding the elements together.

The emotional power of Vermeer's magnificent "View of Delft" (*c.* 1660–61) similarly results from his ability to transform an image of the physical world into a harmonious, timeless visual expression. In this masterpiece Vermeer depicted Delft from across its harbour, where transport boats would unload after navigating inland waterways. Beyond the shadowed frieze of Delft's venerable protective walls and massive gates, bright sunshine illuminates the tower of the Nieuwe Kerk, burial place of the princes of Orange and the city's symbolic core. Aside from the use of light, the painting's forcefulness also stems from its large scale and tangible illusion of reality. The buildings take on a physical presence because of Vermeer's suggestive manner of juxtaposing small dots of unmodulated colours with touches of the brush; he used a similar technique to suggest the reflection of water on the sides of the boats.

Although he drew his inspiration from his observations of everyday life in such mature work, Vermeer remained at his core a history painter, seeking to evoke abstract moral and philosophical ideas. This quality is particularly evident in "Woman Holding a Balance" (*c.* 1664). In this remarkable image, a woman stands serenely before a table that bears a jewelry box draped with strands of gold and pearls while she waits for her small handheld balance to come to rest. Although the subdued light entering the room and the refined textures of the jewelry and fur-trimmed jacket are realistically rendered, the painting of the Last Judgment hanging on the rear wall signifies that the artist conceived the scene allegorically. As the woman stands by the jewelry box and Judgment scene, her calm expression indicates a realization: she must maintain balance in her own life by not allowing transient worldly treasures to outweigh lasting spiritual concerns.

Surprisingly little is known of Vermeer's attitude toward his role as an artist. The philosophical framework for his approach to his craft can perhaps be surmised, however, from another work of this period, "The Art of Painting" (*c.* 1665–66). With a large curtain, drawn back as though revealing a *tableau vivant,* Vermeer announced his allegorical intent for this large and imposing work. The scene depicts an elegantly dressed artist in the midst of portraying the allegorical figure of Clio, the muse of history, who is recognizable through her attributes: a laurel wreath symbolizing honour and glory, the trumpet of fame, and a large book signifying history. Vermeer juxtaposed Clio and a large wall map of the Netherlands to indicate that the artist, through his awareness of history and his ability to paint elevated subjects, brings fame to his native city and country. This painting was so important to Vermeer that his widow tried to keep it from creditors even when the family was destitute.

Working methods. Perhaps the most recognizable feature of Vermeer's greatest paintings is their luminosity. Technical examinations have demonstrated that Vermeer generally applied a gray or ochre ground layer over his canvas or panel support to establish the colour harmonies of his composition. He was keenly

aware of the optical effects of colour, and he created translucent effects by applying thin glazes over these ground layers or over the opaque paint layers defining his forms. His works further seem to be permeated with a sense of light as a result of his use of small dots of unmodulated colour—as in the aforementioned buildings and water of "View of Delft" and in foreground objects in other works, such as the crusty bread in "The Milkmaid" (1658–60) and the finials of the chair in "Girl with the Red Hat" (1665–66).

The diffuse highlights Vermeer achieved are comparable to those seen in a camera obscura, a fascinating optical device that operates much like a box camera. The 17th-century camera obscura created an image by allowing light rays to enter a box through a small opening that was sometimes fitted with a focusing tube and lens. Owing to the device's limited depth of field, the image it projected would have many unfocused areas surrounded by hazy highlights. Vermeer was apparently fascinated by these optical effects, and he exploited them to give his paintings a greater sense of immediacy.

Some have argued that Vermeer used the device to plan his compositions and even that he traced the images projected onto the ground glass at the back of the camera obscura. However, such a working process is most unlikely. Vermeer instead relied primarily on traditional perspective constructions to create his sense of space. It has been discovered, for example, that small pinholes exist in many of his interior genre scenes at the vanishing point of his perspective system. Strings attached to the pin would have guided him in constructing the orthogonal lines that would have defined the recession of floors, windows, and walls. Vermeer carefully placed this vanishing point to emphasize the main compositional element in the painting. In "Woman Holding a Balance," for example, it occurs at the fingertip of the hand holding the balance, thus enhancing his overall philosophical message. Such attention to detail helps explain the small size of Vermeer's creative output, even during his most fertile period. He must have worked slowly, carefully thinking through the character of his composition and the manner in which he wanted to execute it.

Later life and work. In 1670 Vermeer was again elected head of the Delft painting guild. Vermeer's late style is crisper in character, with greater atmospheric clarity than that found in his paintings of the 1660s. The carefully modulated tones and colours he used in those earlier works gave way to a more direct, even bolder technique about 1670. For example, he used sharply defined planes of colour and angular rhythms to convey a sense of emotional energy in such paintings as "Lady Writing a Letter with Her Maid" (1670) and "The Guitar Player" (1670).

The artist's fortunes deteriorated drastically toward the end of his life, mainly owing to the disastrous economic climate in Holland following its invasion by French troops in 1672. When Vermeer died in 1675, he left behind a wife, 11 children, and enormous debts.

Assessment. Vermeer's fame was not widespread during his lifetime, largely because his paintings were collected by local patrons and because his creative output was small. After his death the paintings continued to be admired by a small group of connoisseurs, primarily in Delft and Amsterdam.

By the 19th century a number of Vermeer's paintings had been attributed to other, more prolific Dutch artists, among them de Hooch. However, when the French painter-critic Théophile Thoré (who wrote under the pseudonym W. Bürger) published his enthusiastic descriptions of Vermeer's paintings in 1866, passion for the artist's work reached a broader public. As private collectors and public museums actively sought to acquire his rare paintings during the early years of the 20th century, prices for his work skyrocketed. This situation encouraged the production of forgeries, the most notorious of which were those painted by Han van Meegeren in the 1930s. At the end of the 20th century Vermeer's fame continued to rise, fuelled in part by an exhibition of his work held in 1995–96 at the National Gallery of Art in Washington, D.C., and at the Mauritshuis in The Hague.

The remarkably small oeuvre of the artist has thus only increased in popularity across generations. Vermeer found beneath the accidents of nature a realm infused with harmony and order, and, in giving visual form to that realm, he revealed the poetry existing within transient moments of human existence. He rarely explained the exact meanings of his paintings, preferring instead to allow each viewer to contemplate their significance. As a result, his masterpieces continue to engage fully each contemporary observer, much as they must have engaged their viewers in 17th-century Delft.

(A.K.W.)

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vermeil, also called SILVER GILT, gilded silver produced either by the fire-gilding method or by electrolysis. In the former, earlier method the object is covered with an amalgam of gold and mercury; the mercury evaporates when the piece is fired, leaving a gold deposit. In the later method, the silver object is wired as the cathode and a bar of gold as the anode, and both are immersed in an electrolytic solution; when an electric current is passed, gold ions are deposited on the silver object (cathode). After fire-gilding or electrolysis, the silver gilt is burnished, usually with a polished agate stone.

vermiculatum, opus (mosaic): *see* opus vermiculatum.

vermiculite, clay mineral similar to montmorillonite in structure and, in some cases, composition. Vermiculite is typically formed by the alteration of biotite, and it occurs both as large pseudomorphs replacing biotite and as small particles in soils and ancient sediments. It is also formed at the interface between acidic intrusive rocks and basic rocks such as pyroxenites and dunites. Large deposits occur in South Africa, Australia, Russia, and Brazil. In the United States, it is found in Montana and the Carolinas. For chemical formula and detailed physical properties, *see* clay mineral (table).

When rapidly heated to about 300° C (570° F), vermiculite can expand to 20 times its original thickness; its name, from the Latin word meaning "to breed worms," alludes to this property. In its natural state the mineral has little commercial use, but exfoliated vermiculite is extremely light (specific gravity as low as 0.09) and is used in lightweight concrete or plaster, for thermal and acoustic insulation, or as a packing medium, a soil conditioner, a starting medium for seeds, and a filler or extender in paper, paint, or plastics.

Vermigli, Peter Martyr, Italian PIETRO MARTIRE VERMIGLI (b. Sept. 8, 1500, Florence—d. Nov. 12, 1562, Zürich, Switz.), leading Italian religious Reformer whose chief concern was eucharistic doctrine.

The son of a prosperous shoemaker, Vermigli had by 1518 entered the Lateran Congregation of the Augustinian Canons Regular at Fiesole. After eight years of study at Padova he



Vermigli, detail from an oil painting by an unknown artist, 1560; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

served variously as preacher, vicar, and abbot, finally becoming abbot at St. Peter ad Aram, a city monastery in Naples, in 1537. There he joined the select group around Juan de Valdés and read the pseudonymous works of the Reformers. Vermigli became suspect, and the Theatines procured his suspension from preaching, but sympathetic cardinals at Rome had the ban lifted. In 1541 he became prior of San Frediano at Lucca, where he gathered a teaching staff and introduced both monastery and congregation to Reformed doctrine and worship. Summoned to appear before his order at Genoa, he fled in August 1542 to Zürich. Martin Bucer then called him to Strasbourg (now in France), where he was professor of theology (1542–47, 1553–56). Vermigli in 1547 accepted Archbishop Thomas Cranmer's invitation to England and became regius professor of divinity at the University of Oxford. The major event of his stay was a disputation (1549) on the Eucharist, at which three matters of belief were debated: (1) transubstantiation, (2) carnal or corporeal presence, and (3) whether "the body and blood of Christ is sacramentally joined to the bread and the wine." His influence on the 1552 prayer book and the Forty-two Articles (1553) is problematic. His eucharistic doctrine, in the Oxford *Disputation* and *Treatise* and in *Defensio adversum Gardinerum* (published in 1559), was close to that of John Calvin, Bucer, and Philipp Melanchthon. After Queen Mary's accession, Cranmer named him the archbishop's assistant, but Vermigli went into exile, followed by disciples such as John Jewel, during later persecutions by the crown. He returned to Strasbourg in 1553 but in 1556, after the Lutheran–Reformed dispute over the ubiquity of Christ's body intensified, went to Zürich as professor of Hebrew.

Vermont, constituent state of the United States of America, situated in the New England region, northeastern U.S. It is bounded on the north by the Canadian province of Quebec, on the east by New Hampshire, on the south by Massachusetts, and on the west by New York. The capital is Montpelier.

A brief treatment of Vermont follows. For full treatment, *see* MACROPAEDIA: United States of America: *Vermont.*

Settled originally by Abnaki Indians who

lived by hunting and fishing, the state was visited by the French explorer Samuel de Champlain, who sighted Lake Champlain on Vermont's northwestern border in 1609. The French made the first permanent European settlement in 1666 on Isle La Motte. Both the Dutch and the British established settlements in the 18th century, but the area fell exclusively to the British in 1763. Contested by both New York and New Hampshire, Vermonters created an independent republic in 1777. In 1791 they joined the Union as the 14th state. The state grew quickly, but by the 1830s its residents were departing in large numbers to other parts of the country. Vermont was the site of the only American Civil War action north of Pennsylvania: in 1864, a band of Confederates raided St. Albans from Canada.

The Green Mountains, part of the Appalachian system, trend north–south through the centre of Vermont. The highest point, Mount Mansfield, is 4,393 feet (1,339 m) above sea level. Only 15 percent of the state is level land with fertile soil and high productive capability. Most of the rivers drain into Lake Champlain, which empties northward via the Richelieu River into the St. Lawrence River. Some 400 natural lakes are located entirely within the state.

The climate tends to be cold. Winter temperatures can drop to −34° F (−37° C) and lower, but in the summer they rarely rise above 90° F (32° C). Snowfall usually averages between 70 and 80 inches (1,800 and 2,000 mm) each winter in the valleys and up to 110 inches (2,800 mm) in the mountains. The annual growing season is only about 120 days.

Vermont's culture typified that of the New England Yankee of English and Protestant background, but other ethnic groups have become important. There are French-Canadians in Winooski, Italians in Barre, Spaniards in Barre–Montpelier, Welsh in western Vermont, and Poles in Brattleboro. The population rose 20 percent from 1970 to 1985, one of the highest growth rates in New England, but many new arrivals were building second, or vacation, homes. Vermont's urban population is low—34 percent in 1980; the state had no census-defined Standard Metropolitan Statistical Area until 1980.

Dairying is the dominant agricultural activity, and Vermont has more milk cows per capita than any other state except Wisconsin. Industry has undergone major changes; once-flourishing textile plants are closed, as are railroad shops and related industries, but specialized products are still important. Wood and paper products account for about one-tenth of the manufacturing output. Printing is among the major industries. The mining of marble, granite, and slate, is also significant. Tourism continues to grow in importance, with summer visitors attracted by its forests and mountains and winter sports enthusiasts drawn by its numerous ski resorts.

Rail and airline service is limited. Aside from the main north–south routes in the Connecticut River valley, roads are often winding, narrow, and hilly. Transportation remains a major problem.

Vermont enjoys a vigorous cultural life despite its rural and small-town character. Art galleries are found in a number of cities and there is a state-supported symphony orchestra. A state-operated arts-and-crafts service aids in marketing the work of folk-arts practitioners. Local history is highlighted, and most of the state's more than 100 covered bridges are maintained and protected by the state. The University of Vermont was chartered in 1791, and the school of languages at Middlebury College is internationally known. There are numerous daily and weekly newspapers, several commercial television stations, and many radio stations. Area 9,614 square miles (24,900 square km). Pop. (2000) 608,827.

vermouth, wine-based fortified drink flavoured with aromatic herbs. The name derives from the German *Vermut,* or "wormwood," a bitter herb and traditional ingredient of vermouth and absinthe. As many as 40 different herbs and flavourings may be used in vermouth, including juniper, cloves, quinine, orange peel, nutmeg, and coriander; the vermouths of various producers are flavoured according to closely guarded recipes.

There are two styles of vermouth: the so-called French, or dry style, which is white, and the Italian, or sweet style, which is darker in colour. Both styles, however, are made in both countries, as well as in the United States. Vermouth is used primarily as an ingredient in mixed drinks or sometimes as an apéritif on its own.

Vermuyden, Sir Cornelius (b. 1595, Tholen, Neth.—d. April 1683?, London), British engineer who introduced Dutch land-reclamation methods in England and drained the Fens, the low marshy lands in the east of England.

An experienced embankment engineer, Vermuyden was employed in 1626 by King Charles I of England to drain Hatfield Chase on the isle of Axholme, Yorkshire. Jointly financed by Dutch and English capitalists, this project was a controversial undertaking, not only for the engineering techniques used but also because it employed Dutch instead of English workmen. The fenmen, local inhabitants who hunted and fished in the fens, attacked the Dutch workers; to complete the project, the engineer had to employ English workers and compensate the fenmen for their loss of hunting and fishing rights.

In 1630 Vermuyden contracted to drain the Great Fens, or Bedford Level, Cambridgeshire; this project, completed in 1637, drew objections from other engineers, who claimed the drainage system was inadequate. During the English Civil War, Parliament ordered the dikes broken and the land flooded (1642) to stop a Royalist army advance. In 1649 Vermuyden was commissioned to reclaim the Bedford Level; 40,000 acres were drained by 1652.

In 1653 Vermuyden, who had been knighted in the 1620s and had become a British subject (1633), headed an unsuccessful English mission to the United Provinces of the Netherlands to arrange a political union between the two nations.

Vernadsky, Vladimir Ivanovich (b. March 12 [Feb. 28, Old Style], 1863, St. Petersburg, Russia—d. Jan. 6, 1945, Moscow), Russian geochemist and mineralogist who is considered to be one of the founders of geochemistry and biogeochemistry.

The son of a professor, Vernadsky graduated from St. Petersburg University in 1885 and became curator of the university's mineralogical collection in 1886. In 1890 he became a lecturer on mineralogy and crystallography at Moscow University, where he earned his Ph.D. in 1897. He served as a professor at Moscow University from 1898 to 1911. After the Russian Revolution he was active in scientific and organizational activities; he founded and directed (from 1927) the biogeochemical laboratory of the Academy of Sciences at Leningrad (St. Petersburg).

Vernadsky's initial work was in mineralogy. He carried out highly detailed studies on aluminosilicates and was the first to correctly describe their chemistry and their structure, which forms the basis of many other minerals. He was also a pioneer in geochemistry—the measurement and study of the distribution and migration of the chemical elements and isotopes in the Earth's crust. In this regard he gathered detailed data on the layers of the crust, described the migration of atoms in such layers, tried to explain the occurrence of chemical elements in those layers, and in general studied the formation of chemical compounds under the influence of geologic processes.

Vernadsky was one of the first scientists to recognize the tremendous potential of radioactivity as a source of thermal energy, and he was also one of the first to postulate the long-term heat buildup from radioactivity as a driving force behind many geochemical processes. His later years were taken up with the study of the contributions that life processes make to the atmosphere, and he correctly attributed to living things the creation of the oxygen, nitrogen, and carbon dioxide present in the atmosphere. He also studied the effects living things have on the chemistry of the Earth's crust (*e.g.,* the subsurface concentrations of certain elements due to biological cycles). Vernadsky is thus regarded as the founder of the theory of the biosphere (*i.e.,* the total mass of living organisms, which process and recycle the energy and nutrients available from the environment).

Vernal, city, seat (1880) of Uintah county, northeastern Utah, U.S. The city lies along Ashley Creek, a small tributary of the Green River, and is located 180 miles (290 km) east-southeast of Salt Lake City, at an elevation of 5,322 feet (1,622 m) in an area of geologic and fossil interest. Settled in the 1870s as Ashley Center (for the fur trader William H. Ashley), it was incorporated in 1879 and was renamed Vernal in 1893, implying a springlike growth (hence, progress).

The settlement developed as a trading and processing centre for a ranching and dairy area and later became a tourist centre for the High Uintas Primitive Area within Ashley National Forest (which lies to the northwest and is headquartered at Vernal), the Dinosaur National Monument (12 miles [19 km] east), and the Flaming Gorge National Recreation Area (40 miles [64 km] north). The hub of Utah's "Dinosaurland," it is the site of the Utah Field House of Natural History and hosts a summer art festival; the Dinosaur Roundup Rodeo (July) and a quarter horse show and race (June) are also held there. The Uintah and Ouray Indian Reservation and its Hill Creek Extension lie just to the west and south of Vernal. Aside from livestock farming, the locality has mining (gilsonite, oil, oil shale, phosphate rock, and natural gas) and lumbering. Pop. (2000) 7,714.

vernal grass: *see* sweet vernal grass.

vernalization, the artificial exposure of plants (or seeds) to low temperatures in order to stimulate flowering or to enhance seed production. By satisfying the cold requirement of many temperate-zone plants, flowering can be induced to occur earlier than normal or in warm climates lacking the requisite seasonal chilling. Knowledge of this process has been used to eliminate the normal two-year growth cycle required of winter wheat. By partially germinating the seed and then chilling it to 0° C (32° F) until spring, it is possible to cause winter wheat to produce a crop in the same year.

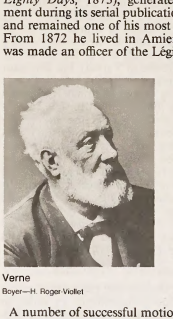
Devernalization can be brought about by exposing previously vernalized plants or seeds to high temperatures, causing a reversion to the original nonflowering condition. Onion sets that are commercially stored at near freezing temperatures to retard spoilage are thereby automatically vernalized and ready to flower as soon as they are planted. Exposure to temperatures above 26.7° C (80° F) for two to three weeks before planting, however, shifts the sets to the desired bulb-forming phase.

Verne, Jules (b. Feb. 8, 1828, Nantes, Fr.—d. March 24, 1905, Amiens), French author whose writings laid much of the foundation of modern science fiction.

In Paris Verne studied law but afterward chose to follow his interest in literature. In 1850 his play, *Les Pailles rompues* ("The Broken Straws"), was successfully produced at Alexandre Dumas's Théâtre Historique. He served as secretary at the Théâtre Lyrique (1852–54) and later turned stockbroker but continued writing comedies, librettos, and stories.

In 1863 he published in Jules Hetzel's *Magasin d'Éducation et de Récréation* the first of his *Voyages extraordinaires—Cinq Semaines en ballon* (1863; *Five Weeks in a Balloon,* 1869). The great success of the tale encouraged him to produce others in the same vein of romantic adventure, with increasingly deft depictions of fantastic but nonetheless carefully conceived imaginary scientific wonders. The *Voyages* continued with *Le Voyage au centre de la Terre* (1864; *A Journey to the Centre of the Earth,* 1874), *De la Terre à la Lune* (1865; *From the Earth to the Moon,* 1873), *Vingt Mille Lieues sous les mers* (1870; *Twenty Thousand Leagues Under the Sea,* 1873), and *L'Île mystérieuse* (1874; *The Mysterious Island,* 1875), in which he foresaw a number of scientific devices and developments, including the submarine, the aqualung, television, and space travel.

Verne's novels were enormously popular throughout the world; one in particular, the grippingly realistic *Le Tour du monde en quatre-vingt jours* (1873; *Around the World in Eighty Days,* 1873), generated great excitement during its serial publication in *Le Temps* and remained one of his most popular works. From 1872 he lived in Amiens. In 1892 he was made an officer of the Légion d'Honneur.



Verne
Boyer—H. Roger Viollet

A number of successful motion pictures have been made from Verne novels, starting in 1916 with *Twenty Thousand Leagues Under the Sea* (remade in 1954 by Walt Disney), *The Mysterious Island* (1929 and 1961), *From the Earth to the Moon* (1958), *Journey to the Center of the Earth* (1959), and, perhaps the most popular, *Around the World in Eighty Days* (1956).

Verné rug, handmade Caucasian pileless floor covering on which the designs are executed in Soumak brocading upon a foundation weave that appears between the motifs. Usually the field design consists of rectangular panels upon which appear attenuated forms of animals and peacocks or angular winged plants. Similar creations fill the wide border, and if guard stripes appear, they are very narrow. In other examples the panels may contain a row of conventionalized leaves or rectilinear split arabesques.

The name Verné is also often applied to a series of Anatolian brocaded rugs the panels of which contain diamonds, delicate latticework, or other varied geometric forms. Caucasian Vernés are normally all wool, except for white cotton accents. Many Anatolian pieces make



Verné rug from the Caucasus, late 19th century; in a private collection in New York state
New York state private collection; photograph, Otto E. Nelson—EB Inc.

use of cotton for whites. Few of these rugs predate the 19th century.

Verner's law, linguistic explanation of the apparent exceptions to Grimm's law (*q.v.*), which first demonstrated the significant role that accent (stress) played in linguistic change in the Germanic languages. It provided further evidence for the important claim of 19th-century linguists that phonetic laws have no exceptions and proved to be a decisive influence in establishing the direction taken by the Neogrammarian school of historical linguistics (*see* Neogrammarians). This law, one of the greatest discoveries in historical linguistics, was first presented in an article, "Eine Ausnahme der ersten Lautverschiebung" ("An Exception to the First Sound Shift"), in the *Zeitschrift für vergleichende Sprachforschung* of July 1875, by the Danish linguist Karl Verner.

Grimm's law stated that the Indo-European *p, t,* and *k* sounds changed into *f, th* or *d,* and *h* in the Germanic languages. Verner noticed that Grimm's law was valid whenever the accent fell on the root syllable of the Sanskrit cognate, but, when the accent fell on another syllable, the Germanic equivalents became *b, d,* and *g.* This was also the case with *s* and *r.* Technically, this rule states that in the Germanic branch of Indo-European, all non-initial voiceless fricatives (spirants) became voiced between voiced sounds if they followed an unaccented syllable in Indo-European or Sanskrit. For example, Sanskrit *bhrātar,* with the accent on the root syllable, corresponds to Gothic *brōþar,* but Sanskrit *pitā,* accented on the final syllable, corresponds to Gothic *fadar.*

Vernet, Carle, Carle also called CHARLOT, original name ANTOINE-CHARLES-HORACE VERNET (b. Aug. 14, 1758, Bordeaux, Fr.—d. Nov. 27, 1836, Paris), French painter of battle scenes for Napoleon I and of sporting subjects, notably horses, for King Louis XVIII.

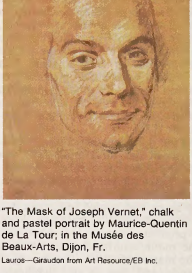
The son of the popular landscapist Joseph Vernet, the younger Vernet early exhibited a gift for painting and came to develop an acute eye for natural detail. Although Napoleon commanded him to paint vast battle scenes, such as "Marengo" (1804), his real talent was for intimate genre and for drawing rather than for painting. His long series of fashionable studies, often satirizing contemporary manners and costume, were reproduced by the best engravers of the time. After the restoration of the monarchy, Vernet became court painter to Louis XVIII.

Vernet, (Émile-Jean-)Horace (b. June 30, 1789, Paris—d. Jan. 17, 1863, Paris), French painter of sporting subjects and vast battle panoramas, notably those in the Gallery of Battles at Versailles.

The son and grandson, respectively, of two well-known painters, Carle Vernet and Joseph Vernet, Horace developed a remarkable facility for working on a grand scale and became one of France's most important military painters. A Bonapartist, he specialized in glorifying the Napoleonic era. During the restoration of the monarchy after 1815, his studio was a centre of political intrigue as well as a meeting place for sportsmen, artists, and writers. A period with the French Army in Algiers (1833) inspired some paintings of the Arab world. He was subsequently commissioned by Louis-Philippe and Napoleon III to produce the battle pieces at Versailles.

Vernet, (Claude-)Joseph (b. Aug. 14, 1714, Avignon, Fr.—d. Dec. 3, 1789, Paris), French landscape and marine painter whose finest works, the series of 15 "Ports of France" (1754–65; Louvre), constitute a remarkable record of 18th-century life.

The son of a decorative painter, Vernet worked at Rome (1734–53), finding inspiration both in the expansive, luminous art of the 17th-century French master Claude Lorrain and in the dramatic and picturesque work of the 17th-century Italian painter Salvator Rosa.

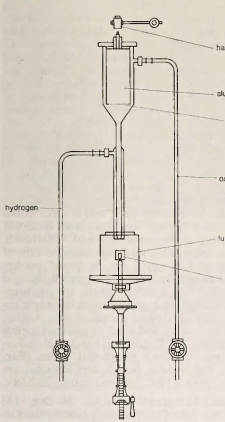


"The Mask of Joseph Vernet," chalk and pastel portrait by Maurice-Quentin de La Tour; in the Musée des Beaux-Arts, Dijon, Fr.
Lauros—Giraudon from Art Resource/EB Inc.

Vernet's shipwrecks, sunsets, and conflagrations reveal an unusually subtle observation of light and atmosphere. With his compatriot Hubert Robert, he catered to a new taste for idealized, somewhat sentimentalized landscapes. After returning to Paris he became a member of the French Royal Academy and was commissioned by King Louis XV to paint the port series. The decline in his later work is attributed to overproduction. The family tradition of painting was maintained by his son Carle Vernet and his grandson Horace Vernet.

Verneuil process, also called FLAME-FUSION PROCESS, method for producing synthetic rubies and sapphires. Originally developed (1902) by a French chemist, Auguste Verneuil, the process produces a boule (a mass of alumina with the same physical and chemical characteristics as corundum) from finely ground alumina (Al_2O_3) by means of an inverted oxyhydrogen torch that opens into a ceramic muffle. With slight modifications, this method is used to produce spinel, rutile, and strontium titanate.

Highly purified alumina is placed in a container with a fine sieve at its base. When the container is tapped by a mechanically-activated hammer, the alumina sifts down into the enclosed chamber. Oxygen passes into this chamber and carries the fine alumina particles into the intense heat of the central part of an oxyhydrogen flame, where they fuse and fall on the molten upper surface of the boule as droplets. Flame characteristics and the rate of powder feed and boule lowering are adjusted to produce a boule of uniform diameter. The temperature of the upper surface of the boule is held just above the melting point, which for



Verneuil apparatus
By courtesy of Swiss Jewel Company

colourless sapphire is 2,030° C (about 3,690° F). When a boule reaches the desired size, normally 150 to 200 carats, the furnace is shut down, and the boule is cooled.

Strain develops during cooling, because the outer surface cools faster than the interior; this phenomenon causes considerable loss from cracking during the manufacturing process. The strain is relieved by splitting the boule longitudinally, which is induced by snapping off its elongated stem. Some residual strain not disadvantageous for gem and most industrial uses is left in the half-boule developed by splitting. Strain-free, whole boules may be produced by annealing at 1,950° C.

Synthetic corundum. Before 1940 all synthetic corundum was made in Switzerland, Germany, and France. For several years after the discovery of the process of manufacture, all of the production was used for gemstones. Synthetic ruby was the chief product and was produced by using an intimate mixture of aluminum and chromium oxides; 5 percent chromium oxide (Cr_2O_3) yields a pale-pink boule and 6 percent a deep-red one. The higher the percentage of chromium oxide, the more difficult it is to control boule growth and the greater the loss from cracking on cooling. Blue sapphire is produced by adding iron and titanium, green by cobalt, and yellow by nickel and magnesium oxides.

Star rubies and sapphires, first developed in 1947 in the United States, are made by adding one percent rutile (titanium oxide, TiO_2) to the starting powder, forming the boules in the usual manner, and then heat treating them at temperatures between 1,100° C and 1,500° C. The rutile forms small needlelike crystals that are oriented along the hexagonal crystal planes within the boule; these are similar to the same crystals in natural star sapphire. The synthetic gems have sharper and more distinctly developed stars than the natural crystals.

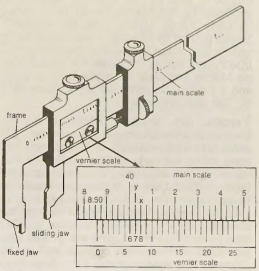
It is very difficult to distinguish between natural and synthetic colourless sapphires. The natural crystals have microscopic irregularly-shaped gas and liquid inclusions, whereas the synthetic gems usually show microscopic cracks along and normal to the intersection of facets. Under the microscope, coloured synthetic stones show curved lines parallel to the upper growth surface of the boule. They represent uneven distribution of pigmentation. Occasionally, especially in blue sapphire, they are visible to the unaided eye.

Synthetic spinel. Spinel boules have a square cross section with round corners but otherwise are like corundum boules in manufacture, size, and appearance, although they do not develop internal stresses during cooling. They are made in all colours by adding appropriate pigments.

Synthetic rutile. Synthetic rutile, first produced in 1948 by the Verneuil process, is far superior to the natural material as a gemstone, because natural rutile is dark in colour and the pure synthetic boules may be produced in nearly any shade by the addition of appropriate pigments. Rutile boules have a square cross section similar to spinel boules but rarely exceed 100 carats in weight. When removed from the furnace they are black in colour, because some titanium is still unoxidized; on heating in an oxygen atmosphere, however, the oxygen is slowly absorbed and the colour fades until only a faint yellow tinge remains in unpigmented boules.

Vernier, Pierre (b. *c.* 1580, Ornans, Fr.—d. Sept. 14, 1637, Ornans), French mathematician and government official who is best remembered for his invention of the vernier caliper, an instrument for making accurate linear measurements. Taught by his scientist-father, Claude Vernier, he early developed an interest in measuring instruments. During his adult years, however, science was for him primarily an avocation. He held various positions with the government of Spain and then became commandant of the Castle of Ornans in France and later director general of the treasury in Bourgogne. In *La Construction, l'usage, et les propriétés du quadrant nouveau de mathématiques* (1631; "The Construction, Uses, and Properties of a New Mathematical Quadrant"), he described his new measuring instrument. The book also contained a table of trigonometric sines and a method for deriving the angles of a triangle from known measurements of its sides.

vernier caliper, instrument for making very accurate linear measurements introduced in 1631 by Pierre Vernier of France. It utilizes two graduated scales: a main scale similar to



Vernier caliper

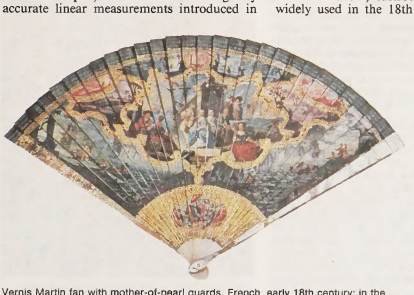
that on a ruler and an especially graduated auxiliary scale, the vernier, that slides parallel to the main scale and enables readings to be made to a fraction of a division on the main scale.

In the figure, the vernier scale has 25 divisions, whereas the main scale has 24 divisions in the same length. This means that the divisions on the vernier scale are shorter than those on the main scale by $^1/_{25}$ of a division on the main scale. In the figure, line 8 on the vernier coincides with line *x* on the main scale. To align lines 7 and *y* the vernier would have to be moved to the left by $^1/_{25}$ of a main-scale division; to align lines 6 and 40, the movement would be $^8/_{25}$, and so on. By similar reasoning, the 0 line on the vernier would have to be moved a distance equal to $^8/_{25}$ of a main-scale division to align it with the 8.50 line on the main scale. This means that in the position shown in the figure the 0 line is $^8/_{25}$ of a main-scale division to the right of the 8.50 line. The reading of the vernier is therefore 30 + 8.50 + 0.08 = 38.58.

Vernier scales are also made with 10 divisions in the same length as 9 on the main scale; the technique of reading such a scale is similar to that described above. A vernier scale can be used to increase the accuracy of angular as well as linear measurements.

Vernio, Giovanni Bardi, conte di (count of): *see* Bardi, Giovanni.

vernis Martin, lustrous lacquer substitute widely used in the 18th century to decorate



Vernis Martin fan with mother-of-pearl guards, French, early 18th century; in the Victoria and Albert Museum, London
By courtesy of the Victoria and Albert Museum, London; photograph, A.C. Cooper Ltd

furniture and such personal articles as *brisé* fans and snuffboxes. The process of adding bronze or gold powder to green varnish was perfected by the Martin family (*q.v.*), hence its name vernis Martin ("Martin varnish"). Highly praised by Voltaire, it was developed to imitate East Asian lacquerware being imported into France during the Louis XV period. Vernis Martin was made in several colours, green and a golden red being the most characteristic. *See also* lacquerwork.

Vernon, city, southern British Columbia, Canada. It lies in Okanagan Lake country, 274 miles (441 km) northeast of Vancouver. Pioneers called the early settlement Priest's Valley owing to a missionary outpost maintained there by Paul Durieu. It was also known as Forge Valley (for its blacksmithing) and, in 1885, as Centreville (the name of the original townsite). It was renamed Vernon in 1887 after Forbes G. Vernon, who was at that time provincial commissioner of lands and works.

Vernon is a service centre for a large lumbering, dairying, and fruit-growing area. Major industries are fruit and vegetable packing and canning, leather tanning, logging, and sawmilling. The city is a popular hunting and fishing base and holds an annual winter carnival at Silver Star Mountain. Architecturally, it is dominated by the Vernon Civic Complex (opened 1966), comprising the City Hall, museum, library, fire and police buildings, and Convention Hall. Inc. 1892. Pop. (1991) city, 23,514; metropolitan area, 48,139.

Verny (city, Kazakhstan): *see* Alma-Ata.

Véroia, historically BEROEA, commercial centre of Greek Macedonia and capital of the *nomós* (department) of Imathía, Greece. It lies on a plateau at the western edge of the Thessaloníki (Salonika) plain, at the eastern foot of the Vérmion Mountains north of the Aliákmon River. The town straddles the Tripótamos (river), an Aliákmon tributary that provides hydroelectric power and irrigation. Véroia is the seat of a metropolitan bishop of the Greek Orthodox church.

Véroia is on the site of ancient Beroea, a city of Emathia prominent from at least the beginning of the 4th century BC. Part of the kingdom of Macedonia, it surrendered to Rome in 168. The Apostle Paul and Silas preached to the Jewish community there in AD 54 or 55. Under the emperor Diocletian (reigned 284–305), the city was one of the two capitals of the Roman province of Macedonia. At an early date it was the seat of a bishop. Invaded by Serbs and Bulgars, in 1361 it was captured by the Turks, who named it Karaferiye and established a military colony.

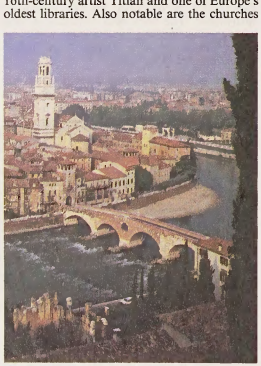
The modern town has cotton and woolen mills and trades in wheat, fruit, and vegetables. It is linked to Edessa by the Thessaloniki-Kozáni railway, with connections to Bitola in the Republic of Macedonia. Lignite mines operate in the area. The town has an archaeological museum and many Byzantine churches of wattle and timber. Pop. (1981) 37,087.

Verona, city, episcopal see, and capital of Verona *provincia,* Veneto *regione,* northern Italy. It lies at the foot of the Lessini Mountains, 65 miles (105 km) west of Venice, and is half-encircled by the Adige River.

The city was founded by an ancient tribe (possibly the Euganei or Raeti) and was later occupied by the Gallic Cenomani. It became a Roman colony in 89 BC and rapidly rose in importance because it was at the junction of main roads between Italy and northern Europe. The poet Catullus was born there. Verona was occupied by the Ostrogoth king Theodoric (489), who built a castle on the site of the present Castel San Pietro on the Adige River. The city remained important under the Lombard kings. It was captured by Charlemagne in 774 and was the residence of his son Pepin and of Berengar of Tour.

Verona was an independent commune from the early 12th century, and it suffered during the early struggles between the Guelfs (papal party) and Ghibellines (imperial party), in the course of which it chose the Guelf party. Ruled by the tyrant Ezzelino da Romano (1226–59); the city grew calmer and prospered under the della Scala (Scaliger) family after Mastino I della Scala became podesta (chief magistrate) in 1260. In the reign of Bartolomeo della Scala, Romeo Montague and Juliet Capulet traditionally loved and died; their romance is commemorated by the so-called Tomb of Juliet, Romeo's House, and Juliet's House. Bartolomeo's brother Cangrande I (d. 1329), the greatest member of the della Scala family, protected the exiled poet Dante. Verona fell to Gian Galeazzo Visconti in 1387 and in 1405 to Venice, which held it, apart from its occupation by Emperor Maximilian I (1509–17), until 1797, when it was ceded to Austria by Napoleon I at the Treaty of Campo Formio. The last congress of the Quadruple Alliance (Russia, Prussia, Austria, Britain) was held at Verona in 1822. In 1866 the city was united to the Kingdom of Italy. It suffered heavy damage in World War II but has since been restored.

Verona is one of the richest cities in northern Italy in Roman remains. The most remarkable of these, the amphitheatre, or Arena, is the third largest surviving Roman amphitheatre and is now used for opera. Also from the 1st century AD are the Roman theatre (with adjacent archaeological museum) and two gateways. The Arco dei Gavi (reconstructed in 1932) was erected in the 1st century BC. The Lapidario Maffeiano Museum (1714) contains Greek and Roman antiquities. Verona is remarkable for its rich Romanesque and Gothic architecture, which is often in a distinctive pink brick. The city produced two great Renaissance architects, Fra Giocondo and Michele Sanmicheli. Its outstanding churches include the Romanesque San Zeno Maggiore (originally 5th century, rebuilt 1117–1227), with a brick and marble facade, a celebrated marble porch, and a triptych by the 14th-century painter Andrea Montegna, and the Gothic Sant'Anastasia (foundation 1290; completed 1422–81). The Romanesque-Gothic cathedral (rebuilt 15th century) contains an "Assumption" by the 16th-century artist Titian and one of Europe's oldest libraries. Also notable are the churches of San Fermo Maggiore, comprising two 11th-century edifices, the upper rebuilt after 1313; SS. Nazzaro and Celso (rebuilt 1464–83); and San Giorgio in Braida, begun in 1477 and consecrated in 1536, partially designed by Sanmicheli. Notable secular landmarks include the Castelvecchio (now the Civic Museum, Verona), built by Cangrande II in 1354; the Loggia del Consiglio (1493), attributed to Fra Giocondo; the Arche Scaligere, comprising the elaborate Scaliger tombs with Gothic canopies surmounted by equestrian statues; the Palazzo della Ragione (1193; much altered); and the Ponte Scaligero (1354), rebuilt after being damaged in World War II.



The Ponte Pietra over the Adige River at Verona, Italy, with the Romanesque-Gothic cathedral at left

E. Streichan—Shostal Assoc.

Verona was also a renowned medieval centre of painting. The work of Antonio Pisanello (Pisano) climaxes the courtly fresco work of the 14th and 15th centuries. The influence of Bartolommeo Montagna of Vicenza and his father-in-law, the Venetian Jacopo Bellini, in the 15th century combined with that of Venice to affect the whole Veronese school. The city's most famous painter was the 15th-century artist Paolo Caliari (Paolo Veronese), who spent most of his active life in Venice although his "Martyrdom of St. George" remains in San Giorgio in Braida at Verona.

The city is the centre of rail and road connections from northern Italy to central Europe via the Brenner Pass; and it links Milan and Venice by rail and road and is served by airports at Boscomantico and Villafranca. Verona ships fruits and vegetables to central Europe and is noted for its cereal market and its annual International Agricultural and Horse Fair (since 1898). There are engineering, chemical, and paper industries, sugar refining, and diversified manufactures. Artistic furniture making and work in precious metals and marble are flourishing handicraft industries, and Verona's traditional wines (Bardolina, Valpolicella, Soave, and Recioto) are famous. Pop. (1991 prelim.) mun., 252,689.

Verona, Congress of (Oct. 20–Dec. 14, 1822), the last of the meetings held by the European powers in accordance with the terms of the Quadruple Alliance (1815) between Russia, Prussia, Austria, and Great Britain. Held at Verona, the congress was also the last effective manifestation of the Holy Alliance (Austria, Russia, Prussia). It was held mainly to consider the revolutionary situation in Spain. Convened because the French king Louis XVIII wanted his allies' consent to intervene in Spain to overthrow the constitutional regime established there in 1820, the congress agreed to support France if it should be attacked by Spain and authorized a French expedition into Spain (1823). The British, however, by threatening the use of their sea power, prevented the allies from interfering with the revolts occurring in Spanish America and created enough discord among the allies to cause a breakdown in the congress system.

Veronese, Guarino: *see* Guarino Veronese.

Veronese, Paolo, pseudonym of PAOLO CALIARI (b. 1528, Verona, republic of Venice [Italy]—d. April 9, 1588, Venice), one of the major painters of the 16th-century Venetian school. His works usually are huge, vastly peopled canvases depicting allegorical, biblical, or historical subjects in splendid colour and set in a framework of classical architecture. A master of the use of colour, he also excelled at illusionary compositions that extend the eye beyond the actual confines of the room.

The early years. Caliari became known as Veronese after his birthplace. Though at first apprenticed as a stonecutter, his father's trade, he showed such a marked interest in painting that in his 14th year he was apprenticed to a painter named Antonio Badile, whose daughter Elena he later married. From Badile Veronese derived a sound basic painting technique as well as a passion for paintings in



"The Adoration of the Kings," oil painting by Paolo Veronese, 1573; in the National Gallery, London

By courtesy of the trustees of the National Gallery, London

which people and architecture were integrated. The style of his first known work, "Bevilacqua-Lazise Altarpiece," reflects Badile's influence. Veronese was also influenced by a group of painters that included Domenico Brusasorci, Giambattista Zelotti, and Paolo Farinati; attracted by Mannerist art, they studied the works of Giulio Romano, Raphael, Parmigiano, and Michelangelo. Fragments of a fresco decoration executed by Veronese in 1551 for the Villa Soranza in Treville (now in S. Liberale, Castelfranco), with their elegant decorative figures, already suggest a new idiom. The influence of Michelangelo is evident in a splendid canvas, "Temptation of St. Anthony," painted in 1552 for the cathedral of Mantua.

In 1553 Veronese was introduced to Venice and launched on a long collaboration with the Venetian authorities in connection with the decoration of different parts of the Palazzo Ducale. The first of these commissions, the partitioned ceiling of the Sala del Consiglio dei Dieci (Hall of the Council of Ten), reveals characteristics of Veronese's mature style: skillful foreshortenings that make figures appear to be actually floating in space above the viewer, chromatic splendour, and luminous passages that endow even the shadows with colour.

In 1555, probably at the summons of the prior of S. Sebastiano in Venice, Veronese began the decoration of the church that was to become his burial place. Whereas in the Palazzo Ducale he had often worked in collaboration with Zelotti, Veronese worked alone in S. Sebastiano. In the "Story of Esther," depicted on the ceiling, appear the first of his rigorous compositions of foreshortened groups in luminous architectural frameworks and his decorative fancies that juxtapose animated, almost stereometric foregrounds and background figures wrought with a few strokes of light. The skilled fresco painter, who had worked in the villas and palaces of Venetian noblemen, including the beautiful boudoir of the Trevisan family in Murano, recounted the stories of St. Sebastian in elegantly fluent frescoes painted for the church (1558). In his decoration of the two shutters of the organ (1559), he again revealed his mastery of rhythmic composition and illusionistic perspective through extreme foreshortening. Contemporaneously with the decoration of S. Sebastiano, Veronese received numerous commissions for altarpieces, devotional paintings, and some "Suppers." The theme of the latter—depicted in such paintings as "The Pilgrims of Emmaus" and "Feast in the House of the Pharisee"—allowed him to compose large groups of figures in increasingly complex Renaissance architectural settings that attest to his knowledge of the works of the 16th-century Venetian architects Michele Sanmicheli, Andrea Palladio, and Jacopo Sansovino.

The later years. The decoration of the villa at Maser (1561), built by Palladio for Daniele and Marcantonio Barbaro, the latter a scholar and translator of the works of the Roman architect Vitruvius, marked a fundamental stage in the evolution of the art of Veronese and in the development of Venetian painting. Assisted by his brother Benedetto in the execution of the architectural framework, Paolo brilliantly interpreted the villa's Palladian rhythms, breaking through the walls with illusionistic landscapes and opening the ceilings to blue skies with figures from classical mythology. Mannerism had given way to harmonious rhythms and a superb handling of colour that imbued his frescoes with glowing vitality: the mythological scenes exalting human pleasures; the depiction of Barbaro's wife with the children and the wet nurse; and the landscapes, rendered in illusionistic perspective and detailed with classic ruins.

The classic compositions at Maser were succeeded by paintings with a tendency to monumentality and with a love for decorative pomp, as in "The Marriage at Cana," executed in 1562 and 1563 for the refectory of S. Giorgio Maggiore (now in the Louvre, Paris). In this work the planes are multiplied, space is dilated, and an assembly of people is accumulated in complex but ordered movements. In their solemn monumentality "The Family of Darius Before Alexander" and the canvasses executed for the Cuccina family (*c.* 1572), which contain splendid portraits, are more organic in structure.

The wealth of whimsical and novel narrative details characteristically incorporated in Veronese's paintings and particularly in the "Last Supper," commissioned in 1573 by the convent of SS. Giovanni e Paolo, aroused the suspicion of the Inquisition's tribunal of the Holy Office, which summoned Veronese to defend the painting. The tribunal objected to the painting on grounds that it included irreverent elements, inappropriate to the holiness of the event, for example, a dog, a jester holding a parrot, and a servant with a bleeding nose. Replying that "we painters take the same liberties as poets and madmen take," Veronese adroitly and staunchly defended the artist's right to freedom of imagination. The tribunal, perhaps influenced by the civil authority, elegantly resolved the question by suggesting that the theme be changed to a "Feast in the House of Levi."

The nocturnal tone in the "Adoration of the Magi" in the church of Sta. Corona (Vicenza) endows the painting with a new intimacy, without renunciation of the characteristic Veronesian richness of colour, laid on with the minute, precious brush strokes also used in small canvases, both sacred and profane, executed during this period. These paintings represent the most authentic expressions of the last 15 years of Veronese's life; for discernible in the large decorations for the Palazzo Ducale begun during this period—including the "Rape of Europa" and the "Apotheosis of Venice"—is a greater participation of his workshop, where his brother Benedetto, his sons Carlo and Gabriele, his nephew Alvise dal Friso, and others were employed. In 1588 Veronese contracted a fever and died after a few days of illness. His brother and sons had him buried in S. Sebastiano, where a bust was placed above his grave.

The sons continued their father's work, signing it *haeredes Pauli* ("Paul's heirs"). They were able to make use of a quantity of splendid sketches and drawings. Among Veronese's last works were superb allegorical fables, such as a series for Rudolph II that included "The Choice of Hercules" and "Allegory of Wisdom and Strength" (Frick Collection, New York City); and "Mars and Venus United by Love" (Metropolitan Museum of Art, New York City), in which the figures are bound to each other by harmonious rhythms. His final work also included biblical scenes (Kunsthistorisches Museum, Vienna) with agitated, gloomy landscapes. A pathos-filled small altarpiece of "St. Pantaleon Healing a Sick Boy" and versions of the "Pietà" exhibit a dramatic quality and a meditative mood unusual in Veronese's works. It is the other, the serene Veronese, characterized by splendid colour and a luminosity that animates groups of figures and pure architectural structures, who above all was loved in his time and in the following centuries. Various leading artists of the 17th century found him a source of inspiration—as did Sebastiano Ricci and Giovanni Battista Tiepolo, who renewed the vital chromatic idiom of Venetian decorative painting. Nineteenth-century French painters from Eugène Delacroix to Paul Cézanne looked to Veronese, inspired by his use of colour to express exuberance as well as to model form.

(R.Pal.)

MAJOR WORKS. "Bevilacqua-Lazise Altarpiece" (1548; Museo di Castelvecchio, Verona, Italy); "Christ Among the Doctors" (*c.* 1550; Prado, Madrid); "Portrait of Francesco Franceschini" (1551; John and Mable Ringling Museum of Art, Sarasota, Fla.); "Temptation of St. Anthony" (1552; Musée des Beaux-Arts, Caen, Fr.); decorative paintings (1553–54; Palazzo Ducale, Venice); "St. Mary Magdalene Laying Aside Her Jewels" (*c.* 1553–54; National Gallery, London); ceiling paintings and frescoes (1555–58; S. Sebastiano, Venice); "The Holy Family with the Infant St. John and St. George" (late 1550s; Ashmolean Museum, Oxford); "Transfiguration" (1555–56; Montagnana Cathedral, Italy); decorative paintings (*c.* 1561; Villa Barbaro, Maser, Italy); "Portrait of a Lady and Her Daughter" (*c.* 1556; Walters Art Gallery, Baltimore); "Portrait of Countess Nani

(La Belle)" (*c.* 1556; Louvre, Paris); "Presentation in the Temple" (mid-1550s; Gemäldegalerie, Dresden, Ger.); "The Anointment of David" (mid-1550s; Kunsthistorisches Museum, Vienna); "The Pilgrims of Emmaus" (*c.* 1560; Louvre); "Feast in the House of the Pharisee" (*c.* 1560; Galleria Sabauda, Turin, Italy); "Baptism of Christ" (1561; Church of the Redentore, Venice); "The Preaching of John the Baptist" (*c.* 1561; Borghese Gallery, Rome); "The Martyrdom of SS. Primo and Feliciano" (1562; Museo Civico, Padua, Italy); "Sacra Conversazione" (S. Zaccaria altarpiece; *c.* 1562; Accademia, Venice); "The Consecration of St. Nicholas" (1562; National Gallery); "The Marriage at Cana" (1562–63; Louvre); "Christ and Centurion" (*c.* 1560s; Prado); "The Martyrdom of St. George" (*c.* 1565; S. Giorgio in Braida, Verona); "St. Jerome in the Wilderness" (1566; S. Pietro Martire, Murano, Italy); "The Family of Darius Before Alexander" (*c.* 1570; National Gallery); "Feast in the House of Levi" (1573; Accademia); "Adoration of the Kings" (1573; National Gallery); "Marriage of St. Catherine" (late 1570s; Accademia); ceiling paintings (1575–77; Palazzo Ducale); "The Magdalen" (1583; Prado); "St. Pantaleon Healing a Sick Boy" (1587; S. Pantalon, Venice).

BIBLIOGRAPHY. Seventeenth-century Venetian sources include Carlo Ridolfi, *Le maraviglie dell'arte* (1648; ed. by Detlev von Hadeln, 1914–24); Marco Boschini, *La carta del navegar pitoresco* (1660; ed. by Anna Pallucchini, 1966); and Antonio M. Zanetti, *Della pittura veneziana . . .*, 2nd ed., 2 vol. (1792), initiating the critical work on Veronese, which was not sustained and that was only renewed at the beginning of the 20th century in the work of Bernhard Berenson, *The North Italian Painters of the Renaissance* (1907). Franz H. Meissner, *Paolo Veronese* (1897), was the first monograph on the artist (in German). The articles by Detlev von Hadeln, "Veronese und Zelotti," in *Jahrbuch der preussischen Kunstsammlungen,* 35:168–220 (1914) and 36:97–218 (1915); and by Giuseppe Fiocco, "Paolo Veronese und Farinati," *ibid.,* New Series, 1:123–136 (1926), are the early research results presented in the form of a catalog, which Fiocco built upon in his first monograph (in Italian), *Paolo Veronese* (1928), enlarging it by an examination of the artist's disciples and of his school. Fiocco concentrated more on the personality of Veronese in his successive volume *Paolo Veronese* (1934). The following article by Anna M. Brizio is also worth noting: "Note per una definizione critica dello stile di Paolo Veronese," in *L'Arte,* 29:213–242 (1926); see also the brilliant monograph by Adolfo Venturi, *Paulo Veronese, per il IV centenario della nascita* (1928); and Rodolfo Pallucchini, *Mostra di Paolo Veronese* (1939); and *Veronese,* 2nd ed. (1943), in which he considered the premises of Brizio and the novelty of Veronese's complementary colours and his position with regard to Mannerism. Gino Fogolari, "Il processo dell'Inquisizione a Paolo Veronese," *Archivio Veneto,* vol. 16 (1935), illuminates an episode that was important for its demonstration of the relationship between the art of the time and the Counter-Reformation. Bernhard Berenson, *Italian Pictures of the Renaissance: Venetian School,* 2 vol. (1957), offers the first accurate catalog of the works of Veronese.

Veronica (plant): *see* speedwell.

Veronica, SAINT (fl. 1st century, Jerusalem; feast day July 12), renowned legendary woman who, moved by the sight of Christ carrying his cross to Golgotha, gave him her kerchief to wipe his brow, after which he handed it back imprinted with the image of his face. This account is not the primitive form of the legend derived from *Historia ecclesiastica* by Bishop Eusebius of Caesarea. Eusebius tells that at Caesarea Philippi there lived the woman whom Christ healed of a hemorrhage (Matt. 9:20).

The legend continued to grow. In France, Veronica was reportedly married to the convert Zaccheus (Luke 19:1–10). In the Bordeaux district, she supposedly brought relics of the Blessed Virgin to Soulac-sur-Mer, where she died and was buried. In the 12th century

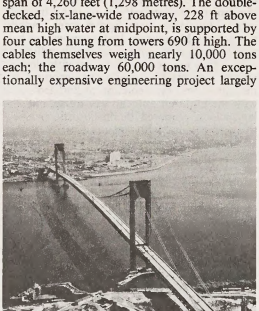


"St. Veronica," wing of an altarpiece by the Master of Flémalle (or Robert Campin); in the Städelsches Kunstinstitut, Frankfurt am Main, Ger.

By courtesy of the Stadelsches Kunstinstitut, Frankfurt am Main, Ger.

the kerchief image began to be identified with one at Rome, the image eventually even being called Veronica.

Verrazano-Narrows Bridge, suspension bridge spanning New York Harbor from Brooklyn to Staten Island, built by Othmar H. Ammann from 1959 to 1964. Succeeding the Golden Gate as the world's longest suspension bridge (until the completion of the Humber Bridge [*q.v.*] in 1981), it has a main span of 4,260 feet (1,298 metres). The double-decked, six-lane-wide roadway, 228 ft above mean high water at midpoint, is supported by four cables hung from towers 690 ft high. The cables themselves weigh nearly 10,000 tons each; the roadway 60,000 tons. An exceptionally expensive engineering project largely



Verrazano-Narrows Bridge looking toward Brooklyn

A. Devaney

because of the problem of land acquisition, its total cost was $325,000,000.

Verrazzano, Giovanni da, Verrazzano also spelled VERRAZANO (b. 1485, Tuscany, Italy—d. 1528, Lesser Antilles), Italian navigator and explorer for France who was the first European to sight New York and Narragansett bays.

After receiving an upper-class education in Florence, Verrazzano moved to Dieppe, Fr., and entered that nation's maritime service. He made several voyages to the Levant, and in 1523 he secured two ships for a voyage backed by the French government to discover a westward passage to Asia. In January 1524 he sailed one of those vessels, "La Dauphine," to the New World and reached Cape Fear about the beginning of March. Verrazzano then sailed northward, exploring the eastern coast of North America. He made several discoveries on the voyage, including the sites of present-day New York Harbor, Block Island, and Narragansett Bay, and was the first European explorer to name newly discovered North American sites after persons and places in the Old World.

Verrazzano wrote interesting, though sometimes inaccurate, accounts of the lands and inhabitants that he encountered. His explorations concluded at the eastern part of Newfoundland. His return to France on July 8, 1524, gave King Francis I his nation's claim to the New World.

Verrazzano undertook two more voyages to the Americas. In 1527 he commanded a fleet of ships on an expedition to Brazil that returned profitable dyewood to France. His final voyage began in the spring of 1528, when he sailed with his brother, Girolamo, from Dieppe with two or three ships. The fleet sailed to Florida, the Bahamas, and finally the Lesser Antilles. He anchored there off one of the islands (apparently Guadaloupe), went ashore, and was captured, killed, and eaten by cannibals.

Where the same name may denote a person, place, or thing, the articles will be found in that order

verre églomisé (French: "Glomyized glass"), glass engraved on the back that has been covered by unfired painting or, usually, gold or silver leaf. The method owes its name to Jean-Baptiste Glomy (d. 1786), a French picture framer who used the process in glass mounts.

The technique derives from late antiquity and was transmitted by the Early Christian tradition. It has been revived at different periods in the history of glass: in Italy during the 14th, 15th, and 16th centuries; in Holland and Spain during the 17th and 18th centuries; and in France, England, and the United States in the 18th century.

Usually executed on a panel of glass (for a picture frame, for example) backed with gold or silver leaf, the technique involves engraving a design through the leaf and applying coloured pigment so that the coloured portions show through the engraved areas. The painting is in turn backed with protective glass or foil. Some late 18th-century examples depicting views of Holland can be assigned to a Dutch engraver signing himself simply "Zeuner." During the same period, *verre églomisé* was popular in the United States as decoration for such objects as clock cases and the panels of Sheraton style mirrors.

Verres, Gaius (b. *c.* 115 BC—d. 43), Roman magistrate notorious for his misgovernment of Sicily. His trial pointed up the extent of official corruption in the Roman provinces during the Late Republic. The son of an undistinguished senator, he became quaestor to the consul Gnaeus Carbo, but, when civil

war broke out in 83, Verres embezzled the military funds and joined the forces of Lucius Cornelius Sulla.

In 80 Verres was legate on the staff of Gnaeus Cornelius Dolabella, governor of Cilicia. Together they plundered the provincials until, in 78, Dolabella was tried at Rome and convicted, mainly on Verres' evidence. In 74 Verres used lavish bribery to obtain the city praetorship then abused his authority for personal gain.

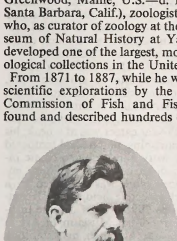
He was next sent as governor to Sicily (73–71). Although corrupt governors were by no means rare, Verres was clearly remarkable for the extent to which he extorted bribes, juggled with the requisition of grain, looted works of art, and arbitrarily executed provincials and Roman citizens. He returned to Rome in 70, and, in the same year, at the Sicilians' request, Cicero prosecuted him. So effective was Cicero's first brief speech and the testimony of his witnesses that Verres' lawyer, the leading Roman advocate Quintus Hortensius, refused to reply. Verres left Rome before the verdict and lived in exile until 43, when he was murdered by order of the general Mark Antony, who apparently coveted his works of art.

Verri, Pietro (b. Dec. 12, 1728, Milan—d. June 28, 1797, Milan), political economist, journalist, government official, and man of letters, leader of a Milanese academy and director of its influential periodical, and author of literary, historical, and economic works.

Verri studied in Monzi, Milan, Rome, and Parma, then served as a captain in the Seven Years' War. After his return to Milan he became the moving spirit of the Società dei Pugni, a group of Milanese intellectuals influenced by the French Encyclopedists. From 1764 to 1766 he directed the society's periodical, *Il Caffè* ("The Coffeehouse"), with the collaboration of his novelist brother, Alessandro (1741–1816). Pietro Verri contributed at least 38 articles on literary subjects to *Il Caffè*. For much of his life he held important posts in the Milanese government, working for administrative reform and a revitalization of commerce. Among his important economic treatises are *Riflessioni sulle leggi vincolanti* (1769; "Reflections on the Banking Laws") and *Meditazioni sull' economia politica* (1771). His correspondence with his brother Alessandro, *Carteggio di Pietro e Alessandro Verri*, 12 vol. (1910–42), provides a vibrant picture of Milanese life in their time.

Verrill, Addison Emery (b. Feb. 9, 1839, Greenwood, Maine, U.S.—d. Dec. 10, 1926, Santa Barbara, Calif.), zoologist and naturalist who, as curator of zoology at the Peabody Museum of Natural History at Yale University, developed one of the largest, most valuable zoological collections in the United States.

From 1871 to 1887, while he was in charge of scientific explorations by the United States Commission of Fish and Fisheries, Verrill found and described hundreds of new marine specimens. He specialized in invertebrates, especially worms, mollusks, corals, sponges, and starfishes, and made important technical improvements in the equipment used for collecting specimens. His expeditions took him to the Atlantic and Pacific coasts of North America and to Hawaii and Central America; many of his more than 300 papers became standard references.



Verrill
By courtesy of Yale University Archives, Yale University Library

Verrill studied at Harvard, where he was an assistant to Louis Agassiz (1860–64). He was professor of zoology at Yale (1864–1907), curator of zoology at the Peabody Museum of Natural History (1865–1910), nonresident professor of comparative anatomy and entomology at the University of Wisconsin, Madison (1868–70), and an instructor in geology at Yale (1870–94).

Verrius Flaccus, Marcus (fl. late 1st century BC), Roman freedman who became a learned scholar and grammarian and the most famous teacher of his day. Verrius Flaccus introduced the principle of competition among his pupils and awarded old books, beautiful or rare, as prizes. Augustus entrusted the education of his two grandsons to him, and thenceforward his school was in the imperial house on the Palatine. He died at an advanced age during the reign of Tiberius.

Verrocchio, Andrea del (b. 1435, Florence—d. 1488, Venice), 15th-century Florentine sculptor and painter and the teacher of



"Bartolomeo Colleoni," bronze statue by Andrea del Verrocchio, 1483–88; in Piazza SS. Giovanni e Paolo, Venice

Brogi—Alinari from Art Resource/EB Inc.

Leonardo da Vinci. His equestrian statue of Bartolomeo Colleoni, erected in Venice in 1496, is particularly important.

Early life. Little accurate biographical information is known about Verrocchio. He was the son of Michele di Francesco Cioni, a maker of bricks and tiles who later became a tax collector. Financial security always seemed to be a family problem. Verrocchio had to support several of his brothers and sisters. Never marrying, he later provided for the education and dowries of the daughters of his younger brother Tommaso.

Initially he was trained as a goldsmith. His master has traditionally been recorded as a supposed goldsmith, Giuliano Verrocchi, whose last name Andrea apparently took as his own. Another questionable biographical tradition is that of his apprenticeship under Donatello, the greatest Italian sculptor of the early Renaissance. Since the stylistic affinity of Verrocchio's early sculpture is with the work of Antonio Rossellino rather than Donatello, this liaison seems doubtful.

His first studies in painting date possibly from the mid-1460s. He is said to have been a pupil of the Florentine artist Alesso Baldovinetti. But it is assumed that he and Sandro Botticelli worked together under the early Renaissance master Fra Filippo Lippi at Prato, a city near Florence, where Lippi had been commissioned to execute a series of murals for the cathedral.

Medici patronage. Verrocchio's most important works were executed in the last two decades of his life. His rise to artistic prominence, which he owed chiefly to encouragement by Piero de' Medici and his son Lorenzo, the leading art patrons of Florence, evidently began only after the death, in 1466, of Donatello, who had been the Medici favourite. Besides the paintings and sculptures Verrocchio produced for the Medici, he designed costumes and decorative armour for their festivals, tournaments, and solemn receptions. Made curator of the collection of antiquities in the Medici palace, he restored many pieces of ancient Roman sculpture, especially portrait busts.

It appears that Verrocchio produced few works for patrons outside of Florence. Though he is said to have worked in Rome for Pope Sixtus IV among others, there is no documentary trace that he ever left the area around Florence until the early 1480s, when he moved to Venice, where he died within a few years. Even while he was in Venice his Florentine workshop was maintained and directed by his favourite student, Lorenzo di Credi. Di Credi was also the administrator and principal heir of Verrocchio's estate.

Verrocchio's reputation was widespread in the second half of the 15th century and many well-known artists of the Italian Renaissance studied painting and sculpture at his Florentine studio. The most important of his students were Leonardo da Vinci and Perugino, the latter Raphael's teacher. The mural painter Domenico Ghirlandajo, Michelangelo's master, was temporarily in close contact with Verrocchio. Sandro Botticelli, the major Florentine painter of the late 15th century, and Francesco di Giorgio, the important Sienese artist, clearly oriented themselves toward Verrocchio's art in certain phases of their development, as did the prominent Florentine sculptors Benedetto da Maiano and Andrea Sansovino.

The paintings and sculptures. The only surviving painting that according to documentary proof should be by Verrocchio, an altarpiece of the "Madonna and Child with Saints" in the Donato de' Medici Chapel of the cathedral at Pistoia, was not completed by the master himself. Largely executed by his pupil Lorenzo di Credi, its handling is inconsistent with that of the "Baptism of Christ" (*c.* 1474/75), which has been attributed to Verrocchio ever since it was first mentioned in 1550 by the Renaissance biographer Giorgio Vasari (1511–74) in his *Lives of the Most Eminent Italian Painters, Sculptors, and Architects* . . . . One of the two angels and part of the distant landscape in the "Baptism," however, were certainly painted by his apprentice, the young Leonardo da Vinci. Other paintings ascribed to Verrocchio are a Madonna, "Tobias and the Angel," and the altarpiece in Argiano. After the mid-1470s Verrocchio dedicated himself principally to sculpture, in which he manifested strong personal convictions and an inventive ability.

The sculptural works either recorded to be by Verrocchio or actually extant are few in number. According to his brother Tommaso, Verrocchio was responsible for an inlaid slab (1467) in the Florentine church of S. Lorenzo recording the burial place of Cosimo de' Medici, who died in 1464. In 1468 Verrocchio is known to have executed a bronze candlestick for the Palazzo della Signoria in Florence. This work was followed by his first

major commission, the tomb of Piero and Giovanni de' Medici in the Old Sacristy of S. Lorenzo. Completed in 1472, this sarcophagus, set in an archway, is impressive for its originality of composition and its inspired use of coloured marble and porphyry in conjunction with rich bronze ornamentation.

Verrocchio's earliest surviving example of figurative sculpture is a small bronze statue of David, which is generally dated before 1476. A second bronze figure, the "Putto with Dolphin," is important in the development of freestanding Renaissance sculpture for its spiral design, which represents a successful effort to evolve a pose in which all views are of equal significance. It was originally commissioned for a fountain in the Medici villa in Careggi, near Florence. The putto, sometimes called a cupid, is precisely balanced in the projection of its limbs and probably was placed initially on a fountain so that it could be turned by the pressure of streams or jets of water. In the mid-16th century it was reinstalled on top of a fountain designed for the courtyard of the Palazzo Vecchio in Florence (the original is now kept in the Palazzo Vecchio museum; the present fountain figure is a copy).

Verrocchio's reputation as one of the great relief sculptors of the 15th century was clearly established with his cenotaph, or memorial, in the cathedral at Pistoia, to a Tuscan ecclesiastical dignitary, Cardinal Niccolò Forteguerri. Ordered in 1476, the cenotaph was still unfinished when Verrocchio died, and its completion was entrusted first to Lorenzo di Credi, then to Lorenzetti, and finally to a minor Italian Baroque sculptor. Though its effect has been altered by changes and additions foreign to Verrocchio's original design, the Forteguerri cenotaph contains some of the artist's most important relief sculpture. Its scenographic arrangement of the figures into a dramatically unified composition anticipates the theatrical effect of the dynamically composed wall reliefs executed by Baroque sculptors of the 17th century. Another relief dates from 1478/79, when it was decided to extend the silver altar in the baptistery of the cathedral of Florence, and one of the four supplementary scenes was allotted to Verrocchio. Depicting the "Beheading of St. John the Baptist," this work was delivered in 1480. Dating from about 1477/78 is a terra-cotta relief of the Madonna coming from the Florentine hospital of Sta. Maria Nuova.

In the late 1470s Verrocchio produced two portrait sculptures. A penetrating realism distinguishes his terra-cotta bust of Giuliano de' Medici from the idealization of the individual that characterizes his marble bust known as "Lady with Primroses" (Bargello, Florence). The latter work created a new type of Renaissance bust, in which the arms of the sitter are included in the manner of ancient Roman models. This compositional device allows the hands, as well as the face, to express the character and mood of the sitter.

Perhaps the most important work Verrocchio executed in Florence was a bronze group of "Christ and St. Thomas" commissioned for a niche in the east exterior wall of the Or San Michele in Florence. Executed between 1467 and 1483, the work is remarkable for its technical perfection, highly intellectual sense of compositional design, and understanding of the subtle emotional nature of the subject. In 1483 Verrocchio was commissioned by the Venetian government to undertake a second major work in bronze, a commemorative statue of Bartolomeo Colleoni, a condottiere, or professional soldier, who had been employed by the Venetian republic. At Verrocchio's death the model was not yet cast, and the work of casting and chasing, or polishing, was entrusted to the Venetian sculptor Alessandro Leopardi. It was erected in 1496 in the Piazza SS. Giovanni e Paolo in Venice. The movement of the horse and commanding forward gaze of Colleoni gives the impression that the warrior is riding into battle at the head of his troops, who press behind. This innovative scenographic conception was influential in the development of the equestrian figures executed from the Baroque period of the 17th century to those produced in the 19th century by sculptors of the Romantic style. Besides Donatello's monument to the condottiere Gattamelata (*c.* 1447–53) at Padua, Verrocchio's Colleoni monument is aesthetically the most important equestrian statue of the Renaissance. Contrived with great technical assurance and modelled with power and sensitivity, it forms a fitting climax to Verrocchio's sculptural career. (G.Pa.)

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verruca (dermatology): *see* wart.

Verrucaria, genus of lichens of the family Verrucariaceae, often found as a black crust covering seashore rocks. Along with the effects of weathering, *Verrucaria* helps break down limestone rocks by secreting acids that dissolve the cement holding together the rock particles. This produces an environment for the growth of mosses and higher plants.

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vers de société (French: "society verse"), light poetry written with particular wit and polish and intended for a limited, sophisticated audience. It has flourished in cultured societies, particularly in court circles and literary salons, from the time of the Greek poet Anacreon (6th century BC). The tone is flippant or mildly ironic. Trivial subjects are treated in an intimate, subjective manner, and even when social conditions form the theme, the light mood prevails.

The Roman poets Catullus, Martial, and Horace produced much witty vers de société and have often been translated or closely paraphrased; but much strikingly original verse has come from poets or other writers known for their serious works. Jean Froissart, the 14th-century historian of feudal chivalry, wrote some of the most charming examples of the late Middle Ages. The English Cavalier poets Robert Herrick, Thomas Carew, and Richard Lovelace wrote much fine vers along with their elegant lyrics.

The 18th century was rich in examples, both in French and in English. Among the best English practitioners were John Gay and Alexander Pope, whose poem *The Rape of the Lock* (1714) is a masterpiece of the genre. Voltaire, in addition to his political and philosophical works, produced exquisite gems of occasional verse, epistles, and light satires for the enjoyment of his royal friends and patrons.

Vers de société bloomed again in 19th-century literature after the Romantic movement's decline, with the poetry of William Ernest Henley and the scholarly Austin Dobson.

Later in the 20th century, the U.S. poet Ogden Nash created a new, sophisticated, and urbane vers de société with a theme of self-ironic adult helplessness. In England the tradition was kept alive by the neo-Victorian topical poems of Sir John Betjeman.

vers libre (French: "free verse"), 19th-century poetic innovation that liberated French poetry from its traditional prosodic rules. In vers libre, the basic metrical unit is the phrase rather than a line of a fixed number of syllables, as was traditional in French versification since the Middle Ages. In vers libre, the lengths of lines may vary according to the sense of the poem, the complete sentence replaces the stanza as a unit of meaning, and rhyme is optional. *See also* free verse.

Versace, Gianni (b. Dec. 2, 1946, Reggio Calabria, Italy—d. July 15, 1997, Miami Beach, Fla., U.S.), Italian fashion designer known for his daring fashions and glamorous lifestyle.

Versace's mother was a dressmaker, and Gianni was raised watching her work on designs in her boutique. In 1972 he moved to Milan, where he worked for several Italian ateliers, including Genny, Complice, Mario Valentino, and Callaghan. Backed by the Girombelli, an Italian fashion family, Versace established his own company, Gianni Versace SpA, in 1978 and staged his first ready-to-wear show under his own name that same year. His brother, Santo, served as the company's CEO, and his sister, Donatella, was a designer and vice president.

Throughout the 1980s and '90s Versace built a fashion empire by producing ensembles that oozed sensuality and sexuality. His most famous designs included sophisticated bondage gear, polyvinyl chloride baby-doll dresses, and silver-mesh togas. Versace's detractors considered his flashy designs vulgar. Unfazed by such criticism, he staged his seasonal fashion shows like rock concerts at his lavish design headquarters in Milan, with groupies and paparazzi awaiting the arrival of both his celebrity friends and his loyal "supermodels."

As his success continued to grow, Versace began establishing boutiques throughout the United States with the help of his family. He also focused on publishing a series of coffee-table books that featured his sketches and photographs of his creations. In 1989 he designed a line of haute couture for the first time and also created costumes for the San Francisco Opera. He was diagnosed in 1993 with a rare cancer of the inner ear, which he battled successfully. He then began to pass much of his business responsibilities onto his family.

On July 15, 1997, while returning to his Miami Beach home after a morning walk, Versace was shot and killed on his front steps, allegedly by the serial killer Andrew Cunanan. At the time of his death, many believed that the designer's 25-year career was at a peak; his business was flourishing, and he had tempered his garish early work and begun to create increasingly refined yet colourful and sexy ensembles. Versace's work was honoured by a posthumous retrospective held from December 1997 to March 1998 at the Costume Institute of the Metropolitan Museum of Art in New York City. After his death, his sister took over as head designer for the Versace label.

Versailles, capital city of Yvelines *département,* Paris region, northern France, 14 mi (22 km) southwest of Paris. The city developed around the 17th-century palace built by Louis XIV, the principal residence of the kings of France and the seat of the government for more than 100 years. The first scenes of the French Revolution were also enacted at the palace, whose gardens, the masterpiece of André Le Nôtre, have become part of the na-

tional heritage of France and one of the most visited historic sites in Europe. Although it was a place of entertainment, the grandiose palace was also well equipped as a centre of government. Of about 20,000 persons attached to the court, some 1,000 courtiers with 4,000 attendants lived in the palace itself. About 14,000 soldiers and servants were quartered in annexes and in the town, which was founded in 1671 and had 30,000 inhabitants when Louis XIV died in 1715.

Louis XV throughout his reign continued the building program begun by his predecessor, and the palace became a symbol of royal extravagance. In 1837 Louis-Philippe restored the palace and turned it into a museum consecrated to "all the glories of France." The German army besieging Paris in 1870 used Versailles as its headquarters, and in 1871 the German emperor was crowned there. For eight years after the peace with Germany, the palace was the seat of the French Parliament, and the constitution of the Third Republic was proclaimed there in 1875. The presidents of the Third and Fourth republics were elected in Versailles. The Treaty of Versailles (1919) between the Allies and Germany was signed in the palace, which was again restored and modernized under President Charles de Gaulle.

The city of Versailles is now a local administrative centre and residential suburb of Paris. The palace serves as a tourist attraction and as a residence for visiting heads of state. The oldest quarter of the city, Satory, contains the cathedral of Saint-Louis, while the new quarter, Le Chesnay, in the north, is the site of the church of Notre-Dame. Versailles is an important garrison town, with a military hospital and a school of military engineering and artillery. Economic activities include distilling, leatherwork, and market gardening. A school of horticulture (1874) is attached to a fine garden. Versailles is also a centre of commerce and education. Pop. (1982) 91,014.

Versailles, Treaty of, peace document signed at the end of World War I by the Allied and Associated Powers and by Germany in the Hall of Mirrors in the Palace of Versailles, France, on June 28, 1919; it took force on Jan. 10, 1920.

When the German government asked U.S. President Woodrow Wilson to arrange a general armistice in October 1918, it declared that it accepted the Fourteen Points (*q.v.*) he had formulated as the basis for a just peace. However, the Allies demanded "compensation by Germany for all damage done to the civilian population of the Allies and their property by the aggression of Germany by land, by sea and from the air." Further, the nine points covering new territorial consignments were complicated by the secret treaties that England, France, and Italy had made with Greece, Romania, and each other during the last years of the war.

The treaty was drafted during the Paris Peace Conference in the spring of 1919, which was dominated by the national leaders known as the "Big Four," David Lloyd George of Britain, Georges Clemenceau of France, Woodrow Wilson of the United States, and Vittorio Orlando of Italy. The first three in particular made the important decisions. None of the defeated nations had any say in shaping the treaty, and even the associated Allied powers played only a minor role. The German delegation was presented with a fait accompli; it was shocked at the severity of the terms and protested the contradictions between the assurances made when the armistice was negotiated and the actual treaty. Accepting the "war guilt" clause and the reparation terms were especially odious to them.

The population and territory of Germany was reduced by about 10 percent by the treaty. On the west Alsace and Lorraine were returned to France, and the Saarland was placed under the supervision of the League of Nations until 1935. In the north three small areas were given to Belgium; and, after a plebiscite in Schleswig, northern Schleswig was returned to Denmark. In the east, Poland was resurrected, given most of formerly German West Prussia and Poznán (Posen), given a "corridor" to the Baltic Sea (which separated East Prussia from the rest of Germany), and given part of Upper Silesia after a plebiscite. Danzig (Gdansk) was declared a free city. All Germany's overseas colonies in China, in the Pacific, and in Africa were taken over by Britain, France, Japan, and other Allied nations (*see* mandate).

The "war guilt clause" of the treaty deemed Germany the aggressor in the war and consequently made Germany responsible for making reparations to the Allied nations in payment for the losses and damage they had sustained in the war. It was impossible to compute the exact sum to be paid as reparations for the damage caused by the Germans, especially in France and Belgium, at the time the treaty was being drafted, but a commission that assessed the losses incurred by the civilian population set an amount of $33,000,000,000 in 1921. Although economists at the time declared that such a huge sum could never be collected without upsetting international finances, the Allies insisted that Germany be made to pay, and the treaty permitted them to take punitive actions if Germany fell behind in its payments.

The Big Four, especially Clemenceau, wanted to make sure that Germany would never again pose a military threat to the rest of Europe, and the treaty contained a number of stipulations to guarantee this aim. The German army was restricted to 100,000 men, the general staff was eliminated, the manufacture of armoured cars, tanks, submarines, airplanes, and poison gas was forbidden, and only a small number of specified factories could make weapons or munitions. All of Germany west of the Rhine and up to 30 miles (50 km) east of it was to be a demilitarized zone. The forced disarmament of Germany, it was hoped, would be accompanied by voluntary disarmament in other nations.

The treaty included the Covenant of the League of Nations, in which members guaranteed each other's independence and territorial integrity. Economic sanctions would be applied against any member who resorted to war. The league was to supervise mandated territories, the occupied Saar Basin, and Danzig and to formulate plans for reducing armaments. The treaty also established the Permanent Court of International Justice and the International Labour Organisation.

The Treaty of Versailles was bitterly criticized by the Germans, who complained that it had been "dictated" to them, that it violated the spirit of the Fourteen Points, and that it demanded intolerable sacrifices that would wreck their economy. In the years after it was ratified the Treaty of Versailles was revised and altered, mostly in Germany's favour. Numerous concessions were made to Germany before the rise of Adolf Hitler, and by 1938 only the territorial settlement articles remained.

Many historians claim that the combination of a harsh treaty and subsequent lax enforcement of its provisions paved the way for the upsurge of German militarism in the 1930s. The huge German reparations and the war guilt clause fostered deep resentment of the settlement in Germany, and when Hitler remilitarized the Rhineland in 1936 (a violation of the treaty), the Allies did nothing to stop him, thus encouraging future German aggression.

verse, a single line of metrical composition; more broadly, the metrical composition itself or the poetic technique of a particular poem. Although verse is sometimes used as a synonym for poetry, it is usually understood to be metrical composition that ranks in artistic quality below the level of poetry. Verse may be technically skillful, or even dazzling, but lacking in depth or imaginative power. Verse also refers to the shortest division of chapters of the Bible.

verset, stanza form modeled after poetic biblical passages such as those found in the Song of Solomon and the Psalms. It is characterized by long lines and powerful, surging rhythms and usually expresses fervent religious or patriotic sentiments. The verset is a flexible form approximating free verse and the prose poem and is open to a wide range of emotional expression. Poetic devices such as repetition, assonance, alliteration, and figures of speech contribute to the overall vigour of the lines. The verset appears mainly in the literature of Christian countries where it was first used in medieval religious and mystical texts.

vertebral column, also called SPINAL COLUMN, SPINE, OR BACKBONE, in vertebrate animals, the flexible column extending from neck to tail, made of a series of bones, the vertebrae. The major function of the vertebral column is protection of the spinal cord; it also provides stiffening for the body and attachment for the pectoral and pelvic girdles and many muscles. In humans an additional function is to transmit body weight in walking and standing.

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

Each vertebra, in higher vertebrates, consists of a ventral body, or centrum, surmounted by a Y-shaped neural arch. The arch extends a spinous process (projection) downward and backward that may be felt as a series of bumps down the back, and two transverse processes, one to either side, which provide attachment for muscles and ligaments. Together the centrum and neural arch surround an opening, the vertebral foramen, through which the spinal cord passes. The centrums are separated by cartilaginous intervertebral disks, which help cushion shock in locomotion.

Vertebrae in lower vertebrates are more complex, and the relationships of their parts to those of higher animals are often unclear. In primitive chordates (*e.g.,* amphioxus, lampreys) a rodlike structure, the notochord, stiffens the body and helps protect the overlying spinal cord. The notochord appears in the embryos of all vertebrates in the space later occupied by the vertebral bodies—in some fish it remains throughout life, surrounded by spool-shaped centrums; in other vertebrates it is lost in the developed animal. In primitive chordates the spinal cord is protected dorsally by segmented cartilages—these foreshadow the development of the neural arch of true vertebrae.

Fish have trunk and caudal (tail) vertebrae; in land vertebrates with legs, the vertebral column becomes further subdivided into regions in which the vertebrae have different shapes and functions. Crocodilians and lizards, birds, and mammals demonstrate five regions: (1) cervical, in the neck, (2) thoracic, in the chest, which articulates with the ribs, (3) lumbar, in the lower back, more robust than the other vertebrae, (4) sacral, often fused to form a sacrum, which articulates with the pelvic girdle, (5) caudal, in the tail. The atlas and axis vertebrae, the top two cervicals, form a freely movable joint with the skull.

The numbers of vertebrae in each region and in total vary with the species. Snakes have the greatest number, all very similar in type. In turtles some vertebrae may be fused to the shell (carapace); in birds all but the cer-

vical vertebrae are usually fused into a rigid structure, which lends support in flight. Most mammals have seven cervical vertebrae; size rather than number account for the variations in neck length in different species. Whales show several specializations—the cervical vertebrae may be either much reduced or much increased in number, and the sacrum is missing. Humans have 7 cervical, 12 thoracic, 5 lumbar, 5 fused sacral, and 3 to 5 fused caudal vertebrae (together called the coccyx).

The vertebral column is characterized by a variable number of curves. In quadrupeds the column is curved in a single arc (the highest portion occurring at the middle of the back), which functions somewhat like a bow spring in locomotion. In humans this primary curve is modified by three more: (1) a sacral curve, in which the sacrum curves backward and helps support the abdominal organs, (2) an anterior cervical curve, which develops soon after birth as the head is raised, and (3) a lumbar curve, also anterior, which develops as the child sits and walks. The lumbar curve is a permanent characteristic only of humans and their bipedal forebears, though a temporary lumbar curve appears in other primates in the sitting position. The cervical curve disappears in humans when the head is bent forward but appears in other animals as the head is raised.

vertebrate, any animal of the subphylum Vertebrata, having a vertebral column, or backbone. The vertebrates, which include the fishes, amphibians, reptiles, birds, and mammals, are the predominant members of the Chordate phylum. In addition to the backbone from which they derive their name, the vertebrates are characterized by (1) a muscular system consisting primarily of bilaterally paired masses and (2) a central nervous system partly enclosed within the backbone.

A brief treatment of vertebrates follows. For full treatment, *see* MACROPAEDIA: Chordates.

Vertebrates are unique in possessing an internal skeleton formed of either cartilage or bone, or both. By its ability to provide support during growth, this skeleton allows vertebrates to achieve large size, so that most vertebrates are bigger than most invertebrates. Except in the most primitive forms, the skeleton consists of skull, vertebral column, and two pairs of limb elements, although one or both pairs of limbs are absent from a few higher forms (*e.g.,* snakes, whales) that have lost limbs in the course of evolution. The skull, by providing a secure housing for brain, eyes, ears, and olfactory organs, has facilitated the evolution of intelligence and a high degree of responsiveness to the environment.

The vertebral column and limb skeleton provide support for the body as a whole: movement is effected by the action of muscles that are attached to the bones or cartilage. The mass of musculature forms the contours of the body. The outer surface is covered by skin that protects the inner parts not only by providing a general covering but also by forming structures of specific protective value, such as bony or horny scales, feathers, and fur.

Internally the vertebrate trunk is a hollow cavity in which the visceral organs are suspended. The heart and respiratory organs are closely associated. The heart lies just behind the gills or between the lungs; it sends unoxygenated blood directly into these organs for oxygenation and removal of carbon dioxide. The digestive tract includes esophagus, stomach, and intestine and usually terminates in a cloaca, a chamber common to the digestive, genital, and urinary systems. In mammals, however, the digestive tract acquires a separate terminal opening.

The central nervous system consists of brain and spinal cord. Although both of these become very thick-walled, they always retain a small central canal; *i.e.,* they are hollow. The brain in lower vertebrates is devoted largely to serving the sense organs of the head. During the course of evolution, however, the brain becomes much larger, relative to body size, through the development of association areas that permit more intensive interchange of information among the parts of the brain. The spinal cord, extending backward from the base of the skull, gives off pairs of nerves at repeated intervals. These nerves run to the skin, muscles, and internal organs. The brain also gives off a series of nerves, not regularly arranged, of which one passes through the neck to innervate the heart, lungs, and other viscera.

Vertebrate history may be traced back to the Silurian period, approximately 438 million to 408 million years ago.

vertical takeoff and landing airplane: *see* VTOL airplane.

vertigo, sensation that a person's surroundings are rotating or that he himself is revolving. Usually the state produces dizziness, mental bewilderment, and confusion. If the sensation is intense enough, the person may become nauseated and vomit.

Aircraft pilots and underwater divers are subject to vertigo because the environments in which they work frequently have no reference points by which to orient their direction of movement. The illusions caused by disorientation are perhaps the most dangerous aspect of vertigo; a pilot, for example, may sense that he is gaining altitude when in reality he is losing it, or he may feel that he is steering to the right when he is on a straight course. *See also* spatial disorientation.

vertisol, soil type differentiated from the nine other major orders on the basis of its high content of swelling clays, which during the dry season cause deep cracks to form. Vertisols are subdivided according to how long the cracks persist. After the cracks form, at the onset of the dry season, loose soil sloughing off from the surface begins accumulating in them until the next wet season, when expansion of the clays causes the cracks to close again. Repeated over long periods of time, this process leads to a gradual inversion of the soil layers. The high content of expanding clays makes vertisols very sticky when wet and very hard when dry. Although tillage of vertisols is difficult in large parts of India and The Sudan where primitive implements are still in use, the soils are very productive where agricultural machinery, fertilizer, and irrigation are available.

Vertov, Dziga, pseudonym of DENIS ARKADYEVICH KAUFMAN (b. Jan. 2, 1896 [Dec. 21, 1895, Old Style], Belostok, Russia—d. Feb. 12, 1954, Moscow), Soviet motion-picture director whose *kino-glaz* ("film-eye") theory—that the camera is an instrument, much like the human eye, that is best used to explore the actual happenings of real life—had an international impact on the development of documentaries and cinema realism during the 1920s. He attempted to create a unique language of the cinema, free from theatrical influence and artificial studio staging.

As a newsreel cameraman during the Russian Civil War, Vertov filmed events that were the basis for such factual films as *Godovshchina revolyutsii* (1919; *The Anniversary of the October Revolution*) and *Boi pod Tsaritsynom* (1920; *Battle of Tsaritsyn*). At age 22 he was the director of a government cinema department. The following year he formed the Kinoki (the Film-Eye Group), which subsequently issued a series of manifestos against theatricalism in films and in support of Vertov's film-eye theory. In 1922 the group, led by Vertov, initiated a weekly newsreel called *Kino-pravda* ("Film Truth") that creatively



Vertov
Novosti Press Agency

integrated newly filmed factual material and older news footage.

The subject matter of Vertov's later feature films is life itself; form and technique are preeminent. Vertov experimented with slow motion, camera angles, enlarged close-ups, and crosscutting for comparisons; he attached the camera to locomotives, motorcycles, and other moving objects; and he held shots on the screen for varying lengths of time, a technique that contributes to the rhythmic flow of his films. Outstanding among Vertov's pictures are *Shagay, Sovyet!* (1925; *Stride, Soviet!*), *Shestaya chast mira* (1926; *A Sixth of the World*), *Odinnadtsatyi* (1928; *The Eleventh*), *Chelovek s kinoapparatom* (1928; *The Man with a Movie Camera*), *Simfoniya Donbassa* (1930; *Symphony of the Donbass*), and *Tri pesni o Lenine* (1934; *Three Songs of Lenin*). Vertov later became a director in the Soviet Union's Central Documentary Film Studio. His work and his theories became basic to the rediscovery of *cinéma vérité,* or documentary realism, in the 1960s.

Verulamium, a Romano-British town in the territory of the Catuvellauni, across the River Ver from St. Albans, Hertfordshire, Eng. Before the Roman conquest, Verulamium was the capital of Tasciovanus, prince of the Catuvellauni; under Roman rule it soon was made a *municipium.* Destroyed by Boudicca (Boadicea; queen of the Iceni) in AD 60–61, it soon regained its prosperity. Among its ruins are the forum, a theatre associated with a temple of Romano-Celtic type, a market hall, two triumphal arches, fragments of the town wall, and many well-appointed houses with fine mosaics and wall paintings.

Verus, Lucius, in full LUCIUS AURELIUS VERUS, also called (AD 136–161) LUCIUS CEIONIUS AELIUS AURELIUS COMMODUS ANTONINUS, original name LUCIUS CEIONIUS COMMODUS (b. Dec. 15, 130—d. 169), Roman emperor jointly (161–169) with Marcus Aurelius. Though he enjoyed equal constitutional status and powers, he did not have equal authority, nor did he seem capable of bearing his share of the responsibilities.

He was the son of a senator, Lucius Ceionius Commodus, whom the emperor Hadrian adopted as his successor. After his father's death, Lucius Verus and Marcus Annius Verus, at the insistence of Hadrian, were adopted by the future emperor Antoninus Pius. Lucius Verus' "brother" succeeded as Emperor Marcus Aurelius on the death of Antoninus and made Lucius Verus his colleague in the principate. For the first time Rome had two emperors of technically complete equality. When sent to deal with Parthian advances in Armenia and Mesopotamia (162–166), Verus dallied in Antioch and subordinate generals concluded the war.

In 167 or 168 Verus campaigned with Marcus Aurelius in the vicinity of Pannonia against a German people, the Marcomanni, but he died on the march home.

vervet, ground-dwelling guenon (*q.v.*) that is widely distributed in the savannas of Africa.

Verwey, Albert (b. May 15, 1865, Amsterdam, Neth.—d. March 8, 1937, Noordwijk aan Zee), Dutch poet, scholar, and literary historian who played an important role in the literary life of The Netherlands in the late 19th and early 20th centuries.

Verwey began to write poetry early in life, and his first book of poems, *Persephone,* was published in 1883. He was a cofounder in 1885 of the periodical *De nieuwe gids* ("The New Guide"), which was one of the chief organs of the Dutch literary revival of the 1880s. Verwey contributed sonnets and other poems to this periodical. His own poetry manifested a unique form of mysticism that was influenced by the pantheism of Benedict Spinoza. Verwey's early poetry, such as that in *Cor Cordium* (1886), was notable for its air of spontaneity and its melodious and evocative qualities. His later poetry is still marked by these qualities but is at the same time highly intellectual, representing Verwey's attempts to



Verwey, detail of an oil painting by Jan Pieter Veth, 1885; in the Stedelijk Museum, Amsterdam

By courtesy of the Stedelijk Museum, Amsterdam

express the mystical ideas that he saw as underlying the world's appearances. The concept of constant renewal of the self, long essential to Verwey, is exquisitely expressed in the free-verse poem *Een dag in April* (1926; "A Day in April"), in which Verwey's mastery of rhythm and "image thinking" is supremely evident.

Verwey was editor of his own periodical, *De Beweging* (1905–19), in which many influential young Dutch writers made their debut. With *De Beweging,* Verwey reached a position of eminence in Dutch cultural life. He was professor of Dutch literature at the University of Leiden from 1925 to 1935. As a scholar and literary historian, he wrote in particular on the 17th-century Dutch poets Joost van den Vondel and Henric Laurenszoon Spieghel.

Verwoerd, Hendrik Frensch (b. Sept. 8, 1901, Amsterdam, Neth.—d. Sept. 6, 1966, Cape Town, S.Af.), South African professor, editor, and statesman who as prime minister (1958–66) rigorously applied a policy of apartheid.

When Verwoerd was three months old his family migrated to South Africa. A brilliant scholar at the University of Stellenbosch, he was appointed professor of applied psychology there in 1927. In 1933 he changed to the chair of sociology and social work.

Verwoerd became prominent in politics in 1937, when he was appointed editor of the new Nationalist daily, *Die Transvaler,* in Johannesburg. He held that post until the Nationalists won the 1948 election, when he was appointed a senator. Becoming minister of native affairs in 1950, he was responsible for much of the apartheid legislation. In the election of 1958 he won a seat in the House of Assembly, and, after the death of Prime Minister Johannes Gerhardus Strijdom, the parliamentary caucus of the Nationalists selected Verwoerd as his successor in September 1958.

Once he was in office, Verwoerd's program for apartheid was applied in full, with an intricate system of laws separating whites, Cape



Verwoerd

Archiv fur Kunst und Geschichte, Berlin

Coloureds, Asians, and Africans (blacks). He pushed through the Promotion of Bantu Self-Government Act in 1959; it provided for the resettlement of blacks in eight separate reservations, or Bantu Homelands (now designated black states). These racial policies provoked demonstrations by blacks, which on one occasion—March 1960 at Sharpeville—led to bloodshed. On Oct. 5, 1960, white voters by a small majority approved his recommendation that South Africa leave the Commonwealth, and Verwoerd's dream of a republic came true on May 31, 1961.

On April 9, 1960, a deranged white farmer shot Verwoerd in an assassination attempt that failed. Six years later Verwoerd was stabbed to death in the parliamentary chamber by a temporary parliamentary messenger, Demetrio Tsafendas, a Mozambique immigrant of mixed racial descent.

very high frequency: *see* VHF.

Very Large Array (VLA), radio telescope system situated on the plains of San Augustin near Socorro, New Mexico, U.S. The VLA went into operation in 1980 and is the most powerful radio telescope in the world. It is operated by the National Radio Astronomy Observatory.

The VLA consists of 27 parabolic dishes that are each 25 m (82 feet) in diameter. Each of these dishes is mounted on a transporter that can be moved along rails laid out in an enormous Y pattern. (The arms of this pattern extend about 21 km [13 miles] each.) The resolution of the VLA is altered by changing the positions of the dishes. The radio signals recorded by the component dishes are integrated by computer so that the entire array acts as a single radio antenna with a maximum effective aperture of 27 km (17 miles). This large aperture gives the VLA a resolving power equal to that of the best ground-based optical telescopes.

Vesaas, Tarjei (b. Aug. 20, 1897, Vinje, Nor.—d. March 15, 1970, Vinje), Norwegian novelist and short-story writer whose symbolic and allegorical narratives won him much recognition in Norway and other European countries.

A writer since 1923, Vesaas first experienced significant success with his two novels about life on a Norwegian farm, *Det store spelet* (1934; *The Great Cycle*) and *Kvinner ropar heim* (1935; "Women Call Home"). His growing political and social awareness mark his *Kimen* (1940; *The Seed*), which shows how hatred is stirred up by mass psychology, and *Huset i mørkret* (1945; "House in Darkness"), a symbolic vision of the Nazi occupation of Norway. *Fuglane* (1957; *The Birds*), considered his greatest work (and later filmed), pleads for tolerance toward the outsider. He also wrote a renowned collection of short stories entitled *Vindane* (1952; "The Winds").

Vesak (Buddhist festival): *see* Wesak.

Vēsalī (India): *see* Vaiśālī.

Vesalius, Andreas (Latin), Flemish ANDRIES VAN WESEL (b. December 1514, Brussels [now in Belgium]—d. June 1564, island of Zacynthus, Republic of Venice [now in Greece]), Renaissance Flemish physician who revolutionized the study of biology and the practice of medicine by his careful description of the anatomy of the human body. Basing his observations on dissections he made himself, he wrote and illustrated the first comprehensive textbook of anatomy.

Vesalius was from a family of physicians and pharmacists. He attended the University of Louvain in 1529–33, and in 1533–36 he attended the medical school of the University of Paris, where he learned to dissect animals. He also had the opportunity to dissect human cadavers, and he devoted much of his time to a study of human bones, at that time easily available in the Paris cemeteries.

In 1536 Vesalius returned to his native Brabant to spend another year at the University of Louvain, where the influence of Arab medicine was still dominant. Following the prevailing custom, he prepared, in 1537, a paraphrase of the work of the 10th-century Arab physician, Rhazes, probably in fulfillment of the requirements for the bachelor of medicine degree.



Vesalius, woodcut probably by Vesalius from his *De humeni corporis fabrica libri septem,* Basel, Switz., 1543

By courtesy of the National Library of Medicine, Bethesda, Md

He then attended the University of Padua, a progressive university with a strong tradition of anatomical dissection. On receiving the M.D. degree the same year, he was appointed a lecturer in surgery with the responsibility of giving anatomical demonstrations. Since he knew that a thorough knowledge of human anatomy was essential to surgery, he devoted much of his time to dissections of cadavers and insisted on doing them himself, instead of relying on untrained assistants. At first, Vesalius had no reason to question the theories of Galen, the Greek physician who had served the emperor Marcus Aurelius in Rome and whose books on anatomy were still considered as authoritative in medical education in Vesalius' time. In January 1540, breaking with this tradition of relying on Galen, Vesalius openly demonstrated his own method—doing dissections himself, learning anatomy from cadavers, and critically evaluating ancient texts. He did so while visiting the University of Bologna. Such methods soon convinced him that Galenic anatomy had not been based on the dissection of the human body, which had been strictly forbidden by the Roman religion. Galenic anatomy, he maintained, was an ap-

plication to the human form of conclusions drawn from the dissections of animals, mostly dogs, monkeys, or pigs. It was this conclusion that he had the audacity to declare in his teaching as he hurriedly prepared his complete textbook of human anatomy for publication. Early in 1542 he traveled to Venice to supervise the preparation of drawings to illustrate his text, probably in the studio of the great Renaissance artist Titian. The drawings of his dissections were engraved on wood blocks, which he took, together with his manuscript, to Basel, Switz., where his major work *De humani corporis fabrica libri septem* ("The Seven Books on the Structure of the Human Body") commonly known as the *Fabrica*, was printed in 1543.

In this epochal work, Vesalius deployed all his scientific, humanistic, and aesthetic gifts. The *Fabrica* was a more extensive and accurate description of the human body than any put forward by his predecessors; it gave anatomy a new language, and, in the elegance of its printing and organization, a perfection hitherto unknown.

Early in 1543, Vesalius left for Mainz, to present his book to the Holy Roman emperor Charles V, who engaged him as regular physician to the household. Thus, when not yet 28 years old, Vesalius had attained his goal. After relinquishing his post in Padua, and returning in the spring of 1544 to his native land to marry Anne van Hamme, he took up new duties in the service of the Emperor on his travels in Europe. From 1553 to 1556 Vesalius spent most of his time in Brussels, where he built an imposing house in keeping with his growing affluence and attended to his flourishing medical practice. His prestige was further enhanced when Charles V, on abdication from the Spanish throne in 1556, provided him with a lifetime pension and made him a count.

Vesalius went to Spain in 1559 with his wife and daughter to take up an appointment, made by Philip II, son of Charles V, as one of the physicians in the Madrid court. In 1564 Vesalius obtained permission to leave Spain to go on pilgrimage to the Holy Sepulchre. He traveled to Jerusalem, with stops at Venice and Cyprus, his wife and daughter having returned to Brussels.

Assessment. Vesalius' work represented the culmination of the humanistic revival of ancient learning, the introduction of human dissections into medical curricula, and the growth of a European anatomical literature. Vesalius performed his dissections with a thoroughness hitherto unknown. After Vesalius, anatomy became a scientific discipline, with far-reaching implications not only for physiology but for all of biology; medicine became a learned profession. Conflicting reports obscure the final days of Vesalius' life. Apparently he became ill aboard ship while returning to Europe from his pilgrimage. He was put ashore on the Greek island of Zacynthus, where he died. (M.Fl./Ed.)

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Vesco, Robert Lee (b. Dec. 4, 1935, Detroit, Mich., U.S.), American financier, once considered the boy wonder of international finance, who later became a fugitive from U.S. and other legal authorities. He was a key figure in certain American financial and political scandals of the early 1970s.

The son of a Detroit auto worker, he left school at 16 to work as an apprentice in an auto body shop. He was later a draftsman and worked in the Detroit aluminum industry. In 1957 he went to New York City as an administrative assistant in engineering for a chemical company. In 1960 he became an independent manufacturer's representative, selling aluminum products. He gained financial interests in two small New Jersey manufacturing companies, and by the mid-1960s he had merged them to form International Controls Corporation. In October 1967 he added Fairfield (N.J.) Aviation Corporation. He set off on a course of mergers, acquisitions, and accounting legerdemain that appeared to make a record of ever-increasing profits. He came to control many smaller companies, and he took annual sales from $1,300,000 to more than $100,000,000 within three years.

In 1971 he acquired control of Investors Overseas Services (IOS), founded by Bernard Cornfeld (*q.v.*). The U.S. Securities and Exchange Commission accused Vesco and his associates of looting the ISO mutual fund empire of $224,000,000, defrauding thousands of investors. In 1973 Vesco was indicted for making illegal contributions totaling $250,000 to the reelection campaign of Pres. Richard M. Nixon. In 1976 he was indicted by a U.S. federal grand jury on charges relating to his fraudulent schemes in ISO.

He fled from the United States in 1972 and for various periods lived wealthily in Costa Rica, the Bahamas, Nicaragua, and Antigua. In all these countries he allegedly employed political bribery, and none granted occasional extradition requests from the United States and from Switzerland, where ISO had been headquartered. While abroad, Vesco reportedly increased his stolen wealth through further large investments, notably in international arms sales to such countries as Libya.

About 1984 Vesco went to live in Cuba, where he allegedly had more than one home and his own private plane and yacht.

Vesey, Denmark (b. *c.* 1767, probably St. Thomas, Danish West Indies—d. July 2, 1822, Charleston, S.C., U.S.), self-educated black who planned the most extensive slave revolt in U.S. history (Charleston, 1822).

Sold as a slave in 1791 to a Bermuda slaver captain named Joseph Vesey, young Denmark, who assumed his master's surname, accompanied him on numerous voyages and in 1783 settled with his owner in Charleston.

In 1800 Denmark was allowed to purchase his freedom with $600 he had won in a street lottery. He was already familiar with the great Haitian slave revolt of the 1790s, and while working as a carpenter he read anti-slavery literature. Dissatisfied with his second-class status as a freedman and determined to help relieve the far more oppressive conditions of bondsmen he knew, Vesey planned and organized an uprising of city and plantation blacks. The plan reportedly called for the rebels to attack guardhouses and arsenals, seize their arms, kill all whites, burn and destroy the city, and free the slaves. As many as 9,000 blacks may have been involved, though some scholars dispute this figure.

Warned by a house servant, white authorities on the eve of the scheduled outbreak made massive military preparations, which forestalled the insurrection. During the ensuing two months, some 130 blacks were arrested. In the trials that followed, 67 were convicted of trying to raise an insurrection; of these, 35, including Vesey, were hanged, and 32 were condemned to exile. In addition, four white men were fined and imprisoned for encouraging the plot.

vesicular exanthema, viral disease of swine causing eruption of painful blisters on feet and snout. Blisters emerge 24 to 72 hours after exposure and are accompanied by fever, which lasts 24 to 36 hours and may occur again after two or three days.

The symptoms resemble those of foot-and-mouth disease and vesicular stomatitis, thus creating a problem of diagnosis. Control programs include quarantine, elimination of infected animals, cleaning and disinfecting contaminated areas, and cooking garbage used for swine feed.

vesicular stomatitis, viral disease causing blisters in the mouths of cattle, horses, and mules and on the snouts and feet of swine. Horses and cattle with vesicular stomatitis become feverish two to five days after exposure. After the blisters break, the fever subsides, and the animal usually recovers. Differential diagnosis between vesicular stomatitis, vesicular exanthema, and foot-and-mouth disease, all of which display similar symptoms, is based partly on the differing susceptibilities to the three diseases among horses, cattle, and swine.

vesiculitis, inflammation and infection of the seminal vesicles in the male reproductive tract. The seminal vesicles are ductlike glands that add fluid secretions to the seminal fluid as it passes from the body during intercourse. Infections present in the prostate or related organs usually involve the seminal vesicles also. Infections can reach the glands through the urethra or by way of the bloodstream.

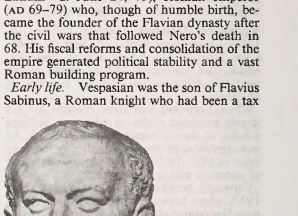
The symptoms of vesiculitis are similar to those in cases of prostate infection; they may include a dull aching pain in the abdomen, discomfort in the urethra, pain after sexual intercourse, the presence of blood in the seminal fluid, premature or painful ejaculation, and impotence. Treatment is usually administration of antibiotics. *See also* prostatic disorder.

Vesoul, town, capital of Haute-Saône *département,* Franche-Comté region, eastern France. It lies between the isolated conical hill, La Motte (1,263 ft [384 m]), and the Durgeon River. The hill is crowned by a votive chapel and a statue of the Virgin Mary.

Vesoul is of ancient origin, but records go back only to the 9th century. The town was much damaged in the late 16th-century Wars of Religion and the Thirty Years' War of the 17th century. Vesoul, which changed hands a number of times, was incorporated into France in 1678 under Louis XIV by the Treaty of Nijmegen. The centre of an agricultural region, the town is an important market for farm produce and cattle. The chief industry is metallurgy. Pop. (1982) 18,257.

Vespasian, Latin in full CAESAR VESPASIANUS AUGUSTUS, original name TITUS FLAVIUS VESPASIANUS (b. Nov. 17, AD 9, Reate [Rieti], Latium—d. June 24, 79), Roman emperor (AD 69–79) who, though of humble birth, became the founder of the Flavian dynasty after the civil wars that followed Nero's death in 68. His fiscal reforms and consolidation of the empire generated political stability and a vast Roman building program.

Early life. Vespasian was the son of Flavius Sabinus, a Roman knight who had been a tax



Vespasian, bust found at Ostia; in the Museo Nazionale Romano, Rome

Anderson—Alinari from Art Resource/EB Inc.

collector. His mother, Vespasia Polla, also belonged to the equestrian order in society but had a brother who entered the Senate. In his early life Vespasian was somewhat overshadowed by his older brother, Flavius Sabinus, who rose to hold an important command on the Danube about AD 48 and was prefect of Rome for many years under Nero. Although Vespasian is said to have hesitated before following his brother into the Senate, his career was in no sense retarded; for, after military service in Thrace and a quaestorship in Crete, he reached the praetorship in the earliest year allowed him by law, namely AD 39, the year in which his elder son, Titus, was born.

Vespasian ingratiated himself with the ruling emperor, Caligula (Gaius Caesar); and in the next reign, that of Claudius, he won the favour of the powerful freedman Narcissus. He became commander of the Legio II Augusta, which took part in the invasion of Britain in 43. After distinguished conduct at the crossing of the Medway River, he was given charge of the left wing of the advance; he proceeded to occupy the Isle of Wight and to conquer tribes as far west as Devon, capturing more than 20 "towns." For these achievements he was awarded triumphal honours and appointed to two priesthoods, and in 51 he became consul. But, on Claudius' death in 54, Narcissus, whose power had been waning, was driven to suicide; and for a time Vespasian received no further appointment. About 63 he obtained the proconsulate of Africa, where his extreme financial rigour made him so unpopular that on one occasion the people pelted him with turnips. There was no ground for suspecting personal enrichment, but the reputation for avarice remained with him the rest of his life.

In the autumn of 66 he accompanied Nero to Greece, where he was indiscreet enough to fall asleep at the Emperor's artistic performance. But this did not prevent his appointment, in February 67, to the command against the Jewish rebellion in Judaea, the scene of two disastrous Roman defeats in the previous year. The appointment was exceptional because Judaea had never before been garrisoned by a legionary army, and Vespasian was given three legions with a large force of auxiliary troops. For such an appointment Vespasian was regarded as a safe man—a highly competent general but one whose humble origins made it almost inconceivable that he would challenge Nero's government should he win victories. As long as Nero was alive, this diagnosis was surely right. Vespasian conducted two successful campaigns in 67 and 68, winning almost all Judaea except Jerusalem. But on Nero's death in June 68 he stopped fighting.

Struggle for power. This pause was surprising, but it was accompanied by the fact that at this moment, with his son Titus as intermediary, Vespasian settled certain differences he had had with the neighbouring governor of Syria, Gaius Licinius Mucianus. The matters discussed between the two commanders are unknown, but the circumstances cannot but raise the question whether they were already considering a bid for power. Vespasian seems to have claimed that further operations against the Jews required a directive from the new emperor, Galba. Such a claim may have been formally valid, but there may have also been underlying political considerations. Vespasian did eventually decide to accept Galba, whose noble descent, given the standards of the day, would have been daunting to a man of Vespasian's position in society. He therefore remained quiet and in the following winter sent Titus to congratulate Galba.

The news of Galba's murder (Jan. 15, 69) reached Titus on his way at Corinth, and he returned to participate in more pregnant discussions between Vespasian and Mucianus. A civil war in Italy was now inevitable; but the main contenders, Otho and Vitellius, were both men whom Vespasian could reasonably hope to challenge. The chronology of Vespasian's actions cannot be precisely determined; what is certain is that at the latest after Otho's defeat and suicide on April 16, he began to collect support. On July 1, probably as a result of a contrived plot, the two Egyptian legions proclaimed him emperor, followed a few days later by the legions of Syria and Judaea. The ubiquitous response in other parts of the empire can hardly have been unplanned, despite Vespasian's claim that his pronunciamento was a response to the misgovernment of Vitellius (who only reached Rome in mid-July).

To ensure his base he had fought a brief campaign against the Jews in midsummer; but he now sent Mucianus with an expeditionary force to Dyrrhachium (Durazzo), where a fleet was instructed to meet him. Vespasian himself went to Alexandria and held up Rome's corn supply. During August the Danubian armies made open their support for him; one of their legionary commanders, Antonius Primus, entered Italy with five legions, destroyed the main Vitellian force near Cremona, and sacked that city. Antonius then proceeded victoriously southward, entering Rome on December 20, when Vitellius was murdered by his own troops. But Antonius arrived too late to prevent the execution of Vespasian's brother Sabinus, who had been persuaded to occupy the capitol, where his small force had been stormed by the Vitellians. It was also alleged that but for Antonius' invasion and its destructive progress Vespasian's victory could have been bloodless, a very doubtful claim. Vespasian gave no thanks to Antonius, whose final misfortune was that Mucianus was able to cross quickly to Rome and take over the reins of power.

Reign as emperor. On December 21 Vespasian's position was officially confirmed by the Senate, but he remained quite frank about the military origin of his rule. He dated his powers to July 1, when the troops had acclaimed him, thus flouting constitutional precedent and contradicting even the behaviour of his rival Vitellius, who had awaited confirmation by the Senate. Later Vespasian received by law a number of powers for which his Julio-Claudian predecessors had not sought explicit sanction. Whether similar grants had been made to Galba, Otho, and Vitellius or were to be made to Vespasian's successors is not known; but a fragment of the enabling law survives, and it includes a provision that can be said to confer on him a naked autocracy. More important to him than any legal enactment, however, was the recognition of his extralegal authority (*auctoritas*) and the prestige of his upstart house. He carefully publicized the divine omens that portended his accession and also built up the title *pater patriae* in his name. He held the consulate, for brief periods on each occasion, every year of his reign except two; and he gave frequent consulates to his two sons, Titus and Domitian. He accumulated "salutations" as imperator from his armies and allowed Titus to share them with him. Throughout his reign he was insistent that his sons would succeed him, one after the other (Titus having no male issue); and it was probably over hereditary succession that he quarrelled with certain doctrinaire senators such as Helvidius Priscus, who was executed about 76. But Helvidius and his friends had already expressed general misgivings about Vespasian's government in the early months of 70.

In about October 70 Vespasian returned to Rome from Alexandria. While in Egypt he had been concerned with raising money; and his exactions, coupled with sales of imperial estates to speculators, caused great discontent among the Egyptians. He now announced that about three times the revenue of the empire was needed to put the state to rights, and both before and after his return he promoted his financial program. He increased, and sometimes doubled, provincial taxation and revoked immunities granted to various Greek-speaking provinces and cities. He reclaimed public land in Italy from squatters and instituted various new taxes, including the diversion to Rome's treasury of the tax paid by Jews of the Diaspora to the Temple at Jerusalem. Such measures were essential after the deficit incurred by Nero and the devastations of the civil wars, but contemporaries inevitably continued to charge Vespasian with "avarice." Such a charge, however, was irrelevant to any emperor of the year 70.

The sum raised by Vespasian for public funds cannot be determined. But he was able to build his Forum and the Temple of Peace, to begin the Colosseum over the foundations of Nero's "Golden House," and above all to restore the capitol. His biographer Suetonius claims that throughout Vespasian's reign his firm policy was "first to restore stability to the tottering state, and then to adorn it." But, despite his buildings and his generosity to needy friends, he probably bequeathed a substantial surplus of public money to his successors.

It was in the same spirit of stabilization that he turned to military affairs. The first task was to restore discipline to the armies after the events of 68–69. Before Vespasian's return Mucianus reduced the Praetorian Guard, greatly enlarged by Vitellius, to approximately its former size; and the legions on the frontiers were soon regrouped to remove from dangerous positions those that had fought for Vitellius. Important changes were made in the East, where Vespasian replaced the single army (which until Nero's time had only four legions) in Syria with three armies, with a total of six legions, in Cappadocia, Syria, and Judaea. Titus effectively ended the Jewish war with the capture of Jerusalem in August 70, and about the same time an alarming revolt in the Rhineland was broken by Vespasian's cousin Petilius Cerealis. The way was now open for the improvement of certain frontiers. In southern Germany annexation of a territory called Agri Decumates cut off the reentrant angle formed by the Rhine at Basel. In Britain more important advances were made; the kingdom of Brigantia in northern England was incorporated in the province, the pacification of Wales was completed, and in 78 the general Gnaeus Agricola began the seven years' governorship that was to lead Roman arms into the Scottish Highlands.

Vespasian had some difficulty with his sons at the beginning of his reign. Domitian had been overbearing and irresponsible in the months before his father's return and was kept firmly in a junior position during the remaining years. With Titus there was cause for alarm when his troops, after his victory in Judaea, asked him to take them to Italy; but he returned alone. Although Titus was not allowed an independent triumph, he became virtually a partner in Vespasian's rule, not only accumulating consulates and imperatorial salutations with his father but also being given command of the Praetorian Guard.

In 73 Vespasian and Titus became censors. In this office, although little is known about the details, they probably carried out extensive reorganization of the provincial communities, including some of the taxation reforms mentioned earlier. They bestowed Latin rights on all Spain, which meant that all city magistrates obtained Roman citizenship, with consequent profit to the imperial treasury; and no doubt Roman citizenship was granted liberally elsewhere. In addition they recruited many new members, provincial as well as Italian, to the Roman Senate.

With the Senate, despite the discords of the early months, Vespasian succeeded in maintaining friendly relations. To the historian

Tacitus, who was embarking on his senatorial career in Vespasian's last years, he was "the only emperor who had changed for the better." With opponents he considered dangerous or irreconcilable, he could be ruthless: with Helvidius Priscus may be associated a group of "philosophers" who were expelled from Italy; and in 78 he executed Eprius Marcellus, one of his earliest and most efficient supporters, accused of a conspiracy that may have been directed at Titus' association with the Jewish princess Berenice. But he showed good-natured tolerance of offensiveness that could do no harm.

Personal characteristics. Matching the rugged and uncompromising features that are familiar from his portrait busts, Vespasian cultivated a bluff and even coarse manner, characteristic of the humble origins he liked to recall. This was popular, as also were his great capacity for hard work and the simplicity of his daily life, which was taken as a model by the contemporary aristocracy. At the same time he was astute and ambitious; he built up a powerful party quickly at the outset, and many of his initial appointments were dictated by nepotism or the desire to reward past services. The policies of his reign, though sensible, reveal no great imaginativeness, compared with those of such later emperors as Trajan or Hadrian. Yet it was justly believed by contemporaries that Vespasian had prevented the dissolution of the empire by putting an end to civil war, and it was fitting that *pax* ("civil peace") should be a principle motif on his coinage. In his last illness he said, "Vae, puto deus fio" ("Oh dear, I think I'm becoming a god"); and after his death he was immediately accorded deification.

He had married one Flavia Domitilla, who bore his sons Titus and Domitian and a daughter, Flavia Domitilla (later deified). Both his wife and daughter died before he became emperor. He then returned to an earlier mistress, called Caenis, who had been a freedwoman of Antonia, sister-in-law to the emperor Tiberius; she too died before he did. (G.E.F.C.)

BIBLIOGRAPHY. For Vespasian's rise to power and the subsequent part of the civil wars, the primary source is Tacitus, *The Histories* (written *c.* AD 105; Eng. trans. by K. Wellesley, 1964); unfortunately the surviving books take the story no farther than the autumn of 70. On eastern affairs, *The Jewish War* of Josephus (Eng. trans. by G.A. Williamson, 1959), written a decade after the events, contains differences from Tacitus both in emphasis and in detail. Of Suetonius, *Lives of the Caesars* (trans. by Robert Graves), his *Divus Vespasianus*, written about 125, is one of the most fascinating; but it is brief and entirely deserts a chronological framework after Vespasian becomes emperor (the edition by A.W. Braithwaite, 1927, is still valuable). The only modern full-length biography of Vespasian is L.P. Homo, *Vespasien, l'empereur du bon sens (69–79 ap. J.-C.)* (1949). But an informative sketch is provided in the well-documented study by Michael Grant, *Twelve Caesars* (1975).

Vespasianus, Titus Flavius (emperor of Rome AD 79–81): *see* Titus.

Vesper (Greco-Roman mythology): *see* Hesperus.

vespers, evening prayer of thanksgiving and praise in Roman Catholic and certain other Christian liturgy. Vespers and lauds (morning prayer) are the oldest and most important of the traditional liturgy of the hours. Many scholars believe vespers is based on Judaic forms of prayer and point to a daily evening celebration observed among Jews in the first century before Christ.

By the 3rd century, the writings of Tertullian show clear evidence of an evening prayer. During the 4th, 5th, and 6th centuries, cathedral choirs and monastic orders developed the vespers service, as it was known for centuries thereafter. Following the second Vatican Council (1962–65) the Roman Catholic service was translated into the vernacular and simplified, but it continues to revolve around the Magnificat canticle, various psalms and antiphons, and readings that vary according to liturgical season.

The Lutheran and the Episcopal churches both include an evening prayer service in their liturgies. In the Episcopal Church, evening prayer traditionally was called evensong, and can be found in the 1549 Book of Common Prayer. Both Protestant churches revised their rite for evening prayer during the 1970s and both rites are patterned closely after the traditional Roman Catholic evening prayer. In the Episcopal Church, the revised prayers offer alternative choices for greater individual choice among congregations.

An early name for vespers is *lucernarium*, literally "lamp-lighting time," referring to the candles lit for this service when it was held in the early evening.

Vespertilionidae, large family of bats, suborder Microchiroptera, including almost 300 species known collectively as common bats. Vespertilionids are found worldwide in tropical and temperate regions. Their habitats are as varied as jungles and deserts.

The vespertilionids are nocturnal bats with small eyes and well-developed tails. Most species have long wings, and some have very large ears. The fur is generally gray, brown, or blackish; but it may be red, as in red bats (*Lasiurus*), frizzled, as in frosted bats (*Vespertilio*), or marked with white, as in spotted bats (*Euderma*). The Philippine bamboo bat, possibly the smallest of bats, is a vespertilionid about 4 centimetres (1½ inches) in head and body length; it weighs about 1.5 grams (1/20 ounce) and has a wingspan of 15 cm. Other vespertilionids range up to 10 cm in head and body length and 50 g in weight.

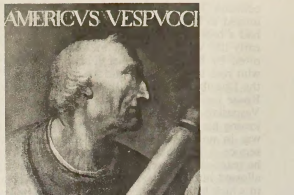
Most vespertilionid bats feed on insects, often catching their prey in the membrane between their hindlegs before seizing the insect with their teeth. The fish-eating bat (*Pizonyx*) and a few species of brown, or mouse-eared, bats (*Myotis*) prey on fish.

In general, the vespertilionids live in colonies and roost in caves, hollow trees, and similar shelters. Some have been found in the twigs of birds' nests and in roof thatching; others habitually roost in branches, on tree trunks, or in the hollow core of bamboo stalks. Many vespertilionids inhabiting temperate regions hibernate or migrate in winter.

For more information about vespertilionid groups and species, *see* brown bat; pipistrelle; noctule; red bat; hoary bat; barbastelle; long-eared bat.

Vespucci, Amerigo (b. 1454, Florence—d. 1512, Seville), merchant and explorer–navigator, who took part in early voyages to the New World (1499–1500, 1501–02). From his name derived the name of the American continent.

Early life. Vespucci was the son of Nastagio, a notary. As a boy Vespucci was given a humanistic education by his uncle Giorgio Antonio. In 1479 he accompanied another relation, sent by the famous Italian family of Medici to be their spokesman to the King of France. On returning, Vespucci entered the "bank" of Lorenzo and Giovanni di Pierfrancesco de' Medici and gained the confidence of his employers. At the end of 1491 they sent him to Seville, where they had a business directed by a man named Giannotto Berardi, who appears to have been engaged chiefly in fitting out ships; and Vespucci was probably present when Columbus returned from his first expedition, which Berardi had assisted. Later, Vespucci was to collaborate, still with Berardi, in the preparation of a ship for Columbus' second expedition and of others for his third. On the last occasion Vespucci and Columbus became personally acquainted. When Berardi died, either at the end of 1495 or at the beginning of 1496, Vespucci became manager of the Seville agency.



Vespucci, portrait by an unknown artist; in the Uffizi, Florence
Alinari—Art Resource/EB Inc.

The period during which Vespucci made his voyages falls between 1497 and 1504. At the beginning of 1505 he was summoned to the court of Spain for a private consultation, and, as a man of experience, was engaged to work for the famous Casa de Contratación de las Indias (Commercial House for the West Indies), which had been founded two years before at Seville. In 1508 the house appointed him chief navigator, a post of great responsibility, which included the examination of the pilots' and ships' masters' licenses for voyages. He also had to prepare the official map of newly discovered lands and of the routes to them (for the royal survey), interpreting and coordinating all data that the captains were obliged to furnish. Vespucci, who had obtained Spanish citizenship, held this position until his death. His widow, Maria Cerezo, was granted a pension in recognition of her husband's great services.

Vespucci's voyages. Two series of documents on Vespucci's voyages are extant. The first series consists of a letter from Vespucci himself dated from Lisbon, Sept. 4, 1504, written in Italian, perhaps to the gonfalonier (chief magistrate of a medieval Italian republic) Piero Soderini, and printed in Florence in 1505; and of two Latin versions of this letter, printed under the titles of "Quattuor Americi navigationes" and "Mundus Novus," or "Epistola Alberici de Novo Mundo." The second series consists of three private letters addressed to the Medici. In the first series of documents, four voyages by Vespucci are mentioned; in the second, only two. Until the 1930s the documents of the first series were considered from the point of view of the order of the four voyages. According to a theory of Alberto Magnaghi, on the contrary, these documents are to be regarded as the result of skillful manipulations, and the sole authentic papers would be the private letters, so that the verified voyages would be reduced to two. The question is fundamental for the evaluation of Vespucci's work and has given rise to fierce controversy; attempts to reconcile the two series of documents cannot generally be considered successful.

The voyage completed by Vespucci between May 1499 and June 1500 as navigator of an expedition of four ships sent from Spain under the command of Alonso de Ojeda is certainly authentic. (This is the second expedition of the traditional series.) Since Vespucci took part as navigator, he certainly cannot have been inexperienced; but it does not seem possible that he had made a previous voyage (1497–98) in this area (*i.e.*, around the Gulf of Mexico and

the Atlantic coast from Florida to Chesapeake Bay), though this matter remains unresolved.

In the voyage of 1499–1500, Vespucci would seem to have left Ojeda after reaching the coast of what is now Guyana. Turning south, he is believed to have discovered the mouth of the Amazon River and to have gone as far as Cape St. Augustine (about 6° S latitude). On the way back, he reached Trinidad, sighted the mouth of the Orinoco River, and then made for Haiti. Vespucci thought he had sailed along the coast of the extreme easterly peninsula of Asia, where Ptolemy, the geographer, believed the market of Cattigara to be; so he looked for the tip of this peninsula, calling it Cape Cattigara. He supposed that the ships, once past this point, emerged into the seas of southern Asia. As soon as he was back in Spain, he equipped a fresh expedition with the aim of reaching the Indian Ocean, the Gulf of the Ganges (modern Bay of Bengal), and the island of Taprobane or Ceylon (now Sri Lanka). But the Spanish government did not welcome his proposals, and at the end of 1500 Vespucci went into the service of Portugal.

Under Portuguese auspices Vespucci completed a second expedition, which set off from Lisbon on May 13, 1501. After a halt at the Cape Verde Islands, the expedition traveled southwestward, reached the coast of Brazil toward Cape St. Augustine, sighted (January 1502) Guanabara Bay (Rio de Janeiro's bay), and certainly sailed as far as the Río de la Plata, which Vespucci was the first European to discover. In all probability the ships took a quick run still farther south, along the coast of Patagonia (in present-day southern Argentina). The return route is unknown. The ships anchored at Lisbon on July 22, 1502.

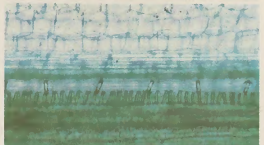
This voyage is of fundamental importance in the history of geographic discovery in that Vespucci himself, and scholars as well, became convinced that the newly discovered lands were not part of Asia but a "New World." In 1507 a humanist, Martin Waldseemüller, reprinted at Saint-Dié in Lorraine the "Quattuor Americi navigationes" ("Four Voyages of Amerigo"), preceded by a pamphlet of his own entitled "Cosmographiae introductio," and he suggested that the newly discovered world be named "ab Americo Inventore . . . quasi Americi terram sive Americam" ("from Amerigo the discoverer . . . as if it were the land of Americus or America"). The proposal is perpetuated in a large planisphere of Waldseemüller's, in which the name America appears for the first time, although applied only to South America. The suggestion caught on; the extension of the name to North America, however, came later. On the upper part of the map, with the hemisphere comprising the Old World, appears the picture of Ptolemy; on the part of the map with the New World hemisphere is the picture of Vespucci.

It is uncertain whether Vespucci took part in yet another expedition (1503–04) for the Portuguese government (it is said that he may have been with one under Gonzalo Coelho). In any case, this expedition contributed no fresh knowledge. Subsequently, Vespucci returned to the service of Spain and certainly, in the capacity of *piloto mayor* ("master navigator"), helped to prepare other expeditions, but he never again joined one in person.

Some scholars have held Vespucci to be an ignorant usurper of the merits of others. The fact that Spain entrusted him, a foreigner, with the office of chief navigator is sufficient to dispose of these accusations. The Spaniards saw that he possessed an outstanding knowledge of nautical science and that he was a man to whom confidential matters could be entrusted. (Ro.A.)

BIBLIOGRAPHY. Frederick J. Pohl, *Amerigo Vespucci, Pilot Major* (1944, reissued 1979); Germán Arciniegas, *Amerigo and the New World: The Life and Times of Amerigo Vespucci* (1955, reprinted 1978).

vessel, also called TRACHEA, in botany, the most specialized and efficient conducting structure of xylem (fluid-conducting tissues). Characteristic of most flowering plants and absent from most gymnosperms and ferns, vessels are thought to have evolved from tracheids (a primitive form of water-conducting cell) by loss of the end walls.

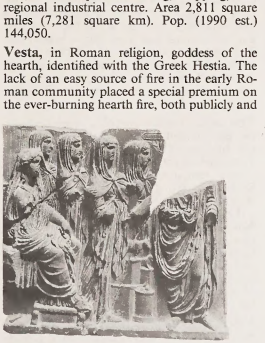


Vessel
Grant Heilman

A vessel consists of a vertical series of vessel members that vary from elongated to squat, drum-shaped cells the walls of which are secondarily thickened with rings, spirals, or networks of cellulose, that later become lignified. The length of vessels varies from two cells to rows several metres long. During development, the end walls, already pitted, break through and eventually disappear. The living protoplast of the cell also breaks down and disappears. *See also* tracheid.

Vest-Agder, southernmost *fylke* (county) of Norway, extending inland from the North Sea and its arm, the Skagerrak, to the southern fringes of the Setes valley. A mild marine climate favours horticulture, which is well developed along the level coastal areas, especially east of Lindes Point, which is the southernmost part of the Norwegian mainland. The northern portion of the *fylke* is mountainous and sparsely settled, while the central upland moors are used for pasturing of cattle and sheep. Fishing, lumbering (in the north), mixed farming, and dairying are the main economic activities. The seaport and county seat of Kristiansand (*q.v.*), in the extreme southeast, is an important fishing, shipping, and regional industrial centre. Area 2,811 square miles (7,281 square km). Pop. (1990 est.) 144,050.

Vesta, in Roman religion, goddess of the hearth, identified with the Greek Hestia. The lack of an easy source of fire in the early Roman community placed a special premium on the ever-burning hearth fire, both publicly and privately maintained; thus, from the earliest times Vesta was assured of a prominent place in both family and state worship. Her worship was observed in every household along with that of the Penates and the Lares, and her image was sometimes encountered in the household shrine.



Vesta (seated on the left) with Vestal Virgins, classical relief sculpture; in the Palermo Museum, Italy
By courtesy of the Palermo Museum, Italy

The state worship of Vesta was much more elaborate. Her sanctuary was traditionally a circular building, in imitation of the early Italian round hut and symbolic of the public hearth. The Temple of Vesta in the Roman Forum was of great antiquity and underwent many restorations and rebuildings in both republican and imperial times. There burned the perpetual fire of the public hearth attended by the Vestal Virgins (*q.v.*). This fire was officially extinguished and renewed annually on March 1 (originally the Roman new year), and its extinction at any other time, either accidentally or not, was regarded as a portent of disaster to Rome. The temple's innermost sanctuary was not open to the public; once a year, however, on the Vestalia (June 7–15), it was opened to matrons who visited it barefoot.

The days of the festival were unlucky. On the final day occurred the ceremonial sweeping out of the building, and the period of ill omen did not end until the sweepings were officially disposed of by placing them in a particular spot along the Clivus Capitolinus or by throwing them into the Tiber.

In addition to the shrine itself and between it and the Velia stood the magnificent Atrium Vestae. This name originally was given to the whole sacred area comprising the Temple of Vesta, a sacred grove, the Regia (headquarters of the *pontifex maximus*, or chief priest), and the House of the Vestals, but ordinarily it designated the home or palace of the Vestals.

Vesta is represented as a fully draped woman, sometimes accompanied by her favourite animal, an ass. As goddess of the hearth fire, Vesta was the patron deity of bakers, hence her connection with the ass, usually used for turning the millstone, and her association with Fornax, the spirit of the baker's oven. She is also found allied with the primitive fire deities Cacus and Caca.

Consult the INDEX *first*

Vesta, in astronomy, the brightest asteroid, though not the largest, and the only one ever visible with the naked eye. Found on March 29, 1807, by Heinrich Wilhelm Matthäus Olbers, it was the fourth minor planet to be discovered. Its diameter is about 390 km (240 miles).

Vestal Virgin, in Roman religion, any of the six priestesses, representing the daughters of the royal house, who tended the state cult of Vesta, the goddess of the hearth. Chosen between the ages of six and ten by the *pontifex maximus* ("chief priest"), they served for 30 years, during which time they had to remain virgins. Afterward they could marry, but few did, as it was considered unlucky. Those chosen as Vestal Virgins had to be of the required age, be freeborn of freeborn and respectable parents (though later the daughters of freedmen were eligible), have both parents alive, and be free from physical and mental defects. The Vestal Virgins' duties included tending the perpetual fire in the Temple of Vesta, keeping their vow of chastity, fetching water from a sacred spring (Vesta would have no water from the city water-supply system), preparing ritual food, caring for objects in the temple's inner sanctuary, and officiating at the public worship of Vesta (the Vestalia, June 7–15). Failure to attend to their

duties was punished by a beating; violation of the vow of chastity, by burial alive. The Vestal Virgins enjoyed many honours and



A Vestal Virgin, classical sculpture; in the Museo Nazionale Romano, Rome
Anderson—Alinari from Art Resource/EB Inc.

privileges, including emancipation from their fathers' rule.

Vestdijk, Simon (b. Oct. 17, 1898, Harlingen, Neth.—d. March 23, 1971, Utrecht), prolific Dutch writer whose early novels, with their unrelenting exposure of the barrenness of middle-class provincial life, shocked the bourgeois world of the 1930s.

The cerebral, intellectual approach that characterizes Vestdijk's writing was already apparent in his poetry, with which he started his literary career. In his first published novel, *Meneer Vissers hellevaart* (1936; "Mr. Visser's Journey Through Hell"), the influence of James Joyce is evident—from the wealth of interior monologue to the author's preoccupation with distasteful everyday details. The bestiality and mental cruelty of Mr. Visser is shown to stem from his militaristic upbringing, but, as in most of Vestdijk's novels, psychoanalytical intentions tend to swamp spiritual and human considerations in the work. His novel *Terug tot Ina Damman* (1934; "Back to Ina Damman"), a love story, was considered equally shocking when it appeared, but, having a less bitter theme, it probably remains the most popular of his 38 novels.

Vesterålen, island group, in the Norwegian Sea, northern Norway. Forming the northern end of the Lofoten–Vesterålen archipelago, the Vesterålen include, from east to west, Hinn Island (largest Norwegian island but for Spitsbergen), And Island, and Lang Island; important smaller islands are Gryt and Hadsel, and there are hundreds of islets and skerries (small, rocky islets and reefs). The islands are composed of volcanic rock (gneiss and granite). Their climate is similar to that of the Lofoten island group—*i.e.*, temperate, owing to the North Atlantic Current. Administratively, Hinn Island is divided between Troms and Nordland *fylker* (counties); the rest of the archipelago is in Nordland *fylke.*

A settlement on the islet of Bjark is mentioned in the 11th century. Waters around the islands are among the best in Norway for fishing, yielding vast catches of cod, haddock, and halibut. Fishing and fish processing are virtually the sole economic activity; agriculture is nonexistent. Harstad on Hinn Island is the main town and port in the islands. The islet of Andørja, actually a submarine mountain, rises, in the peak of Mount Langli, to 4,190 feet (1,277 m), the highest island mountain in Norway.

Vestfjorden, fjord, in the Norwegian Sea off the northwestern coast of Norway. Formed by the Norwegian mainland to the east and the Lofoten islands to the north and west, Vestfjorden is about 100 miles (160 km) long and almost 50 miles (80 km) wide at its mouth, becoming narrower toward its head.

The port of Narvik is located on its northeastern arm, Ofotfjorden, and the port of Bodø on the southeastern side of its mouth, on Saltfjorden. The legendary and treacherous Maelstrøm (*q.v.*; Moskenstraumen), a channel, is located near the northwestern side of the mouth of Vestfjorden. The fjord is dotted with thousands of islands, and it branches into hundreds of smaller fjords.

Vestfold, *fylke* (county), southeastern Norway. Lying along the western shore of Oslo Fjord, the county seat is Tønsberg (*q.v.*), Norway's oldest town. Vestfold is known for its prehistoric Bronze Age mounds and for its Viking ship burials. By the 10th century the local kings had established themselves as the first dynasty to begin the unification of Norway.

Covering 856 square miles (2,216 square km) of rolling countryside, the *fylke* contains some of Norway's best farmland (dairying, grains, and fruits). Formerly a headquarters for whaling fleets, the coastal towns of Vestfold now engage in fishing and shipbuilding. Some lumbering is carried on in the interior. Horten has a fine yacht harbour, with an annual summer regatta. Pop. (1988 est.) 194,619.

vestibulocochlear nerve, also called AUDITORY NERVE, ACOUSTIC NERVE, OF EIGHTH CRANIAL NERVE, nerve in the human ear, serving the organs of equilibrium and of hearing. It consists of two anatomically and functionally distinct parts: the cochlear nerve, distributed to the hearing organ, and the vestibular nerve, distributed to the organ of equilibrium.

The cochlear nerve fibres end in terminals around the bases of the inner and outer hair cells of the organ of Corti and begin in groups of nerve cells—dorsal and ventral cochlear nuclei—located at the base of the brain at the juncture of the pons and the medulla oblongata. The vestibular portion of the vestibulocochlear nerve originates in a group of nerve cells called the vestibular ganglion, in the internal acoustic meatus, a channel in the temporal bone through which the facial and auditory nerves and some blood vessels run. The sensory endings of this portion of the nerve are in the semicircular canal and in the utricle and saccule, the structures of the inner ear responsible for the sensation of equilibrium.

Vestini, ancient Sabine tribe, which occupied the eastern and northern bank of the Aternus (modern Aterno) River in central Italy. They entered into the Roman alliance in 302 BC and remained loyal until they joined the Social War (90–88 BC), by which they won Roman citizenship.

The Vestini's local dialect, belonging to the Northern Oscan group, probably survived until this time. The oldest known Latin inscriptions of the district are not earlier than 100 BC, and they indicate that the Latin first spoken by the Vestini was not that of Rome but that of their neighbours, the Marsi and the Aequi (*qq.v.*).

Vestlandet, geographical region, southwestern Norway. Its 22,592 square-mile (58,512 square-kilometre) area embraces the *fylker* (counties) of Rogaland, Hordaland, Sogn og Fjordane, and Møre og Romsdal. Providing the most spectacular fjord and mountain scenery in Norway, the region has been a tourist mecca for centuries. Except for the Jæren plain located at the extreme southern end of the region, Vestlandet is mountainous, with Jotunheimen and the Hardanger Plateau being the highest areas. The Jostedals Glacier, the largest glacier in Europe, is located in the north-central part of the region, while Hardanger Icecap and the Folge Glacier are smaller ice fields in the south. Norway's longest fjord, Sogna Fjord (127 miles [204 km]), located in the central part of the region, nearly divides Vestlandet in two; farther south Hardanger Fjord knifes inland for 111 miles (178 km). Many waterfalls flow into the fjords, with the Syv Systre, Toka Gorge, and Vørings Waterfalls among the most beautiful and best known. The rugged coastline is protected by thousands of offshore islands in a nearly continuous line.

Vestlandet contains the second and fourth most populous Norwegian cities, Bergen and Stavanger, respectively; both are historically important port cities and trading centres. Other ports are Kristiansund, Ålesund, Haugesund, and Sandnes. Most of the inhabitants of Vestlandet live in these communities and in the hundreds of fishing villages along the coasts, fjords, and islands. Economically, the region depends on fishing, tourism, lumbering, shipping, and farming (mostly on the Jæren plain). Most industry is located in the larger cities and towns. Development of the region's large hydroelectric potential began in the 1970s. Land transportation routes are few, though both rails and roads connect with the rest of Norway. The main form of intercity transportation is by coastal ferries and ships. In addition, many tour ships ply the fjords, offering tourists unsurpassed vistas. Pop. (1988 est.) 1,078,825.

Vestmanna Islands, Vestmanna also spelled VESTMANN, OF WESTMAN, Icelandic VESTMANNAEYJAR, group of 14 small Icelandic islands off Iceland's southern shore. They have a total area of about 8 square miles (21 square km). Volcanic in origin, the islands are rocky and barren, with precipitous cliffs up to 1,000 feet (300 m) in height rising straight up from the Atlantic Ocean.

The largest and only inhabited island is Heimaey, 4 miles (6 km) in length, on which the town of Vestmannaeyjar is located. Cod fishing and some limited farming are the chief economic activities. The fiery emergence in 1963–67 of the volcanic isle of Surtsey, 14 miles (23 km) southwest, covered the island group with a layer of ash.

Vestmannaeyjar, town, southern Iceland, on Heima Island, the largest of the Vestmanna Islands. One of the older Icelandic settlements, it grew as a fishing village. It is almost entirely dependent upon cod fishing and processing, having been the site of Iceland's first fish-freezing plant, established in 1908.

A series of disasters has afflicted the town. Often plundered by English ships in the 15th century, in 1627 it was attacked by Algerian pirates, who carried off many of the inhabitants into slavery. In 1963, when the volcanic island of Surtsey emerged from the Atlantic Ocean, the town was covered with a layer of volcanic ash. In January 1973 a 1-mile- (1.6-kilometre-) long fissure in the side of the long-dormant Helgafell Volcano began to erupt, burying the town under a rain of ash and cinder and forcing the evacuation of most of the inhabitants. When the eruption subsided in June, most of the evacuees returned and removed the thick deposits of ash that covered the town's buildings. Vestmannaeyjar subsequently made a complete recovery from this disaster. Pop. (1984 est.) 4,743.

Vestris, Auguste, also called VESTR' ALLARD, original name MARIE-JEAN-AUGUSTIN VESTRIS (b. March 27, 1760, Paris—d. Dec.

5, 1842, Paris), son of the great ballet dancer Gaetano Vestris and the ballerina Marie Allard, himself a dancer whose unusually brilliant technique and prodigious leaps set a new



Auguste Vestris, detail of an aquatint by F. Bartoiozzi and B. Pastorini, 1781, after a portrait by N. Dance

By courtesy of the Victoria and Albert Museum, London

style of ballet. He was a star of the Paris Opéra from his debut in 1772 until his retirement in 1816, spending the 1791 season in London.

Vestris's greatest roles were in *Télémaque* and as Amour in Pierre Gardel's *Psyché*. His later years were devoted to teaching, his pupils including August Bournonville, Fanny Elssler, and his son Auguste-Armand, who also became a dancer but is remembered chiefly as the first husband of the English actress and theatrical manager Madame Vestris.

Vestris, Gaetano (Apolline Baldassare), also called GAÉTAN VESTRIS (b. April 18, 1729, Florence—d. Sept. 23, 1808, Paris), the finest French male ballet dancer of his time.

With his parents, brothers, and sisters—almost all of whom had careers in the theatre—he went to Paris in 1747 and about a year later, at age 19, entered the Paris Opéra ballet school, studying under Louis Dupré. Vestris danced briefly in the ensemble, was appointed soloist in 1751, and for the next 30 years enjoyed a succession of triumphs in the ballets of Jean-Barthélemy Lany, Pierre Gardel, and Jean-Georges Noverre. Because of his conceited ways, as well as his undisputed gifts, he was called, half ironically, "the god of the dance."

Vestris, Madame, married name (from 1838) LUCIA ELIZABETH, or ELIZABETTA, MATHEWS, *née* BARTOLOZZI (b. Jan. 3, 1797, London—d. Aug. 8, 1856, London), British actress, opera singer, and manager who inaugurated tasteful and beautiful stage decor and set a standard in stage costumes.



Madame Vestris, detail of a watercolour by S. Lover, *c.* 1840; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

In 1813 she married Auguste-Armand Vestris, a dancer and ballet master who left her four years later. Mme Vestris made her first appearance in Italian opera in 1815 and had an immediate success in London and in Paris, where she played with F.-J. Talma. Her first hit in English was in 1820. Because of her beautiful figure, she was a particular favourite in such breeches parts as Cherubino in *The Marriage of Figaro* and in *Giovanni in London*. In 1831 she became lessee of the Olympic Theatre and began presenting the burlesques and extravaganzas for which that house became known. She married Charles James Mathews in 1838, accompanying him to the United States and aiding him in his subsequent managerial ventures.

A biography, *Madame Vestris and the London Stage*, was published in 1974.

vestry (church architecture): *see* sacristy.

Vestsjællands, *amtskommune* (county), western Sjælland (Zealand), Denmark, created in 1970 from the former counties of Sorø and Holbæk, with an area of 1,155 sq mi (2,991 sq km). The northern coast is characterized by tongueliké peninsulas and islands.

Fertile clay loams support agriculture, dairying, and pig rearing. The principal centres of industrial activity are Slagelse, Kalundborg, Holbæk (*qq.v.*), Ringsted, and Nykøbing-Sjælland. Sorø (*q.v.*) is the administrative seat. Pop. (1982 est.) 278,117.

vesuvianite, also called IDOCRASE, common silicate mineral that occurs in crystalline limestones near their contacts with igneous rocks, and in beds of marble and calcsilicate granulite that are associated with gneiss and mica



Vesuvianite in calcite from Templeton, Que.

By courtesy of the Field Museum of Natural History, Chicago; photograph, John H. Gerard—EB Inc.

schist. Fine glassy crystals coloured yellow, green, or brown have been found in the Ala Valley in the Piedmont, and on Mte. Somma, Italy; the Vilyuy River, Siberia; Christiansand, Nor.; Litchfield, Quebec; and Auburn, Maine, Amity, N.Y., and Franklin, N.J. For chemical formula and detailed physical properties, *see* silicate mineral (table).

Transparent crystals of a good green or brown colour are sometimes cut as gemstones. Cut stones resemble diopside or epidote but can be distinguished optically. A compact green variety resembling jade, found at several localities in California, is known as californite. A sky-blue variety, cyprine, contains traces of copper.

Vesuvius (Mount), Italian VESUVIO, active volcano that rises above the Bay of Naples on the plain of Campania in southern Italy. Its western base rests almost upon the bay. The height of the cone in 1980 was 4,198 ft (1,280 m), but it varies considerably after each major eruption. At about 1,968 ft a high semicircular ridge, called Mt. Somma, begins, girding the cone on the north and rising to 3,714 ft. Between Mt. Somma and the cone is the Valle del Gigante (Giant's Valley). At the summit of the cone is a large crater about 1,000 ft deep and 2,000 ft across; it was formed in the eruption of 1944. More than 2,000,000 people live in the area of Vesuvius and on its lower slopes. There are industrial towns along the coast of the Bay of Naples and small agricultural centres on the northern slopes.

Vesuvius originated during the late Pleistocene Epoch, probably somewhat less than 200,000 years ago. Although a relatively young volcano, Vesuvius had been dormant for centuries before the great eruption of AD 79 that buried the cities of Pompeii and Stabiae under ashes and lapilli and the city of Herculaneum under a mud flow. The writer Pliny the Younger, who was staying at a place west of Naples, gave an excellent account of the catastrophe in two letters to the historian Tacitus. Between the years 79 and 1631, several eruptions were reported. Confirmed eruptions occurred in 203, 472, 512, 787, 968, 991, 999, 1007, and 1036. The explosions of 512 were so severe that Theodoric the Goth released the people living on the slopes of Vesuvius from payment of taxes.

After some centuries of quiescence, a series of earthquakes, lasting for six months and gradually increasing in violence, preceded a major eruption that took place on December 16, 1631. Many villages on the slopes of the volcano were destroyed; about 3,000 people were killed; the lava flow reached the sea; and the skies were darkened for days. After 1631 there was a change in the eruptive character of the volcano and activity became continuous. Two stages could be observed: quiescent and eruptive. During the quiescent stage the volcano's mouth would be obstructed, whereas in the eruptive stage it would be almost continually open.

Between 1660 and 1944 some 19 of these cycles were observed. Severe paroxysmal eruptions, concluding an eruptive stage, occurred in the years 1660, 1682, 1694, 1698, 1707, 1737, 1760, 1767, 1779, 1794, 1822, 1834, 1839, 1850, 1855, 1861, 1868, 1872, 1906, and 1944. The eruptive stages varied in length from 6 months to 30¾ years. The quiescent stages have varied from 18 months to 7½ years.

Scientific study of the volcano did not begin until late in the 18th century. An observatory was opened in 1845 at 1,995 ft, and, in the 20th century, numerous stations were set up at various heights for making volcanologic measurements. A large laboratory and a deep tunnel for seismo-gravimetric measurements were also built.

The slopes of Vesuvius are covered with vineyards and orchards, and the wine grown there is known as Lacrima Christi; in ancient Pompeii the wine jars were frequently marked with the name Vesuvinum. Higher up, the mountain is covered with copses of oak and chestnut, and on the northern side along the slopes of Mt. Somma the woods proceed to the very summit. On the western side the chestnut groves give way above 2,000 ft to undulating plateaus covered with broom, where the crater left by the great eruption of the year 79 has been filled in. Still higher, on the slopes of the great cone and on the inner slope of Mt. Somma, the surface is almost barren; during quiescent periods it is covered by tufts of meadow plants.

The soil is very fertile, and in the long period of inactivity before the eruption of 1631 there were forests in the crater and three lakes from which pasturing herds drank. Vegetation on the slope dies off during eruptive periods because of the volcanic gases. After the eruption of 1906, forests were planted on the slopes in order to protect inhabited places from the flows of mud that usually occur after violent eruptions, and in the fertile soil the trees grew rapidly. In 73 BC the gladiator Spartacus was besieged by the praetor Publius Claudius Pulcher on the barren summit of Mt. Somma, which was then a wide, flat depression walled by rugged rocks festooned with wild vines.

He escaped by twisting ropes of vine branches and descending through unguarded fissures in the crater rim. Some paintings excavated in Pompeii and Herculaneum represent the mountain as it looked before the eruption of AD 79, when it had only one peak.

Veszprém, *megye* (county), western Hungary, extending north from Lake Balaton. It consists largely of the forested Bakony Mountains (*q.v.*). Lowlands in the northwest are agriculturally poor, but the production of wines is important on the north shore of Lake Balaton, particularly around Balatonfüred. The Bakony Mountains and Lake Balaton form the basis of a substantial tourist industry.

After 1945 Veszprém saw rapid industrial growth based on the mineral wealth of the Bakony Mountains, especially lignite, bauxite, and manganese. Ajka, once a small coal-mining village, has developed a substantial aluminum industry. Chemical plants have been important in the growth of Veszprém town, the county seat; and Várpalota, just northeast, has chemical, aluminum, coal-mining, and mineral-oil industries. At Herend is a well-known porcelain and china factory. Other population centres include Keszthely, Pápa, and Tapolca. At Zirc, high in the Cuha Valley, is a 12th-century abbey, and in Nagyvázsony are the ruins of the legendary Kinizsi Castle. Area 1,810 square miles (4,689 square km). Pop. (1994 est.) 378,000.

Veszprém, town and seat of Veszprém *megye* (county), western Hungary. It lies along the Séd River, spanned there by a viaduct, in the Bakony Mountains, southwest of Budapest.



Vetch (*Vicia cracca*)
Walter Dawn

with trailing or climbing stems and compound leaves with several pairs of leaflets. The magenta, bluish white, white, or yellow flowers are borne singly or in clusters. Two to ten seeds are borne in a pod. A few species of vetch are cultivated as important fodder and cover crops and as green manure. Like other legumes, they add nitrogen to the soil by means of nitrogen-fixing bacteria and thus are particularly valuable as a soil-enriching crop. For the low-growing ground cover *Coronilla varia, see* crown vetch.

Veterans Day, annual holiday in the United States honouring veterans of the armed forces and also the men and women killed in the country's wars. The observance originated as Armistice Day, which was set aside by the United States, Great Britain, and France to commemorate the ending of World War I (Nov. 11, 1918). After World War II it was recognized as a day of tribute to the veterans and the dead of that conflict as well. In Canada it came to be known as Remembrance Day, and in Great Britain the Sunday nearest November 11 was proclaimed Remembrance Sunday honouring the dead of both World Wars. In 1954, after the Korean War, the date was officially designated in the United States as Veterans Day to honour servicemen of all U.S. wars.

Veterans Day is usually observed with parades, speeches, and floral tributes placed on servicemen's graves or memorials. In the United States, group naturalization ceremonies have come to be an important part of the day's activities. Special Veterans Day services are held at Arlington National Cemetery, Arlington, Va., and at similar shrines in other countries.

Veterans of Foreign Wars (VFW), American organization created in 1913–14 by the merger of three national war-veteran societies that were founded in 1899, shortly after the Spanish-American War. The American Veterans of Foreign Service, the Colorado Society of the Army of the Philippines, and another society also known as the American Veterans of Foreign Service merged in a convention in Pittsburgh, Pa., to become the single nationwide association known since then as the Veterans of Foreign Wars of the United States.

Membership in the VFW is restricted to any active or honourably discharged male officer or enlisted man who is a citizen of the United States and who has served in its military service "in any foreign war, insurrection or expedition, which service shall be recognized by the authorization or the issuance of a campaign medal" by the military or naval service. The basic aims of the VFW are: to ensure the national security through maximum military strength, to speed the rehabilitation of the nation's disabled and needy veterans, to assist veterans' widows and orphans and the dependents of needy or disabled veterans, and to promote Americanism by means of education in patriotism and by constructive service to communities.

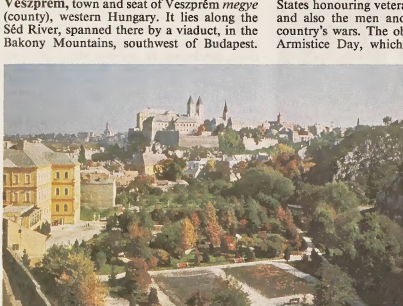
The VFW maintains both its legislative service and the central office of its national rehabilitation service in Washington, D.C. The latter nationwide program serves all disabled veterans of all wars, members and nonmembers alike, in matters of government compensation and pension claims, hospitalization, civil-service employment preference, and so on. The VFW has more than 10,000 local units, which are known as "posts." The VFW maintains a national headquarters in Kansas City, Mo.

veterinary science, also called VETERINARY MEDICINE, the prevention, diagnosis, and treatment of the diseases of domestic animals and the management of other animal disorders. The field also deals with those diseases that are intercommunicable between animals and humans.

Persons serving as doctors to animals have existed since the earliest recorded times, and veterinary practice was already established as a specialty as early as 2000 BC in Babylonia and Egypt. The ancient Greeks had a class of physicians who were literally called "horse-doctors," and the Latin term for the specialty, *veterinarius* ("pertaining to beasts of burden") came to denote the field in general in modern times. After a period of virtual nonexistence during the Middle Ages, veterinary science revived in the mid-18th century, when the first veterinary schools in Europe were established. Veterinary science rapidly regained its lost status, and its subsequent development largely parallels that of modern medicine.

The preventive and control measures used in veterinary science are of vital economic importance to the livestock industry. Such common animal diseases as mastitis, brucellosis, swine fever, erysipelas, anthrax, and leptospirosis can cause major losses among stock animals and must be controlled or prevented by veterinarians. Vaccination and immunization, sanitation measures, and the rigid segregation, or quarantine, of sick animals are important tools used to combat the spread of infectious diseases such as anthrax, bovine tuberculosis, brucellosis, canine distemper, and rabies. Veterinarians also treat parasitical infections, conditions resulting in impaired fertility (in livestock), and nutritional disorders, and they often set broken limbs and neuter domestic pets.

A veterinarian's training must include the basic preclinical disciplines of anatomy, histology, physiology, pharmacology, microbiology (including bacteriology, virology, and parasitology), and pathology. The clinical subjects



Veszprém, Hung., showing the fortress hill with the 11th-century Gothic Cathedral of St. Michael
ZEFA

The town already had a cathedral and castle in the 9th century; it was named after the Polish prince Bezbriem. The town is built on five hills and contains many historical and architectural monuments: the street of ancient houses, the Cathedral of St. Michael, the Gizella Chapel with valuable 13th-century frescoes, the Baroque bishop's palace (1765–76), the Franciscan cloister (1770–76), and the fortress with its Heroes' Gate. Between 1552 and the end of the 17th century, Veszprém was intermittently occupied by the Turks. The town is a rail and market centre. The University of Veszprém was founded in 1949.

Manufactures include textiles, wine, and vegetable oil. Veszprém also has a chemical industry. Pop. (1994 est.) 65,789.

vetch, also called TARE, any herbaceous plant of the genus *Vicia,* within the pea family (Fabaceae). About 150 species are known. The plants are 30–120 cm (1–4 feet) tall,

of study can be broadly divided into internal medicine, surgery, preventive medicine, and clinical practice. Internal medicine includes the diagnosis and treatment of diseases as they affect animals. Preventive medicine and public health concern the broader aspects of disease prevention and control, especially of those diseases transmissible between animals and humans or affecting human welfare. Surgery includes wound treatment, fracture repair, the excision of body parts, and the related techniques of radiology, anesthesiology, obstetrics, treatment of lameness, and so on. In most veterinary schools, a clinic is operated to enable students to observe and assist with actual cases of disease or other conditions requiring attention. In both medical and surgical treatment, the same techniques are used as in medical practice on humans. Many veterinarians specialize either in the care of small animals, *i.e.,* pets, or in the care of livestock. A few veterinarians specialize in the care of wild animals held in zoos.

In most countries of the world, professional veterinarians must complete an educational program of from four to six years of work at the university level, after which they must obtain a license to practice from some duly constituted authority. In many countries the degree of doctor of veterinary medicine (D.V.M.) is awarded after successful completion of such a formalized course of study. Veterinary associations exist in practically all countries, their purpose being to advance the standards and improve the services of the profession.

vetiver, also called KHUS-KHUS (*Vetiveria zizanioides*), perennial grass of the family Poaceae, native to tropical Asia and also introduced into the tropics of both hemispheres. Its thick, fragrant roots contain an oil used in perfumes. It is planted as hedges in some areas. In others it has escaped cultivation and become a weed.

Vetravati (river, India): *see* Betwa River.

Veuillot, Louis (b. Oct. 11, 1813, Boynes, France—d. March 7, 1883, Paris), author and leader within France of extreme Ultramontanism, a movement advocating absolute papal supremacy.

Veuillot was uninterested in religion until 1838, when he was converted while on a visit to Rome and immediately became involved in polemics. He became editor of *L'Univers* in 1843, and that newspaper subsequently served as the medium for his Ultramontane campaign. Veuillot quickly became disillusioned with the Second French Republic (1848–52) and was a champion of Emperor Napoleon III and the Second Empire (1852–70) until the emperor threatened Pope Pius IX's temporal sovereignty by his military campaign in Italy (1859). Veuillot's continued opposition to Napoleon's Italian policy eventually led to the suppression of *L'Univers* (1860–67).

Veuillot lived in Rome during the First Vatican Council (1870), which asserted papal infallibility, thus representing a triumph for the Ultramontanists. He subsequently came to regard the restoration of the Bourbons as the best hope of the Roman Catholic church in France. His health failed in 1878, but his influence persisted in the French church until his death. Veuillot was an enemy of all conciliation and compromise, despised industrialism, and hated bourgeois institutions and all that stemmed from the French Revolution. He was a talented writer and was adroit in the manipulation of public opinion. Merciless toward opponents, including all he chose to call liberal Catholics, Veuillot finally drew a rebuke from Pope Pius IX for his "bitter zeal." His *Oeuvres complètes* (1927–38; "Complete Works") include novels, biographies, correspondence, poetry, and polemical writings.

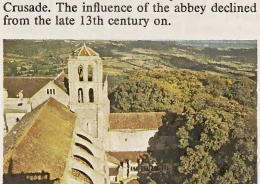
Veurne, French FURNES, municipality, West Flanders *province,* western Belgium. The municipality lies at the junction of four canals, northeast of Dunkerque. It was founded about 870 by Baldwin I Iron-Arm (or Ferreus), first ruler of Flanders. An important town of the Spanish Netherlands, it was often besieged in the 17th century. During World War I, it was the centre of that part of Belgium unoccupied by the Germans.

An agricultural market for the fertile coastal plain of the Veurne-Amblecht Polders (land reclaimed from the sea), Veurne also manufactures bricks and tiles. It is famous for its annual processions of the Holy Cross (in May) and of the Penitents (in July), both dating from medieval times. Historic buildings grouped around the ancient Grote Markt (marketplace) include the 15th-century Gothic-style Spanish Pavilion (until 1586 the town hall), the Meat Market (1615, now a theatre), the 15th-century St. Nicholas Church with its massive tower, the Spanish Guard House (1636), the town hall (1596–1612 and restored in 1880), and St. Walburga's Church (begun 1230–80). Pop. (1993 est.) 11,228.

Veuster, Joseph de: *see* Damien, Father.

Veygoux, Louis-Charles-Antoine Desaix, chevalier de (knight of): *see* Desaix de Veygoux, Louis-Charles-Antoine.

Vézelay, village, Yonne *département,* Bourgogne *région,* north-central France. The village lies on a hill on the left bank of the Cure River. Its history is tied to its great Benedictine abbey, which was founded in the 9th century under the influence of Cluny. After the supposed remains of St. Mary Magdalene were deposited in the abbey for safekeeping from Muslim armies, vast numbers of pilgrims were attracted to the abbey, and a town of about 10,000 inhabitants grew up around it. St. Bernard preached at Vézelay in 1146 before Louis VII in order to inspire the Second Crusade. The influence of the abbey declined from the late 13th century on.



Church of the Madeleine, Vézelay, Fr.
K. Kirshaes—Bruce Coleman Inc.

The great abbey church of the Madeleine, which is one of the largest monastic churches in France, was started at the end of the 11th century. It was restored in the 19th century by Emmanuel Viollet-le-Duc. Nearby, the medieval castle of Bazoches was rebuilt by Sébastien Vauban, who is buried in the local church. The village still has most of its medieval ramparts. Pop. (1990) 575.

VHF, in full VERY HIGH FREQUENCY, conventionally defined portion of the electromagnetic spectrum including any radiation with a wavelength between 1 and 10 metres and a frequency between 300 and 30 megahertz. VHF signals are widely employed for television and radio transmissions. In the United States and Canada, television stations that broadcast on channels 2 through 13 use VHF frequencies, as do FM radio stations. Many amateur radio operators also transmit on frequencies within the VHF band.

VHF waves, unlike longer waves, are not strongly reflected from the atmosphere; therefore, they do not bend readily around the Earth's curvature and cannot be transmitted beyond the horizon. Their range is further limited by their inability to pass through hills or large structures. Accordingly, VHF waves are limited to use in short-range, line-of-sight communications, including radio and television broadcasting, and in electronic navigation systems. They are especially suited to such applications because their reception is not impaired by random electromagnetic noise ("static") of longer wavelengths. Because of their limited transmission range, VHF signals of the same frequency can be used by transmitters several hundred miles apart without interfering with one another. *See also* UHF.

VIA Rail Canada, Inc., Canadian state-owned passenger-railway system. Incorporated in 1977 and established in 1978 as a crown corporation independent of the Canadian National Railway Company and Canadian Pacific Ltd., VIA has gradually assumed full responsibility for managing all the country's rail-passenger services except commuter lines and some small local lines. Headquarters are in Montreal.

After World War II, Canadian rail-passenger service fell off owing to competition from airplanes and automobiles, and much stock became outdated, with service becoming inefficient and costly. VIA was formed in the hope that it would permit economies not possible when the CN and CP railroads ran independent passenger services and would thus reduce the amount of government subsidies needed to support Canada's rail-passenger system. It acquired ownership of all CN and CP passenger locomotives but does not own any track. The government compensates the railroads for the cost of operating VIA trains over their tracks.

Since VIA's inception, the government has ordered significant reductions in its routes and frequency of service, most dramatically in 1990, when its operations were cut by about half.

Viacom Inc., one of the largest and foremost communications and media conglomerates in the United States. The present form of the corporation dates from 1994 when Viacom Inc., which owned radio and television stations and cable television programming services and systems, acquired the entertainment and publishing giant Paramount Communications Inc. and then merged with the video and music retailer Blockbuster Entertainment Corp. Headquarters are in New York City.

Viacom was formed in 1971 by CBS Inc. to operate cable TV systems and to syndicate such popular CBS series as *I Love Lucy* after the Federal Communications Commission prohibited television networks from performing such activities. In 1976 it established the Showtime movie network, and in 1985 it bought the MTV networks, including the music video channels MTV and VH-1 as well as the Nickolodeon channel for children. In 1987 Viacom became a wholly owned subsidiary of the National Amusements Inc. movie theatre chain. It continued to expand, acquiring more radio and television stations, adding cable channels and franchises, and producing films for Showtime and several popular television series for the networks.

In 1994 Viacom acquired Paramount Communications Inc., a media conglomerate that had been founded in 1958 as Gulf + Western Corporation. Among the major businesses Paramount brought to Viacom were Paramount Pictures Corporation, Simon & Schuster, Inc., and Madison Square Garden (later sold by Viacom). Viacom's subsequent merger with Blockbuster added video rental and music retail operations to its considerable film, cable, television, and publishing holdings, making it one of the most diversified entertainment companies in the world.

In 1995 Viacom's Paramount unit and Chris-

Craft Industries launched a new broadcasting network called United Paramount Network.

viaduct, type of long bridge or series of bridges, usually supported by a series of arches or on spans between tall towers. The purpose of a viaduct is to carry a road or railway over water, a valley, or another road. The viaduct is both functionally and etymologically related to the aqueduct, which carries water; both were developed by Roman engineers.

The long spans of Roman viaducts were supported by semicircular arches resting on piers of stone or masonry. A well-preserved example is the span over the Tagus River at Alcantara, Spain (*c.* AD 105). The next advance in viaduct construction did not occur until the late 18th-century development of iron bridges and the 19th-century introduction of steel.

In the early 20th century the spread of reinforced-concrete construction led to the building of concrete arch structures such as the Colorado Street viaduct over the Pasadena Freeway in California (1938). A recent method used on long viaducts is segmental construction. The sections are precast and jacked forward from one end of the viaduct to form the extension.

Viagra: *see* PDE-5 inhibitor.

Viana, Carlos de Aragon, Prince (príncipe) **de,** English CHARLES OF ARAGON (b. May 29, 1421, Penafiel, Aragon [Spain]—d. Sept. 23, 1461, Barcelona), heir apparent to the throne of Navarre (from 1428), who intrigued for both the Navarrese and Aragonese crowns.

The son of the future John II of Aragon and Blanche, daughter of Charles III of Navarre, who succeeded her father in 1425, Carlos was accepted as heir apparent by the Navarrese Cortes. On Blanche's death (1441) her testament was found to direct Carlos not to use the royal titles without his father's consent. John, who regarded his son with jealous animosity, withheld consent, but Carlos, for a time, governed Navarre as viceroy; later, however, John sent his second wife, Juana of Castile, to supervise the Navarrese government (1451), and civil war began between *beaumonteses,* who defended Prince Carlos' rights, and *agramonteses,* supporters of Juana. Defeated and disinherited, Carlos fled to the Neapolitan court of his uncle, Alfonso V of Aragon (1455), devoting himself to literary studies in Messina.

When Alfonso was succeeded in Aragon by John (1458), Carlos obeyed an order to return home and was enthusiastically received by the Catalans, who demanded his formal recognition as heir to the Aragonese throne. The intrigues of Queen Juana on behalf of her own son Ferdinand prevented this, and Carlos was imprisoned by his father (1460). The Catalans then rebelled (February 1461), forcing John II to proclaim Carlos his heir and governor of Catalonia (June). But the prince died, leaving John to cope with a general uprising of the Catalans, who believed—probably without reason—that Carlos had been murdered.

Viana do Castelo, town and capital of Viana do Castelo *concelho* (municipality), northwestern Portugal. It lies at the mouth of the Lima River, north of Porto. Mount Santa Luzia dominates the town, which originated as the Roman Velobriga. An important medieval seaport trading with Genoa and Venice, it subsequently developed as the base for cod-fishing fleets sailing to the Grand Banks of Newfoundland. Notable buildings of Gothic, Renaissance, and Manueline architecture in the town include the Misericórdia Church, Medahões House, and the Convent of São Bento. Local manufactures include carpets, rope, clothing, and flour products. Wine production and fishing are the economic mainstays of the surrounding area. Pop. (2001) town, 15,577; mun., 88,628.

Vianney, Saint Jean-Baptiste-Marie, also called CURÉ D'ARS (b. May 8, 1786, Dardilly, France—d. Aug. 4, 1859, Ars; canonized May 31, 1925; feast day August 4 [formerly August 9]), French priest, the patron saint of parish priests, who was renowned as a confessor and for his supernatural powers.

Because of the French Revolution, Vianney received little education and made his first communion and confession secretly. He was ordained a priest in 1815 and was made assistant priest at Écully, France. In 1818 he became priest of Ars, which he made a model parish and from which reports of his holiness and his supernatural powers soon spread. From 1824 he suffered attacks that he believed were caused by the devil, who allegedly on one occasion set fire to Vianney's bed. By 1827 Ars became a pilgrimage, and, every year from 1845 until Vianney's death, about 20,000 persons visited Ars to see Vianney and especially to make their confession to him.

Viardot, Pauline, in full MICHELLE FERDINANDE PAULINE VIARDOT, *née* GARCÍA (b. July 18, 1821, Paris, France—d. May 18, 1910, Paris), French mezzo-soprano, best known for highly dramatic operatic roles.

As a child Viardot studied piano with Franz Liszt, composition with Anton Reicha, and voice with her mother. She was the sister of Maria Malibran, the celebrated soprano, and of the great voice teacher Manuel García II. Viardot made her concert debut at the age of 15 in Brussels and her operatic debut two years later as Desdemona in Gioacchino Rossini's *Otello* in London. She was noted for her wide vocal range and could sing both soprano and contralto roles. Her greatest successes were in highly dramatic roles, such as Fidès in Giacomo Meyerbeer's *Le Prophète* (1849), which was written for her, and Rachel in Fromental Halévy's *La Juive.* The climax of her career came in 1859 when she performed the title role in Hector Louis Berlioz' re-creation of Christoph Gluck's *Orfeo ed Eurydice* at the Théâtre Lyrique in Paris. She sang for several seasons in the opera in St. Petersburg, Russia, and was one of the first artists to promote Russian music in western Europe. Her thoughtful interpretations earned her a place in Parisian intellectual circles, and Johannes Brahms, Camille Saint-Saëns, Robert Schumann, and Gabriel Fauré all wrote pieces for her. In her later years she taught singing and composed. Her compositions include vocal transcriptions of Frédéric Chopin's mazurkas, songs setting Russian texts, and several operettas, including *Le Dernier Sorcier* (1869; "The Last Sorcerer"), the libretto of which was written by the Russian novelist Ivan Turgenev, who had fallen in love with Viardot when she first performed in Russia in 1843.

Viareggio, town, Lucca *provincia,* Toscana (Tuscany) *regione,* central Italy. It lies along the Ligurian Sea, south of the Apuan Alps, just northwest of Pisa. Sheltered by dense pine woods and possessing a famous 5.5-mile (9-km) beach of fine sand, it is one of Italy's most popular seaside resorts and has a small harbour for yachts and a fishing port.

The body of the English poet Percy Bysshe Shelley was cremated on the beach near Viareggio after he drowned offshore in 1822; he is commemorated in the Piazza Shelley by a bust sculptured by Urbano Lucchesi (1894). At nearby Torre del Lago is the villa of the composer Giacomo Puccini, which is the site of his grave. Pop. (2001) 61,103.

Viatka (Russia): *see* Kirov.

Viau, Théophile de, Viau also spelled VIAUD (b. 1590, Clairac, near Agen, France—d. Sept. 25, 1626, Paris), French poet and dramatist of the pre-Neoclassical period.

Born into a Huguenot family of the minor nobility, Viau went to Paris, where he soon won a reputation as the leader of the free-thinkers (*libertins*). He was briefly house dramatist to the Hôtel de Bourgogne in Paris, writing one important tragedy, *Pyrame et Thisbé* (1623). This period of prosperity ended when he was charged with irreligious activities. He fled, was sentenced in absentia to death, was rearrested, and was finally released in 1625 under sentence of banishment. His health broken, he died soon afterward.

Viau wrote odes and other poems on a wide range of topics. His verse is marked by a strong feeling for nature, great musicality, a use of original and ingenious imagery, and an epicurean outlook that is tempered by apocalyptic visions and the thought of death. He defended spontaneity and inspiration against the set of literary rules laid down by the influential poet François de Malherbe.

Vibo Valentia, Latin HIPPONIUM, town, capital of Vibo Valentia *provincia,* Calabria *regione,* southern Italy. It lies near the Gulf of Sant'Eufemia. It originated as the ancient Greek town of Hipponion and was praised in the 1st century BC by the Roman statesman and author Cicero. There is a museum of Greek antiquities, and ruined Greek walls can be seen outside the town. Another historical name of Vibo Valentia was Monteleone. Rebuilt in the 13th century after destruction by the Arabs, the town was damaged by earthquakes in 1783 and 1905.

Notable buildings include the Church of San Michele, the Baroque cathedral of San Leoluca, and a 13th-century Norman castle used by the Holy Roman emperor Frederick II. Vibo Valentia is now a centre for regional agriculture, with wagon- and tool-making industries and tomato canning. Pop. (2001) 33,957.

Viborg, city, seat of Viborg *amtskommune* (county commune), north-central Jutland, Denmark. It lies northwest of Århus. Originally a centre of pagan worship, Viborg (English: "sacred hill") was a royal town and the early capital of Jutland. According to legend, it was from Viborg that King Canute set out to conquer England. The kings of Denmark were consecrated in Viborg from 1027 onward. The first Danish coins were struck there in the early 11th century, and it became a bishop's see in 1065. After its 12th-century charter was renewed (1440), it was the largest town in Jutland (and was also the starting point of the Reformation in Denmark) until the 17th century. Successive fires accelerated its decline, caused when the political centre of Denmark shifted east. After 1866 reclamation of the surrounding heathland revived the city, which became the seat of the High Court for



Cathedral of Our Lady on the Mount, Viborg, Den.

Jutland in 1919. It is now a commercial centre manufacturing beer, tobacco, textiles, and machinery. Historic buildings include the 12th-century cathedral (rebuilt 1864–76), with frescoes by Joakim Skovgård; the medieval Sondersogns and Asmild churches; the Baroque Town Hall (1728); and the Bishop's Palace (1728).

Viborg *amtskommune,* created in 1970 from the former *amtskommuner* of Viborg and Thisted, lies west of the Djursland peninsula and includes the Salling peninsula, Fur Island, and Mors Island in Lim Fjord, and the Thy peninsula between Lim Fjord and the Skagerrak. The Thy peninsula is a low, wooded region with a smooth dune coast and chalk and limestone quarries. The rest of the county commune is more fertile, supporting mixed farming and dairying. The Dollerup Hills and the Hald Lake National Park lie south of Viborg, and the medieval castle of Spøttrup is on the Salling peninsula. Viborg, Nykøbing Mors, Skive, and Thisted are the principal centres. Area *amtskommune,* 1,592 square miles (4,122 square km). Pop. (1988 est.) city, 28,958; (1990 est.) mun., 39,395; (1990 est.) *amtskommune,* 229,775.

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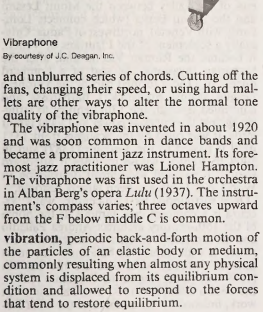
vibraphone, also called VIBRAHARP, percussion instrument that has tuned metal bars and is similar in shape to a xylophone. Felt or wool beaters are used to strike the bars, giving a soft, mellow tone quality. Suspended vertically below each aluminum bar is a tubular, tuned resonator that sustains the tone when the bar is struck. The special feature of the vibraphone, the one that gives the instrument its name, is a set of small, electrically operated fans above the resonators (and below the bars) that cause a vibrato effect by rapidly closing and opening the resonators. A pedal-controlled damper, consisting of a long strip of felt below each row of bars, can silence the bars, permitting the playing of short notes



Vibraphone
By courtesy of J.C. Deagan, Inc.

and unblurred series of chords. Cutting off the fans, changing their speed, or using hard mallets are other ways to alter the normal tone quality of the vibraphone.

The vibraphone was invented in about 1920 and was soon common in dance bands and became a prominent jazz instrument. Its foremost jazz practitioner was Lionel Hampton. The vibraphone was first used in the orchestra in Alban Berg's opera *Lulu* (1937). The instrument's compass varies; three octaves upward from the F below middle C is common.

vibration, periodic back-and-forth motion of the particles of an elastic body or medium, commonly resulting when almost any physical system is displaced from its equilibrium condition and allowed to respond to the forces that tend to restore equilibrium.

Vibrations fall into two categories: free and forced. Free vibrations occur when the system is disturbed momentarily and then allowed to move without restraint. A classic example is provided by a weight suspended from a spring. At equilibrium, the system has minimum energy and the weight is at rest. If the weight is pulled down and released, the system will respond by vibrating vertically.

The vibrations of a spring are of a particularly simple kind known as simple harmonic motion (SHM). This occurs whenever the disturbance to the system is countered by a restoring force that is exactly proportional to the degree of disturbance. In this case, the restoring force is the tension or compression in the spring, which (according to Hooke's law) is proportional to the displacement of the spring. In simple harmonic motion, the periodic oscillations are of the mathematical form called sinusoidal.

Most systems that suffer small disturbances counter them by exerting some form of restoring force. It is frequently a good approximation to suppose that the force is proportional to the disturbance, so that SHM is, in the limiting case of small disturbances, a generic feature of vibrating systems. One characteristic of SHM is that the period of the vibration is independent of its amplitude. Such systems therefore are used in regulating clocks. The oscillation of a pendulum, for instance, approximates SHM if the amplitude is small.

A universal feature of free vibration is damping. All systems are subject to frictional forces, and these steadily sap the energy of the vibrations, causing the amplitude to diminish, usually exponentially. The motion is therefore never precisely sinusoidal. Thus, a swinging pendulum, left undriven, will eventually return to rest at the equilibrium (minimum-energy) position.

Forced vibrations occur if a system is continuously driven by an external agency. A simple example is a child's swing that is pushed on each downswing. Of special interest are systems undergoing SHM and driven by sinusoidal forcing. This leads to the important phenomenon of resonance. Resonance occurs when the driving frequency approaches the natural frequency of free vibrations. The result is a rapid take-up of energy by the vibrating system, with an attendant growth of the vibration amplitude. Ultimately, the growth in amplitude is limited by the presence of damping, but the response can, in practice, be very great. It is said that soldiers marching across a bridge can set up resonant vibrations sufficient to destroy the structure. Similar folklore exists about opera singers shattering wine glasses.

Electric vibrations play an important role in electronics. A circuit containing both inductance and capacitance can support the electrical equivalent of SHM involving sinusoidal current flow. Resonance occurs if the circuit is driven by alternating current that is matched in frequency to that of the free oscillations of the circuit. This is the principle behind tuning. For example, a radio receiver contains a circuit, the natural frequency of which can be varied. When the frequency matches that of the radio transmitter, resonance occurs and a large alternating current of that frequency develops in the circuit. In this way, resonating circuits can be used to filter out one frequency from a mixture.

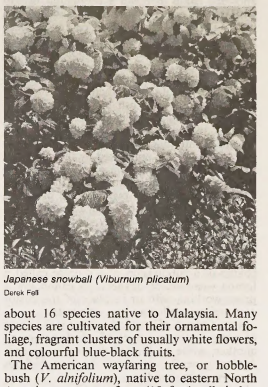
In musical instruments, the motion of strings, membranes, and air columns consists of a superposition of SHM's; in engineering structures, vibrations are a common, though usually undesirable, feature. In many cases, complicated periodic motions can be understood as the superposition of SHM at many different frequencies.

vibrio (genus *Vibrio*), any of a group of comma-shaped bacteria in the family Vibrionaceae. Vibrios are aquatic microorganisms, some species of which cause serious diseases in humans and other animals.

Vibrios are microbiologically characterized as gram-negative, highly motile, facultative anaerobes (not requiring oxygen), with one to three whiplike flagella at one end. Their cells are curved rods 0.5 μm (micrometre; 1 $\mu m = 10^{-6}$ metre) across and 1.5 to 3.0 μm long, single or strung together in S-shapes or spirals.

Two species of vibrio are of significance to humans: *V. cholerae,* which is the cause of cholera, and *V. parahaemolyticus,* the agent of an acute enteritis, or bacterial diarrhea. *V. anguillarum* is found in diseased eels and other fishes.

viburnum (genus *Viburnum*), any of about 200 shrubs and small trees belonging to the family Caprifoliaceae, native to temperate and subtropical Eurasia and North America, with



Japanese snowball (Viburnum plicatum)
Derek Fell

about 16 species native to Malaysia. Many species are cultivated for their ornamental foliage, fragrant clusters of usually white flowers, and colourful blue-black fruits.

The American wayfaring tree, or hobblebush (*V. alnifolium*), native to eastern North America, grows to 3 m (10 feet) tall; it has roundish leaves, with white flower clusters and red berries that turn purple-black at maturity. The wayfaring tree of Europe, *V. lantana,* grows to 5 m (16 feet). The European cranberry, highbush cranberry, or water elder (*V. opulus*), a small tree reaching 4 m (13 feet) is native to northern Europe and North Africa. It has three- to five-lobed, maplelike leaves and round heads of white flowers that are followed by hanging clusters of shiny, bright red, translucent berries. The leaves turn red in autumn. *V. trilobum,* from northern North America, is similar but has short-stalked flowers and three-lobed leaves.

A variety of the European cranberry, *V. opulus* variety *roseum,* is known as snowball, or guelder rose, for its round, roselike heads of sterile florets. Chinese snowball (*V. macrocephalum* variety *sterile*) and Japanese snowball (*V. plicatum*) are common snowball bushes with large balls of white to greenish white flowers. The 4.5-metre- (15-foot-) high black haw (*V. prunifolium*), of eastern North America, has plumlike leaves, small white flower clusters, and blue-black berries.

Other North American species are the southern black haw (*V. rufidulum*), similar but taller; the sheepberry, or nannyberry (*V. lentago*), with finely toothed, oval leaves; and the arrowwood (*V. dentatum*), with roundish to oval, coarsely toothed leaves. Laurustinus (*V. tinus*), a 3-metre-tall evergreen with oblong leaves, is native to the Mediterranean area.

Sweet viburnum (*V. odoratissimum*), from India and Japan, bears dark-green, shiny, evergreen leaves and large clusters of fragrant flowers.

vicar (from Latin *vicarius*, "substitute"), an official acting in some special way for a superior, primarily an ecclesiastical title in the Christian Church. In the Roman Empire as reorganized by Emperor Diocletian (reigned 284–305), the *vicarius* was an important official, and the title remained in use for secular officials in the Middle Ages. In the Roman Catholic Church, "vicar of Christ" became the special designation of the popes starting in the 8th century, and eventually it replaced the older title of "vicar of St. Peter."

In the early church, the name vicar, or legate, was used for the representative of the pope to the Eastern councils. Beginning in the 4th century, vicar of the apostolic see or vicar apostolic came to mean a residential bishop with certain rights of surveillance over neighbouring bishops. By the 13th century a vicar was an emissary sent from Rome to govern a diocese that was without a bishop or in special difficulties. The Roman Catholic Church in England was governed by vicars apostolic from 1685 until 1850 when Pope Pius IX reestablished the English hierarchy. In modern times vicars apostolic are generally titular bishops appointed to rule territories not yet organized into dioceses.

A vicar general is appointed by the bishop as the highest administrative officer of the diocese, with most of the powers of the bishop. The pope governs his own diocese of Rome through a cardinal vicar and a special vicar general for the Vatican City. Vicar general is also the title for some heads of religious orders.

A vicar forane (or rural dean) is a priest in charge of a subdivision of a diocese called a forane vicariate, or deanery. In canon law a priest working with or in place of the pastor of a parish is called a vicar, or curate.

In the Church of England, a vicar is the priest of a parish the revenues of which belong to another, while he himself receives a stipend. A vicar general is employed by some bishops to assist in special duties.

In the Protestant Episcopal Church and in some Lutheran churches, the vicar is an assistant to the pastor.

vice (hand tool): *see* vise.

Vicence, Armand(-Augustin-Louis) de Caulaincourt, duc de (duke of): *see* Caulaincourt, Armand(-Augustin-Louis), marquis de.

Vicente, Gil (b. *c.* 1465, Portugal—d. 1536/37), chief dramatist of Portugal, sometimes called the Portuguese Plautus. He was also a noted lyric poet, in both Portuguese and Spanish.

The record of much of Vicente's life is vague, to the extent that his identity is still uncertain. Some have identified him with a goldsmith of that name at the court of Evora; the goldsmith is mentioned in royal documents from 1509 to 1517 and worked for the widow of King John II, Dona Leonora. Others believe he was the master of rhetoric of the future King Manuel. His first known work was produced June 7, 1502, on the occasion of the birth of the future John III. This was a short play entitled *Monológo del Vaquero* ("The Herdsman's Monologue"), which was presented in Castilian in the apartment of Queen Maria. Later that year he produced for Christmas a longer but equally simple *Auto Pastoril Castelhano* ("Castilian Pastoral Play").

For the next 34 years he was a kind of poet laureate, accompanying the court from Lisbon to Almeirim, Thomar, Coimbra, or Evora and staging his plays to celebrate great events and the solemn occasions of Christmas, Easter, and Holy Thursday. The departure of a Portuguese fleet on the expedition against Azamor in 1513 turned his attention to more national themes; and in the *Auto da Exhortação da Guerra* (1513; "Play of Exhortation to War") and *Auto da Fama* (1515; "Play of Fame"), inspired by the victories of Albuquerque in the East, he wrote fervent patriotic verse. In 1514 he produced the charming *Comédia do Viúvo* ("The Widower's Comedy").

After the death of King Manuel in 1521, Vicente frequently complained of poverty, but he received various pensions in the new reign and enjoyed the personal friendship of King John III.

On the occasion of the departure by sea of King Manuel's daughter Beatriz to wed the duke of Savoy in August 1521, Vicente's *Cortes de Júpiter* ("Jupiter's Courts") was acted in a large room "adorned with tapestry of gold," a fact chronicled by his friend, the poet Garcia de Resende. The *Frágua de Amor* (1524; "The Forge of Love") was also written for a court occasion, the betrothal of King John III to the sister of the Holy Roman emperor Charles V. In the *Auto Pastoril Português* (1523; "Portuguese Pastoral Play"), the farce *Juiz da Beira* (1525; "The Judge of Beira"), the *Tragi-comédia Pastoril da Serra da Estrela* (1527; "The Pastoral Tragicomedy of Serra da Estrela"), and the satirical *Clérigo da Beira* (1529–30; "The Priest of Beira"), he returned to the peasants and shepherds of the Beira mountain country that he knew so intimately.

He devoted himself more and more to the stage and multiplied his output in answer to the critics of Sá de Miranda's school. In 1526 came the *Templo de Apolo* ("The Temple of Apollo"), followed in rapid succession by the biblical play *Breve sumário da história de Deus* ("A Brief Summary of the Story of God"), *Nao de amores* ("The Ship of Love"), *Divisa da Cidade de Coimbra* ("The Coat of Arms of the City of Coimbra"), and *Farsa dos Almocreves* ("The Muleteers' Farce"). These last three plays, with the *Serra da Estrella*, were all produced before the court in 1527 at Lisbon and Coimbra. On the other hand the *Auto da Festa* (1525; "The Festival Play") appears to have been acted in a private house at Evora.

Vicente was now over 60, but he retained his vigour and versatility. The brilliant scenes of two of his last plays, *Romagem de Agravados* (1533) and *Floresta de Enganos* (1536; "The Forest of Lies"), are loosely put together, and may well be earlier work; but the lyrical power of *Triunfo do Inverno* (1529; "The Triumph of Summer") and the long, compact *Amadis de Gaula* (1532) show that he retained his creative powers in his last decade. *Auto da Mofina Mendes* (1534), partly a religious allegory, shows his old lightness of touch and penetrating charm. *Auto da Lusitânia*, which was acted in the presence of the court in 1532, may with some plausibility be identified with the *Caça de Segredos* ("The Hunt for Secrets") at which Vicente tells us he was at work in 1525. It was the last of his plays to be staged at Lisbon in his lifetime; in Lent of 1534, by request of the abbess of the neighbouring convent of Odivelas, he produced there his religious *Auto da Cananéia* ("The Canaanite Play"), but the remainder of his plays were acted before the king and court at Évora; and it was probably at Evora that Vicente died in the year of his last play (1536).

Vicente's 44 plays admirably reflect the change and upheaval of his era in all its splendour and its squalor. Eleven are written exclusively in Spanish, 14 in Portuguese; the rest are multilingual; scraps of church or medical or law Latin, of French and Italian, of the dialect or slang of peasants, gypsies, sailors, fairies, and devils frequently occur. His drama may be divided into religious plays, foreshadowing the Calderon *autos*, court plays, pastoral plays, popular farces, and romantic comedy. They were often elaborately staged: a ship was rowed on the scene, or a tower opened to display some splendid allegory; here too he anticipated the later Spanish drama.

The various plays of the years 1513–19, composed when he was about 50, show Vicente at the height of his genius. He possessed a genuine comic vein, an incomparable lyric gift, and the power of seizing touches of life or literature and transforming them into something new by the magic of his phrase and his satiric force, under which lay a strong moral and patriotic purpose.

Vicente López, *partido* (political subdivision) of Gran (Greater) Buenos Aires, Arg., directly north of the city of Buenos Aires, in Buenos Aires province, on the Río de la Plata estuary. Colonization of the area began with the second and permanent founding of Buenos Aires (1580). The region was called Costa de Monte Grande (later becoming the Pago de Monte Grande in 1730) and included the present *partido* of San Isidro. In 1706, the region became part of the parish of the San Isidro Labrador chapel, which in 1784 became San Isidro *partido*. In 1905 the *partido* of Vicente López was created out of San Isidro territory; its name honours the Argentine historian Vicente López, author of the country's national anthem.

The *partido* covers 15 sq mi (39 sq km) and is bordered by the Río de la Plata (northeast), the national capital (Buenos Aires, southeast), and the *partidos* of General San Martín (southwest) and San Isidro (northwest). Olivos is the *cabecera* (principal built-up area). Other localities are Vicente López, Florida, and Munro. Olivos, Vicente López, and Florida are primarily residential communities with some light industry. Munro has many manufacturing and processing establishments producing textiles, chemicals, lumber, metals, and food. Beach resort facilities are located along the coast of the *partido* in Olivos and Vicente López. The Argentine presidential residence is located in Olivos.

With the growth of the national capital, the *partido* of Vicente López has been absorbed into the north-northwestern suburban area of Gran Buenos Aires. The *partido* experienced most population growth in the 1920s through 1950s. Its population density is the second highest among the *partidos*. Three railway lines cross the *partido*, and the national highway system connects it with Buenos Aires city and other parts of Argentina. Pop. (1980) 291,072.

Vicenza, Latin VICETIA, city, episcopal see, and capital of Vicenza province, Veneto region, northern Italy, traversed by the Bacchiglione and Retrone rivers, at the eastern end of the valley between the Monti Lessini and the Monti Berici (which connects Lombardy with Veneto), northwest of Padua. Originally a settlement of the Ligurians or Veneti, it became the Roman Vicetia and, after the barbarian invasions, the seat of a Lombard duchy. In 1164 it formed part of the Veronese League against Frederick I Barbarossa and continued through the 13th century to struggle against the imperial power and local tyrant lords. It was ruled by the Scaligers from 1311 until it passed to the Visconti (1387) and in 1404 to Venice, whose fortunes it afterward shared. It suffered widespread destruction in World War II but has been largely restored.

Once surrounded by 13th-century walls, Vicenza is a compact city, famous as the home of the 16th-century architect Andrea Palladio and his successor Vincenzo Scamozzi, who enriched it with numerous buildings. The most notable Palladian structures are the Basilica (1549–1614); the Loggia del Capitanio (1571); the Teatro Olimpico (1580–84), Palladio's last work, finished by Scamozzi; and the Villa Ro-



Loggia del Capitanio, a gallery designed by Andrea Palladio, Vicenza, Italy
SCALA—Art Resource

tonda (1553–89), also completed by Scamozzi (1599). Palladio's Palazzo Chiericati (1551–57) houses the city art museum, which contains works by northern Italian painters. Earlier churches include the Gothic cathedral (13th century, rebuilt since 1944), Santa Corona (1260, restored), San Lorenzo (13th century), and SS. Felice e Fortunato (nucleus 4th century, with major restorations of the 10th–12th century). The Basilica of Monte Berico (rebuilt 1687–1702) and the Villa Valmarana (1669) stand outside the city.

The economic and communications centre of its province, Vicenza has engineering, food-processing, chemical, textile, and timber industries. Vicenza was designated a World Heritage Site in 1994. Pop. (1994 est.) mun., 108,013.

viceroy, one who rules a country or province as the representative of his sovereign or king and who is empowered to act in the sovereign's name. Viceroy (*virrey*) was the title given to the principal governors of Spain's American colonies, as well as to the governors of the "kingdoms" (*reinos*) of peninsular Spain proper (*e.g.*, Aragon, Valencia).

In the early 16th century the great viceroyalties of New Spain (Mexico) and Peru were instituted; two more—New Granada and Río de la Plata—were created in South America in the 18th century. The viceroys were appointed by the king of Spain and the Council of the Indies from among noble Spanish families. Their official powers and duties were extensive: the collection and augmentation of royal revenues, the nomination of lesser colonial officials (both civil and ecclesiastical), the enforcement of the laws, the protection of the Indians and their conversion to Christianity, and, until the 18th century, the grant of encomiendas (grants of Indians for labour and tribute to certain colonists).

The powers of the viceroys were subject to various limitations: other important colonial officials were also crown-appointed and could thwart them by dealing directly with Madrid. Moreover, the home government's minute regulations on every aspect of colonial administration (though they were often ignored) tended to allow little discretionary power. The audiencia, a court that shared the viceroy's administrative responsibilities, often used its power to obstruct him. The viceroy's princely salary was supposed to prevent corruption, and commercial dealings were forbidden to him. Before laying down his office he was required to report to the king the principal deeds and events of his administration, which was also subjected to a judicial review (residencia).

In Brazil, the captain general, who occupied a position similar to the Spanish viceroys, was styled viceroy from the mid-17th century. From the 14th century the governors appointed by the English crown to rule in Ireland were called viceroys; and between 1858 and 1935 the title was applied to the British governor-general of India.

Viceroyalty of ———: *see under* substantive word (*e.g.*, Peru, Viceroyalty of).

Vich, city, Barcelona *provincia,* in the *comunidad autónoma* ("autonomous community") of Catalonia, northeastern Spain. The city is situated on the Vich Plain and lies along the Meder River, which is an affluent of the Ter River. Because it was first inhabited by the Ausetanos, an ancient Iberian tribe, it was called Ausa. It was Romanized in the 2nd century and took the name Vicus Ausonensis (Ausona) in the 5th century. In 826 it was destroyed by Arab invaders who rebuilt it as Vich in 885.

The city has a restored Roman temple and a Neoclassical cathedral. The latter, founded in 1040 and reconstructed in the period 1780–1803, is notable for the wall paintings of José María Sert y Badía, whose earlier series were destroyed in 1936 when the building was sacked during the Spanish Civil War. The city is a meat-processing and dairy centre that also produces cereals, textiles, and dyes. Pop. (1991 prelim.) 28,289.

Vichada, *departamento,* eastern Colombia. It lies in the Llanos (plains) of the Orinoco River basin and is bounded north and east by Venezuela and south by the Guaviare River. It is drained by several navigable tributaries of the Orinoco River, including the Meta (along the southern border), Vichada, and Guaviare. As elsewhere in the Llanos, cattle raising is a dominant economic activity. There is also some fishing and hunting and gathering. The only major road roughly parallels the Meta River from Villavicencio, in Meta *departamento,* to the departmental capital of Puerto Carreño (*q.v.*), on the Orinoco, the eastern border of the *departamento.* Most travel, however, is by river or by air. Area 38,703 square miles (100,242 square km). Pop. (1995 est.) 19,673.

Vichy, town, Allier *département,* Auvergne *région,* central France. It lies on the east bank of the Allier River. Vichy is the chief spa of France. The town, largely modern and with a profusion of hotels, is separated from the river by parks surrounding the two extensive bathing establishments.

Known to the Romans as Vicus Calidus, Vichy acquired fame for its alkaline springs in the 17th century. The families of successive French kings set the pattern of visits kept up by Napoleon III in the 19th century. In the 20th century the number of visitors grew to more than 130,000 a year. Following the Franco-German Armistice in 1940, it was at Vichy that Marshal Philippe Pétain set up his collaborationist government, known thereafter as the Vichy government. Present-day Vichy exports its bottled waters throughout the world. The town has a modern sports facility, together with the existing bathing establishment. Pop. (1990) 28,048.

Vichy-Chamrond, Marie de: *see* Deffand, Marie de Vichy-Chamrond, marquise du.

Vichy France, formally FRENCH STATE, French ÉTAT FRANÇAIS (July 1940–September 1944), France under the regime of Marshal Philippe Pétain from the Nazi German defeat of France to the Allied liberation in World War II.

The Franco-German Armistice of June 22, 1940, divided France into two zones, one to be under German military occupation, one to be left to the French in full sovereignty, at least nominally. The unoccupied zone comprised the southeastern two-fifths of the country, from the Swiss frontier near Geneva to a point 12 miles (19 km) east of Tours and thence southwest to the Spanish frontier, 30 miles (48 km) from the Bay of Biscay.

Pierre Laval joined the government the day after the armistice was signed and became the main architect of the Vichy regime. It was he who on July 10, 1940, persuaded the National Assembly (summoned at Vichy to ratify the armistice) to grant Pétain authority to promulgate a new constitution (569 votes in favour, 80 against, 18 abstentions), so that Pétain was able, the next day, to assume in his own name full legislative and executive powers in the "French State." The Vichy governments in fact survived for four years by never promulgating a new constitution. Their policy changed in tune with the fortunes of the war. When close collaboration with the Germans proved impracticable, a plot was formed at Vichy against Laval, who fell from power in December 1940 and was succeeded as premier by Pierre Étienne Flandin and then by Admiral Jean Darlan. Backed by Charles Maurras's *Action française* (a newspaper that advocated traditionalist, semiroyalist doctrines), Pétain and Darlan embarked on a period of *attentisme* ("wait and see") in their dealings with Germany. Vichy became, at least superficially, a corporative state. The republican slogan of "Liberty, Equality, Fraternity" was replaced by "Work, Family, Fatherland." A labour charter was passed, and there was much talk of a Pétainist "national revolution."

In April 1942 Laval returned to power and contrived to convince the Germans that they could get more active collaboration from him. Germany was now engaged in massive war with the Soviet Union and with the United States and needed greater security in western Europe. But six months later the whole basis of Vichy's position was transformed. U.S. and British forces landed in North Africa; the main units of the French fleet were scuttled by their crews at Toulon; and on Nov. 11, 1942, Germany occupied the whole of France and disbanded the "armistice army" of Vichy.

Henceforth, Vichy had no assets with which to bargain, with the exception of the cult of loyalty to Pétain (which still kept some Frenchmen obedient to the armistice) and the cleverness of Laval. It became increasingly a tool of German policy and, by January 1944, included extreme collaborators such as the National Socialist Marcel Déat. Darlan was assassinated in December 1942 in Algiers.

Meanwhile, the Resistance movements against both Vichy and the Germans grew rapidly in strength and significance as large numbers of young men fled to the hills and open country to escape the German forced-labour laws. Living as outlaws in the countryside and aided by the country people and by supplies dropped by aircraft from Great Britain, they harassed German communications and transport in preparation for Allied landings. The six months preceding the Normandy Invasion were a period of civil war in France between the members of the Resistance and the German Gestapo (secret police) aided by Vichy militias. When the provisional government of Charles de Gaulle moved to France after the Allied invasion of Normandy, it took over from a fascist regime in utter collapse. In September 1944, after the liberation of Paris, the new government declared Pétain's French State abolished, together with all its laws.

Laval fled to Germany and Austria but was captured and returned to France, where he was tried and executed (1945). Pétain, abducted to Germany, voluntarily returned to France for trial and was convicted; his death sentence, however, was commuted by de Gaulle

to solitary confinement for life, and he died in prison (1951).

Vickery, Howard Leroy (b. April 20, 1892, Bellevue, Ohio, U.S.—d. March 21, 1946, Palm Springs, Calif.), U.S. naval officer and outstanding merchant shipbuilder of World War II.

Vickery graduated from the U.S. Naval Academy, Annapolis, Md., in 1915 and became assistant to the chairman of the U.S. Maritime Commission in 1937. He was appointed a commissioner in 1940 and vice chairman of the commission in 1942, the year he became a rear admiral. Under his leadership, more than 5,500 oceangoing ships were built, an unprecedented production record and a contributing factor in winning World War II despite shipping losses inflicted by German submarines. In 1944 he was made a vice admiral.

Vickrey, William, in full WILLIAM SPENCER VICKREY (b. June 21, 1914, Victoria, B.C., Can.—d. Oct. 11, 1996, Harrison, N.Y., U.S.), Canadian-born economist who was credited with innovations in the analysis of the problems of incomplete, or asymmetrical, information. He shared the 1996 Nobel Prize for Economic Sciences with James A. Mirrlees of Great Britain.

Vickrey's family moved to New York when he was only three months old. He was educated at Yale University (B.S., 1935) and Columbia University (M.A., 1937; Ph.D., 1947), where he taught throughout his career.

Vickrey had a keen interest in human welfare and often chose projects that had practical applications. His studies of traffic congestion concluded that pricing on commuter trains and toll roads should vary according to usage, with higher fees during peak-use periods. This congestion pricing was later adopted by electric and telephone utilities and airlines.

In naming him for the 1996 Nobel Prize, the selection committee specifically cited his novel approach to auctioneering (now known as a Vickrey auction), which, through sealed bidding, awards the auctioned item to the highest bidder but at the sum bid by the second-highest bidder. According to Vickrey, in guaranteeing the lower price, both buyers and sellers benefit from bids that more accurately reflect the value of the item.

Vicksburg, city, seat (1817) of Warren county, western Mississippi, U.S. It lies on the Mississippi River, at the mouth of the Yazoo, 44 miles (77 km) west of Jackson. Frenchmen settled there in 1718 and built Fort-Saint-Pierre (1719) on the high bluffs, but the settlement was wiped out by Indians 10 years later. A military outpost established on the site by Spaniards in 1790 was known as Nogales, later called Walnut Hills. A sprawling community developed, which was incorporated in 1825 and named for the Reverend Newitt Vick, a Methodist minister. The settlement prospered as a shipping point. Because of its strategic location, Vicksburg was besieged for 47 days during General Ulysses S. Grant's campaign for control of the Mississippi River in the American Civil War, before surrendering on July 4, 1863. The Old Courthouse (1858) is now a museum displaying Confederate and antebellum Americana.

Vicksburg is now a major tourist spot and a shipping centre for cotton, livestock, lumber, and paper products. Manufactures include wood products, chemicals, light fixtures, prefabricated housing, petroleum products, and fabricated metal products, and there are boat-building yards.

The Vicksburg National Military Park and Cemetery (2.7 square miles) partially encircle the city. The U.S. Army Engineer Waterways Experiment Station is nearby. Pop. (1994 est.) 28,122.

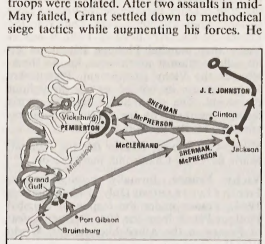
Vicksburg Campaign (1862–63), in the American Civil War, the campaign by Union forces to take the Confederate stronghold of Vicksburg, Miss., which lay on the east bank of the Mississippi River, halfway between Memphis (north) and New Orleans (south). The capture of Vicksburg divided the Confederacy and proved the military genius of Union General Ulysses S. Grant.

After the spring of 1862, when the Confederates lost Fort Henry, Fort Donelson, and Memphis in Tennessee and New Orleans in Louisiana, Vicksburg became the key remaining point of their defense of the Mississippi River. The capture of Vicksburg would yield the North control of the entire course of the river, and thus enable it to isolate those Confederate states that lay west of the river from those in the east. Vicksburg was ideally suited for defensive purposes, however; it was situated on high bluffs along the river and was protected on the north by a maze of swampy bayous. The Confederates' batteries on the bluffs could outgun any Union ships on the river.

A Union naval expedition using ironclads (May–June 1862) to subdue the Confederate batteries failed, as did an attempt to take the city by land from the north by General William Tecumseh Sherman (December 1862) and an attempt by Grant to cut a canal around Vicksburg that would divert the river (February–March 1863). After this string of frustrating failures, Grant conceived a bold move that would enable him to take the city using the high-ground approaches from the east, well behind Confederate lines. Moving his army of 40,000 troops to the west bank of the Mississippi, he marched south along it for a considerable distance until he could recross the river at Bruinsburg, which lay about 30 miles (48 km) south of Vicksburg. His army recrossed to the east bank of the river by means of a Union fleet, which, under the command of Admiral David D. Porter, had run south past the batteries at Vicksburg. Once across the river, Grant quickly began moving northeast, though this meant abandoning his already tenuous supply lines and feeding his troops off the surrounding enemy countryside. His forces took Port Gibson on May 2, reached Grand Gulf on May 3, and prevented the small Confederate army of General Joseph E. Johnston near Jackson from linking up with the Vicksburg forces.

Vicksburg's commander, General John C. Pemberton, led his forces out in an effort to link up with Johnston but met Grant moving westward and was forced to return to the city. On May 18 Grant arrived in the rear of Vicksburg, within which Pemberton's 30,000 troops were isolated. After two assaults in mid-May failed, Grant settled down to methodical siege tactics while augmenting his forces. He controlled all the approaches to the city, and by early June the Confederate garrison was desperately short of ammunition and on the brink of starvation. Pemberton surrendered the city on July 4.

The surrender of Vicksburg, with the victory at the Battle of Gettysburg the previous day (July 3), greatly heartened the North and in fact marked the turning point of the war.



The Vicksburg Campaign, movements in April–May 1863

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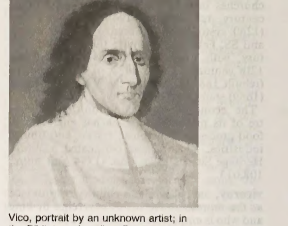
Vico, Giambattista (b. June 23, 1668, Naples [Italy]—d. Jan. 23, 1744, Naples), Italian philosopher of cultural history and law, who is recognized today as a forerunner of cultural anthropology, or ethnology. He attempted, especially in his major work, the *Scienza nuova* (1725; "New Science"), to bring about the convergence of history, from the one side, and the more systematic social sciences, from the other, so that their interpenetration could form a single science of humanity.

Early life and career. Vico was the son of a poor bookseller. He attended various schools, including a Jesuit college, for short periods but was largely self-taught. He had to study by candlelight in a miserable room crowded with a large family. He often skipped his classes, because his mediocre teachers could offer him nothing more than an arid Scholasticism, the



Vico, portrait by an unknown artist; in the Biblioteca Angelica, Rome

By courtesy of the Biblioteca Angelica, Rome

system of Western Christian philosophy that flourished from the 11th to the 15th century but had declined greatly by the time of Vico. In fact, personal experience, rather than reading, was the primary source of Vico's unique genius, although his reading was extensive, varied, and always distinguished by a personal interpretation.

In the course of his reading Vico encountered his first master, the Greek philosopher Plato. A critical spirit quickly intervened, and he turned to Tacitus, a Roman historian, and to Machiavelli, an Italian statesman and political philosopher, who portrayed men not as they should be but as they unfortunately are. Thus, contrasts soon became an important element in his thought: between nature and spirit; between the body, as "this sombre prison," and the soul; between the high aspirations of the imprisoned soul and the fall that awaits it when it yields to the desires of the senses.

Vico's thought became increasingly independent, and he preferred to meditate in solitude; but, at the same time, he frequented the fashionable salons, where he met several scholars of the time, such as Thomas Corneille, a French dramatist, and Giovanni Mario Crescimbeni, a literary historian, with whom he debated. Gradually, this circle of scholars became attracted by the ideas of René Descartes, Benedict de Spinoza, and John Locke, which were penetrating Naples at the end of the 17th century. Although Vico was distantly involved in the controversies, he continued to depend more upon the course of his own self-instruction.

Following an attack of typhus, Vico left

Naples and accepted a tutoring position in the home of the Duca della Rocca at Vatolla, south of Salerno, where he wrote his most authentic, and most despondent, poetry. There, secretly infatuated with his pupil, the young Giulia della Rocca, he discovered the pain of "social barriers"—barriers that were insuperable, because they were the vestige of entrenched ancient structures. Giulia, who admired Vico, died at the age of 22, shortly after her marriage to a young man "of her sphere." Although Vico always had a longing for a peaceful world, he felt that the discord that governs the individual spreads and that history itself only partially obeys the designs of Providence.

After his return to Naples, Vico found the next few years less difficult. He recovered from his ill-fated passion and in December 1699 married a childhood friend, Teresa Destito, who was well intentioned but almost illiterate and incapable of understanding him. In the same year he obtained a chair of rhetoric at the University of Naples. One of the duties of the professor of rhetoric was to open the academic year with a Latin oration, and Vico carried out this responsibility by giving the introductory lectures between 1699 and 1708. The last one, printed in 1709 under the title *De Nostri Temporis Studiorum Ratione* ("On the Method of the Studies of Our Time"), is rich with his reflections about pedagogical methods. This work was followed almost immediately by the publication of Vico's great metaphysical essay *De Antiquissima Italorum Sapientia* ("On the Ancient Wisdom of the Italians"), which was a refutation of the Rationalistic system of Descartes.

This tranquil interval, during which he brought his aging father to live with him, did not last. Three of his eight children died at an early age, and another, Ignazio, caused his parents grave anxiety and was even imprisoned for his debts. Vico was also disappointed in his own career, which had initially appeared promising. He failed to obtain the more prestigious and better paid chair of law that he actively sought. When a notice contemptuous of his work appeared in one of the scholarly publications, his fiery temper was sparked, and he wrote his pamphlet "Vici Vindiciae" ("The Vindications of Vico") in reply. It was distressing for him to see so many mediocre thinkers favoured and to be unable to ensure publication of his most important work.

Period of the "Scienza Nuova." The outline of the work that he planned to call *Scienza nuova* first appeared in 1720–21 in a two-volume legal treatise on the "Universal Law." The outline was written in Latin and appeared in a chapter entitled "Nova Scientia Tentatur" ("The New Science Is Attempted"). The ideas outlined here were to be fully developed in a version that the powerful cardinal Corsini, the future pope Clement XII, agreed to sponsor. According to contemporary practice, this meant that he would assume the costs of publication. At the last moment the Cardinal withdrew, pleading financial difficulties. It is probable, however, that the Cardinal was alarmed by certain of Vico's propositions, which were bold for that period, such as the notion that human society went through a "bestial" stage and that it is possible for society to revert to this primitive barbarism in which men possess only an obscure form of reason.

According to his autobiography, since he lacked money to publish the full text of his work, Vico sold the only jewel he possessed—a family ring—and reduced his book by two-thirds. It appeared in 1725 under the title *Scienza nuova* but was unsuccessful. Vico complained bitterly of the virtually universal indifference that his masterpiece evoked. He quickly regained his confidence, however, and returned to his work with energy. His mind was crowded with ideas, but ordering and systematizing them was a trying task for him. He thought as a poet, not as a dialectician. Nevertheless, he began a total revision and restructuring of his work.

In his autobiography Vico revealed that a vain hope had been born in him when Jean Leclerc, an encyclopaedist and one of the greatest scholars of the time, had written to him from Amsterdam in 1722 asking for information about him. Vico had sent his two-volume legal treatise to him, and Leclerc had devoted 17 two-column pages in the 1722 edition of his *Bibliothèque ancienne et moderne* ("Ancient and Modern Library") to Vico. This, however, was a trifle in comparison with the 70 pages devoted to Paola Mattia Doria, a friend of Vico from the salons of Naples. His hope was further betrayed when the *Scienza nuova* was not mentioned in subsequent volumes of the celebrated *Bibliothèque*.

Vico's effort to restructure his masterpiece was completed as the second edition of the *Scienza nuova.* It was actually the fourth edition, if the outline contained in the legal treatise and the "fragments" written between 1729 and 1732 are taken into account. The definitive edition that appeared posthumously in 1744, however, was marked *terza impressione* ("third edition") and was conceived according to a very different and greatly revised plan.

Vico's contemporaries portray him, in his old age, awakening intermittently from his exhaustion to dash off prophetic lines or to comment on a text from some classical author for the few pupils remaining to him. He found satisfaction in the fact that his eldest son, Gennaro, succeeded him in his chair at the university. Surrounded by the three survivors of his once numerous family (Ignazio had died shortly after his release from prison), Vico died. Since the stairway of his house was too narrow to permit passage of his coffin, it had to be lowered through a window, and then it was unceremoniously borne to the church of the Oratorian priests, where his remains are still kept.

Vico's vision. Vico had his own vision of man and the universe, and, in a time when the deductive method brought into fashion by Descartes was much employed, he posed the modern problem of sense: the sense of life and of history. He discovered the irrational, the small flame that at certain times grows imperceptibly in the heart of reason. His philosophy recognized the aspirations of humanity, its obsessions and dreams, its precarious achievements, and its frustrations and defeats. He described human societies as passing through stages of growth and decay. The first is a "bestial" condition, from which emerges "the age of the gods," in which man is ruled by fear of the supernatural. "The age of heroes" is the consequence of alliances formed by these leaders to protect against internal dissent and external attack; in this stage, society is rigidly divided into patricians and plebeians. "The age of men" follows, as the result of class conflict in which the plebeians achieve equal rights, but this stage encounters the problems of corruption, dissolution, and a possible reversion to primitive barbarism. Vico affirmed that Providence must right the course of history so that humanity is not engulfed in successive cataclysms.

According to Vico, the origin of unequal social classes, which often retain the rigidity of primitive castes, must be attributed to imperfect forms of religion, not to technological progress. All of Vico's anthropology is based on the affirmation of the absolute primacy of religion, which was no doubt suggested to him by the thought of Giovanni Pico della Mirandola, an Italian Renaissance philosopher. Vico observed that three principles are dominant in the birth and regeneration of nations: "All the people have a religion; official marriages are celebrated among them; and the burial of the dead is a properly human and universal custom." Modesty and piety are the basic moral sentiments, the pillars on which the family is built. When they crumble, the descent toward the bestial state of man accelerates. Without expressly saying so, Vico thought that the degeneration that struck down the idolatrous religions of ancient times could even overtake what for him was the true religion—Christianity, which had established monasteries as refuges from the world and had secured the purity of sentiments and morals.

A second basic notion of Vico is that man has a mixed nature: he remains closer to the beast than to the angel. For Vico the second stage of barbarism, which closes the age of men, arises from an excess of reflection or from the predominance of technology. This stage heralds an imminent new beginning of history. The fundamental perversity of the second stage of barbarism makes it, in fact, more dangerous than the first, which in its excess of strength contains noble impulses that need only to be brought under control. Man becomes a coward, an unbeliever, and an informer, hiding his evil intentions behind "flattery and hypocritical wheedling." Families live huddled together in tentacled cities, veritable "deserts of souls." These degenerate peoples do not hesitate to rush into the worst of slaveries to find shelter and protection. Money becomes the only value. This dissolution from the age of men to the bestial state exposes humanity to a fate far worse than arrests or regressions of civilizations. Vico hoped to serve warning to men of the evils that could overtake them if they became worshippers of a materialist ideology or the servants of a science uninformed by conscience.

Influence. Johann Wolfgang von Goethe, the great German writer, received a copy of the second edition of *Scienza nuova* from an enthusiastic student of Vico whom he visited in Naples in 1787. In an article published that same year, Goethe spoke of the dead writer whose "wisdom is now endlessly praised by Italian legal writers." He said that the work had been handed to him "as though it were a sacred thing" and that it contained "prophetic insights on the subject of the good and the just that we shall or must attain in the future, insights based on sober meditation about life and about the future." Convinced by the strength of Vico's demonstration, Goethe henceforth believed that the evolution of humanity should be represented not by a continually ascending line but by a spiral. Nevertheless, it appears that Vico's work was not widely read during the 18th century.

In the 19th century, Jules Michelet, a great nationalist and romantic historian of France, called Vico "his own Prometheus," his intellectual forerunner. Michelet eventually abandoned the idea of recourse to Providence but continued to cite Virgil and Vico as his authorities. Auguste Comte, the French Positivist philosopher, hailed Vico as an influence in the formulation of his law of the three states, or ages, of mankind. Karl Marx, who developed an economic interpretation of history, owed a great deal more to Vico than he himself acknowledged; in fact, there was a close relationship of dependence. They were separated, however, by their major difference over religion. Today, many scholars see in Vico the forerunner of the sciences of anthropology and ethnology. In fact, in recent times, despite the obscurity of his style, Vico has been increasingly recognized as one of the important figures in European intellectual history, and *Scienza nuova* has been accepted as one of the landmark works in that history.

(J.C.-R.)

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Victor, name of popes and antipopes, grouped below chronologically and indicated by the symbol •.

• **Victor I,** SAINT (b. Africa—d. 199, Rome?; feast day July 28), pope from about 189 to 199.

After succeeding St. Eleutherius in 189, Victor tried to assert Roman authority in the early Christian church. Most notably, he tried to sanction the Roman date for Easter over that celebrated by the Quartodecimans of Asia Minor, who kept the holiday on 14 Nisan rather than on the following Sunday. Victor threatened Polycrates (the bishop of Ephesus) and other bishops of Asia Minor with excommunication if they did not abandon their practice, and when they defied him he went through the motions of carrying out the sentence. The sentence was apparently withdrawn later, since the Asian churches remained in communion with Rome, and Quartodeciman practices in fact continued in Asia Minor for several centuries. Still, Victor's threat was reputedly the first papal act to influence the ecclesiastical affairs of the Eastern patriarchs.

Under Victor, Latin replaced Greek as the official language of the Roman church, and Victor himself wrote in Latin. In addition to settling the Easter controversy, he held a number of synods at Rome to deal with the dynamic monarchian heresy of the Byzantine merchant Theodotus, whom Victor excommunicated for teaching that Jesus was a normal human being until his Baptism, when the divine power (*dynamis*) descended upon him. Victor's actions were more characteristic of a pope than those of preceding bishops of Rome.

• **Victor II,** original name GEBHARD OF DOLLNSTEIN-HIRSCHBERG (b. *c.* 1018, Swabia—d. July 28, 1057, Arezzo, Tuscany [Italy]), pope from 1055 to 1057.

Victor was of noble birth and was appointed bishop of Eichstätt in 1042. He eventually became chief adviser to the Holy Roman emperor Henry III, who in 1054 nominated him as Pope St. Leo IX's successor. After his consecration on April 13, 1055, Victor joined Henry at Florence. There, in June, they held a council that condemned clerical marriages and simony. In similar synods at Lyon (1055) and Toulouse (1056), he expanded his clerical reform.

In 1056 he was summoned to the imperial court in Germany to attend Henry's death (October 5). As guardian of the emperor's infant son, Henry IV, and as adviser to the empress regent Agnes, Victor wielded enormous power, which he employed tactfully to maintain peace throughout the empire and to strengthen the papacy against baronial aggressions.

• **Victor III,** BLESSED, original name DAUFERI, Benedictine name DESIDERIUS (b. 1027, Benevento, principality of Benevento [Italy]—d. Sept. 16, 1087, Montecassino, principality of Capua; beatified July 23, 1887; feast day September 16), pope from 1086 to 1087.

Of noble birth, Dauferi entered the Benedictine monastery of Montecassino, where he changed his name to Desiderius and where in 1058 he succeeded Pope Stephen IX (X) as abbot. His rule at Montecassino marks the monastery's golden age, for he promoted writing and manuscript illumination, established an important school of mosaic, and radically reconstructed the abbey, considered a major event in the history of Italian architecture. He was made cardinal priest by Pope Nicholas II in 1059 and papal vicar in southern Italy, where he negotiated peace between the Normans and the papacy.

Favoured by the cardinals and his predecessor, St. Gregory VII, Desiderius was chosen pope, but he declined the office, and the year 1085 passed without an election. On May 24, 1086, the cardinals proclaimed him pope against his will, but before his consecration was completed, he was driven from Rome by supporters of the Holy Roman emperor Henry IV, who had set up the antipope Clement III in 1084. Victor retired to Montecassino.

In March 1087 Victor convened a synod at Capua and resumed his papal authority. He received belated consecration in St. Peter's, Rome, on May 9, but imperial support for Clement made it impossible for Victor to spend more than a few weeks in the city. He dispatched an army to Tunis, where it defeated the Saracens and compelled them to pay tribute to Rome. In August 1087 he held at Benevento a synod that excommunicated Clement; banned Hugues of Die, archbishop of Lyon, and Abbot Richard of Marseille as schismatics; and condemned lay investiture. Falling ill at the synod, Victor returned to Montecassino, where he died.

• **Victor (IV),** original name GREGORY CONTI (fl. 12th century), antipope from March to May 29, 1138. He was a cardinal when chosen pope by a faction opposing Pope Innocent II and led by King Roger II of Sicily and the powerful Pierleoni family.

Victor succeeded the antipope Anacletus II (Pietro Pierleoni), but the renowned mystic abbot St. Bernard of Clairvaux influenced him to reconcile with Innocent. He submitted at Rome on May 29.

• **Victor (IV),** original name OTTAVIANO DE MONTICELLO (d. April 20, 1164, Lucca, Tuscany [Italy]), antipope from 1159 to 1164, the first of four antipopes established against Pope Alexander III by the Holy Roman emperor Frederick I Barbarossa. (In adopting his papal name, he ignored the antipope Victor of 1138.)

Made cardinal by Pope Innocent II in 1138, he was elected by a minority of cardinals in September 1159, while, concurrently, a majority elected Alexander as Adrian IV's successor. After a scandalous scene between Victor and Alexander, Victor's armed supporters burst into St. Peter's, Rome, and enthroned him, forcing Alexander to withdraw.

Frederick, as protector of the church, attempted to solve the schism both through diplomacy and by convening the Council of Pavia in 1160 to obtain ecclesiastical endorsement for Victor. Europe, however, rejected any revival of imperial control over the papacy. Even in Germany some clergy remained loyal to Alexander. Victor never received much support and anathematized Alexander, who excommunicated Frederick for convoking the council. Victor was succeeded by the antipope Paschal III.

Victor, Claude: *see* Victor-Perrin, Claude.

Victor, Geraldo Bessa: *see* Bessa Victor, Geraldo.

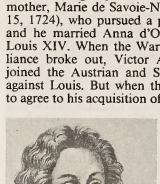
Victor Amadeus, Italian VITTORIO AMEDEO, name of dukes of Savoy and kings of Sardinia, grouped below chronologically and indicated by the symbol •.

• **Victor Amadeus I** (b. May 8, 1587, Turin, Savoy [Italy]—d. Oct. 7, 1637), duke of Savoy from 1630 to 1637, son of Charles Emmanuel I.

The French were again occupying Savoy when his father died in 1630, but by an alliance with France (his wife Christine was a daughter of King Henry IV), Victor Amadeus managed to recover Savoy and obtain one-third of Montferrat by the Treaty of Cherasco (1631). At the same time, he had to yield the Piedmontese fortress of Pinerolo to the French, who thereby held a threat of domination over Savoy for 65 years. Victor Amadeus was a wise and popular ruler. His eldest son, Francis Hyacinth (Francesco Giacinto), a minor, died within a year of his own death, and his second son, Charles Emmanuel II, also a minor, remained long under the regency of his mother during a period of civil war.

• **Victor Amadeus II** (b. May 14, 1666, Turin, Savoy [Italy]—d. Oct. 31, 1732, Moncalieri, near Turin), duke of Savoy who through his diplomacy became the first king of Sardinia-Piedmont and thus established the foundation for the future Italian national state.

Victor Amadeus grew up under the protection of a regency that was headed by his mother, Marie de Savoie-Nemours (d. March 15, 1724), who pursued a pro-French policy; and he married Anna d'Orléans, a niece of Louis XIV. When the War of the Grand Alliance broke out, Victor Amadeus in 1690 joined the Austrian and Spanish Habsburgs against Louis. But when the Spanish refused to agree to his acquisition of Milan, he made a



Victor Amadeus II, detail of a lithograph

By courtesy of the Museo Centrale del Risorgimento, Rome

separate peace with France that was distinctly favourable to his interests. In the next war, that of the Spanish Succession, he began on the French side, but in 1703 he changed to the Habsburg side. The French defeat at Turin (1706) secured his position in Italy; and the Treaty of Utrecht (1713) gave him the royal title as king of Sicily. The Quadruple Alliance of 1718 obliged Victor Amadeus to accept the offer of Sardinia as a kingdom instead of Sicily, and he effectively became king of Sardinia in 1720.

In 1730 Victor Amadeus abdicated in favour of his son, Charles Emmanuel III, but, when he changed his mind and attempted to reassume his throne, Charles Emmanuel had him arrested (1731) and confined for the remainder of his years.

• **Victor Amadeus III** (b. June 26, 1726, Turin, Piedmont, kingdom of Sardinia [Italy]—d. Oct. 16, 1795, Moncalieri, near Turin), Savoyard king of Sardinia (Piedmont-Sardinia) from 1773 to 1796.

Victor Amadeus, the son of Charles Emmanuel III, was incapable and extravagant, and he chose equally incapable ministers. On the outbreak of the French Revolution he sided with the royalists and was eventually brought into conflict with the French Republic. Although his troops had some successes against the French in 1792, 1794, and 1795,

his army became demoralized and the treasury empty; and Napoleon Bonaparte's campaign of 1796 forced Victor Amadeus to accept the Armistice of Cherasco and the Treaty of Paris, whereby he ceded Savoy and Nice to France and granted free passage across Piedmont to the French. He died soon afterward, being succeeded by his timid and ascetic son, Charles Emmanuel IV.

Victor Emanuel Range, section of the central highlands, Papua New Guinea, east of the Star Mountains and forming part of the boundary between West Sepik and Western provinces. The rugged rampart, rising sheer from the south to over 10,000 ft (3,000 m), is composed of coralline limestone, which is so porous that water falling on it quickly percolates into the ground, making surface water scarce.

Victor Emmanuel, Italian VITTORIO EMANUELE, name of kings of Sardinia (Sardinia–Piedmont), grouped below chronologically and indicated by the symbol •.

• **Victor Emmanuel I** (b. July 24, 1759, Turin, Kingdom of Sardinia—d. Jan. 10, 1824, Moncalieri, near Turin), duke of Aosta, duke of Savoy, and king of Sardinia (1802–21) on his brother Charles Emmanuel IV's abdication.

He participated in the First Coalition against Revolutionary France (1792–97). All his dominions save Sardinia were occupied by the French during 1802–14. His kingdom was later restored, with the addition of Genoa, by the Final Act of the Congress of Vienna (June 9, 1815), but he abdicated (1821) in favour of another brother, Charles Felix.

• **Victor Emmanuel II** (b. March 14, 1820, Turin, Piedmont, Kingdom of Sardinia—d. Jan. 9, 1878, Rome), king of Sardinia–Piedmont who became the first king of a united Italy.

Brought up in the court of his father, Charles Albert, and given a conventional monarchical education emphasizing religious and military



Victor Emmanuel II
Alinari—Art Resource/EB Inc

training, he was married to his cousin Maria Adelaide, daughter of an Austrian archduke. After the Revolution of 1848, when war broke out with Austria, Victor Emmanuel was given command of a division. In the luckless campaign that followed he proved a brave soldier but an indifferent general.

Ascending the throne on his father's abdication, he consolidated his position by suppressing the republican left and paying an indemnity to Austria, which brought him considerable opprobrium in Italy. In November 1852 he made the momentous decision to turn the government over to the able, determined Count Cavour, whose skillful manoeuvres over the next few years made him king of Italy. At the decisive battles of Magenta and Solferino, he commanded the Piedmontese corps in person, and following the armistice of Villafranca, he exercised a valuable restraint on Cavour, who wanted to continue the war alone. The following year Victor Emmanuel secretly encouraged Garibaldi in the conquest of Sicily and Naples; he then led his Piedmontese army into papal territory to link up with Garibaldi in the face of an excommunication by Pius IX.

Following Cavour's death in 1861, Victor Emmanuel played a more direct role in government and despite setbacks achieved two notable triumphs: the acquisition of Venetia through war on the side of Bismarck's Prussia in 1866, and of Rome after the withdrawal of the French garrison in 1870. The occupation of Rome as the national capital so antagonized Pius IX that he refused all overtures toward reconciliation, and no meeting ever took place between the two sovereigns; nevertheless, on Victor Emmanuel's death in 1878 Pius permitted his burial in the Pantheon.

• **Victor Emmanuel III** (b. Nov. 11, 1869, Naples—d. Dec. 28, 1947, Alexandria), king of Italy whose reign brought the end of the Italian monarchy.

After a mainly military education, he came suddenly to the throne in 1900 on the as-



Victor Emmanuel III
Alinari—Art Resource/EB Inc

sassination of his father, King Umberto I. A tractable constitutional monarch, he accepted a Liberal cabinet and readily acquiesced in Italy's war against Turkey in 1911 and entrance into World War I in 1915.

When the strains put on the parliamentary system by the war brought Mussolini to the fore, Victor Emmanuel failed to prevent the Fascist seizure of power, though it apparently lay in his hands to do so merely by signing the decree of martial law proposed by the cabinet. He was quickly reduced to a figurehead or less by the Mussolini dictatorship, but in 1943, following disastrous Italian military reverses in World War II, capped by the Allied invasion of Sicily, Victor Emmanuel surprised the world by having Mussolini arrested and installing Marshal Pietro Badoglio as premier. The move failed to extricate Italy from the war or the King from his difficult position, and finally, on June 5, 1944, the day after the Allied liberation of Rome, he named his son Crown Prince Umberto lieutenant general of the realm, relinquishing all power for himself but retaining his title of king.

In 1946 public opinion forced a plebiscite to decide between the monarchy and a republican form of government. In an effort to influence the vote in favour of the dynasty, Victor Emmanuel abdicated in favour of Umberto (May 9, 1946), but the plebiscite resulted in a victory for the republic, and both Victor Emmanuel and Umberto went into exile.

Victor Harbour, town and coastal resort, South Australia, situated at the mouth of the Inman River, on the northwest shore of Encounter Bay (so called for the chance meeting of the British explorer Matthew Flinders and the French navigator Nicolas Baudin, in 1802). Founded in 1839, the town was named for HMS "Victor," a ship that had entered the bay two years earlier. In the 1880s there was a concerted effort to make the harbour (protected from the sea by the small Granite Island) the primary outlet for Murray River Basin traffic, and it did hold some importance as a port until 1912.

Declared a town in 1914, Victor Harbour is a service centre for a region producing beef and dairy cattle, sheep, fruits, and wine. Fine beaches and easy access from Adelaide (52 mi [84 km] north) have helped to make the place the state's leading coastal resort. Pop. (1981) 4,522.

Victor-Perrin, Claude, DUC (duke) DE BELLUNE, byname CLAUDE PERRIN (b. Dec. 7, 1764, La Marche, Fr.—d. March 1, 1841, Paris), a leading French general of the French Revolutionary and Napoleonic wars, who was created marshal of France in 1807.

In 1781 he entered the army as a private soldier and, after 10 years' service, received his discharge and settled at Valence. Soon afterward he joined the local volunteers, rising to the command of a battalion. He served at Toulon (1793), in the Italian campaign of 1796–97, in La Vendée, and then in Italy at Marengo. In 1802 he was governor of the colony of Louisiana for a short time; in 1803 he commanded the Batavian army, and in 1805–06 was French plenipotentiary at Copenhagen. On the outbreak of hostilities with Prussia he joined the V Army Corps as chief of the general staff. He distinguished himself at Saalfeld and Jena; and after Friedland, where he commanded the I Corps, Napoleon gave him the marshalate. After the Peace of Tilsit he became governor of Berlin, and in 1808 he was created duke of Belluno (Bellune). In the same year he was sent to Spain, where he took a prominent part in the Peninsular War (especially at Espinosa, Talavera, Barrosa, and Cádiz), until his appointment in 1812 to a corps command in the invasion of Russia. There his most important service was in protecting the retreating army at the crossing of the Beresina.

He took an active part in the wars of 1813–14, until in February of the latter year he had the misfortune to arrive too late at Montereau-sur-Yonne. The result was a scene of violent recrimination and his supersession by Napoleon, who relieved him of his command.

Victor-Perrin now transferred his allegiance to the Bourbons and in December 1814 received from Louis XVIII the command of the second military division. In 1815 he accompanied the King to Ghent, and on the Second Restoration he was made a peer of France. He was war minister in 1821–23. In 1830 he was major general of the royal guard, and after the revolution of that year he retired altogether into private life.

Victoria, in full ALEXANDRINA VICTORIA (b. May 24, 1819, Kensington Palace, London—d. Jan. 22, 1901, Osborne, near Cowes, Isle of Wight, Eng.), queen of the United Kingdom of Great Britain and Ireland (1837–1901) and empress of India (1876–1901), last of the House of Hanover, who gave her name to an era, the Victorian Age. She and her husband, Prince Consort Albert of Saxe-Coburg-Gotha, had nine children; through their marriages there descended many of the royal families of Europe.

A brief account of the life and works of Queen Victoria follows; for a full biography, *see* MACROPAEDIA: Victoria and the Victorian Age.

Victoria's long reign restored dignity and popularity to the British crown and may have saved the monarchy from abolition. The only child of Edward, duke of Kent, Victoria acceded to the throne in 1837. Prince Albert,

her cousin, met her on his first court visit at Windsor on Oct. 10, 1839. Victoria proposed to him five days later, and they were married in the following February. She was devoted to her husband, relied on his advice, and mourned his premature death (1861) for the remaining 40 years of her reign. Despite Victoria's determination to retain political power, her actual influence on governments was slight. She fought a long rearguard action against the growth of "democratic monarchy," a development to which she herself had actually contributed by making the monarchy respectable. At her death, in contrast to the time of her coronation, its continuance was guaranteed.

Victoria, formally EMPRESS FREDERICK, original name VICTORIA ADELAIDE MARY LOUISE, German KAISERIN FRIEDRICH, or VIKTORIA ADELHEID MARIA LUISE (b. Nov. 21, 1840, London, Eng.—d. Aug. 5, 1901, Schloss Friedrichshof, Kronberg, Ger.), consort of the German emperor Frederick III and eldest child of Queen Victoria and Prince Albert of Great Britain.

Well-educated and multilingual from childhood (spent largely at Windsor and Buckingham Palace), Victoria remained all her life strongly devoted to England and, even after her marriage to the Prussian crown prince, Frederick William, in 1858, spoke English habitually in her German household. Her English liberalism came to be shared by her husband (whom she tended to dominate) but was scorned by the conservative Prussians, especially the old emperor, William I, and Otto von Bismarck, with whom a mutual resentment developed. Within the constraints of her position, however, she encouraged philanthropic causes and the arts.

When her husband developed throat cancer and died only 99 days after becoming emperor (as Frederick III) in 1888, she lost all possibility of influencing a change of political climate. She was again subjected to estrangement, for her son, the new emperor William II, was thoroughly Prussianized. Although later somewhat reconciled to him, she remretired to Kronberg in the Taunus hills, where she built a palatial country seat, Schloss Friedrichshof. She died there of cancer, outliving her mother by only six months.

Victoria, state of southeastern Australia, occupying a mountainous coastal region of the continent. Victoria is separated from New South Wales to the north by the Murray River for a length of 1,065 miles (1,714 km) and by an additional boundary of 110 miles (176 km), linking Cape Howe and the nearest source of the Murray River. The western boundary is with South Australia, and the southern coastline on the Tasman Sea and the Antarctic Ocean stretches for 1,045 miles (1,681 km) and includes the shoreline of Port Phillip Bay. Melbourne, the state capital, is at the head of the bay off Bass Strait. Victoria covers an area of 87,900 square miles (227,600 square km). Pop. (1996) 4,373,520; (2001 prelim.) 4,644,950.

A brief treatment of Victoria follows. For full treatment, *see* MACROPAEDIA: Australia.

Physical and human geography. Victoria has a rich variety of landscapes. The main upland areas are a southern continuation of the Dividing Range of eastern Australia. Plains surround this upland core on the north, west, and south. The southern plains are divided into smaller areas by the Otway Ranges, the South Gippsland Highlands, and Port Phillip Bay. Victoria can thus be divided into three geographic regions. The central uplands contain the most extensive forest in the state. There is some mixed farming in the sheltered valleys. Most of the northern plains consist of the Mallee, an infertile area of unreliable rainfall, which supports Mallee eucalyptus and little else. There is, however, a narrow fertile strip adjoining the Murray River. There the agriculture consists of wheat growing and the raising of Merino sheep and prime lambs. The southern plains are divided by Port Phillip Bay. These plains are grazed to support the wool, beef, and dairy industries.

Among the Australian states, Victoria is second to New South Wales in terms of production and population, but in the late 20th century it sustained the fastest economic growth, fueled after 1965 by the exploitation of gas and oil fields in Bass Strait and the completion of a new integrated steel plant. Victoria has a broadly based economy with well-developed primary, manufacturing, and service sectors. A significant proportion of the work force is engaged in manufacturing, with lesser numbers in commerce, farming, construction, and transport. Most of the factories are located in Melbourne, which is also the major port and the focus of the rail, air, and road systems of Victoria.

Before 1939 most of Victoria's population had been born in Australia, but after 1945 the country in general and Victoria in particular encouraged large-scale European immigration to strengthen the country economically and strategically and to assist European refugees made homeless by World War II.

Legislative power in Victoria is vested in a bicameral legislature consisting of a Legislative Assembly and a Legislative Council. The leader of the party with the greatest plurality in the Legislative Assembly is the premier-designate and forms a government for the pro forma approval of the governor-general, the titular representative of the British Crown. This slate of proposed ministers becomes the Executive Council, which advises the governor-general, whose position places him above party politics and who is regarded as the trustee of the constitution.

Voting is compulsory, and universal adult suffrage prevails. Members of the Legislative Assembly are elected in single-member electorates for four-year terms; members of the Legislative Council are elected from two-member provinces for eight-year terms. In the late 20th century there were three major political parties: the Liberal Party, the National Party, and the Australian Labor Party.

Wages and working conditions in Victoria are supervised by the Australian Industrial Relations Commission, for industries that extend beyond the state, and by state wages boards for those within. The economy is strong and since 1945 has been able to absorb large numbers of migrants and still have full employment. In 1982 a 38-hour workweek was implemented, and most employees are covered by long-service awards and compensation schemes.

Education is compulsory and free to the age of 15. There are several universities in Victoria. The state's most important modern cultural development was the creation of the Victorian Arts Centre near Melbourne. The complex includes art galleries, courtyards for theatrical productions, a convention centre and concert hall, a display centre, and a hall for state receptions. There are several other art galleries at different centres. Melbourne also has an orchestra that has made successful overseas tours.

History. Aborigines had been living in Victoria for at least 40,000 years before contact with Europeans. Some 60 years after Captain James Cook first sighted its coastline (1770), Victoria (then part of New South Wales) was first settled by European pioneers in search of fresh pasturelands. Without domesticated animals, cultivation, and technology, the Aborigines were no match for the Europeans, and the Aborigine population was decimated by disease and slaughter in the 1830s and '40s. Protectorships that were established thereafter largely failed—land reserves were taken over by farms and the inhabitants dispersed. By 1850 the area had more than 75,000 inhabitants and 6 million sheep. Victoria became a separate colony in 1851, about the time that gold was first discovered there, and it achieved self-government in 1855. In 1886 the Aboriginals Protection Act defined exactly who would be protected, and Aborigines with mixed blood were forced off reserves. Full-blooded Aborigines were segregated on mission stations by 1917, and children were separated from parents.

Noted as Australia's most radical and progressive colony, Victoria grew rapidly until the crash of 1891 and a sharp fall in wool and wheat prices. In a rather abrupt turnaround, the colony became noted for its extreme conservatism, especially in its notions of property and social conformity. In 1901 Melbourne hosted the first federal Parliament (the Parliament moved to Canberra in 1927).

Victoria (Cameroon): *see* Limbe.

Victoria, capital of British Columbia, Canada, on the southeastern tip of Vancouver Island, overlooking Juan de Fuca Strait. One of the province's oldest communities, it was founded in 1843 as a Hudson's Bay Company fur-



Parliament Buildings, Victoria, B.C.
Bob and Ira Spring—EB Inc.

trading post known as Fort Camosun, which was later renamed Fort Victoria to honour the English queen.

Victoria, which retains a distinct transplanted English atmosphere, served as capital of the colony of Vancouver Island from 1848, before becoming the administrative centre of the united colony of British Columbia in 1868. The city was associated with the gold crush of the 1860s; it is now one of the largest commercial and distribution centres of the province and, because of its equable climate, a popular tourist resort and retirement community. A major Pacific-coast port, with a naval base and dockyard, Victoria is connected to mainland Canada and the United States by air and ferry service and to the remainder of the island by rail and highway. Manufacturing is centred on the forest-products industry but also includes shipbuilding and food processing. The city is the site of Victoria University (1963; formerly Victoria College, established in 1902), an armed forces training college (Royal Roads), The British Columbia Provincial Museum (1886), and an astrophysical observatory. The Victorian-style Parliament Buildings (seat of the provincial legislative assembly) overlook the Inner Harbour and yacht basin. Included in Victoria's metropolitan area are the communities of Esquimalt, Oak Bay, and Saanich.

Inc. 1862. Pop. (2001) city, 74,125; metropolitan area, 311,092.

Victoria, densely populated urban area in Hong Kong (*q.v.*), a special administrative region of China. It lies on the north shore of Hong Kong Island, across a strait from Kowloon on the Chinese mainland, with which it is connected by ferry and by automobile and mass transit railway tunnels. Victoria is the chief administrative, commercial, and cultural centre of Hong Kong and is the headquarters for numerous international banks and corporations. Pop. (2001 est.) 1,035,000.

Victoria, town and capital of the Republic of Seychelles, located on the northeastern coast of Mahé Island, the largest island in the Seychelles group. Victoria is the only port of the archipelago and the only town of any size in Seychelles. Three-fourths of the people of Mahé Island live in Victoria. The port has



Victoria and its harbour on Mahé Island, Seychelles
Gerald Cubitt

deep water for large ships and is capable of accommodating four ships at one time. An inner harbour provides facilities for smaller craft. An international airport was built near Victoria in 1971, subsidized by British funds in compensation for the temporary removal of certain islands from Seychelles hegemony. As the business and cultural centre for the country, the town has a hospital and a teacher-training college. Victoria is connected by paved roads to major points on Mahé Island. Pop. (1999 est.) 28,000.

Victoria, city, seat (1836) of Victoria County, southern Texas, U.S. It lies along the Guadalupe River, 85 miles (137 km) northeast of Corpus Christi. Founded in 1824 by Spanish settlers under Martín de León, it was named to honour both Nuestra Señora de Guadalupe de Jesus Victoria (Our Lady of Guadalupe) and Guadalupe Victoria, the first Mexican president. Actively involved in the Texas Revolution, it was incorporated (1839) as a city in the Republic of Texas. It developed as a cattle centre and became a rendezvous for trail drivers moving northward.

Since the 1940s Victoria has become a hub for oil, gas, and petrochemical production of the Texas Gulf Coast. The city's industrial growth was stimulated by completion (1963) of the 35-mile- (56-km-) long Victoria Barge Canal to the Gulf Intracoastal Waterway. Institutions in the city include Victoria College (1925), the University of Houston at Victoria (1973), and a museum. Pop. (2000) city, 60,603; Victoria MSA, 84,088.

victoria, French carriage, named for Queen Victoria at least by 1844, and renowned for its elegance. It was first imported into England by the Prince of Wales in 1869, where it rapidly gained popularity. It was usually pulled by one or two horses.

The victoria was a low, light, four-wheeled, doorless vehicle with a forward-facing seat for two persons covered with a folding top, or calash, and a removable, elevated coachman's seat above the front axle. The graceful body curved down from the coachman's seat to the floorboards, and up again like a gently sloping chair. Panel-boot victorias were, confusingly, also known as cabriolets. The Grand Victoria



Victoria, 1889; in the Science Museum, London
By courtesy of the Science Museum, London, Crown copyright reserved

had a rumble seat for two extra passengers, and the Victoria-Hansom was an improved hansom cab with a collapsible hood.

Victoria, Baldomero Espartero, duque de (duke of): *see* Espartero, Baldomero.

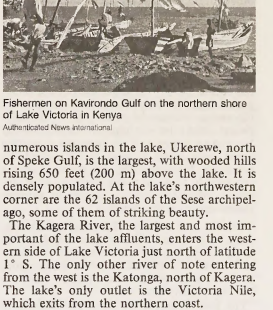
Victoria, Guadalupe, original name MANUEL FÉLIX FERNÁNDEZ (b. 1786, Tamazuela, Mex.—d. 1843, Perote), Mexican soldier and political leader who was the first president of the Mexican Republic.

Victoria left law school to join the movement for independence from Spain, fighting under José María Morelos in 1812. He changed his name to show his devotion to the cause of Mexican independence (the image of the Virgin of Guadelupe, the patron saint of Mexico, had been adopted as a symbol of the insurgency). After the death of Morelos, Victoria waged guerrilla war against the Spaniards from the mountains around Veracruz and Puebla. When Agustín de Iturbide came to power (1821), Victoria at first supported him, but by 1822, as Iturbide arrested all political opponents and dissolved the legislature, Victoria denounced him and joined Antonio López de Santa Anna's successful revolt in 1823.

Victoria became Mexico's first elected president (1824–29), but, while honest, unassuming, and a courageous general, he was not particularly suited for the presidency. The inexperienced administrator was not able to deal effectively with the constant political bickering and Byzantine machinations of government rivals, often being taken advantage of by those he trusted. It is small wonder that little progress was made domestically and the economy was in a shambles. During Victoria's tenure in office, Iturbide was executed. In foreign affairs, Victoria managed much better and established relations with all the major powers. The bitterest blow of his term came in 1827 when his vice president, Nicolás Bravo, led a revolt against Victoria. It was easily suppressed by his comrades from revolutionary times, Generals Santa Anna and Vicente Guerrero.

Victoria, Lake, also called VICTORIA NYANZA, largest lake in Africa and chief reservoir of the Nile, lying mainly in Tanzania and Uganda but bordering on Kenya. Among the freshwater lakes of the world it is exceeded in size only by Lake Superior in North America, its area being 26,828 square miles (69,484 square km). An irregular quadrilateral in shape, its shores, save on the west, are deeply indented. Its greatest length from north to south is 210 miles (337 km), its greatest breadth 150 miles (240 km). Its coastline exceeds 2,000 miles (3,220 km). Its waters fill a shallow depression in the centre of the great plateau that stretches between the Western and Eastern Rift Valleys. The lake's surface is 3,720 feet (1,134 m) above sea level, and its greatest ascertained depth is 270 feet (82 m). Many archipelagos are contained within the lake, as are numerous reefs, often just below the surface of the clear waters. Lake Victoria has more than 200 species of fish, of which the *Tilapia* is the most economically important. The lake's basin area covers 92,240 square miles (238,900 square km).

The lake's shores vary in aspect. The lake's southwestern coast is backed by precipices 300 feet (90 m) high, which give way on the western coast to papyrus and ambatch swamps marking the delta of the Kagera River. The lake's deeply indented northern coast is flat and bare. A narrow channel leads into the Kavirondo Gulf, which has an average width of 16 miles (25 km) and extends for 40 miles (64 km) eastward to Kisumu, Kenya. The Ugandan cities of Kampala and Entebbe lie along or near the northern coast. At the lake's southeastern corner is Speke Gulf, and at the southwestern corner Emin Pasha Gulf. Of the



Fishermen on Kavirondo Gulf on the northern shore of Lake Victoria in Kenya
Authenticated News International

numerous islands in the lake, Ukerewe, north of Speke Gulf, is the largest, with wooded hills rising 650 feet (200 m) above the lake. It is densely populated. At the lake's northwestern corner are the 62 islands of the Sese archipelago, some of them of striking beauty.

The Kagera River, the largest and most important of the lake affluents, enters the western side of Lake Victoria just north of latitude 1° S. The only other river of note entering from the west is the Katonga, north of Kagera. The lake's only outlet is the Victoria Nile, which exits from the northern coast.

The search by Europeans for the source of the Nile led to the sighting of the lake by the British explorer John Hanning Speke in 1858. Formerly known to the Arabs as Ukerewe, the lake was named by Speke in honour of Queen Victoria of England. A detailed survey of the lake was made by Sir William Garstin in 1901. Plans for gradually raising the level of the lake's waters were completed in 1954 with the construction of the Owen Falls Dam on the Victoria Nile at Jinja, Uganda; the dam, which provides hydroelectric power on a large scale, made the lake a vast reservoir.

The Lake Victoria region is one of the most densely populated in Africa; within 50 miles (80 km) of its shores live several million people, nearly all Bantu-speaking. There are local steamer services around the lake.

Victoria, National Gallery of: *see* National Gallery of Victoria.

Victoria, Science Museum of: *see* Science Museum of Victoria.

Victoria, Tomás Luis de (b. *c.* 1548, near Avila, Spain—d. Aug. 27, 1611, Madrid), Spanish composer who ranks with Palestrina

and Orlando di Lasso among the greatest composers of the 16th century.

Victoria was sent by King Philip II of Spain in 1565 to prepare for holy orders at the German College in Rome. There he probably studied with Giovanni da Palestrina, whom he eventually succeeded as director of music at the Roman Seminary. From 1578 to 1585 he assisted Philip Neri as chaplain of San Girolamo della Carità. In 1578 he met the pious dowager empress Maria, widow of the Holy Roman emperor Maximilian II, and later became her chaplain. In 1584 she entered the convent of the Descalzas Reales in Madrid, where Victoria became priest and organist. He settled in Madrid in 1594.

Victoria's works include 21 masses and 44 motets that are among the finest of the period. He also wrote psalm settings; hymns; several Magnificats; four offices for the dead; and music for Holy Week services, including two Passions, the *Improperia,* and the Lamentations of Jeremiah. His last work was the Requiem (1605) in memory of the empress Maria.

Victoria's music has a depth of purpose that some writers have compared to the mystical fervour of St. Teresa of Avila, who probably knew him as a youth and was also patroness of the Descalzas. With the contrapuntal technique of Palestrina he fused an intense dramatic feeling that is uniquely personal and deeply Spanish. He often reused his own and other music through the technique of parody and was a master of canonic devices. His use of plainsong as cantus firmus is surprisingly rare. He also used devices that were modern in the late 16th century. The pictorial writing that portrays the fury of the wild beasts in "Cum beatus Ignatius" surpasses that of the contemporary madrigalists. His use of repeated notes for emphasis reflects the growing Florentine interest in recitative. In his polychoral works he exploits the contemporary Venetian manner, and his provision of written organ parts looks forward to the age of the continuo. Harmonically, his music shows a remarkable sense of tonal contrast, foreshadowing the major-minor concept of tonality characteristic of the Baroque era.

Victoria and Albert Museum, British museum that houses what is generally regarded as the world's greatest collection of the decorative arts. It is located in South Kensington, London, near the Science Museum and the Natural History Museum.

The foundation of the museum dates from 1852, when the British government established the Museum of Manufacturers in Marlborough House, Pall Mall. This museum largely housed a collection of decorative-arts objects that had been displayed at the Great Exhibition in 1851. The items were transferred to the South Kensington Museum and reopened in 1857 as part of a government effort to improve taste and knowledge among those concerned with British manufactures. The collection soon outgrew its premises, and plans for a new museum were developed. The museum was renamed the Victoria and Albert Museum in 1899, when Queen Victoria laid the cornerstone for the present building designed by Sir Aston Webb. This structure opened in 1909. Since then the museum's premises have been modified and extended, partly into adjacent buildings.

The Victoria and Albert Museum houses vast collections of European sculpture, ceramics, furniture, metalwork, jewelry, and textiles from early medieval times to the present day. Among its collections are the Jones bequest of French furniture, porcelain, and other objets d'art; the Schreiber collection of English ceramics, enamels, and glass; the Currie collection, containing fine Italian and French arms and armour; and a collection of 18th-century German porcelain that forms part of the Murray collection. There are strong Indian collections, which were given an early impetus with the acquisition of the East India Company's museum in 1858. The East Asian collections include remarkable Chinese ceramics, jade, and sculpture from the Eumorfopoulous collection. The museum also houses the national collection of British watercolours, miniatures, prints, and drawings, among which is an outstanding group of works by John Constable. The collection of Italian Renaissance and Baroque sculpture is one of the best outside Italy. The museum also houses the National Art Library.

Victoria Cross, the highest decoration for valour in the British armed forces, awarded for extreme bravery in the face of the enemy. It was instituted in 1856 by Queen Victoria at the request of her consort, Prince Albert. The first crosses were awarded during the Crimean War. In 1858, new statutes allowed the Victoria Cross to be conferred for gallantry when not in the presence of the enemy; instances of this were extremely rare, and by 1881 the cross was again awarded only for conspicuous courage in the face of the enemy. King Edward VII, in 1902, decreed that the honour could be awarded posthumously, which, since then, it frequently has been. Anyone in any branch of the British armed forces is eligible, including women, although no woman has as yet received the award.

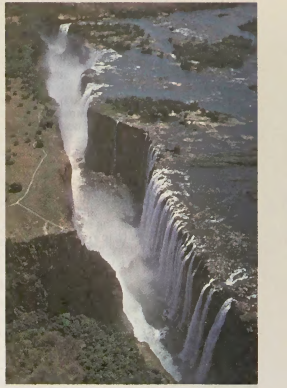
So great is the prestige of the Victoria Cross that it takes precedence over all other orders and medals in Britain, and recipients are entitled to add V.C. after their name. Only 1,348 crosses have been awarded since the honour was instituted. The medal is bronze (originally cast from Russian guns captured in the Crimean War), depicting a lion on a crown with the inscription "For Valour," while the reverse side has the date of the act for which the decoration is bestowed and the name, rank, and regiment of the recipient.

Victoria de las Tunas, city, capital of Las Tunas *provincia,* eastern Cuba. It is principally a commercial and manufacturing centre for a rich agricultural and pastoral hinterland, whose major yields are sugarcane, bananas, oranges, and cattle; beeswax and honey are also produced. Deposits of both iron ore and marble are located in the vicinity. Victoria de las Tunas is on the central highway and a major railroad, 140 miles (225 km) northwest of Santiago de Cuba. The city has an airport. Pop. (1994 est.) 126,930.

Victoria Falls, spectacular waterfall located about midway along the course of the Zambezi River, at the border between Zambia to the north and Zimbabwe to the south. Approximately twice as wide and twice as deep as Niagara Falls, the falls span the entire breadth of the Zambezi River at one of its widest points (more than 5,500 feet [1,700 m]). At the falls, the river plunges over a sheer precipice to a maximum drop of 355 feet (108 m). The falls' mean annual flow is almost 33,000 cubic feet (935 cubic m) per second.

The Zambezi River does not gather speed as it nears the drop, the approach being signaled only by the mighty roar and characteristic veil of mist for which the Kalolo-Lozi people named the falls Mosi-oa-Tunya ("The Smoke That Thunders"). The lip of the falls' precipice is split into several parts by various small islands, depressions, and promontories along its edge. The eastern portions of the falls are mostly dry during times of low river flow.

The waters of Victoria Falls do not drop into an open basin but rather into a chasm that varies in width from 80 to 240 feet (25–75 m). This chasm is formed by the precipice of the falls and by an opposite rock wall of equal height. The chasm's only outlet is a narrow channel cut in the barrier wall at a point about three-fifths of the way from the western end of the falls, and through this gorge, which is less than 210 feet (65 m) wide and 390 feet (120 m) long, flows the entire volume of the Zambezi River. At the gorge's end is the Boiling Pot, a deep pool into which the waters churn and foam at flood time. Just below the Boiling Pot, the gorge is spanned by the Victoria Falls (Zambezi) Bridge, which carries rail, automobile, and pedestrian traffic between Zambia and Zimbabwe. The river's waters then emerge into an enormous zigzag trough that forms the beginning of Batoka Gorge, which has been cut by the river to a depth of 400–800 feet (120–240 m) through a basalt plateau for a distance of 60 miles (100 km).



Victoria Falls on the Zambezi River from the Zambia side, near Livingstone
G. Holton—Photo Researchers

The British explorer David Livingstone was the first European to see the falls (on Nov. 16, 1855). He named them for Queen Victoria of the United Kingdom. In addition to the falls themselves, which now attract tourists from all parts of the world, adjacent Victoria Falls National Park (Zimbabwe) and Mosi-oa-Tunya National Park (Zambia) abound with large and small game and offer recreational facilities. Victoria Falls was designated a World Heritage Site in 1989.

Victoria Falls, township, northwestern Zimbabwe. It is located on the south bank of the Zambezi River adjacent to Victoria Falls, the greatest waterfall in Africa. The town faces Livingstone (Maramba), Zambia, across the river. The first storage and rest huts in the original village were built in 1898 by Albert Giese. The township was founded in conjunction with the construction of a steel-arch railway bridge just below the waterfall in 1905. The Victoria Falls Hotel dates from that year. In 1930 the bridge was altered to carry automobile traffic as well as trains.

Victoria Falls is the customs and immigration post for travelers to and from Zambia and a major tourist centre. It is surrounded by the Victoria Falls National Park. The township has an international airport 14 miles (22 km) away. Pop. (1992 prelim.) 17,269.

Victoria Island, island in the Canadian Arctic Archipelago, Northwest Territories, that is separated from the mainland on the south by Dolphin and Union Strait, Coro-

nation Gulf, Dease Strait, and Queen Maud Gulf. It is about 320 miles (515 km) long and 170–370 miles (270–600 km) wide, with an area of 83,896 square miles (217,291 square km). The terrain rises from a deeply indented coast to about 2,150 feet (655 m) in the northwest.

The island's sparse population is concentrated chiefly in the settlements of Holman (which is an Eskimo printmaking centre) and offshore Read Island in the west and Cambridge Bay (the site of a Canadian weather station) in the southeast. Discovered in 1838 by Thomas Simpson, the island was named for Queen Victoria and was first explored by John Rae in 1851.

Victoria Land, physical region in eastern Antarctica, bounded by the Ross Sea (east) and Wilkes Land (west) and lying north of the Ross Ice Shelf. It was discovered in 1841 by a British expedition led by Sir James Clark Ross, and it was named for Queen Victoria. It consists largely of snow-covered mountains, with heights up to 13,200 feet (4,025 m).

The United States and New Zealand operate research stations there. More than 300 meteorites preserved in Antarctic ice were located in 1979 in the Allan Hills and Darwin Glacier areas of Victoria Land. Their discovery was the result of a scientific insight that in less than three years doubled the number of meteorites available worldwide for scientific study.

Victoria Nile, river that forms the upper section of the Nile River and issues from the northern end of Lake Victoria at Ripon Falls (now submerged), west of Jinja, Uganda. The river flows 260 miles (420 km) northwest over the Owen Falls Dam, through Lake Kyoga, and past Masindi Port and Atura to the northern end of Lake Albert (Lake Mobutu Sese Seko), where it forms a swampy estuary. In its lower course the Victoria Nile is impeded by a series of rapids culminating in the Karuma Falls on the edge of the East African Rift Valley. Navigation is possible only on Lake Kyoga between Namasagali and Masindi Port.

Victoria Nyanza (East Africa): *see* Victoria, Lake.

Victoria River, longest river in Northern Territory, Australia. The river rises in low sand hills at 1,200 feet (370 m) elevation north of Hooker Creek. It flows north and northwest for about 350 miles (560 km) across a region of hills and basins to enter Joseph Bonaparte Gulf of the Timor Sea via a 16-mile- (25.5-kilometre-) wide mouth at Queens Channel. Fed by its major tributaries—the West Baines, Wickham, Gordon, Armstrong, and Camfield rivers—the Victoria drains a basin of 27,060 square miles (70,090 square km). Its upper course, seasonally intermittent, flows through some of Australia's largest cattle ranges.

Reached in 1839 by Captain J.C. Wickham of the HMS *Beagle,* the river was named in honour of Victoria, who had been crowned queen of Great Britain in 1837. The river is only 500 feet (150 m) above sea level 300 miles (480 km) from the coast; its last 100 miles (160 km) are tidal, of which the lowest 50 are navigable by boats of up to 10-foot (3-metre) draft.

Victoria Strait, southern arm of the Arctic Ocean, lying between Victoria Island on the west and King William Island on the east, in eastern Kitikmeot region, Northwest Territories, Canada. The strait is about 100 miles (160 km) long and from 50 to 80 miles (80 to 130 km) wide. It connects Queen Maud Gulf (south) with McClintock Channel (northwest) and Franklin Strait (northeast). The Royal Geographical Society and Jenny Lind islands are near the southern entrance of the strait.

In 1845 Sir John Franklin, the English explorer, led an expedition of 129 men in the HMS *Erebus* and HMS *Terror* in search of the Northwest Passage, a route through the Canadian Arctic archipelago connecting the Atlantic and Pacific oceans. The ships became hopelessly icebound in Victoria Strait just northwest of King William Island, and all lives were lost.

Victorian period (chronology): *see* Dionysian period.

Victoriaville, town, Mauricie–Bois-Francs region, southern Quebec province, Canada, on the Nicolet River. Originally called Demersville, it became a village in 1860 and was renamed for Queen Victoria in 1861.

Victoriaville is located in a mixed farming area and serves as a distributing centre. The town processes food and manufactures hockey sticks, furniture, clothing, farm implements, bricks, and sheet metal and foundry products. Victoriaville College, a bilingual commercial institution that is operated by the Brothers of the Sacred Heart, is on the eastern outskirts of the town. Inc. town, 1890. Pop. (1991) 21,495.

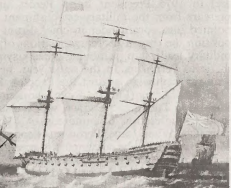
Victorville, city, San Bernardino county, southwestern California, U.S. It lies along the Mojave River in Victor valley at the edge of the Mojave Desert. The settlement was founded in 1885 by the Santa Fe Railroad, and its name was derived (1901) from Jacob N. Victor, a railway official.

Mining (granite and limestone) and cement and lime production are the city's basic economic activities, supplemented by agriculture (irrigated crops, poultry, cattle), construction, tourism, and nearby George Air Force Base. Victorville and its back country have been used as settings for many western movies. It is the seat of Victor Valley College (1960). Inc. 1962. Pop. (1992 est.) 42,186.

Victory, flagship of the victorious British fleet commanded by Admiral Horatio Nelson in the Battle of Trafalgar on Oct. 21, 1805. The ship is preserved today as a historic relic at Portsmouth, Eng.

HMS *Victory,* launched at Chatham in 1765, was a 100-gun ship of the line with a length of 186 feet (57 m), a displacement of 2,162 tons, and a crew of more than 800 men. As a flagship of Britain's Channel and Mediterranean fleets during the American Revolution and French Revolutionary wars, the ship saw extensive action against France and its allies. In 1778 under Admiral Augustus Keppel, and again in 1781 under Richard Kempenfelt, it led engagements near the island of Ushant (Ouessant). In 1782 it flew the flag of Admiral Richard Howe in the relief of a besieged garrison at Gibraltar, and in 1793 it served under Admiral Samuel Hood during a brief occupation of Toulon, Fr. In 1797 the *Victory* was the flagship of Admiral John Jervis in his destruction of a Spanish fleet off Cape Saint Vincent, Port.

At the Battle of Trafalgar the *Victory*'s flags gave Nelson's famous signal "England expects that every man will do his duty." The *Victory* itself engaged two French ships of the line; from the topmast of one a sniper fired the shot that mortally wounded Nelson, who died in the ship's cockpit in the midst of battle. After carrying Nelson's body home, the *Victory* continued to aid in Britain's continental blockade during the Napoleonic Wars. By the 1830s the ship had been dismasted and moored at Portsmouth, Eng., as a stationary flagship of the naval command. There it remained until 1922, when it was placed in dry dock and restored to its condition under Nelson. The ship and an attached maritime museum have attracted tourists since 1928.



HMS *Victory,* detail of an oil painting attributed to Monamy Swaine, *c.* 1792

By courtesy of the National Maritime Museum, Greenwich, Eng

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Victory Peak, Russian PIK POBEDY, Chinese SHENG-LI FENG, mountain in the eastern Kokshaal-Tau Mountains, on the frontier of Kyrgyzstan and the People's Republic of China. It was first identified in 1943 as the highest peak (24,406 feet [7,439 m]) in the Tien Shan range and the second highest peak in the U.S.S.R.; its name commemorates victory in World War II. An enormous dome-shaped mountain, heavily glaciated and frequently wreathed in clouds, it was first climbed in 1956 by Soviet alpinists.

Vičuga (Russia): *see* Vichuga.

vicuña (*Lama,* or *Vicugna, vicugna*), South American member of the camel family, Camelidae (order Artiodactyla), that is closely related to the alpaca, guanaco, and llama (known collectively as lamoids). Depending on the authority, the llama, alpaca, and guanaco may be classified as distinct species of llama (*Lama glama*). Because of differences in the incisor teeth, however, some authorities place the vicuña in a separate genus, *Vicugna.* Most vicuñas inhabit Peru, with smaller numbers found in Bolivia, Chile, and Argentina.

The vicuña is covered with a remarkably long, fine, soft, and lustrous coat that varies in colour from light cinnamon to a pale white, with long white fleece hanging from the lower flanks and the base of the neck. The annual yield of fleece sheared from domesticated vicuñas shows a wide range of from 85 to 550 g (3 to 20 ounces) per animal. Vicuña fibre is strong and resilient, but it is highly sensitive to chemicals and is generally used in its natural colour. The costly fibre is made into high-priced coats, dressing gowns, and shawls.

The dense, silky fleece of the vicuña, once reserved for the Incan nobility, provides excellent insulation against the temperature fluctuations the animal encounters in its natural habitat: semiarid grasslands in the central Andes at altitudes of 3,600–4,800 m (12,000–16,000 feet).

A swift, graceful animal, the vicuña is the smallest of the camelids, with a shoulder height of about 90 cm (36 inches) and a weight of about 50 kg (110 pounds). When in danger, they emit a high, clear whistle. Vision and hearing are more highly developed than their sense of smell.

Like guanacos, vicuñas are wild, with temperaments that preclude domestication. The animals graze on low grasses and ruminate while resting. They travel in small bands of females, usually led by a male who acts as lookout and defends his territory against intruders. Vicuñas use communal dung heaps to mark their territorial boundaries. They spit frequently and noisily, like all lamoids. A single young, born in February about 11 months after the parents have mated, remains close

to the mother for at least 10 months. The life expectancy is about 15 to 20 years.

Vicuñas have been hunted for centuries with a resulting decline in numbers. The Inca rounded the animals up, sheared their wool, and then released them; they also killed some for meat. In Spanish colonial times greater numbers of the animals were hunted and killed, and though protective legislation was introduced in the 19th century, poaching continued to reduce their total numbers, which declined from a million in Incan times to only about 10,000 by the late 1960s. Subsequent conservation efforts managed to increase the population to more than 80,000 by the late 20th century. The vicuña is listed as vulnerable in the *Red Data Book* and is now protected effectively in South American countries.

Vidal, Gore, original name EUGENE LUTHER VIDAL (b. Oct. 3, 1925, West Point, N.Y., U.S.), prolific American novelist, playwright, and essayist, noted for his irreverent and intellectually adroit novels.

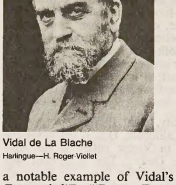
Vidal graduated from Philips Exeter Academy in New Hampshire in 1943 and served in the U.S. Army in World War II. Thereafter he resided in many parts of the world—the east and west coasts of the United States, Europe, North Africa, and Central America. His first novel, *Williwaw* (1946), which was based on his wartime experiences, was praised by the critics, and his third novel, *The City and the Pillar* (1948), shocked the public with its direct and unadorned examination of a homosexual main character. Vidal's next five novels, including *Messiah* (1954), were received coolly by critics and were commercial failures. Abandoning novels, he turned to writing plays for the stage, television, and motion pictures and was successful in all three media. His best-known dramatic works from the next decade were *Visit to a Small Planet* (produced for television, 1955; on Broadway, 1957; for film, 1960) and *The Best Man* (play, 1960; film, 1964).

Vidal returned to writing novels with *Julian* (1964), a sympathetic fictional portrait of Julian the Apostate, the 4th-century pagan Roman emperor who opposed Christianity. *Washington, D.C.* (1967), an ironic examination of political morality in the U.S. capital, was followed by several popular novels that vividly re-created prominent figures and events in American history—*Burr* (1974), *1876* (1976), and *Lincoln* (1984). *Lincoln* is a compelling portrait of President Abraham Lincoln's complex personality as seen through the eyes of some of his closest associates during the American Civil War. Another success was the comedy *Myra Breckenridge* (1968), in which Vidal lampooned both transsexuality and contemporary American culture. In *Rocking the Boat* (1962), *Reflections upon a Sinking Ship* (1969), *The Second American Revolution* (1982), and other essay collections, he incisively analyzed contemporary American politics and government. Vidal was noted for his outspoken political opinions and for the witty and satirical observations he was wont to make as a guest on talk shows.

Vidal de La Blache, Paul (b. Jan. 22, 1845, Pézenas, France—d. April 5, 1918, Tamaris-sur-Mer), French geographer who had a profound influence on the development of modern geography.

Vidal studied history and geography at the École Normale Supérieure, in Paris, and taught there from 1877 until he became professor of geography at the Sorbonne (1898–1918).

Vidal's life study of the interrelations of people's activities and their physical environment made him the founder of French human geography. He held that the role of people is not passive, since within limits they can modify their environment to advance their own ends. Many later French geographers had either studied under him or his students. Vidal was the moving force behind a spate of lucid regional monographs on France and other parts of the world; all form a distinctive part of geographic literature. *Tableau de la géographie de la France* (1903; "Outline of the Geography of France") is prefixed to Ernest Lavisse's history of France and is considered



Vidal de La Blache
Harlingue—H. Roger Viollet

a notable example of Vidal's approach. *La France de l'Est* ("Eastern France") appeared in 1917. Many of Vidal's papers were collected in *Principes de géographie humaine* (1922; *Principles of Human Geography,* 1950). In 1891 he founded and, until his death, edited the periodical *Annales de Géographie* ("Annals of Geography").

Vídalín, Arngrímur Jónsson: *see* Jónsson, Arngrímur.

Vídalín, Jón Thorkelsson, also called MAGISTER JÓN (b. 1666, Gardhur, near Reykjavík, Ice.—d. 1720, Iceland), Lutheran bishop, best known for his *Hiss-Postilla* (1718–20; "Sermons for the Home"), one of the finest works of Icelandic prose of the 18th century.

The son of a learned physician and a grandson of the scholar Arngrímur Jónsson the Learned, Vídalín was educated at Skálholt in Iceland and at the University of Copenhagen and rose rapidly in the church, becoming bishop of Skálholt in 1697. The extreme poverty of the Icelanders and the misery that had been caused by a series of epidemics aroused his indignation against the negligent secular authorities, and he carried on a lifelong feud against them. His Baroque antithetical style sprinkled with proverbs, his ironic portrayals of prevailing abuses, and his vivid pictures of hell—all of these elements made Vídalín's homilies the most popular devotional work in Iceland down to the 19th century.

Vidda (Norway): *see* Hardanger Plateau.

Videla, Jorge Rafaél (b. Aug. 2, 1925, Mercedes, Arg.), military officer who was president of Argentina from 1976 to 1981.

After a long military career, Videla became chief of the Army General Staff in 1973, and in 1975 President Isabel Perón, under pressure from the military establishment, appointed him commander in chief. From this position he began a reorganization of the military leadership, removing officers sympathetic to Peronism. In the same year, he led an army campaign against the People's Revolutionary Army (Ejército Revolucionario del Pueblo) in Tucumán province, which resulted in the annihilation of hundreds of Marxist guerrillas. When Isabel Perón was deposed on March 24, 1976, he accepted the presidency as head of a three-man (later a five-man) military junta including General Orlando Ramón Agosti and Admiral Eduardo Emilio Massera. Videla then suspended Congress and vested legislative powers in a nine-man military commission, halted the functioning of the courts, political parties, and labour unions, and filled all important posts with military personnel. Hundreds of persons suspected of being left-wing guerrillas were arrested in the last week of March 1976 alone, and several thousand others "disappeared" over the next few years, apparently murdered. Videla then took measures to restore economic growth, reversing Peronism in favour of a free-market economy. His economic measures were moderately successful, but his continued campaign against the left elicited strong international criticism, particularly after he broadened the scope of political arrests and executions to include journalists, educators, and intellectuals. An estimated 10,000–15,000 people were killed by the military and right-wing death squads during Videla's presidency, in what became known as the "dirty war" against political subversion.

Videla retired in 1981 and was succeeded by General Roberto Viola. After Argentina returned to civilian rule in December 1983, charges were brought against various former junta leaders for the human-rights abuses committed by the military during the "dirty war." Videla and Massera were both convicted of murder and sentenced to life imprisonment in 1985. The other three junta leaders received lesser terms.

video game: *see* electronic game.

video tape recorder, also called VIDEO RECORDER, electromechanical device that records and reproduces an electronic signal containing audio and video information onto and from magnetic tape. It is commonly used for recording television productions that are intended for rebroadcasting to mass audiences. There are two types of video tape units: the transverse, or quad, and the helical.

The transverse unit uses four heads rotating on an axis perpendicular to the direction of 2-inch (5-centimetre) tape. The transverse format achieves a 1,500-inch-per-minute head-to-tape speed necessary for high picture quality. For broadcast industry needs, an audio track, control track, and cue track are added longitudinally. These units follow the standards of the North American Television Standards Commission—*i.e.,* the electron beam sweeps 525 horizontal lines at 60 cycles per second.

The helical unit, designed for home and amateur use, uses half- or three-quarter-inch tape traveling around a drum in the form of a helix. There are various forms of these recorders: the playback deck can play back recorded programs but cannot record or erase; the video-record deck can record directly from a camera but cannot record off-the-air programs; the TV-record deck has an antenna and tuner for recording off-the-air programs. Portable reel-to-reel or cassette recorders are also produced. *See also* magnetic recording.

videocassette recorder, also spelled VIDEO CASSETTE RECORDER (VCR), electromechanical device that records, stores, and plays back television programs on a television set by means of a cassette of magnetic tape. A videocassette recorder is commonly used to record television programs broadcast over the air or by cable and to play back commercially recorded cassettes on a television set.

Prototypes of videocassette recorders were developed in the 1960s, but the first relatively convenient and low-cost VCR was introduced by the Sony Corporation in 1969. With the subsequent development of the Betamax format by Sony and the VHS format by the Matsushita Corporation in the 1970s, videocassette recorders became sufficiently inexpensive to be purchased by millions of families for use in the home. Both the VHS and Betamax systems use videotape that is 0.5 inch (13 mm) wide, but the two systems are mutually incompatible, and a cassette that is recorded on one system cannot be played back on the other system. A third system using 0.3-

inch- (8-millimetre-) wide tape was introduced in early 1985.

A videocassette recorder can have from two to as many as seven tape heads that read and inscribe video and audio tracks on the magnetic tape. Most VCRs have fast-forward and reverse controls and a timer that enables television programs to be recorded automatically, and they can record a program on one television channel while a viewer watches a program on another channel of the same television set.

Colour home movies can be made with the use of a camcorder system; this consists of a videocassette recorder that is connected to a relatively light and simple video camera. One camcorder system uses 8-millimetre videotape, and other portable video systems are available for filming outside of the home or studio.

videodisc, also spelled VIDEODISK, rigid circular plate of either metal or plastic used to record video and audio signals for playback. It resembles a phonograph record and can be played on a disc machine attached to a conventional television receiver. There are two major classes of videodiscs: magnetic and nonmagnetic.

The magnetic videodisc has an oxide-coated surface onto which input signals are recorded as magnetic patterns in spiral tracks. The video heads of the playback unit pick up these impressions and produce electrical signals that are converted back into pictures and sounds (*see also* magnetic recording).

Nonmagnetic videodiscs are available in two basic types. One is produced by a mechanical recording system analogous to that used in the manufacture of phonograph records, whereas the other involves laser technology. The mechanically recorded disc is a metallic plate with spiral grooves of V-shaped cross section. The pickup of the recorded information from the disk is accomplished electrically by a stylus. A metallic layer on the rear of the stylus detects capacitance variations as the stylus passes along the valleys and peaks of the grooves.

The laser videodisc is a metal or plastic disc on which input signals are recorded as a sequence of coded holes that were originally written onto a master disc by using a high-power laser. Copies are made by contact printing the master onto discs of the same size. During playback the signals are read out with a low-power helium-neon laser that is focused by a lens to form a tiny spot on a disc. Variations in the amount of light reflected from the disc are sensed by a photodetector. Electronic circuitry translates the light signals into video and audio signals for the television receiver.

videophone, also called VIDEO TELEPHONE, device that simultaneously transmits and receives both audio and video signals over telephone lines. Such a device consists of a telephone; a display unit with a television picture tube, camera tube, and loudspeaker; a control unit with a microphone; and associated circuitry.

The utilization of television as an adjunct to telephone service has been considered since the earliest demonstration of television itself. The first practical television–telephone service was established in 1936 by the German Post Office. Limited public service was provided over coaxial cables between Berlin, Leipzig, Nürnburg, and Hamburg until 1940. The American Telephone and Telegraph Company developed a modern videophone system in the late 1950s and began providing intercity service between Chicago, New York, and Washington, D.C., on a test basis in 1964. During the early 1970s this service, known as Picturephone, was offered to regular subscribers of the Bell System in the same cities. A similar system acquired more widespread use in Japan.

High cost has limited the use of videophones. One of the main difficulties is the expense of transmitting video signals, which requires a minimum bandwidth of one megahertz. This is equivalent to the demands of more than 300 regular long-distance telephone calls. The development of new techniques of reducing transmission bandwidth and the use of improved fibre-optic telephone cables (assemblies of thin glass rods) may help to make videophone service more economical.

Vidin, also spelled WIDYN, port town, extreme northwestern Bulgaria, on the Danube River. An agricultural and trade centre, Vidin has a fertile hinterland renowned for its wines and is the site of an annual fair. A regular ferry service connects it with Calafat, across the Danube in Romania.

Vidin occupies the site of an old Celtic settlement, Dunonia, founded in the 3rd century BC and fortified by the Romans as Bononia. A Bulgarian fortress dating from the 13th century and called Babini Vidini Kuli ("Granny Vida's Towers") is well-preserved. The churches of St. Panteleimon and St. Petka have fine murals. During the Second Bulgarian Empire (1185–1396), when the town was known as Bdin, a brief revolt occurred there; later, as the empire under Ivan-Aleksandŭr was disintegrating, he gave a third of it to his son, with Bdin as the capital. In 1396 the Vidin kingdom fell to the Turks, who ruled it until 1878 except for a period of Austrian occupation from 1683 to 1690. Pop. (1986 est.) 62,689.

Consult the INDEX *first*

Vidisha, also spelled VIDIŚĀ, town, west-central Madhya Pradesh state, central India. It lies just east of the Betwa River. Formerly called Bhīlsa (or Bhelsa), Vidisha is of great antiquity, being mentioned in the Sanskrit epics *Mahābhārata* and *Rāmāyaṇa*. Under the Maurya and Gupta empires the town was a great religious, commercial, and political centre. It fell to the Muslims in 1235. Numerous remains of Buddhist stupas nearby, commonly called Bhīlsa Topes, date from between the 3rd century BC and the 1st century AD and include the Sānchi (*q.v.*) group. To the north lies the site of Besnagar, the older city remains, with a 1st-century-BC monolithic pillar. Nearby, on Udayapur Hill, are remains of cave temples dating from the Gupta period (4th–6th century AD). Renamed Vidisha in 1956, the modern town is an agricultural trade centre and is engaged in flour milling and hand weaving. The town has four colleges, including a technological institute, affiliated with Bhopāl University. Wheat, sorghum, and oilseeds are the chief crops of the surrounding area. Pop. (1981) town, 65,521.

Vidocq, François(-Eugène) (b. July 24, 1775, Arras, Fr.—d. May 11, 1857, Paris), adventurer and detective who helped create the *police de sûreté* ("security police") in France.

A venturesome, sometimes rash youth, Vidocq had bright beginnings in the army, fighting in the Battles of Valmy and Jemappes in 1792. After having spent several periods in prison, mostly for petty offenses, and having tried his hand at a number of trades, he offered his services to the state in 1809 and created a new police department under Napoleon. His experience of life among thieves in Arras, Paris, and the provinces contributed to the effectiveness of the security brigade. He resigned in 1827 to start a paper and cardboard mill, where he employed former convicts. The business was a failure, and in Louis-Philippe's reign he again became chief of the detective department. Dismissed in 1832 for a theft that he allegedly organized, Vidocq created a private police agency, the prototype of modern detective agencies. It was, however, soon suppressed by the authorities.

Known all over France as a remarkably audacious man, Vidocq was a friend of such authors as Victor Hugo, Honoré de Balzac, Eugène Sue, and Alexandre Dumas *père*. Several works were published under Vidocq's name, but it is doubtful that he wrote any of them. The figure of Vidocq is believed to have inspired Balzac's creation of the criminal genius Vautrin, one of the most vivid characters to appear in his novelistic series *La Comédie humaine* (*The Human Comedy*).

Vidolini, also spelled VIDOLINO: *see* Vitale da Bologna.

Vidor, King (Wallis) (b. Feb. 8, 1894, Galveston, Texas, U.S.—d. Nov. 1, 1982, Paso Robles, Calif.), American motion-picture director whose films of the 1920s and '30s in both content and theme were among the most creative of those produced in Hollywood; they deal in relatively uncompromising terms with such themes as idealism and disillusionment in contemporary life.

As a schoolboy, Vidor was an assistant projectionist in a nickelodeon. In 1915 he went to Hollywood, where he was a prop boy, scriptwriter, newsreel cameraman, and assistant director, while his wife, Florence Vidor (divorced 1925), became a well-known silent-film actress. Within three years (1918) Vidor was directing his first films. *The Big Parade* (1925), a film about World War I, was a tremendous success and established his reputation. Marked by a flair for characterization and social consciousness, it was followed by *The Crowd* (1928), considered to be one of the finest of all silent films. With grim and sombre imagery, it deals with the life of a very average American, who starts out with high hopes but is gradually broken by the social ills of modern urban life. Vidor's other films include *Hallelujah!* (1929), the first Hollywood film with an all-black cast; *Street Scene* (1931), a tragedy of lower-class New York life based on the play by Elmer Rice; *Our Daily Bread* (1934), dealing with the formation of a farm cooperative; *The Wedding Night* (1935), containing a sensitive depiction of Polish immigrant customs; and *The Citadel* (1938), a screen adaptation of the novel by A.J. Cronin about a physician's struggle in a Welsh mining community, which won an Academy Award nomination for best director. He also directed the black-and-white (Kansas) scenes of *The Wizard of Oz* (1939).

Some of Vidor's well-known films of the 1940s and '50s were *The Fountainhead* (1949), *Duel in the Sun* (1946), and *War and Peace* (1956). Vidor's autobiography, *A Tree Is a Tree* (1953), contains valuable information on the development of the motion picture.

Vidyāraṇya (Hindu philosopher): *see* Mādhavācārya.

Vidyasagar, Isvar Chandra, also spelled ISVARCANDRA BIDYASAGAR (b. Sept. 26, 1820, Birsingha, Midnapore district, India—d. July 29, 1891), Indian educator and social reformer, considered the father of Bengali prose.

He was a brilliant student at Sanskrit College, Calcutta, where he received the title Vidyasagar ("Ocean of Learning"), and in 1850 he was appointed head pandit (scholar-teacher) of Fort William College, Calcutta. A year later he became principal of Sanskrit College, where he promoted the study of English and admitted students of lower castes.

Vidyasagar was well-read in English literature and was influenced by Western ideas. Although an orthodox high-caste Brahmin, he took a leading part in social reform movements, notably a successful campaign to legalize remarriage of widows, many of whom had

been married for the first time in childhood. He also opposed child marriage and polygamy and did much to promote the education of girls, but his reforming zeal met with much opposition from orthodox Hindus.

Vidyasagar was a prolific and vigorous writer. Among his works are *Vetāl Pañcavimsati* (1847; "Twenty-five Tales of a Goblin"); *Shakuntalā* (1854), which was based on a famous play by the Sanskrit poet and dramatist Kālidāsa; and *Sītār Vanavās* (1860; "The Exile of Sita").

Vidzeme, also called LIVONIAN HIGHLAND, plateau region of central Latvia, roughly corresponding to the historic state of Livonia. It is a hilly, irregular, partially terraced moraine area, dotted with many small morainal lakes. It reaches an elevation of 1,024 feet (312 m) at Mount Gaiziņ and is drained to the west by the Gauja River, which flows into the Gulf of Riga about 12 miles (20 km) north of Riga after a course of 286 miles (460 km).

Viedma, city, capital of Río Negro *provincia,* south-central Argentina. It lies along the western bank of the Negro River, 20 miles (32 km) from the river's mouth at the Atlantic Ocean and opposite Carmen de Patagones in Buenos Aires province. A fort called Mercedes de Patagones, built there in 1779 by the explorer Francisco de Viedma, was the capital of the Patagonian Territory until the Río Negro national territory was set up in 1884. In 1955, with the creation of Río Negro province, Viedma became the provincial capital. The agricultural potential of the city's environs, long stymied by occasional inundation from the Negro River, was enhanced after 1970 with the assistance of international funds. Viedma received its present name in 1878. Pop. (1999 est.) 56,583.

Vieille, Paul, in full PAUL-MARIE-EUGÈNE VIEILLE (b. Sept. 2, 1854, Paris, Fr.—d. Jan. 14, 1934, Paris), French scientist, known for his invention of smokeless powder.

After studying with the chemist Marcellin Berthelot, Vieille collaborated with him in researches that led to important discoveries of the physics of shock waves (1881). He then undertook to solve the problem of harnessing the powerful but unstable substance nitrocellulose as a propellant charge to replace black powder. Utilizing the colloiding action of certain solvents, he molded the resultant gelatinous mass into shapes of controlled dimensions, resulting in the formation of an explosive that came to be known as Powder B, its French army designation (*c.* 1885); this was the first of the series of modern smokeless high explosives. Vieille made further contributions in the study of shock waves and pressures and on the stability of nitrocellulose.

Vieira, António (b. Feb. 6, 1608, Lisbon, Port.—d. July 18, 1697, Salvador, Braz.), Jesuit missionary, orator, diplomat, and master of classical Portuguese prose who played an active role in both Portuguese and Brazilian history. His sermons, letters, and state papers provide a valuable index to the climate of opinion of the 17th-century world.

Vieira went to Brazil with his parents as a child of six. Educated at the Jesuits' college in Bahia, he joined the Society of Jesus in 1623 and was ordained in 1635. He soon became the most popular and influential preacher in the colony, and his sermons exhorting the various races to join the Portuguese in arms against the Dutch invaders of Brazil (1630–54) are considered the first expression of the Brazilian national mystique of forming a new race of mixed bloods. In addition to the Tupí-Guaraní tongue, the lingua franca of the Brazilian littoral, Vieira learned a number of local Amazon dialects and the Kimbundu language of the black slaves who had been brought to Brazil from Angola.

Vieira worked among the Indians and black slaves until 1641, when he went with a mission to Portugal to congratulate King John IV on his accession. The king soon fell under the spell of Vieira's self-assured and magnetic personality and came to regard the tall, lean, dynamic Jesuit as "the greatest man in the world." The king made him tutor to the infante, court preacher, and a member of the royal council. Vieira's devotion to the king was such that after John's death (1656) he formed a fixed idea that the king would return to inaugurate a prophesied golden age of peace and prosperity.

Between 1646 and 1650 Vieira was engaged in diplomatic missions to Holland, France, and Italy. But by his outspoken advocacy for toleration for Jewish converts to Christianity in Portugal and because of his willingness to cede Pernambuco to the Dutch as the price of peace, he made enemies in Portugal. By 1652 it had become prudent for him to leave the country for Brazil. His denunciation of slave-owning there resulted in his return to Lisbon in 1654. During his stay in Portugal, he secured decrees protecting the Brazilian Indians from enslavement and creating a monopoly for the Jesuits in the government of the Indians, and he returned triumphantly in 1655. He resumed his apostolic mission in Maranhão and on the Amazon delta, where for six years he traveled widely and laboured energetically before being forced back to Lisbon in 1661. For prophesying the return of John he was condemned by the Inquisition and imprisoned (1665–67).

On his release (1668) he went to Rome, where he secured at least temporary toleration for the converted Jews. He remained there for six years, becoming confessor to Queen Christina of Sweden and a member of her literary academy. In 1681 he returned to Bahia, where he fought for the freedom of the Indians until his death at 89.

Vieira is claimed as a literary master by both the Portuguese and the Brazilians. Though his prose style, in its ornateness, Latinisms, and elaborate conceits, is a product of the Old World, his works are of the New World in their emotional freedom, boldness of thought, and advanced attitude of racial tolerance.

Vieira, Luandino, pseudonym of JOSÉ VIEIRA MATEUS DA GRAÇA (b. May 4, 1935, Lagoa de Furadouro, Port.), Angolan writer of short fiction and novels.

Vieira immigrated with his parents to Angola in 1938, living in and around the *musseques* (African quarters) of Luanda. His writings reflect the fusion of Kimbundu (the language of the Mbundu people) and a variety of Portuguese that is the unique language of the *musseque.* Vieira, a white Angolan, committed himself early to the overthrow of the Portuguese colonial government and was arrested in 1961 for disclosing, during a BBC interview, secret lists of deserters from the Portuguese armies fighting in Africa. He spent 11 years in prison, mostly at Tarrafal, Cape Verde Islands.

Vieira is best known for his early collection of short stories, *Luuanda* (1963). The book, which received a Portuguese writers' literary award in 1965, was banned until the overthrow of the colonial government in 1974. Although the stories are not overtly political, their realism makes clear the oppressiveness of Portuguese occupation. Many of Vieira's stories follow the traditional structure of African oral narrative. His political novella *A vida verdadeira de Domingos Xavier* (1974; *The Real Life of Domingos Xavier*) portrays the cruelty of white "justice" and the courage of African men and women in preindependent Angola. His other works—among them *Velhas estórias* (1974; "Old Stories"), *Nós os do Makulusu* (1974; "Our Gang from Makulusu"), *Vidas novas* (1975; "New Lives"), and *João Vêncio: os sues amores* (1979; "The Loves of João Vêncio")—include both novels and collections of stories.

As secretary-general of the Union of Angolan Writers, Vieira directed the publication of a number of works by other Angolan authors and poets.

Vieira da Silva, Maria Elena, Maria Elena also rendered MARIE-HÉLÈNE (b. June 13, 1908, Lisbon, Port.—d. March 6, 1992, Paris, Fr.), Portuguese-born French painter of intricate, semiabstract architectural compositions.

Vieira da Silva studied sculpture first with Antoine Bourdelle at Paris in 1928 and later with Charles Despiau. Her interest in painting flowered under the tutelage of Fernand Léger and Stanley William Hayter. Although the abstract patterning of her early paintings tended toward the decorative, her mastery of spatial manipulation became apparent. The luminous spots and intersecting lines in her paintings assumed an explicit architectural organization, culminating in the dreamlike cityscapes of such mature works as "Golden City" (1956). She and her husband (the Hungarian artist Arpad Szenes) lived in Brazil during World War II. She returned to Paris in 1947 and became a French citizen in 1956.

Viélé-Griffin, Francis, pseudonym of EGBERT LUDOVICUS VIELE (b. May 26, 1864, Norfolk, Va., U.S.—d. Nov. 12, 1937, Bergerac, Fr.), American-born French poet who became an important figure in the French Symbolist movement.

Viélé-Griffin, son of a military governor for the Union in the American Civil War, was sent to France at the age of eight to attend school and remained there for the rest of his life. His first collection of verse, *Cueille d'avril* (1886; "April's Harvest"), showed the influence of the Decadent movement, and the next two, *Les Cygnes* (1887; "The Swans") and *Les Joies* (1889; "The Joys"), established his reputation as a preeminent Symbolist.

In 1890 Viélé-Griffin cofounded the review *Les Entretiens politiques et littéraires* ("Political and Literary Conversations"), in which appeared many of his essays calling for the liberation of verse from the strictures of traditional poetic form. He accomplished such liberation in his own poems through his pioneering use of vers libre (free verse). Viélé-Griffin's work is marked by a fundamental optimism that is grounded in his delight in nature and his belief in the spiritual dimension of human life. He lived much of the time in Touraine, and many of his works—such as *La Clarté de vie* (1897; "The Brightness of Life") and *Le Domaine royale* (1923; "The Royal Domain")—celebrate the countryside. Others—such as *La Chevauchée d'Yeldis* (1893; "The Ride of Yeldis"), *Phocas le jardinier* (1898; "Phocas the Gardener"), and *La Légende ailée de Wieland le forgeron* (1900; "The Winged Legend of Wieland the Blacksmith")—draw on Christian themes and Greek and medieval legends for their inspiration.

vielle (musical instrument): *see* fiddle.

Vienna, German WIEN, Czech VIDEŇ, Hungarian BÉCS, city and *Bundesland* ("federal state"), the capital of Austria. It is located along the Danube (Donau) River and serves as a gateway between western and eastern Europe. Vienna was the seat of the Holy Roman Empire from 1558 to 1806, of the Austrian (and Habsburg) Empire from 1806 to 1867, and then of the Austro-Hungarian Empire until 1918. It is a city of nobility and vast cultural achievement, renowned for its architecture and music. Area city, 160 square miles (415 square km); metropolitan area, 1,491 square miles (3,862 square km). Pop. (2001) city, 1,562,482; (2001 prelim.) metropolitan area, 1,838,225.

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

Vienna borders the Danube where the Pannonian Basin begins to rise toward the Alpine regions to the west. The highest area within the city is called the Wiener Wald ("Vienna Woods"); it descends rapidly toward the Danube in four roughly semicircular terraces. The climate is typically midcontinental, with a January average of 31° F (−0.5° C) and a July average of 67° F (19.5° C); rainfall amounts to about 26 inches (660 mm).

Trade and industry are the basis of Vienna's economy; principal manufactures include electrical appliances, paper, clothing, and machine tools. The city government plays a large role in the economy, including the management of many enterprises.

Much evidence of Vienna's rich history remains. One of its most famous buildings, St. Stephen's Cathedral, was built during the middle of the 12th century, destroyed by fire, and rebuilt two centuries later. Other notable medieval buildings include the Hofburg, the late 13th-century palace of the Habsburg rulers; and the 14th-century churches of the Friars Minor (Minoritenkirche) and of Maria am Gestade.

Toward the end of the 17th century, Baroque architecture began to appear, notably in the buildings of the Plague Column. The Viennese style of Baroque remained popular for more than 70 years, giving way eventually to an architectural style called Ring architecture, for the buildings lining the Ringstrasse. Buildings constructed in this style include the neo-French Renaissance State Opera house, the pseudo-Gothic Votive Church, the neo-Italian Renaissance University of Vienna, and the neo-Flemish Gothic Rathaus (City Hall).

In addition to possessing remarkable architecture, Vienna was for centuries the music capital of the world. Franz Joseph Haydn, Wolfgang Amadeus Mozart, Ludwig van Beethoven, Franz Schubert, Johannes Brahms, Johann Strauss, Gustav Mahler, Arnold Schoenberg, and many other great figures in Western music made it their home. The waltz, derived from Tirolean folk dances, was established in Vienna by 1820, and the great age of the Viennese operetta began shortly thereafter. Vienna is the home of one of the world's great symphony orchestras, the Vienna Philharmonic.

There are more than 30 museums in Vienna. One of the city's most striking collections, lodged in the treasure room of the Hofburg Palace, is the regalia of the Habsburgs and the Holy Roman emperors. The palace also houses the world's largest collection of graphic arts, including works by Rembrandt and Albrecht Dürer among its more than 1 million pieces. The Fine Arts Museum contains the Habsburg collection of old masters. The former residences of Sigmund Freud and of Haydn, Mozart, Beethoven, and Schubert have also been established as museums.

Subways encircle the central city and extend to the suburbs. Railways run to the north, east, and south, and major road arteries radiate in all directions. Vienna's international airport is located 11 miles (18 km) to the southeast, at Schwechat.

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Vienna, Congress of, assembly in 1814–15 that reorganized Europe after the Napoleonic Wars. Having begun in September 1814, five months after Napoleon's first abdication, it completed its "Final Act" in June 1815, shortly before the Waterloo campaign and the end of the Hundred Days of Napoleon's return to power. The settlement was the most comprehensive treaty that Europe had ever seen.

Austria, Prussia, Russia, and Great Britain, the four powers chiefly instrumental in the overthrow of Napoleon, had concluded a special alliance among themselves with the Treaty of Chaumont, on March 9, 1814, a month before Napoleon's first abdication. The subsequent treaties of peace with France, signed on May 30 not only by the "four" but also by Sweden and Portugal and on July 20 by Spain, stipulated that all former belligerents should send plenipotentiaries to a congress in Vienna. Nevertheless, the "four" still intended to reserve the real making of decisions to themselves. Two months after the sessions began, however, Bourbon France was admitted to the "four." The "four" thus became the "five," and it was the committee of the "five" that was the real Congress of Vienna.

Representatives began to arrive in Vienna toward the end of September 1814. Klemens, prince von Metternich, principal minister of Austria, represented his emperor, Francis II. Tsar Alexander I of Russia directed his own diplomacy. King Frederick William III of Prussia had Karl, prince von Hardenberg, as his principal minister. Great Britain was represented by its foreign minister, Viscount Castlereagh. When Castlereagh had to return to his parliamentary duties, the Duke of Wellington replaced him, and Lord Clancarty was principal representative of Britain after the departure. The restored Louis XVIII of France sent Talleyrand. Spain, Portugal, and Sweden had only men of moderate ability to represent them. Many of the rulers of the minor states of Europe put in an appearance. With them came a host of courtiers, secretaries, and ladies to enjoy the magnificent social life of the Austrian court.

The major points of friction occurred over the disposition of Poland and Saxony, the conflicting claims of Sweden, Denmark, and Russia, and the adjustment of the borders of the German states. In general, Russia and Prussia were opposed by Austria, France, and England, which at one point (Jan. 3, 1815) went so far as to conclude a secret treaty of defensive alliance. The major final agreements were as follows.

For Poland, Alexander gave back Galicia to Austria and gave Thorn and a region around it to Prussia; Kraków was made a free town. The rest of the duchy of Warsaw was incorporated as a separate kingdom under the Russian emperor's sovereignty. Prussia got two-fifths of Saxony and was compensated by extensive additions in Westphalia and on the left bank of the Rhine. It was Castlereagh who insisted that Prussian occupation of this latter territory, with which it had been suggested the king of Saxony should be compensated; Castlereagh wanted Prussia to guard the Rhine against France and act as a buttress to the new Kingdom of The Netherlands, which comprised both the former United Provinces and Belgium. Austria was compensated by Lombardy and Venice and also got back most of Tirol. Bavaria, Württemberg, and Baden on the whole did well. Hanover was also enlarged. The outline of a constitution, a loose confederation, was drawn up for Germany—a triumph for Metternich. Denmark had to pay to Sweden but got Lauenburg, while Swedish Pomerania went to Prussia. Switzerland was given a new constitution.

In Italy, Piedmont absorbed Genoa; Tuscany and Modena went to an Austrian archduke; Parma was given to Marie-Louise, consort of the deposed Napoleon. The Papal States were restored to the pope, Naples to the Sicilian Bourbons.

Valuable articles were agreed to on the free navigation of international rivers and diplomatic precedence. Castlereagh's great efforts for the abolition of the slave trade were rewarded only by a pious declaration.

The Final Act of the Congress of Vienna comprised all these agreements in one great instrument. It was signed on June 9, 1815, by the "eight" (except Spain, who refused as a protest against the Italian settlement). All the other powers subsequently acceded to it.

As a result, the lines laid down by the Congress of Vienna lasted, except for one or two changes, for more than 40 years.

Vienna, Siege of (July 17–Sept. 12, 1683), expedition by the Turks against the Habsburg Holy Roman emperor Leopold I that resulted in their defeat by a combined force led by John III Sobieski of Poland. The siege marked the beginning of the end of Turkish domination in eastern Europe.

The leader of the Hungarian Calvinists, Imre Thökölyi, appealed to the Turkish grand vizier, Kara Mustafa, to attack the Habsburg capital. With the tacit support of the Hungarian army, 150,000 Turks laid siege to Vienna, succeeded in capturing the outer fortifications, and began to tunnel to the inner walls. The emperor fled the city. Pope Innocent XI tried unsuccessfully to induce Louis XIV of France to aid Leopold against the Turks and then appealed to Poland with a large subsidy. Although Sobieski and the emperor had made a pact of alliance earlier that year, Sobieski was reluctant to come until Innocent persuaded Charles of Lorrainę to join a combined army with the electors of Saxony and Bavaria as well as 30 German princes. The 80,000 troops of this relieving army formed along the top of the Vienna hills, and, on the morning of September 12, Lorraine's and Sobieski's forces attacked the Turks. The battle raged for 15 hours before the Turkish invaders were driven from their trenches. The red tent of the grand vizier was blown up, but he escaped while thousands of members of his routed army were slaughtered or taken prisoner. Reports stated that it took the armies and the Viennese a week to collect the booty that was left behind in the Turkish camp.

Vienna, University of, German UNIVERSITÄT WIEN, state-financed coeducational institution for higher learning at Vienna. Founded in 1365, it is the oldest university in the German-speaking world.

The university was first chartered, following the model of the University of Paris, by the Habsburg duke Rudolf IV of Austria, as an expression of his rivalry with German king Charles IV, who had founded the University of Prague in 1348. After Rudolf's brother and successor, Albert III, reorganized the foundering university in 1384, endowing it generously, broadening the curriculum, and making enrollment more geographically comprehensive, Vienna achieved first rank among universities in the German-speaking east, with special distinction in medicine, law, and theology.

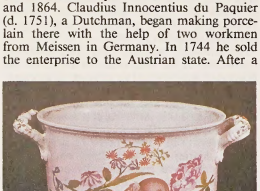
The university was a centre of revolution in 1848 and in 1850 won important reforms, including greater freedom for teachers and students, the seminar method of instruction, and a wider selection of subjects. In 1878 women were admitted to study in the philosophy (liberal arts) faculty on a limited basis, broadened 11 years later; in 1900 the medical school became coeducational, in 1919 the law school. The modern university includes faculties of Roman Catholic and of Protestant theology, social sciences and economics, medicine, basic and general sciences, human sciences, and mathematics and natural sciences.

Vienna Circle, German WIENER KREIS, a group of philosophers, scientists, and mathematicians formed in the 1920s that met regularly in Vienna to investigate scientific language and scientific methodology. The philosophical movement associated with the

Circle has been called variously logical positivism, logical empiricism, scientific empiricism, neopositivism, and the unity of science movement. The work of its members, although not unanimous in the treatment of many issues, was distinguished, first, by its attention to the form of scientific theories, in the belief that the logical structure of any particular scientific theory could be specified quite apart from its content. Second, they formulated a verifiability principle or criterion of meaning, a claim that the meaningfulness of a proposition is grounded in experience and observation. For this reason, the statements of ethics, metaphysics, religion, and aesthetics were held to be assertorically meaningless. Third, and as a result of the two other points, a doctrine of unified science was espoused. Thus, no fundamental differences were seen to exist between the physical and the biological sciences or between the natural and the social sciences.

The founder and leader of the group was Moritz Schlick, who was an epistemologist and philosopher of science. Among its members were Gustav Bergmann, Rudolf Carnap, Herbert Feigl, Philipp Frank, Kurt Gödel, Otto Neurath, and Friedrich Waismann; and among the members of a cognate group, the Gesellschaft für empirische Philosophie ("Society for Empirical Philosophy"), which met in Berlin, were Carl Hempel and Hans Reichenbach. A formal declaration of the group's intentions was issued in 1929 with the publication of the manifesto *Wissenschaftliche Weltauffassung: Der Wiener Kreis* ("Scientific Conception of the World: The Vienna Circle"), and in that year the first in a series of congresses organized by the group took place in Prague. In 1938, with the onset of World War II, political pressure was brought to bear against the group, and it disbanded, many of its members fleeing to the United States and a few to Great Britain.

Vienna porcelain, ceramic ware made at the Vienna factory in Austria between 1719 and 1864. Claudius Innocentius du Paquier (d. 1751), a Dutchman, began making porcelain there with the help of two workmen from Meissen in Germany. In 1744 he sold the enterprise to the Austrian state. After a



Vienna porcelain wine cooler decorated with *deutsche Blumen*, Claudius Innocentius du Paquier period, *c.* 1740; in the Victoria and Albert Museum, London

By courtesy of the Victoria and Albert Museum, London; photograph, Wilfrid Walter—EB Inc.

succession of different directors, Konrad von Sorgenthal took over the direction in 1784. After Sorgenthal's death in 1805, the factory produced little that was original.

Vienna porcelain achieved fame early for its rich decoration, which took many forms as one period of taste gave way to another. During the du Paquier period, the range included formal, orientalizing flowers (*indianische Blumen*), succeeded by more naturalistic flowers (*deutsche Blumen*) based on contemporary European illustrations; leaf and strapwork patterns; black monochrome painting (*Schwarzlot*), often of animals and hunting scenes; and little figures in the "Chinese" taste drawn with more than usual vivacity and assurance. The colour range, which included mauve, green, blue, gray, brownish gray, and pink, was dominated by a colour graduating from orange to rust. Of the many artists employed at Vienna, Jakobus Helchis (fl. 1740) was distinguished for cupids drawn delicately but strongly in a range of pink, mauve, and orange. The State period, until 1784, had Johann Josef Niedermayer, who produced porcelain figures of distinction from 1747 to 1784 as *Modellmeister.* In the period from Sorgenthal's direction onward, the Neoclassical taste was paramount, and the artistry was that of the miniaturist. The use of gilding gave a jewellike appearance to the tableware, and new background colours were developed, such as dark blue, dark brown, and bright yellow; they tended to cover the whole outer area of the vessel except for small reserves (spaces) in which minute landscapes, figures, and the like were brilliantly executed. The repertoire of classical and Renaissance motifs was augmented by antique designs collected by Anton Grassi (who had succeeded Niedermayer as *Modellmeister* in 1778). The factory began to decline in 1805 and closed in 1864.

Vienna State Opera, German STAATSOPER, theatre in Vienna, Austria, that is one of the world's leading opera houses, known especially for performances of works by Richard Wagner, Wolfgang Amadeus Mozart, and Richard Strauss. The original theatre was built in 1869 to house the expanded operations of the Vienna Court Opera (Hofoper), by which name it was originally known. Particularly famed during the conductorship of Hans Richter (artistic director 1880–96) were productions of Wagner's cycle *Der Ring des Nibelungen.* The directorship of the composer Gustav Mahler (1897–1907) was one of the artistic high points of the opera's history. Among directors from 1908 until the annexation of Austria by Germany in 1938 were Richard Strauss and the conductors Clemens Krauss and Felix Weingartner.

Wartime bombing destroyed the building in 1945. Its reconstruction, completed in 1955, was financed by taxes, contributions, and U.S. Marshall Plan aid. In the interim, performances of the State Opera were held at the Vienna Volksoper (Folk Opera) and the Theater an der Wien. The outstanding musical director of the period after World War II was the conductor Herbert von Karajan. Performances are financed in part by a state subsidy.

Vienne, *département,* Poitou-Charentes *région,* west-central France. It was created mainly from the historic province of Poitou (*q.v.*), and from neighbouring parts of the provinces of Touraine, Berry, and Anjou.

Most of the *département,* which has an area of 2,699 square miles (6,990 square km), occupies the lowland Poitou threshold of the Paris Basin, between the Massif Central and the highlands south of the Loire River. As the natural approach from the southwest to the Paris region, it has been the scene of many battles. Among the most memorable were the defeat of the Saracens (Arabs) in 732 by the Frankish leader Charles Martel and the English victory over the French in 1356 at the Battle of Poitiers.

The *département* is crossed south–north by the Vienne River and by its tributary, the Clain, which joins it near Châtellerault. The climate is mild, with warm summers; rain is abundant, especially in winter. The region is essentially rural. Cereals, fruit, vegetables, and fodder crops are extensively cultivated. Tobacco is also grown, and mushrooms are exported from Châtellerault and Loudun. Forests and woodlands abound.

Poitiers is the capital of the *département* and its largest town. Châtellerault, where there is some industry, is the only other town of considerable size. The *département's* other towns are small agricultural market centres, and some have Romanesque churches. Chauvigny, on a promontory above the Vienne River, has the ruins of several feudal castles. Charroux, in the south, has extensive remains of a great abbey, half of which was demolished in the 19th century. The *département* is also rich in megalithic remains. It has three *arrondissements,* Poitiers, Châtellerault, and Montmorillon; Vienne is in the educational division of Poitiers. Pop. (1987 est.) 381,700.

Vienne, town, Isère *département,* Rhône-Alpes *région,* southeastern France. It lies along the Rhône River where the latter is joined by the Gère River. In ancient times Vienne was the capital of the Celtic tribe known as the Allobroges. It was conquered by the Romans in 121 BC and was subsequently one of the most important towns of Gaul until Roman rule of the area ended in AD 275. Late in the 9th century the town became part of the Holy Roman Empire, and it was transferred to French sovereignty in 1450.

The old town lies in a depression that is surrounded by steep hills. Vienne is among the richest French repositories of Roman and medieval buildings. The town's Roman temple dates from the early 1st century AD. It became a Christian church in the 5th century, was used as a club for the Jacobins during the French Revolution, and was restored to its original aspect in 1860. The ruined Roman theatre on the slopes of nearby Mount Pipet could seat more than 13,000 spectators and is still used for theatrical performances. In the centre of the town, excavations in the 1960s and '70s uncovered the walls of a 1st-century theatre and temple consecrated to the Eastern divinity Cybele. On the right bank of the Rhône, excavations have uncovered Roman residential and industrial quarters extending over 10 acres (4 hectares).

Vienne has three important medieval churches. Near the Rhône Bridge is the 9th-century Church of Saint-André-le-Bas, which was rebuilt in the 12th–13th century. The former Abbey Church of Saint-Pierre was begun in the 4th century and is one of the oldest Christian churches in France. It now houses a museum of Roman sculptures and other antiquities. The largest church in the town is Saint-Maurice Cathedral, which was built in the 12th–15th century.

Present-day Vienne is a marketing centre for the agricultural produce of the Rhône River valley. Its industries include textiles, metallurgy, and footwear. Pop. (1982) 25,414.

Vienne, Council of, 15th ecumenical council of the Roman Catholic church (1311–12), convoked by Pope Clement V at the insistence of Philip IV of France, who demanded the posthumous trial of Pope Boniface VIII and the suppression of the Knights Templars, one of the great military religious orders founded during the Crusades. Vienne, near Lyon, was chosen because it was easily accessible and because it was in a practically independent state that was not acquired by France until 1349.

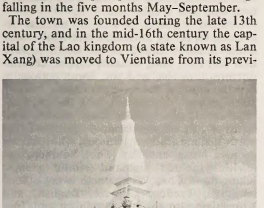
Philip invited all Western bishops to attend; though he personally ordered 230 to be present, only about 120 came. No trial was held, but the Templars were suppressed by a papal order issued independently of the council. Besides voting money for a crusade and issuing reform decrees, the council heard complaints of opposing factions among the Franciscans—the Spirituals and the Conventuals—concerning the practice of poverty and sided with the more moderate Conventuals; Clement sanctioned their decision.

Vienne River, river, western France, 217 mi (350 km) in length, a left-bank tributary of

the Loire. Rising on the Plateau de Millevaches, the Vienne winds through the agricultural regions of five *départements.* It flows west-northwest into the Haute-Vienne *département,* receiving the Maulde and Taurion tributaries, which are dammed in several places, before it flows past the city of Limoges. Beyond Saint-Junien it turns sharply north and broadens. After passing through Châtellerault, it meets the Creuse River and bends westward past Chinon before joining the Loire.

Vientiane, also spelled VIANGCHAN, largest city and capital of Laos, situated on a plain just northeast of the Mekong River. The city's central river port location in a country relying heavily on its rivers for transportation and its surrounding hinterland of intensive rice cultivation have made Vientiane the major economic centre of Laos. The city has a tropical monsoon climate, every month having an average daytime temperature above 80° F (27° C) and more than 80 percent of Vientiane's annual precipitation on the average falling in the five months May–September.

The town was founded during the late 13th century, and in the mid-16th century the capital of the Lao kingdom (a state known as Lan Xang) was moved to Vientiane from its previ-



That Luang temple, Vientiane, Laos
Picturepoint, London

ous traditional location at Luang Prabang (now Louangphrabang). In 1778 Vientiane came under Siamese control; in 1828 it was sacked and destroyed when the subject Laotian king revolted against Siamese hegemony. From 1899 to 1953, with the exception of the Japanese occupation (1945), Vientiane was in succession the seat of the French governor and the French administrative capital.

Vientiane still has some of its older wooden structures, besides its government offices, foreign embassies, and schools. Its modern industries include brewing, lumber processing, and the manufacture of brick, tile, textiles, cigarettes, matches, detergents, plastic bags, rubber sandals, and iron and steel. The Lao farmers of the surrounding area tend rice, corn (maize), and livestock in some of the best alluvial lowlands of Laos. Before 1975 the city was the principal stock shipping and slaughtering centre of the country. Since the shift in the country's import trade from Vietnam to Thailand, Vientiane has replaced Pakxé to the southeast as Laos's principal port of entry.

The Sisavangvong University (founded 1958) in Vientiane has faculties of agriculture, art, education, forestry and irrigation, and medicine. Affiliated bodies include Fa-Ngum College, Lycée Vientiane, Polytechnic, and Pali and Sanskrit institutes. Ho Phakeo, the national museum, is located in the city, as are the Dongsaphangmeuk Library and the National Library.

At Vientiane the Mekong River is navigable only by small craft; passage to the right bank and the Thai railhead of Nong Khai was solely by ferry until 1994, when a highway bridge was opened. Vientiane has an international airport, and highways link the city with Louangphrabang and Savannakhet in Laos and with Ho Chi Minh City in Vietnam. The Nam Ngum Dam north of Vientiane provides enough hydroelectric power for the surrounding areas and for export to Thailand as well. Vientiane's outstanding building is the That Luang, a stupa (temple), dating from about 1566 and restored by Lao civil servants under Prince Phetsarath during the French colonial period. Pop. (1999 est.) 534,000.

Vieques Island, Spanish ISLA DE VIEQUES, island, and *municipio* ("municipality"), Puerto Rico. It lies 13 miles (21 km) east of the main island, fronting south on the Caribbean Sea and north on the Vieques Sound, which connects the Caribbean with the Atlantic Ocean. Composed mostly of volcanic and granite intrusives, the generally hilly island is 21 miles (34 km) long and 3 miles (5 km) wide, and it is 52 square miles (135 square km) in area. Isabel Segunda, the chief town, is located on the northern coast. Esperanza, a fishing village, is on the south coast. Fishing, tourism, and light manufacturing are economically important.

In the early 1940s more than two-thirds of the island was annexed by the U.S. Navy, which established a large munitions depot and a bombing range. Many local residents and other Puerto Ricans subsequently protested against the Navy's use of the land, notably during 1999–2000, when camps were set up to disrupt the use of the bombing range. Pop. (2000) 9,106.

Vierordt, Karl von (b. July 1, 1818, Lahr, Baden [Germany]—d. Nov. 22, 1884, Tübingen, Ger.), German physician and professor of medicine who developed techniques and instruments for the measurement of various aspects of blood and its circulation.

Vierordt studied at the universities of Berlin, Göttingen, Vienna, and Heidelberg and started a practice at Karlsruhe in 1842. In 1849 he became associate professor of theoretical medicine at Tübingen and four years later was made professor of physiology there.

One of Vierordt's early discoveries was an exact method of making an erythrocyte (red blood cell) count. His inventions included the sphygmograph, the first instrument that could produce a graphic representation of the pulse, and the hemotachometer, an instrument that monitored the velocity of blood flow. Other research included spectrographic analyses of hemoglobin solutions, bile, and urine and studies of respiration and sound conduction.

Vierwaldstätter See (Switzerland): *see* Lucerne, Lake.

Vierzon, city, Cher *département,* Centre *région,* central France. It lies along the Canal du Berry, at the confluence of the Cher and Yèvre rivers, northwest of Bourges. The city grew from a rail and industrial complex formed in 1938 from several small communes (Vierzon-Ville, Vierzon-Village, Vierzon-Forges, and Vierzon-Bourgneuf). Metals, glass, and agricultural machinery dominate local industry. Pop. (1999) 29,723.

Viet Cong (VC), in full VIET NAM CONG SAN, English VIETNAMESE COMMUNISTS, the guerrilla force that, with the support of the North Vietnamese Army, fought against South Vietnam (late 1950s–1975) and the United States (early 1960s–1973). The name is said to have first been used by South Vietnamese President Ngo Dinh Diem to belittle the rebels.

Though beginning in the mid-1950s as a collection of various groups opposed to the government of President Diem, the Viet Cong became in 1960 the military arm of the National Liberation Front (*q.v.;* NLF). In 1969 the NLF joined other groups in the areas of South Vietnam that were controlled by the Viet Cong to form the Provisional Revolutionary Government (PRG). The movement's principal objectives were the overthrow of the South Vietnamese government and the reunification of Vietnam.

The early insurgent activity in South Vietnam against Diem's government was initially conducted by elements of the Hoa Hao and Cao Dai religious sects. After 1954 they were joined by former elements of the southern Viet Minh (*q.v.*), a Communist-oriented nationalist group. The overwhelming majority of the Viet Cong were subsequently recruited in the south, but they received weapons, guidance, and reinforcements from North Vietnamese Army soldiers who had infiltrated into South Vietnam. During the so-called Tet Offensive of 1968, the Viet Cong suffered devastating losses and their ranks were later filled primarily by North Vietnamese soldiers. For the most part, the Viet Cong fought essentially a guerrilla war of ambush, terrorism, and sabotage; they used small units to maintain a hold on the countryside, leaving the main population centres to government authorities.

Under terms of the agreement reached at the peace negotiations held in Paris in 1971–73, the PRG won acknowledgment of its authority in areas under its control, pending general elections to determine the future of South Vietnam. The peace agreement soon broke down, however, as both the South Vietnamese government and the PRG began trying to improve their military and territorial positions at each other's expense. Following the full-scale North Vietnamese invasion of South Vietnam and the subsequent rapid collapse of the government of South Vietnamese president Nguyen Van Thieu in the spring of 1975, the PRG assumed power as the government of South Vietnam; the following year, when reunification of the country was accomplished, the PRG joined other political groups in forming a National United Front. Real governmental power was subsequently exercised by the Vietnamese Communist Party and its North Vietnamese leadership.

Viet Minh, in full VIET NAM DOC LAP DONG MINH HOI, English LEAGUE FOR THE INDEPENDENCE OF VIETNAM, organization that led the struggle for Vietnamese independence from French rule. The Viet Minh was formed in China in May 1941 by Ho Chi Minh. Although led primarily by Communists, the Viet Minh operated as a national front organization open to persons of various political persuasions.

In late 1943 members of the Viet Minh, led by General Vo Nguyen Giap, began to infiltrate Vietnam to launch guerrilla operations against the Japanese, who occupied the country during World War II. The Viet Minh forces liberated considerable portions of northern Vietnam, and after the Japanese surrender to the Allies, Viet Minh units seized control of Hanoi and proclaimed the independent Democratic Republic of Vietnam.

The French at first promised to recognize the new government as a free state but failed to do so. On Nov. 23, 1946, at least 6,000 Vietnamese civilians were killed in a French naval bombardment of the port city of Haiphong, and the first Indochina War began. The Viet Minh had popular support and was able to dominate the countryside, while the French strength lay in urban areas. As the war neared an end, the Viet Minh was succeeded by a new organization, the Lien Viet, or Vietnamese National Popular Front. In 1951 the majority of the Viet Minh leadership was absorbed into the Lao Dong, or Vietnamese Workers' Party (later Vietnamese Communist) Party, which

remained the dominant force in North Vietnam.

Elements of the Viet Minh joined with the Viet Cong (*q.v.*) against the U.S.-supported government of South Vietnam and the United States in the Vietnam War (or Second Indochina War) of the late 1950s, '60s, and early '70s. After the reunification of the country (1976), Viet Minh leaders continued to take an active role in Vietnamese politics.

Viet-Muong languages, subbranch of the Vietic branch of the Mon-Khmer family of languages, itself a part of the Austroasiatic stock. Vietnamese, the most important language of the group and of the entire Mon-Khmer family, has a number of regional variants. Northern Vietnamese, centred in Hanoi, is the basis for the official form of Vietnamese. Central Vietnamese, centred in Hue, and Southern Vietnamese, centred in Ho Chi Minh City (Saigon), differ from the Northern norm in having fewer tones and in modifying certain consonants. All three use the same writing system, which is called quoc ngu (*q.v.*). The dialects spoken in the city of Vinh and in much of Nghe An province are more divergent. Vietnamese has borrowed liberally from Chinese over the centuries. This vocabulary, which has now diverged from the original Chinese source, is sometimes called Sino-Vietnamese. Muong, the other language of the group, is spoken in northern Vietnam; it differs from Vietnamese primarily in showing far less Chinese influence.

Viet Nam Quoc Dan Dang (VNQDD), English VIETNAMESE NATIONALIST PARTY, the first large-scale revolutionary nationalist organization in Vietnam. Founded officially in 1927, the VNQDD was modelled after the revolutionary Nationalist Party (Kuomintang) of China. Its aim, like that of the Nationalist Party, was the establishment of a republican democratic government free from foreign interference. Gaining the allegiance of many military officers, as well as of the young intelligentsia, the VNQDD turned to terrorist activities in the late 1920s after the French repeatedly denied it a chance to participate in the electoral process.

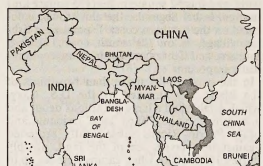
Its most ambitious action—an event known as the Yen Bai uprising—occurred on the night of Feb. 9, 1930, when the military garrison at Yen Bai, a small town along the Chinese border, mutinied. Before the remainder of the country could follow suit, however, the French, who had been alerted, crushed the revolt with such severity that the VNQDD was destroyed. Many former members joined the newly formed Indochinese Communist Party.

Viète, François, SEIGNEUR (lord) DE LA BIGOTIERE, Latin FRANCISCUS VIETA (b. 1540, Fontenay-le-Comte, France—d. Dec. 13, 1603, Paris), mathematician who introduced the first systematic algebraic notation and contributed to the theory of equations.

Viète, a Huguenot sympathizer, solved a complex cipher of more than 500 characters used by King Philip II of Spain in his war to defend Roman Catholicism from the Huguenots. When Philip, assuming that the cipher could not be broken, discovered that the French were aware of his military plans, he complained to the pope that black magic was being employed against his country.

Viète's *Canon mathematicus seu ad triangula* (1579; "Mathematical Laws Applied to Triangles") is probably the first western European work dealing with a systematic development of methods—utilizing all six trigonometric functions—for computing plane and spherical triangles. Viète has been called "the father of modern algebraic notation," and his *In artem analyticem isagoge* (1591; "Introduction to the Analytical Arts") closely resembles a modern elementary algebra text. His contribution to the theory of equations is *De aequationum recognitione et emendatione* (1615; "Concerning the Recognition and Emendation of Equations"), in which he presented methods for solving equations of second, third, and fourth degree. He knew the connection between the positive roots of an equation (which, in his time, were thought of as the only roots) and the coefficients of the different powers of the unknown quantity.

Vietnam, officially SOCIALIST REPUBLIC OF VIETNAM, Vietnamese CONG HOA XA HOI CHU NGHIA VIET NAM, country situated along the eastern coast of the Indochinese Peninsula in Southeast Asia. The country's maximum length from northwest to southeast is about 1,025 miles (1,650 km), and maximum width from east to west is about 340 miles (550 km) in the north and about 210 miles (340 km) in the south. Vietnam is bordered to the north by China, to the east and south by the Gulf



Vietnam

of Tonkin and the South China Sea, to the southwest by the Gulf of Thailand, and on the west by Laos and Cambodia. The capital is Hanoi. Area 128,379 square miles (332,501 square km). Pop. (2003 est.) 81,377,000.

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

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

The land. Vietnam can be divided into four physiographic regions: the Annamese Cordillera extending from north to south through west-central Vietnam, the Red River delta in the north, the Mekong River delta in the south, and the coastal plain in the east. The extremely rugged and densely forested Annamese Cordillera, a southward extension of the Yunnan Plateau, covers about two-thirds of the total land area. Parallel northwest-southeast ranges with several peaks exceeding 6,000 feet (1,830 m) above sea level dominate the northern half of Vietnam, and a series of heavily eroded longitudinal plateaus (average elevation 2,500 to 5,000 feet [760 to 1,500 m]) extend into the southern half. Extensive rubber and tea estates occur on the mountains' slopes.

In the north the densely populated Red River delta, roughly triangular in shape, is intensively cultivated (wet rice is the chief crop). The Red River and its tributaries are subject to severe and frequent flooding and are important for irrigation and local freight transportation. The fertile Mekong River delta is almost four times larger than the Red River delta and is one of the richest rice-growing areas in the world. The annual floods in the Mekong River, unlike those in the Red, are regular and increase the fertile land each year by depositing new sediments on the floodplains. There are extensive rice paddies and plantations of sugarcane, bananas, and coconuts in the Mekong delta. A low-lying, narrow coastal plain about 620 miles (1,000 km) long connects these two major river deltas.

Vietnam has a tropical monsoonal climate with hot winters in the south and cool winters in the north. The annual average temperature in the north (Hanoi) is 74° F (23° C) and in the south (Ho Chi Minh City) is 81° F (27° C). The mean annual precipitation (mainly occurring from May to October) is 60 to 80 inches (1,500 to 2,000 mm). Typhoons are frequent in the north and southwest.

Almost one-third of the total land area is under tropical evergreen and subtropical deciduous forests of oak, beech, chestnut, pine, teak, and ebony. Bamboo is widespread both in the undergrowth of forests and in pure stands, primarily along rivers. Mangrove forests are prevalent in the tidal coastal plains, and savanna-type grasses and shrubs cover the highlands and plateaus of the southwest. A great amount of forestland has been degraded by slash-and-burn cultivation and by bombing and herbicides used by U.S. armed forces during the Vietnam War in the late 1960s, although war-ravaged areas subsequently underwent renewal. About one-fifth of the country's total land area is cultivated.

Northern Vietnam is rich in mineral resources, especially anthracite and lignite coal. Other minerals found in the north include iron ore, lead, zinc, bauxite, copper, chromium ore, tungsten, and tin. Some petroleum deposits exist off the southern coast.

The people. Vietnamese are the predominant ethnic group, accounting for some five-sixths of the total population. Minorities in the north include Chinese, Hmong, Tai-speaking peoples, Nung, and Tay (Tho). Southern minorities include highland ethnic groups, Khmer, and Chan. Vietnamese is the official language; French, Chinese, English, and Khmer are also spoken. Buddhism and Taoism are the major religions, and Confucianism is a predominant philosophy. Roman Catholics, Muslims, Hoa Hao, Cao Dai, and Protestants are other religious groups.

Vietnam's birth and death rates and annual average population growth are relatively high by world standards but are comparable with those of other countries in Southeast Asia. About one-third of the population is younger than 15 years. Life expectancy is 67 years for males and 72 years for females.

During the Vietnam War (1954–75) there was a sizable shift of the population from rural to urban areas, especially in the south. About one-fourth of the total population now lives in urban areas. Hundreds of thousands of refugees fled the country between 1975 and 1990, many of them eventually resettling in the United States and other countries.

The economy. Vietnam has a centrally planned, developing economy that is largely based on agriculture. Unyielding policies of collectivization and nationalization implemented by an often inefficient and sometimes corrupt bureaucracy hampered economic reconstruction after the end of the Vietnam War in 1975, but since the mid-1980s Vietnam has moved toward a market economy. The country's economy has grown rapidly since 1990, but its gross national product per capita has remained one of the lowest in the world.

Agriculture employs some two-thirds of Vietnam's workforce and accounts for nearly one-fourth of the gross domestic product (GDP). The government began allowing the sale of surplus grain on the open market in the late 1980s, and Vietnam again began to export rice after years of shortages. Most arable land is used for rice cultivation, with two crops harvested per year in many areas. Other significant food crops include cassava, sweet potatoes, peanuts (groundnuts), sorghum, and corn (maize). State collective farms produce some coffee, tea, and rubber for export as well as sugarcane, soybeans, and coconuts. Pigs and cattle are the main livestock raised.

Fish and shellfish, from capture and aquaculture, are the second most important food

staple after rice and are valuable export commodities. Forestry is important, though deforestation is a major problem. Vietnam extracts economically significant amounts of coal, apatite (phosphate rock), tin, and chromite. Offshore petroleum production has increased.

Mining and manufacturing account for nearly one-third of the GDP but employ only one-tenth of the labour force. Most of the country's industries are concentrated in the north. The government has urged incentive pay systems to increase output, reduced subsidies to inefficient, state-run operations, and allowed limited market mechanisms. Food processing is the largest industrial activity, but textile and apparel manufacture have grown in importance. Transport and distribution of goods remains a problem because of an inadequately developed infrastructure. Hydroelectricity provides most of the country's power. Energy production has been increasing, but it still falls short of demand.

Vietnam, once heavily dependent on foreign aid, has succeeded in attracting trade and increased foreign investment. It has been narrowing its chronic balance-of-trade deficit. Its main trading partners are Japan, Singapore, and China. Imports include fuel; textiles, clothing, and leather; and iron and steel. The main exports are crude petroleum, garments, seafood, and footwear.

Government and social conditions. Under the 1992 constitution Vietnam is a socialist republic, and the highest organ of state power is the National Assembly, whose members are popularly elected for a five-year term. The National Assembly elects Vietnam's president from among its members, and the president asks the assembly to appoint or dismiss the vice president, prime minister, and the chief justice of the Supreme People's Court. The terms of the president and of the prime minister and other members of the government follow that of the National Assembly. The Supreme People's Court is the highest court of appeal and supervises lower People's courts. The most important political institution in the country is, however, the Vietnamese Communist Party, most of whose members hold high positions in the government. Major policy decisions are formulated by its Politburo. The party selects the members of the National Assembly, who are then ratified by voters from a single unopposed candidate list.

Vietnam provides health services and facilities that reach into the villages and rural areas, and the incidence of diseases such as poliomyelitis, typhoid, diphtheria, and tuberculosis has been reduced. Education is officially compulsory and free for nine years of schooling; literacy rates are high. Higher education is provided by the University of Hanoi and other colleges. The press and all broadcasting facilities are operated and controlled by the government and the Communist Party. A number of daily, biweekly, and weekly newspapers are published, including *Nhan Dan* ("The People"), the official party newspaper.

History. A distinct Vietnamese ethnolinguistic group began to emerge about 200 BC in the independent kingdom of Nam Viet, which was later annexed to China. In the 1st century AD the kingdom of Funan, which was greatly influenced by contact with India, occupied much of the Mekong delta area, but it disappeared in the 6th century. By 939 the north was finally freed of Chinese rule. The Vietnamese repulsed three Mongol invasions in the 13th century but were reconquered by the Chinese in 1407; a national resistance movement finally drove the Chinese out in 1428. Under the Le dynasty a bureaucratic government was established in the Chinese style, and the borders of Vietnam were gradually pushed southward. By 1757, however, the country had been divided into two parts, and it was not reunited until 1802, by the general Nguyen Anh, who became the emperor Gia Long.

In the latter half of the 19th century, Vietnam was gradually conquered by the French, who controlled it as a colony (1883–1939) and then as a possession (1939–45). In 1945 communists and other nationalists under Ho Chi Minh declared Vietnam's independence. For seven years the French opposed independence, and Ho Chi Minh led guerrilla warfare against the French in the First Indochina War, which ended in a Vietnamese victory at Dien Bien Phu on May 7, 1954. An agreement was signed at Geneva on July 21, 1954, providing for a temporary division of the country, at latitude 17° N, between a communist-led and Soviet-supported northern half and a U.S.-supported southern half. The activities of North Vietnamese guerrillas and procommunist rebels in South Vietnam led to U.S. intervention and the Second Indochina War, or Vietnam War (1954–75), which caused great destruction and loss of life. A cease-fire agreement was signed in 1973, and U.S. troops were withdrawn. The civil war soon resumed, however, and in 1975 North Vietnam launched a full-scale invasion of South Vietnam that resulted in the collapse of the South Vietnamese government and its replacement by a regime dominated by the communists. On July 2, 1976, the two Vietnams were united as the Socialist Republic of Vietnam.

In 1978 relations with Cambodia and China worsened as border fighting between Vietnamese and Cambodian forces occurred and thousands of ethnic Chinese fled Vietnam because of government policies directed against them. In 1979 Vietnam invaded Cambodia, toppling the Khmer Rouge government under Pol Pot and installing a Vietnamese-backed regime. In response, Chinese troops briefly invaded Vietnam along the latter's northern border. Although Vietnam stopped the Chinese advance, the nine-day war was a severe economic drain. In the 1980s Vietnam maintained large numbers of troops in Laos and Cambodia. Followers of the Khmer Rouge continued to fight Vietnamese forces in Cambodia, however, and in 1989 Vietnam completed a phased withdrawal of all its troops from Cambodia.

From the mid-1980s, prompted in part by serious economic problems and in part by similar developments in the Soviet Union, Vietnam's government enacted a series of economic reforms, including significantly more liberal policies toward private enterprise. Following the dissolution of the Soviet Union in 1991, Vietnam improved relations with a number of Asian and Western nations. A bilateral trade agreement with the United States was ratified by both countries in 2001.

Vietnam War (1954–75), a protracted and unsuccessful effort by South Vietnam and the United States to prevent the communists of North Vietnam from uniting South Vietnam with North Vietnam under their leadership.

A brief treatment of the Vietnam War follows. For full treatment, *see* MACROPAEDIA: Vietnam War.

The Vietnam War had its origins in the broader Indochina wars of the 1940s and '50s, when Vietnamese groups such as the communist Viet Minh fought the colonial rule of Japan and then of France. With their victory at the Battle of Dien Bien Phu on May 7, 1954, the Viet Minh brought an end to French rule in Indochina. The Geneva Accords of July 1954 established a separation between North Vietnam, ruled by the Vietnamese communists, and South Vietnam, ruled by a succession of civilian and military leaders supported first by France and then by the United States. The United States introduced military advisers in 1961 and then active combat units beginning in 1965. By 1969 more than 540,000 U.S. military personnel were stationed in Vietnam. Meanwhile, China and the Soviet Union poured weapons, supplies, and advisers into the North, which in turn provided support, political direction, and regular combat troops for the war in the South, which at first was fought mainly by irregular units known as the Viet Cong. The war crossed into neighbouring Laos and Cambodia, where communists established sanctuaries and supply lines for the Vietnamese conflict and also mounted insurgencies against U.S.-backed regimes in those countries.

Despite their numbers and sophisticated weapons, the Americans could not eradicate the skillful and determined insurgents. In January 1968 the communists launched a surprise attack throughout the South during the Tet (lunar new year) festival. Though the Tet offensive caused huge losses to the Viet Cong, it also convinced much of the American public that the war in Vietnam was being waged at too high a price. In May 1968 the United States and North Vietnam began peace talks in Paris, and the U.S. military instituted a program of "Vietnamization," whereby the South Vietnamese assumed all responsibility for their defense while being supplied by the United States. A formal peace agreement was signed in January 1973, establishing a cease-fire throughout Vietnam until the country could be reunited by "peaceful means." The last U.S. combat units were withdrawn in March, but fighting continued between North and South, each side accusing the other of violating the agreement. The Vietnam War finally ended in 1975, when South Vietnam fell to a full-scale invasion by the North. A military government was instituted, and on July 2, 1976, the country was officially united as the Socialist Republic of Vietnam.

The effects of the conflict were harsh for all involved. Approximately 2,000,000 Vietnamese civilians perished, as did some 1,100,000 North Vietnamese and Viet Cong troops and approximately 225,000 South Vietnamese soldiers. More than 58,000 Americans died or were missing as a result of the war.

Vietnamese language, official language of Vietnam, spoken in the early 21st century by more than 70 million people. It belongs to the Viet-Muong subbranch of the Vietic branch of the Mon-Khmer family, which is itself a part of the Austroasiatic stock. Except for a group of divergent rural dialects spoken between Hue and Vinh, most of the dialects of Vietnamese differ from each other to about the same degree as do the dialects of English in the United States. The standard language is based on the speech of educated people living in and around Hanoi. A large proportion of the vocabulary of Vietnamese has been borrowed from Chinese, and the influence of Tai languages is also evident. *See* Austroasiatic languages.

Vietnamese literature, body of literature produced by Vietnamese-speaking people, primarily in Vietnam.

Like the river basins that have nourished Vietnam's agricultural civilization for thousands of years, Vietnamese literature has been fed by two great tributaries: the indigenous oral literature and the written literature of Chinese influence.

The oral poetry tradition is purely native. Older even than the linguistic separation of the Muong and Vietnamese languages 1,000 years ago, the oral poetry tradition probably has its origins in the agrarian prayers common to the prehistory of the Mon-Khmer language family. The oral poetry, still sung today in the countryside, remains a strong influence in contemporary poetry and fiction writing. Its word stock, prosodic patterns, and themes show few foreign influences. And, while its main contemporary feature is the lyrical, first-

person, sung poetry of *ca dao* ("folk ballads"), the oral tradition also contains third-person narratives, as in the *ca tru* ("ceremonial songs") tradition in the north and the *vong co* ("echoes of the past") tradition in the south, as well as in the *tuc-ngu* proverbs ("customary words"), related to *ca dao*.

Chinese influence on the written literature of Vietnam is nearly as old as its conquest of the country in the 2nd century BC. For nearly 2,000 years after that, most Vietnamese writing was in Chinese ideograms. In other words, to express themselves in writing, the Vietnamese had to use a writing system that represented their ideas but not their speech. However, with national independence and the establishment of a Vietnamese state in the 10th century AD, scholars began to develop an ideographic writing system that represented Vietnamese speech. This demotic writing system, called Chu Nom, or "the southern script," existed beside Chinese writing into the early 20th century when both Chinese and Chu Nom were supplanted by a Roman alphabetical script, first proposed in 1651 by the Jesuit priest Alexandre de Rhodes. The alphabetical system of writing, called Quoc-ngu, or "the national script," was much simpler to learn than either Chinese or Chu Nom. Its general adoption, particularly in the late 19th and early 20th centuries, spread literacy throughout Vietnam and sped the introduction of Western ideas and literary forms, including the appearance of the Western-style novel and short story.

Along with the borrowed conventions of Chinese literature came Confucianism, Buddhism, and Taoism. Over the many centuries of Chinese acculturation, these "Three Religions" grafted themselves, more or less successfully, onto similar, indigenous habits of belief. The choice of writing in Han-Viet (Chinese-Vietnamese) or in Chu Nom gave individual authors a wide range of formal and thematic possibilities, including the *luc-bat* ("six-eight," referring to a basic couplet of six syllables in the first line and eight in the second) prosody of the oral tradition. While concurring on the prestige of Chinese writing, Vietnamese literati were intent on establishing the independence of Vietnamese writing, even as they accepted models from the full range of Chinese literary forms, especially the "regulated verse" form, or *lii-shih*, of the T'ang dynasty. Both in Chinese and in Chu Nom writing, *lii-shih* (*tho duong luat* in Vietnamese) became the classical carrier of lyrical expression. In its borrowed origins and in its formal compression, its cultural function was similar to that of the English sonnet. The form reached aesthetic heights in Vietnamese hands in the 19th century, with poets such as the concubine Ho Xuan Huong, who composed regulated verse poems that were complete double entendres, filled with tonal puns (*noi lai*). Still others created regulated verse palindromes that would be in Vietnamese from start to finish but then, going backward, ideogram by ideogram, became poems in Chinese, switching languages on the reversal. Perhaps the most extraordinary proponent of this kind of virtuoso play was the emperor Thieu Tri (ruled 1841–47), who wrote a poem for his intellectual recreation that was a circular palindrome offering 12 different readings. This poem, carved in jade inlay for a wood panel at the Long-An Palace, can still be seen at the Imperial Museum of Hue.

In the earliest centuries of the independent Vietnamese nation, a great deal of the literature was produced by Buddhist monks of the Thien school (a prior form of what is better known as Zen), which had reached Vietnam as early as the 2nd century by means of Indian monks traveling to China. In the 10th and 11th centuries a collection of Buddhist biographies and verse pronouncements entitled *Thien uyen tap anh* (literally "Flowers of the Garden of Thien," more prosaically "Outstanding Figures in the Zen Community") included works by famous monks such as Van Hanh, Man Giac, Vien Chieu, Vien Thong, and Khong Lo. In the late 13th century, with the Buddhist Truc Lam ("Bamboo Forest") sect under the patronage of King Tran Nhan Tong, this brand of Buddhism, as the state religion, was still the chief influence in literature. However, as Confucianism of the Chinese administrative model became an increasingly reliable tool in governing and defending Vietnam, the locus of literary talent gradually shifted to high court officials and statesmen such as Nguyen Trai in the 15th century or Nguyen Binh Khiem in the 16th.

Perhaps the greatest of these statesmen-poets was Nguyen Du in the 19th century. His *Truyen Kieu* (*The Tale of Kieu*), or *Kim Van Kieu*, is generally considered the pinnacle of Vietnamese literature. Written in the Chu Nom vernacular in 3,253 *luc-bat* couplets of the oral folk tradition, *The Tale of Kieu* was immediately a great classical work and also a work, when read aloud, that was accessible to the masses of Vietnamese who could not read or write. With its concerns for individual freedom and its sense of karmic destiny, with its conflicts over Confucian versus Buddhist obligations, and with its examination of *duyen* ("fated love"), this great work is the summation of the Vietnamese sense of self at the end of the feudal period.

Indeed, by the time Nguyen Du had finished his *Tale of Kieu*, French military engineers had already built the fortifications of the Hue citadel for a new dynasty of the Nguyen emperors. Feudal Vietnam would soon disappear under French colonial rule. The Confucian mandarinate that had served the throne of the nation for centuries would then be gone entirely. Except for a few brilliant traditionalists such as the poet-journalist Tan Da in the 1920s, new literature in Chu Nom and Chinese would dwindle to nothing as the mandarins gradually retired from the political and cultural scenes. Meanwhile, Western writing filtered into the culture through French and through translations into Quoc-ngu, the Roman script that had made literature available to ordinary people. By the turn of the 20th century, the first Western-style short story had appeared (Nguyen Trong Quan's "Truyen thay Lazaro Phien" ["The Story of Lazaro Phien"], 1887) and, in 1910, the first Western-style novel (Tran Chanh Chieu's *Hoang To Anh ham oan* ["The Unjust Suffering of Hoang To Anh"]).

Twentieth-century Vietnamese literature was a chronicle of movements, evolutions, and revolutions as writers witnessed the disappearance of their feudal past under French colonialism. With France in control of the major part of Vietnam by 1862, Vietnamese writers struggled to find some intellectual system to address this drastic redefinition of the nation. Movements to restore the throne met movements to abandon it altogether. When the Japanese defeated the Russians in 1905 and when the Chinese revolution met success in 1911 under Sun Yat-sen's leadership, the Vietnamese took note. Early on, some Confucian reformists, such as Luong Van Can, Phan Boi Chau, and Phan Chau Trinh, proposed cooperation with the French as they worked to establish a literature that could meet the needs of their changed world. Some, such as Pham Quynh with his influential journal *Nam phong* ("South Wind"), accepted French rule as an inevitability that might offer new thinking and writing. Still others envisioned only a literature of resistance.

Perhaps the two most influential literary movements, when one considers their lasting effect, were the Tu Luc Van Doan ("Independent Literary Group"), led by Khai Hung and Nhat Linh, and the Tho Moi ("New Poetry") school, which included important writers such as Xuan Dieu, Che Lan Vien, Cu Huy Can, Bang Ba Lan, and Luu Trong Lu. Both groups succeeded in throwing off antiquated Chinese literary habits, creating a new and lively literature in Quoc-ngu, the former in prose and the latter in poetry. Their differences in defining Vietnamese nationalism would lead to further extremes of right and left in later years. This ferment in the "national script" also swept into the essentially new medium of journalism, which afforded great access to the Vietnamese people. Indeed, in 1938, after the French had lifted censorship on the eve of World War II, there were 128 daily newspapers in Vietnam.

With the establishment of the Popular Front in France, the ideological rift widened between literary movements. Those who followed communism sought a new realism akin to the Socialist Realism of Soviet Russia. With the success of the Viet Minh and the abdication of Emperor Bao Dai in August 1945, the current stage was set: in the North a form of Socialist Realism became the orthodoxy, both in poetry and prose, yet there were notable nonconforming poets such as Xuan Dieu, Che Lan Vien, Te Hanh, as well as To Huu, who served as the poet of the Marxist viewpoint. In the South, under American influence after 1954, many writers, such as Vo Phien and Doan Quoc Sy, struggled on with their independent voices.

With the end of the war in 1975, gifted, startling, and, sometimes, dissident writers emerged in works that often found Western readers. Although significant poets such as Nguyen Duy were among this new group, it was largely prose fiction that marked the lively postwar period, with novels such as Duong Thu Huong's *Tieu thuyet vo dat* (1991; *Novel Without a Name*), Bao Ninh's *Than phan cua tinh yeu* (1991; *The Sorrow of War*), and Nguyen Huy Thiep's remarkable collection *Tuong ve huu* (1988; *The General Retires and Other Stories*).

At the turn of the 21st century, a second generation of writers had emerged abroad, especially in the United States, including Nguyen Qui Duc, *Where the Ashes Are* (1994); Andrew Lam, coeditor of *Once upon a Dream: The Vietnamese-American Experience* (1995); Monique Truong, *The Book of Salt* (2003); and Le Thi Diem Thuy, *The Gangster We Are All Looking For* (2003). There remained in Vietnamese literature, wherever one found it, traces of French Symbolism and of a renovated Socialist Realism. In poetry frequent use of free verse occurred. Postmodernism and even magic realism had become available literary strategies. All these blended into the ancient streams of Vietnamese literary habit, which had by no means disappeared.

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founding of the nation in the 10th century to the modern period; it contains interesting (if faint) photographs of landscapes, authors, and monuments.

A number of anthologies also are available. John Balaban and Nguyen Qui Duc (eds.), *Vietnam* (1996), comprises 17 short stories by contemporary authors living in Vietnam, Europe, and the United States, including several by northerners who became known in the West in the postwar Renovation period. Sanh Thong Huynh (ed. and trans.), *An Anthology of Vietnamese Poems from the Eleventh Through the Twentieth Centuries* (1996, reissued 2001), comprises poetry from the 11th through the 20th century. Wayne Karlin, Le Minh Khue, and Truong Vu (eds.), *The Other Side of Heaven: Post-war Fiction by Vietnamese and American Writers* (1995), presents a large collection of war-related contemporary fiction in which prominent Vietnamese authors alternate stories with American authors. Ngoc Bich Nguyen (ed. and trans.), *A Thousand Years of Vietnamese Poetry* (1975), is the first English anthology done in collaboration with Burton Raffel and W.S. Merwin, the noted poet.

(Jo.Ba.)

Vietnamese Nationalist Party: *see* Viet Nam Quoc Dan Dang.

Vieux-Colombier, Theatre of the, French theatre founded in Paris in 1913 by the writer and critic Jacques Copeau to present alternatives to both the realistic "well-made" plays of the time and the star system of actor-celebrities. Copeau sought to renovate French theatre by focusing attention on the actor, whom he viewed as the essential element in translating the dramatic text into the "poetry of the theatre." He assembled a group of young actors that included Charles Dullin, Suzanne Bing, and Louis Jouvet, who was also his principal stage manager. Copeau and Jouvet designed a small (400-seat) theatre with a permanent stage setting and without the proscenium that separated actors and audience.

The Vieux-Colombier opened in October 1913. By May 1914 Copeau had produced 15 plays, including works by Molière, Shakespeare, and several modern writers. From 1917 to 1919 Copeau moved his company to New York City. Returning to Paris after World War I, he founded a drama school in association with the theatre. In 1924 he left the Vieux-Colombier, and thereafter the theatre was used by various acting companies. In 1961 it was renamed the Theatre of the Vieux-Colombier-Jacques Copeau.

Vieux Fort, town and former capital of St. Lucia island in the eastern Caribbean Sea. It lies 19 miles (30 km) south of the harbour of Castries and is situated near the island's extreme southeastern tip on fertile, flat ground overlooking Vieux Fort Bay. Named after a 17th-century fort (Old Fort), it was the site of St. Lucia's first sugar works (1765) and is still the centre of a sugar- and coconut-growing district. Hewanorra International Airport, one of the island's two airports, is nearby. Vieux Fort has one of the most modern deepwater ports in the Caribbean. Pop. (2001 prelim.) 14,754.

Vieuxtemps, Henry (b. Feb. 17, 1820, Verviers, Neth. [now in Belgium]—d. June 6, 1881, Mustapha, Alg.), Belgian violinist and composer who was one of the most influential figures in the development of violin playing.

As a prodigy, Vieuxtemps was taken by his father on a number of European tours. He subsequently toured several times in Europe and made three tours of America. He held two conservatory positions: one in St. Petersburg (1846–51), where he exerted considerable influence on Russian violin playing, and the other in Brussels (1871–73), where he was forced to resign because of a paralytic stroke. His playing style, which combined extraordinarily precise virtuoso technique and full-bodied tone, was widely imitated. He was one of the earliest bravura 19th-century virtuosos. His compositions, too, were pathbreaking; his concerti especially contributed much to the development of that form.

viewfinder, camera component that shows the area of the subject to be included in a photograph. In modern cameras it usually is part of a direct visual or range finder focusing system and may also be used to display exposure settings or meter information.

Modern viewfinders are variations on two types: reflex and direct optical. In the single-lens reflex camera, the camera lens itself serves as the finder in conjunction with a ground-glass focusing screen to which the image is reflected by a mirror. The image is viewed on the screen through a pentaprism that corrects the lateral reversal of the image as it appears on the screen. At the moment of exposure, the mirror moves out of the way, leaving a clear path to the film.

In a twin-lens reflex camera, the finder has a lens of its own, essentially a duplicate of the aperture lens, placed above it and reflecting the image by a mirror to a ground-glass screen. The image is not inverted but is laterally reversed. The focusing mechanism of the viewfinder regulates the main lens as well.

The direct-optical viewfinder most commonly used, the bright-line viewfinder, is essentially an inverted Galilean telescope system, with an optically projected rectangle outlining the frame area. The viewed image is neither inverted nor reversed.

With direct-optical and twin-lens reflex viewfinder systems, a slight error known as parallax is introduced by the slightly different viewpoints of finder and camera lenses. The error can be reduced by positioning the finder as close to the camera lens as possible or by making the finder field smaller so that the camera field includes it.

Viganò, Salvatore (b. March 25, 1769, Naples, Kingdom of Naples [Italy]—d. Aug. 10, 1821, Milan, Austrian Habsburg domain [Italy]), Italian dancer and choreographer whose innovations included the synthesis of dance and pantomime, which he called "coredodramma," in highly dramatic ballets based on historical and mythological themes and Shakespearean plays.

Viganò was born of a family of dancers and was the nephew of the composer Luigi Boccherini. He studied literature and music as well as dance. While performing in Madrid he married the Austrian dancer Maria Medina and met the choreographer Jean Dauberval (a pupil and protégé of Jean-Georges Noverre), whom he joined in France and England. Viganò then danced and choreographed in Italy and central Europe, principally Vienna (1793–95 and 1799–1803). In 1811 he went to Milan to become ballet master at La Scala, Italy's principal opera and ballet theatre. Under his influence, ballet in Italy flourished. In contrast to many earlier choreographers, Viganò tried to select music for his ballets that was appropriate to their themes and dance movements. In *Gli strelizzi* (1809) and subsequent ballets, he further developed Noverre's dance-drama approach by combining conventional dance patterns with pantomime, whereas Noverre had stopped at the alternation of such sequences. Among Viganò's more than 40 ballets were *Die Geschöpfe des Prometheus* (1801; *The Creatures of Prometheus*), composed especially for him by Beethoven; *Gli strelizzi*, based on an insurrection in the late 17th century among the guards (*strelsy*) of the Russian tsar Peter the Great; *Otello* (1818); and *I titani* (1819; "The Titans"), which explored man's greed for gold.

Vigée-Lebrun, Elisabeth, Lebrun also spelled LE BRUN, or LEBRUN, in full MARIE-LOUISE-ELISABETH VIGÉE-LEBRUN (b. April 16, 1755, Paris, France—d. March 30, 1842, Paris), French painter, one of the most successful women artists (unusually so for her time), particularly noted for her portraits of women.

Her father and first teacher, Louis Vigée, was a noted portraitist who worked chiefly in pastels. In 1776 she married an art dealer, J.-B.-P. Lebrun. Her great opportunity came in 1779 when she was summoned to Versailles to paint



Self-Portrait in a Straw Hat, oil on canvas by Vigée-Lebrun, after 1782; in the National Gallery, London

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a portrait of Queen Marie-Antoinette. The two women became friends, and in subsequent years Vigée-Lebrun painted more than 20 portraits of Marie-Antoinette in a great variety of poses and costumes. She also painted many self-portraits. In 1783, because of her friendship with the queen, Vigée-Lebrun was grudgingly accepted into the Royal Academy.

On the outbreak of the Revolution in 1789, she left France and for 12 years lived abroad, traveling to Rome, Naples, Vienna, Berlin, St. Petersburg, and Moscow, painting portraits and playing a leading role in society. In 1801 she returned to Paris but, disliking Parisian social life under Napoleon, soon left for London, where she painted portraits of the court and of Lord Byron. Later she went to Switzerland (and painted a portrait of Mme de Staël) and then again (*c.* 1810) to Paris, where she continued to paint until shortly before her death.

Vigée-Lebrun was a woman of much wit and charm, and her memoirs, *Souvenirs de ma vie* (1835–37; "Reminiscences of My Life"; Eng. trans. *Memoirs of Madame Vigée Lebrun*), provide a lively account of her life and times. She was one of the most technically fluent portraitists of her era, and her pictures are notable for freshness, charm, and sensitivity of presentation. According to her own account, she painted more than 900 pictures, including some 600 portraits and about 200 landscapes.

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Vigeland, Gustav, in full ADOLF GUSTAV VIGELAND (b. April 11, 1869, Mandal, Norway—d. March 12, 1943, Oslo), Norwegian sculptor, best known for his major work, Fountain Square, an outdoor sculpture complex, in Frogner Park, Oslo. He is said to have been the most prolific sculptor of all time.

Vigeland's parents were farmers, and he was apprenticed to a wood-carver when he was 14 years old. His first work was shown in 1889, and, though early influenced by Auguste Rodin, he soon developed his own realistic style. His works were often controversial, and he remained poor all his life.

The early sculptures, mostly portrait busts and reliefs, are now in the Vigeland Museum in Oslo. The later, monumental works are concentrated in Oslo's largest park, for which he designed more than 200 individual sculptural projects, including an entrance, bridge, fountain, circular staircase, mosaic labyrinth, and, literally, a stone forest of people. A central monolith, carved from a single block of solid granite 57 feet high, weighed 270 tons before sculpting began. It consists of 121 figures and is surrounded by 36 major groupings, all dealing with the various periods in the cycle of life—birth, childhood, adolescence, maturity, old age, and death.

Vigevano, town, Pavia province, Lombardia (Lombardy) region, northern Italy, on the right bank of the Ticino River, southwest of Milan. An old silk-manufacturing town, it was the site during the Renaissance of a hunting villa of the Sforza family, who built the arcaded Piazza Ducale (1494) and enlarged the former Castello Visconti (1492). A bishopric, it has a notable cathedral (1532–1606).

Industry has grown steadily in Vigevano during the 20th century, and the town is widely known as a shoe-manufacturing centre with an annual International Shoe Fair and Market. It also has textile and leather industries. Pop. (1981 prelim.) mun., 65,355.

Vigfússon, Gudbrandur (b. March 13, 1827, Dalasýsla, Ice.—d. Jan. 31, 1889, Oxford), one of the 19th century's foremost scholars of Old Norse, who completed the Richard Cleasby *Icelandic–English Dictionary* (1874; 2nd ed., 1957) and published editions of a number of Icelandic sagas as well as the collection *Corpus poeticum boreale* (1883; "Body of Northern Poetry").

Vigfússon studied in Iceland and at the University of Copenhagen but took no degree. As a research fellow at Copenhagen (1854–64), Vigfússon published his first work, the *Tímatal* (1855), a brilliant attempt at establishing the chronologies of the Icelandic family sagas, followed by editions of Icelandic works, the first volume of the *Biskupa sögur* (1858; "Bishops' Sagas") and the *Eyrbyggja saga* (1864). Persuaded to move to Oxford to supervise completion of the Cleasby Icelandic–English lexicographical enterprise (1864), he collaborated on the *Flateyjarbók* (1860–68; *The Flatey Book,* 1893) and published his edition of the *Badar saga* (1869). In 1871 he was granted an honorary M.A. degree by Christ Church, Oxford, became a member of the college, and from 1884 was a reader in Old Icelandic. In the works of his later years, including editions of the *Sturlunga saga* (1878), the *Hákonar saga* (1887), and the *Corpus poeticum boreale,* he wrote prefaces and notes showing insight into literary and historical problems far ahead of his contemporaries.

Vigilius (b. before 500, Rome—d. June 7, 555, Syracuse, Sicily), pope from 537 to 555, known for his major role in what later was called the "Three Chapters Controversy," a complex theological dispute between the Eastern and Western churches.

Vigilius, of noble birth, became a Roman deacon and was with Pope St. Agapetus I during the latter's unsuccessful mission in March 536 to Constantinople to deter the Byzantine emperor Justinian I the Great from reconquering Italy. At Constantinople, Agapetus died on the following April 22, and Vigilius ingratiated himself with Justinian's wife, the empress Theodora. With her, Vigilius schemed the deposition of Pope St. Silverius, who had been elected in June 536 as Agapetus' successor.

Silverius was deposed by the Byzantine general Belisarius, who, on Theodora's orders, entered Rome on Dec. 9, 536, and replaced him with Vigilius. Silverius was exiled and appealed to Justinian, but upon his return to Rome from Constantinople Silverius was forcefully banished by Vigilius and subsequently died, probably late in 537. Vigilius thus succeeded him as pope.

Meanwhile, Rome had been devastated by the Ostrogoths, and the Eastern Church was torn between orthodoxy and Monophysitism. While faced with a restoration of Rome, Vigilius turned to the ecclesiastical dilemma pressing Justinian. The Eastern conflict was between the orthodox view accepted at the Council of Chalcedon (451) that Christ's divine and human natures coexist and the Monophysite teaching that emphasized his divine nature. The conflict was further complicated by a political problem: if Justinian condemned Monophysitism, he would lose the Monophysite provinces of Syria and Egypt.

The Emperor attempted a compromise by issuing an edict in 544 condemning three writings (chapters) that were opposed by the Monophysites. His edict roused an outcry in the West, thus causing the "Three Chapters Controversy." In November 545 Justinian forced Vigilius to go to Constantinople, where, despite brutal imperial pressure to condemn the writings, Vigilius long vacillated. Finally, he censured with reservations the Three Chapters in his *Judicatum* ("Verdict") in April 548, causing such adverse reaction in the West that Justinian decided to convoke a general council. Without waiting for the council to convene, however, Justinian repeated his own condemnation, whereupon Vigilius severed relations with him. For his personal safety, Vigilius took refuge first in a sanctuary at Constantinople and then at Chalcedon, from where he issued censures against certain high ecclesiastics who supported Justinian. The council opened in 553 without the Pope and confirmed the sentence passed against the Three Chapters.

Vigilius' *Constitutum* ("Resolution") of May 24, 553, withheld ratification of the council's decision. Succumbing to lassitude, to the appeals of the Romans for his return, and to the ill treatment to which Justinian was subjecting him, however, Vigilius decided to revoke his first *Constitutum* and sign a second on Feb. 23, 554, which gave pontifical approbation to the council's verdict. At this point, he lost the support of his nuncio Pelagius I (later his successor), who had been with him throughout the ordeal at Constantinople but who now deserted him. Vigilius then excommunicated Pelagius, who was subsequently imprisoned.

The Pope died on the trip home and was buried at Rome. The Western schism resulting from his Eastern policies raged on for 150 years.

Vigneaud, Vincent Du: *see* Du Vigneaud, Vincent.

Vignola, Giacomo da, also called GIACOMO BAROZZI or GIACOMO BAROZIO (b. Oct. 1, 1507, Vignola, Bologna—d. July 7, 1573, Rome), architect who, with Andrea Palladio and Giulio Romano, dominated Italian Mannerist architectural design and stylistically anticipated the Baroque.

After studying in Bologna, Vignola went to Rome in the 1530s and made drawings of the antiquities for a projected edition of Vitruvius' treatise on architecture. In 1541–43 he spent 18 months at the court of Francis I at Fontainebleau and in Paris, where he probably met his fellow Bolognese, the architect Sebastiano Serlio and the painter Primaticcio. On his return to Italy he built the Palazzo Bocchi at Bologna and then went to Rome (*c.* 1550), where he was appointed architect to Pope Julius III, for whom he built the Villa Giulia in collaboration with Giorgio Vasari and Bartolommeo Ammannati, in 1551–55. This was a summer villa, based on ancient villa types as described by Pliny the Younger, with a small house and an elaborate garden.

In 1554 he built the church of S. Andrea in the nearby Via Flaminia, the first church to have an oval dome, although the ground plan is rectangular. In his church of Sta. Anna dei Palafrenieri (begun *c.* 1572), Vignola extended this idea to include an oval in the ground plan, and this oval theme became a favourite of 17th-century Baroque architects. Vignola's most important church was, however, Il Gesù in Rome, headquarters of the Society of Jesus, which he began in 1568. Vignola died before the structure was completed, but the basic plan is his: aisles subsumed in side chapels so as to produce an illusion of vast interior space. The broad nave thus created was an effective instrument for dramatizing the Mass, and as such was widely copied throughout Europe in the service of the Counter-Reformation.



Palazzo Farnese at Caprarola, Italy, by Giacomo da Vignola, 1559–73
Anderson—Alinari from Art Resource/EB Inc.

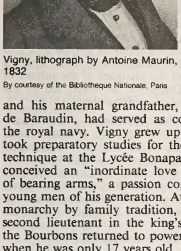
After the death of his patron Julius III in 1555, Vignola worked mainly for the Farnese family, for whom he completed the huge Palazzo Farnese at Caprarola, near Viterbo, the plan of which had been established earlier by Antonio da Sangallo and Baldassarre Peruzzi.

The academic tendency of Vignola's mind is epitomized in his *Regola delli cinque ordini d'architettura* of 1562, which remained a standard textbook on the architectural orders for three centuries. He also wrote on perspective in *Le due regole della prospettiva pratica,* which was published posthumously (1583) and had a short life.

Vigny, Alfred-Victor, comte de (count of) (b. March 27, 1797, Loches, Fr.—d. Sept.

17, 1863, Paris), poet, dramatist, and novelist who was the most philosophical of the French Romantic writers.

Youth and Romantic works. Vigny was born into an aristocratic family that had been reduced to modest circumstances by the French Revolution. His father, a 60-year-old retired soldier at the time of his son's birth, was a veteran of the Seven Years' War;



Vigny, lithograph by Antoine Maurin, 1832
By courtesy of the Bibliotheque Nationale, Paris

and his maternal grandfather, the Marquis de Baraudin, had served as commodore in the royal navy. Vigny grew up in Paris and took preparatory studies for the École Polytechnique at the Lycée Bonaparte, where he conceived an "inordinate love for the glory of bearing arms," a passion common to the young men of his generation. Attached to the monarchy by family tradition, he became a second lieutenant in the king's guard when the Bourbons returned to power in 1814 and when he was only 17 years old.

Though he was promoted to first lieutenant in 1822 and to captain the following year, the military profession, limited to garrison duty rather than pursued on the battlefield, bored the young officer, who preferred the adventures of a literary career. After several leaves of absence, he abandoned military life in 1827. In the meantime, he had published his first poem, "Le Bal," in 1820. Two years later his first collection of verse was published as *Poèmes*, along with contributions to Victor Hugo's politically conservative literary periodical *La Muse Française*. Salons and reviews in Paris hailed the birth of a poet who combined grace with a strength and depth that was totally Romantic. Vigny's expanded version of *Poèmes* under the title *Poèmes antiques et modernes* (1826) was also a success.

Vigny, however, was not content to excel merely in poetry, and he revealed his narrative talent in *Cinq-Mars* (1826), a historical novel centred around the conspiracy of Louis XIII's favourite, the Marquis de Cinq-Mars, against the Cardinal de Richelieu. *Cinq-Mars* was the first important historical novel in French, and it derived much of its popularity at the time from the enormous vogue of the novels of Sir Walter Scott. Vigny also showed a typically Romantic interest in William Shakespeare, freely adapting *Othello* (*Le More de Venise*, first performed 1829) as well as *The Merchant of Venice* (*Shylock*, 1829). During these years Vigny was regarded as a literary leader of the Romantic movement in France. The Romantic poet Alphonse de Lamartine recognized his talents, and Hugo and Charles Sainte-Beuve treated him as a friend. Vigny and the writer Delphine Gay, the "muse of the country" as she was called—for her beauty as well as her literary talents—formed a striking couple before his marriage in February 1825 to Lydia Bunbury, daughter of a wealthy Englishman.

Maturity and disillusionment. By 1830 Vigny's temperament had become more sombre. The July Revolution engendered in him a political pessimism inspired by the repeated faults of the French monarchy, an issue that had become evident already in *Cinq-Mars*. As a point of honour he, like Chateaubriand, sought to remain faithful to the monarchy, but he did not conceal the fact that the cause of the Bourbon king Charles X was worth no more than that of Louis-Philippe, who had been placed on the throne by the moneyed bourgeoisie. He searched unsuccessfully for a political creed and studied every shade of opinion without giving his allegiance to any. From this time on he closely followed current affairs, grasping them with a clarity that was at times prophetic, though his overt political activity remained erratic.

He acknowledged his disillusionment as early as 1831 in "Paris," a poem of a new genre that he termed *élévations*. He felt all the more tormented, for he could no longer count on the religious faith of his childhood. His feelings on this score are evident in another poem (1832) in which he contemplated suicide: "And God? Such were the times, they no longer thought about Him." The only thing left for him to doubt was love itself, a trauma he painfully experienced in the course of his liaison (1831–38) with the actress Marie Dorval, for whom he was to create the role of Kitty Bell in the play *Chatterton* in 1835. He accused Dorval of deceiving him and of having maintained an overaffectionate friendship with the writer George Sand. His relationship with Dorval left Vigny profoundly embittered.

In *Stello* (1832) Vigny put together a series of *consultations*, or dialogues, between two symbolic figures: Doctor Noir (the Black Doctor), who represents Vigny's own intellect; and Stello, who represents the poet's desire for an active part in the public arena. In seeking to preserve Stello from the dangers of his imprudent enthusiasm, Doctor Noir tells him three anecdotes. In these three short stories Vigny examines the poet in his dealings with political authority: the levity of Louis XV condemns Nicolas Gilbert to die in privation; the fanaticism of the republican tyrant Robespierre leads André Chénier to the scaffold; the egoism of William Beckford, lord mayor of London, provokes the suicide of the poet Thomas Chatterton; all political regimes inflict on the poet the harshness of "perpetual ostracism." What then is this evil malaise? Vigny questions himself on the nature of it. He submits Stello to a sort of psychoanalytic examination, as confided to Doctor Noir. After having listened to Stello, the doctor prescribes a remedy of "separating poetic life from political life" and advises the poet against direct involvement in politics in order to preserve the dignity of his art and escape the horrible cruelties that characterize every kind of fanaticism.

Vigny adapted the part of *Stello* dealing with the suicide of Chatterton into a prose drama in three acts, *Chatterton* (1835). In presenting the last moments of Chatterton's life, he exalts the nobility and suffering of a misunderstood genius in a pitiless and materialistic society. The triumph of Vigny's career as a playwright, *Chatterton* remains one of the best Romantic dramas. It is far superior to *La Maréchale d'Ancre* (first performed 1831) and expresses Vigny's melancholy genius more seasonably than does his spiritual comedy *Quitte pour la peur* (first performed 1833).

Vigny's novel *Servitude et grandeur militaires* (1835; "Servitude and Military Greatness"; Eng. trans. *The Military Necessity*) is also a *consultation*. The book's three stories, linked by personal comment, deal with the dignity and suffering of the soldier, who is obliged by his profession to kill yet who is condemned by it to passive obedience as well. The first and third stories in this volume are Vigny's masterpieces in prose, and the third story's portrait of Captain Renaud, an old Napoleonic soldier, is a profound portrait of human greatness. Vigny began another ambitious *consultation* dealing with the religious prophet, but only one story, *Daphné* (published 1912), about the Roman emperor Julian the Apostate, survives.

Vigny's *consultations* enlarged upon his philosophy, formulated theories about the fate of man, and defined the principles that he thought should govern human conduct. To give these ideas the finish they required, he turned again, between 1838 and his death, to poetry, slowly composing the 11 poems that were later collected under the title *Les Destinées* (1864). The early poems are very pessimistic, but the later ones are increasingly confident affirmations of the imperishable nature of human spiritual powers.

In middle age Vigny gradually withdrew into a curious silence and retired, according to the famous expression of Sainte-Beuve, to an "ivory tower." He rarely went out, preferring the calm of his country manor to the excitement of Paris. In 1841 he stood as a candidate to the Académie Française, but he was elected only in 1845, after five checks, and was received there with a perfidious speech by Count Molé. His wife, Lydia, whose longtime invalidism had caused him constant anxiety, died in 1862, and Vigny himself died of cancer of the stomach after much suffering the following year. He left several unedited works whose posthumous publication enhanced his reputation: *Les Destinées*, *Le Journal d'un poète* (1867), *Daphné*, and *Mémoires inédits* (1958).

Assessment. Vigny's literary art is uneven. He does not possess great technical facility, and when not profoundly inspired, he is prosaic; there are long passages in *Les Destinées* that are laborious and dull. His austere imagination soberly developed a few symbols of the human condition and condensed them to achieve what he called a "hard, brilliant diamond."

It is *Les Destinées* above all that has earned Vigny his reputation as a philosopher-poet. His work is a poignant plea against all that is inhumane in the forces that rule the world: expedience (*Cinq-Mars*), governments and the mob (*Stello* and *Daphné*), and the treacherous love of women ("La Colère de Samson"). Vigny is particularly critical of the equivocality of Providence, which is silent in the face of suffering ("Le Mont des Oliviers") and as coldly insensitive as nature ("La Maison du Berger"). Vigny's belief in God is just strong enough for Vigny to reproach him. As a tormented skeptic, he proposes that strictly human values—honour, pity, and the love of beauty—should be adopted. His last poem celebrates the apotheosis of a Holy Spirit ("L'Esprit pur") that is essentially human and takes over the place of God.

It would be unjust, however, to regard Vigny solely as a philosopher. His literary creations spring less from a system of thought than from a spontaneously tragic conception of existence. Thwarted love, unrecognized goodwill, humiliated greatness, the tormented conscience of the soldier who detests war but fights on energetically—these are more than just general ideas: they express a wounded sensitivity and a soul torn by moral scruples. Under the anonymous cloak of symbols, Vigny extends to the whole of humanity his own conflicts and agonies, and his work is an effort to resolve them. Therein lies the poignancy of his work.

(P.Vi./P.-G.Ca./Ed.)

MAJOR WORKS. *Poetry. Poèmes* (1822), including "La Fille de Jephté"; "Éloa, ou la soeur des anges" (1824); *Poèmes antiques et modernes* (1826), including "Éléa," "Le Déluge," "La Neige," "Moïse," and "Le Cor"; "Madame de Soubise" and "La Frégate 'La Sérieuse' " (included in the

1829 revised edition of *Poèmes*); "Paris" (1831) and "Les Amants de Montmorency" (1832), both included in the 1837 revised edition of *Poèmes antiques et modernes*; "La Mort du loup" (1843); "La Maison du Berger" (1844); "Le Mont des Oliviers" (1844); and "La Colère de Samson" (1864), all included in *Les Destinées* (1864).

Plays. La Maréchale d'Ancre (1831); *Quitte pour la peur* (1833); *Chatterton* (1835).

Novels. Cinq-Mars (1826; *Cinq-Mars; or, A Conspiracy Under Louis XIII*, 1847); *Stello* (1832); *Daphné* (1912, published posthumously).

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Vigo, port town and naval station, Pontevedra *provincia*, in the *comunidad autónoma* ("autonomous community") of Galicia, northwestern Spain. Vigo lies along the southeastern shore of the Vigo Inlet of the Atlantic Ocean, southwest of Pontevedra city. It was attacked by the English admiral Sir Francis Drake in 1585 and 1589. In 1702 a British-Dutch fleet under Sir George Rooke and James Butler, Duke of Ormonde, destroyed a Franco-Spanish fleet in the bay.

The town's architecture gives a modern impression, though a few old buildings still remain. These include the medieval chapel of the Casa de Caridad; the neoclassical Collegiate Church of Santo Cristo de la Victoria, built to commemorate the defeat of the French in the Peninsular War (1808–14); and the 17th-century Castillo del Castro.

Fishing is important, and the town's industry is well developed. Its manufactures include leather, lumber, flour, paper, sugar, brandy, and machinery. Pop. (1991 prelim.) mun., 274,629.

Vigo, Jean (b. April 26, 1905, Paris, France—d. Oct. 5, 1934, Paris), French film director whose blending of lyricism with realism and Surrealism, the whole underlined with a cynical, anarchic approach to life, distinguished him as an original talent. Although he completed only three feature films and one short, *Taris* (1931), before his early death, his films produced great public reaction. A Jean Vigo Prize is awarded each year in France in memory of the filmmaker whose work is characterized by "independence of spirit and quality of directing."

Vigo's father, Miguel Almereyda, a militant French anarchist, died in a prison cell in 1917. Vigo spent an unhappy and sickly childhood being shuffled about between relatives and boarding schools. He suffered from tuberculosis and finally settled in the warm climate of Nice, where he directed his first film, *À propos de Nice,* a satiric social documentary, in 1930. Vigo moved to Paris shortly thereafter and directed *Zéro de conduite* (1933; *Zero for Conduct*), which was branded as "anti-French" by the censors, removed from the theatres after only a few months, and was not shown again in France until 1945. The moving story, set in a boy's boarding school, explores the question of freedom versus authority and probably contains elements of Vigo's own unhappy childhood. *L'Atalante* (1934), a masterpiece, directed a slashing attack on the essence of the French bourgeoisie and had to be drastically edited by its producers who feared criticism from the public. Vigo's death of leukemia at the age of 29 took from the French cinema one of its most promising talents.

vihara, early type of Buddhist monastery consisting of an open court surrounded by open cells accessible through an entrance porch. The viharas in India were originally constructed to shelter the monks during the rainy season, when it became difficult for them to lead the wanderer's life. They took on a sacred character when small stupas (housing sacred relics) and images of the Buddha were installed in the central court.

A clear idea of their plan can be obtained from examples in western India, where the viharas were often excavated into the rock cliffs. This tradition of rock-cut structures spread along the trade routes of Central Asia (as at Bāmiān), leaving many splendid monuments rich in sculpture and painting.

As the communities of monks grew, great monastic establishments (*mahāvihāras*, "great viharas") developed that consisted of clusters of viharas and associated stupas and temples. Renowned centres of learning, or universities, grew up at Nālandā, in present-day Bihār state, during the 5th to 12th centuries and at Nāgārjunakoṇḍa, Andhra Pradesh, in the 3rd–4th century.

Vihārī, also spelled VEHARI, town, south-central Punjab province, Pakistan. The town lies on a flat alluvial plain bordered by the Sutlej River on the southeast. It is a market and processing centre for cotton and oilseeds. Wheat, rice, sugarcane, and vegetables are also grown nearby, and there are rice and flour mills in the area. Vihārī lies on the main road between Multān and Lahore. Pop. (1981) town, 53,799.

vihuela, in full VIHUELA DE MANO, stringed musical instrument that in Spanish Renaissance art music held the popularity accorded the lute elsewhere in Europe. Built like a large guitar, it had six, sometimes seven, double courses of strings tuned like the lute: G–c–f–a–d′–g′. (The guitar then had four double courses.)

The *vihuela* was played by the aristocracy, the guitar by commoners. By the 18th century both instruments had given rise to the six-stringed guitar. The *vihuela de arco* was a viola da gamba, or viol.

Viipuri (Russia): *see* Vyborg.

Vijayanagar (Sanskrit: "City of Victory"), great ruined city in southern India and also the empire ruled first from that city and later from Penukonda (in Anantapur district, Andhra Pradesh) between 1336 and about 1614. The site of the city, on the Tungabhadra River, is now partly occupied by the village of Hampi (in eastern Karnātaka state).

The city and its first dynasty were founded in 1336 by five sons of Saṅgama, of whom Harihara and Bukka became the city's first kings. In time Vijayanagar became the greatest empire of southern India. By serving as a barrier against invasion by the Muslim sultanates of the north, it fostered the reconstruction of Hindu life and administration after the disorders and disunities of the 12th and 13th centuries. Contact with the Muslims (who were not personally disliked) stimulated new thought and creative productivity. Sanskrit was encouraged as a unifying force, and regional literatures thrived. Behind its frontiers the country flourished in unexampled peace and prosperity.

The first dynasty (the Saṅgama) lasted until about 1485, when—at a time of pressure from the Bahmanī sultan and the raja of Orissa—Narasiṃha of the Sāluva family usurped power. By 1503 the Sāluva dynasty had been supplanted by the Tuluva dynasty. The outstanding Tuluva king was Kṛṣṇa Deva Rāya. During his reign (1509–29) the land between the Tungabhadra and Krishna rivers (the Raichūr doab) was acquired (1512), the Orissa Hindus were subdued by the capture of Udayagiri (1514) and other towns, and severe defeats were inflicted on the Bījāpur sultan (1520). Kṛṣṇa Deva's successors, however, allowed their enemies to combine against them. In 1565 Rāma Rāya, the chief minister of Vijayanagar, led the empire into the fatal battle at Rakasa-Tangadi (also known as Tālikota) in which its army was routed by the combined forces of the Muslim states of Bījāpur, Ahmadnagar, and Golconda and the city of Vijayanagar was destroyed. Tirumala, brother of Rāma Rāya, then seized control of the empire and founded the Aravīḍu dynasty, which established a new capital at Penukonda and kept the empire intact for a time. Internal dissensions and the intrigues of the sultans of Bījāpur and Golconda, however, led to the final collapse of the empire about 1614.

Vijayawāda, also called BEZWĀDA, city, east-central Andhra Pradesh state, southern India, on the Krishna River. The city is a centre for Hindu pilgrimages. It is also known for its toys, many of them miniatures. Of note is the Victoria Jubilee Museum, which has a magnificent black granite Buddha. A college of Oriental studies and a medical college are located in the city. Pop. (1991 prelim.) city, 701,351; metropolitan area, 845,305.

vijñāna (Sanskrit), in the Buddhist chain of dependent origination, thought or knowledge giving rise to name and form. *See* pratītyasamutpāda.

vijñāna-skandha (Sanskrit: "aggregate of thought"), Pāli VIÑÑAṆA-KHANDHA, in Buddhist philosophy, one of the five skandhas, or aggregates, that constitute all that exists. Thought (*vijñāna/viññāṇa*) is the psychic process that results from other psychological phenomena. The simplest form is knowledge through any of the senses, particularly through the mind (*citta*), which is regarded as the coordinating organ of the sense impressions. Thoughts are classified by the Theravāda tradition of Buddhism under some 89 headings, depending on their qualities and consequences; other schools classify thoughts in six groups correlated with the five originating senses and the mind. *See also* skandha.

Vijñānavāda (Buddhist school): *see* Yogācāra.

vijñapti-karman (Sanskrit: "manifest activity"), in Buddhist philosophy, a kind of action that manifests itself outside of the actor and is capable of being recognized by others. Of the three kinds of action (*i.e.*, those produced by the body, mouth, and mind) usually admitted in Buddhism, bodily ones and verbal ones are classified as *vijñapti-karman.* But mind activity (*i.e.*, will or thought) is considered as unmanifest action (*avijñapti-karman*). These actions, when they are finished, exert some effects on the agent according to the moral natures of the actions.

Viking, also called NORSEMAN, or NORTHMAN, member of the Scandinavian seafaring warriors who raided and colonized wide areas of Europe from the 9th to the 11th century and whose disruptive influence profoundly affected European history. These pagan Danish, Norwegian, and Swedish warriors were probably prompted to undertake their raids by a combination of factors ranging from overpop-



Viking longship found at Gokstad, Norway, in The University Collection of National Antiquities, Oslo
By courtesy of The University Collection of National Antiquities, Oslo, Norway

ulation at home to the relative helplessness of victims abroad.

The Vikings were made up of landowning chieftains and clan heads, their retainers, freemen, and any energetic young clan members who sought adventure and booty overseas. At home these Scandinavians were independent farmers, but at sea they were raiders and pillagers. During the Viking period the Scandinavian countries seem to have possessed a practically inexhaustible surplus of manpower, and leaders of ability, who could organize groups of warriors into conquering bands and armies, were seldom lacking. These bands would negotiate the seas in their longships and mount hit-and-run raids at cities and towns along the coasts of Europe. Their burning, plundering, and killing earned them the name *vikingr,* meaning "pirate" in the early Scandinavian languages.

The exact ethnic composition of the Viking armies is unknown in particular cases, but the Vikings' expansion in the Baltic lands and in Russia can reasonably be attributed to the Swedes. On the other hand, the nonmilitary colonization of the Orkneys, Faroes, and Iceland was clearly due to the Norwegians.

England. In England desultory raiding occurred in the late 8th century but began more earnestly in 865, when a force led by the sons of Ragnar Lodbrok—Healfdene, Inwaer, and perhaps Hubba—conquered the ancient kingdoms of East Anglia and Northumbria and reduced Mercia to a fraction of its former size. Yet it was unable to subdue the Wessex of Alfred the Great, with whom in 878 a truce was made, which became the basis of a treaty in or soon after 886. This recognized that much of England was in Danish hands. Although hard pressed by fresh armies of Vikings from 892 to 899, Alfred was finally victorious over them, and the spirit of Wessex was so little broken that his son Edward the Elder was able to commence the reconquest of Danish England. Before his death in 924 the small Danish states on old Mercian and East Anglian territory had fallen before him. The more remote Northumbria resisted longer, largely under Viking leaders from Ireland, but the Scandinavian power there was finally liquidated by Edred in 954. Viking raids on England began again in 980, and the country ultimately became part of the empire of Canute. Nevertheless, the native house was peacefully restored in 1042, and the Viking threat ended with the ineffective passes made by Canute II in the reign of William I. The Scandinavian conquests in England left deep marks on the areas affected, in social structure, dialect, place-names, and personal names.

The western seas and Ireland. In the western seas, Scandinavian expansion touched practically every possible point. Settlers poured into Iceland from at least about 900, and from Iceland colonies were founded in Greenland and attempted in North America. The same period saw settlements arise in the Orkneys, the Faroes, the Shetlands, the Hebrides, and the Isle of Man.

Scandinavian invasions of Ireland are recorded from 795, when Rechru, an island not identified, was ravaged. Thenceforth fighting was incessant, and although the natives often more than held their own, Scandinavian kingdoms arose at Dublin, Limerick, and Waterford. The kings of Dublin for a time felt strong enough for foreign adventure, and in the early 10th century several of them ruled in both Dublin and Northumberland. The likelihood that Ireland would be unified under Scandinavian leadership passed with the Battle of Clontarf in 1014, when the Irish Scandinavians, supported by the Earl of Orkney and some native Irish, suffered disastrous defeat. Yet in the 12th century the English invaders of Ireland found the Scandinavians still dominant (though Christianized) at Dublin, Waterford, Limerick, Wexford, and Cork.

The Carolingian empire and France. Viking settlement was never achieved in the well-defended empire on the scale evidenced in the British Isles, and Scandinavian influence on continental languages and institutions is, outside Normandy, very slight. Sporadic raiding did occur, however, until the end of the Viking period; and, in the 10th century, settlements on the Seine River became the germ of the duchy of Normandy, the only permanent Viking achievement in what had been the empire of Charlemagne (*see* Norman).

Farther south than France—in the Iberian peninsula and the Mediterranean coasts—the Vikings raided from time to time but accomplished little of permanence.

Eastern Europe. The eastern Viking expansion was probably a less violent process than that on the Atlantic coasts. Although there was, no doubt, plenty of sporadic raiding in the Baltic and although to go on the "east-Viking" was an expression meaning to indulge in such activity, no Viking kingdom was founded with the sword in that area.

The greatest eastern movement of the Scandinavians was that which carried them into the heart of Russia. The extent of this penetration is difficult to assess; for, although the Scandinavians were at one time dominant at Novgorod, Kiev, and other centres, they were rapidly absorbed by the Slavonic population, to which, however, they gave their name of *Rus,* "Russians." The *Rus* were clearly in the main traders, and two of their commercial treaties with the Greeks are preserved in the *Primary Chronicle* under 912 and 945; the *Rus* signatories have indubitably Scandinavian names. Occasionally, however, the *Rus* attempted voyages of plunder like their kinsmen in the West. Their existence as a separate people did not continue past 1050 at the latest.

The first half of the 11th century appears to have seen a new Viking movement toward the East. A number of Swedish runic stones record the names of men who went with Yngvarr on his journeys. These journeys were to the East, but only legendary accounts of their precise direction and intention survive. A further activity of the Scandinavians in the East was service as mercenaries in Constantinople (now Istanbul), where they formed the Varangian Guard of the Byzantine emperor.

After the 11th century the Viking chief became a figure of the past. Norway and Sweden had no more force for external adventure, and Denmark became a conquering power, able to absorb the more unruly elements of its population into its own royal armies. Olaf II Haraldsson of Norway, before he became king in 1015, was practically the last Viking chief in the old independent tradition.

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Viking, either of two unmanned U.S. spacecraft launched by the National Aeronautics and Space Administration on Aug. 20 and Sept. 9, 1975. After 10 months, Vikings 1 and 2 entered orbits around Mars and released



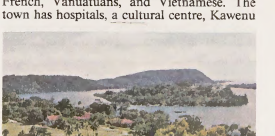
Viking 2 lander (foreground) on Mars
By courtesy of the Jet Propulsion Laboratory/National Aeronautics and Space Administration

landers that touched down at sites (designated Chryse and Utopia, respectively) 6,500 km (about 4,000 miles) apart on July 20 and Sept. 3, 1976. The landers relayed measurements of properties of the atmosphere and soil of Mars and colour photographs of the rocky surface. Experiments designed to detect evidence of living organisms provided no convincing evidence of life on the surface of the planet. The orbiters transmitted photographs of large expanses of the Martian surface.

Viking ship: *see* longship.

Vikramāditya (Indian emperor): *see* Candra Gupta II.

Vila, also called PORT-VILA, capital and largest town of the republic of Vanuatu, southwestern Pacific Ocean. Located on Mele Bay on the southwest coast of Éfaté, Vila is a port and the commercial centre of the island group. Although the town is French in appearance, the population is multinational, including British, French, Vanuatuans, and Vietnamese. The town has hospitals, a cultural centre, Kawenu



Vila Harbour (Mele Bay) on Éfaté Island, Vanuatu
Jacques Barrau

College (training of primary teachers), and a meat cannery.

Bauerfield, just outside the town, is the major international airport of the Republic of Vanuatu. Vila served as a base for the United

States in World War II. Pop. (1989) urban area, 19,311.

Vila do Conde, town and *concelho* (township), Porto district, northwestern Portugal. It lies at the mouth of the Ave River, north of Porto. Dating from Roman times, the town received its charter about 1500 from King



Aqueduct at Vila do Conde, Port.
Virginia Carleton—Photo Researchers

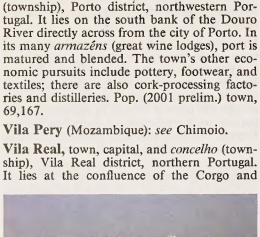
Manuel I. Its harbour and shipbuilding industry were important in the 15th and 16th centuries.

Vila do Conde is basically a fishing port, and there is a fish farm nearby. Local manufactures include rope, textiles, confectionery, and lace. Two dominant landmarks are the huge Santa Clara Convent (14th century), built on a hill overlooking the Ave River valley, and sections of an 18th-century, 999-arch aqueduct. The Celtic ruins of Bagunte are nearby at the junction of the Ave and Este rivers. Pop. (2001 prelim.) town, 25,545.

Vila Nova de Gaia, town and *concelho* (township), Porto district, northwestern Portugal. It lies on the south bank of the Douro River directly across from the city of Porto. In its many *armazéns* (great wine lodges), port is matured and blended. The town's other economic pursuits include pottery, footwear, and textiles; there are also cork-processing factories and distilleries. Pop. (2001 prelim.) town, 69,167.

Vila Pery (Mozambique): *see* Chimoio.

Vila Real, town, capital, and *concelho* (township), Vila Real district, northern Portugal. It lies at the confluence of the Corgo and



Salt evaporation ponds in Vila Real, Port.
Josef Muench

Cabril rivers, east of Porto. The town, which was founded in the 13th century, has notable landmarks, including a cathedral built in the Romanesque and Gothic styles, the former Dominican conventual church, and 17th-century houses near the main square. Vila Real is the principal centre of the port-wine-producing area; its other manufactures include textiles and ceramics. The town is connected to Porto and Bragança by rail and paved road.

Vila Real district is bounded by Spain (north) and the Douro River (south). In addition to viticulture and cereal crops, some livestock raising is carried on in the northern mountainous part of the district. Besides Vila Real town, Peso da Régua and Chaves are the chief urban centres. Area district, 1,662 square miles (4,305 square km). Pop. (2001 prelim.) town, 16,133; (1993 est.) district, 233,100.

Vila Velha, also called ESPÍRITO SANTO, coastal city, east-central Espírito Santo state, eastern Brazil. It lies along Espírito Santo Bay and is just southeast of Vitória, the state capital. It was settled in 1535 and was given city status in 1896. Chocolate and candy making are the principal economic activities. Nearby is the 16th-century convent of Our Lady of Penha. Pop. (2001 prelim.) mun., 343,567.

Vilakazi, Benedict Wallet (b. Jan. 6, 1906, Groutville, Natal [now in South Africa]—d. Oct. 26, 1947, Johannesburg, S.Af.), Zulu poet, novelist, and educator who devoted his career to the teaching and study of the Zulu language and literature.

Vilakazi became a teacher and earned a B.A. in 1934 from the University of South Africa, Pretoria. He began publishing poetry and articles in various journals in the 1930s, and his novels from that time are among the earliest Zulu works to handle a modern subject matter. Vilakazi helped to compile a Zulu-English dictionary, and in 1938 he earned an M.A. from Witwatersrand University in Johannesburg. In 1946 he was awarded a doctoral degree in literature from Witwatersrand for a dissertation on Zulu poetry, thereby becoming the first African (*i.e.*, black) in South Africa to obtain a doctorate. He later served as a a senior lecturer at Witwatersrand University and taught in Lesotho as well.

Vilakazi's literary output was large. He is best known for his poetry, which critics praise for the beauty and vitality resulting from his astute powers of observation and for his full use of the resources of the Zulu language. His first book of verse, *Inkondlo kaZulu* (1935; "Zulu National Songs"), was the first collection of Western-influenced poetry ever published in the Zulu language. It was selected by Witwatersrand University in 1935 to be the lead volume of its Bantu Treasury Series. Vilakazi's next collection of verse, *Amal'ezulu* (1945; "Zulu Treasures"), became the eighth volume of the same series. These two volumes appeared together in English translation under the title *Zulu Horizons* (1962). The best known of Vilakazi's three novels is *Noma nini* (1935; "Forever and Ever").

Vilar, Jean (b. March 25, 1912, Sète, France—d. May 28, 1971, Sète), French actor and director who revitalized the Théâtre National Populaire as a forceful educational and creative influence in French life.

Vilar trained as an actor and stage manager, then toured with an acting company throughout France. In 1943 he began his career as a director with a season in a small Paris theatre. Invited to direct the first annual drama festival at Avignon in 1947, Vilar effectively employed bold movements and simplified settings on the large platform stage of the outdoor theatre. The success of the Avignon festival, followed by productions for more conventional Parisian stages, led to his appointment as director (1951–63) of the Théâtre National Populaire. During his tenure, he endeavoured to bring drama to residents of outlying areas



Vilar, 1961
Lipnitzki—H. Roger Viollet

and to those who could not afford tickets to commercial theatrical productions. He continued to stage the Avignon festivals and from 1963 independently produced plays and operas throughout Europe.

Vilas, William F., in full WILLIAM FREEMAN VILAS (b. July 9, 1840, Chelsea, Vt., U.S.—d. August 27, 1908, Madison, Wis.), a leader of the U.S. Democratic Party in the late 19th century and a member of President Grover Cleveland's Cabinet.

Vilas was born in Vermont and grew up in Wisconsin. He graduated from the University of Wisconsin (Madison) in 1858 and studied at the law school of the University of Albany (Albany, N.Y.). Before he could begin a legal career, however, the Civil War erupted. Vilas joined a volunteer regiment in which he eventually rose to the rank of lieutenant colonel.

At the end of his military service, Vilas returned to Madison, where he became a law professor and a leader in the state Democratic Party. In 1884 he served as chairman of the convention that nominated Grover Cleveland for president. Following Cleveland's election, Vilas joined the Cabinet as postmaster general. He soon became a close adviser and friend to the president.

In 1888 Vilas was named to head the Department of the Interior. When Cleveland lost his reelection bid that year, Vilas returned to Madison and to his teaching position at the law school. In 1891 he resumed his political career and was elected by the state legislature to a seat in the U.S. Senate. A conservative "Gold" Democrat, Vilas supported the Cleveland administration's economic policies and tried to block the nomination of William Jennings Bryan as the Democratic candidate for president in 1896.

Vilas retired from politics in 1897 and devoted most of his remaining years to the University of Wisconsin, to which he left a substantial portion of his large estate.

Vilcabamba, Cordillera de, small range of the Andes Mountains in south-central Peru, extending about 160 miles (260 km) northwestward from the city of Cuzco. The range, marked by the erosive action of rivers that have cut deep canyons, rises to 20,574 feet (6,271 m) at Mount Salccantay (Salcantay, or Sarkantay). The most atypical of the range's peaks is Pumasillo ("Puma's Claw"), at 19,915 feet (6,070 m), which is not an isolated peak but the culmination of a large massif. Pumasillo is not visible from surrounding villages, and, although its existence was known, it was not accurately mapped until 1956.

Vîlcea (county, Romania): *see* Vâlcea.

Vildrac, Charles, pseudonym of CHARLES MESSAGER (b. Nov. 22, 1882, Paris, France—d. June 25, 1971, Saint-Tropez), French poet, playwright, and essayist whose idealistic commitment to humanitarianism characterized his artistic and personal life.

Vildrac, along with the writer Georges Duhamel (later his brother-in-law) and others, founded the Abbaye, a community of young artists and writers who, from 1906 to 1907, lived together in the Paris suburb of Créteil. During World War II he was active in the French Resistance.

Some of his verse—including *Poèmes* (1905) and *Images et mirages* (1907)—celebrates brotherhood and proclaims a belief in the basic goodness of man, while *Chants du désespéré (1914–20)* (1920; "Songs of a Desperate Man") expresses anguish at the horrors of war. Vildrac's best-known play, *Le Paquebot Tenacity* (produced, 1920; *S.S. Tenacity*), is a character study of two former soldiers about to immigrate to Canada. *Michel Auclair* (1921) revolves around the loyalty of a man to a woman who has rejected him. *La Brouille* (1930; "The Misunderstanding") traces the quarrel of an idealist and a pragmatist. Other plays include *Madame Béliard* (1925), *Les Pères ennemis* (1946; "The Enemy Fathers"), and *Les Jouets du Père Noël* (1952; "The Toys of Father Christmas").

Vildrac also wrote travel memoirs and essays, such as *Notes sur la technique poétique* (1910; "Notes on Poetic Technique"), coauthored with Duhamel. His works for children, including *L'Île rose* (1924; "The Pink Island"), have been praised as excellent examples of the genre.

Viljoen, Marais (b. Dec. 2, 1915, Robertson, S.Af.), South African politician who was the fifth state president (1979–84) of South Africa (a largely ceremonial post).

Viljoen was born on a farm in the Cape Province and orphaned at the age of four. Forced to leave school before matriculation (which he obtained later by private study), he joined the Post Office as a learner telegraphist at the age of 18. In 1937 he moved on to journalism as a reporter on a newly founded Afrikaans newspaper edited by the future prime minister H.F. Verwoerd, who in time would give him his first Cabinet post.

Years of service as an efficient party organizer led to his election as a member of the Transvaal provincial council in 1949 and to a seat in Parliament four years later (1953). Following a term as deputy minister of labour and of mines (1958–61), Viljoen served, either as deputy minister or as minister, in the departments of labour, mines, Coloured affairs, immigration, education, the interior, and posts and telecommunications. In these positions he firmly supported the National Party's policy of apartheid, or separate development, for South Africa's racial groups. Viljoen was president of the Senate from 1976 until he was elected to replace B.J. Vorster as state president in 1979.

Viljoen served until September 1984, when a new constitution dramatically increasing the president's powers came into effect. Pieter Willem Botha became the first state president under this new constitution.

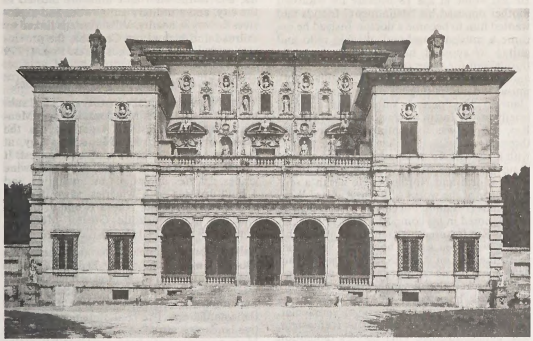
villa, country estate, complete with house, grounds, and subsidiary buildings. The term villa particularly applies to the suburban summer residences of the ancient Romans and their later Italian imitators. In Great Britain the word has come to mean a small detached or semidetached suburban home. In the United States it generally refers to a sumptuous suburban or country residence.

Many villas existed throughout the Roman Empire, and references to them are common in the works of Roman writers, especially Cicero, who had seven villas, and Pliny, who described at great length in his letters his villas in Tuscany and near Laurentum. The Italian countryside is dotted with ruins of innumerable villas. The most famous of these is Hadrian's Villa at Tivoli (*c.* AD 120–130), which was a sumptuous imperial residence with parks and gardens on a grand scale. The uneven terrain made necessary large flights of steps and terraces. The buildings, which covered an area about two miles in length, were reproductions of celebrated structures the emperor had seen in his travels.

Roman villas frequently were asymmetrical in plan and were built with elaborate terracing on hillsides; they had long colonnades, towers, fine water gardens with reflecting pools and fountains, and extensive reservoirs for water supply. According to Pliny there were two kinds of villas, the *villa urbana,* which was a country seat with city comforts, and the *villa rustica,* the farmhouse in which the principal room was the kitchen, with the bakery and stables beyond, and room for winepresses, oil presses, hand mills, and so on.

During the Middle Ages villas were abandoned, and in some places castles and monasteries were built in and on top of them. The great Renaissance villas were also occasionally built on their ruins and frequently used some of the better-preserved remains as models. This influence is evident in the Villa Madama (*c.* 1520) just outside Rome, designed by Raphael, and in Pirro Ligorio's Casino of Pius IV (*c.* 1558–62) in the Vatican gardens. The Renaissance villa sought, however, greater symmetry than those of antiquity, and the houses were less rambling (frequently being remodeled castles, especially in Tuscany), though the gardens were often even more elaborate. In fact, the garden often became the principal element in the 16th- and 17th-century villa, as in the Villa d'Este in Tivoli (1550), also designed by Ligorio. Other important examples include the Villa di Papa Giulio (1550) in Rome and the Villa Farnese (1587) at Caprarola, both by Giacomo da Vignola; the Villa Aldobrandini (1598–1603) at Frascati; the Villa Barberini at Castel Gandolfo (on the site of a villa of the emperor Domitian); the Boboli Gardens (begun 1550) in Florence; the Villa Barbaro (1555–59) at Maser in the Veneto and the Villa Rotonda (1550–51) by Andrea Palladio, and the villas Borghese (1613–16), Medici (*c.* 1540), and Doria Pamphili (1650) in Rome. By the 18th and 19th centuries, villas in Italy were less extensive, though fine ones continued to be built, especially in the Piedmont, Lombardy, the Venetia, and around Rome and Naples.

In the mid-19th century eclectic Romantic architects often adopted a modified Italian villa style as a model for country and town houses in Germany, England, and the United States. These were usually characterized by flat roofs, broadly projecting eaves supported on brackets, square towers, and arcaded or colonnaded piazzas.



Villa Borghese, Rome, Italy; Renaissance villa designed *c.* 1610 by Giovanni Vasanzio
Alinari/Art Resource, New York City

Villa, Pancho, byname of FRANCISCO VILLA, original name DOROTEO ARANGO (b. June 5, 1878, Hacienda de Río Grande, San Juan del Río, Mex.—d. June 20, 1923, Parral), Mexican revolutionary and guerrilla leader who fought against the regimes of both Porfirio Díaz and Victoriano Huerta and after 1914 engaged in civil war and banditry.

Villa was the son of a field labourer and was orphaned at an early age. In revenge for an assault on his sister, he killed one of the owners of the estate on which he worked and was afterward forced to flee to the mountains, where he spent his adolescence as a fugitive.

In 1909 Villa joined Francisco Madero's uprising against the dictator of Mexico, Porfirio Díaz. During the rebellion, Villa, who lacked a formal education but had learned to read and write, displayed his talents as soldier and organizer. Combined with his intimate knowledge of the land and the people of northern Mexico, these gifts enabled him to place at Madero's disposal a division of trained soldiers under his command. After the success of the revolution, Villa remained in the irregular army.



Villa in 1914
Photography Collection, Harry Ransom Humanities Research Center, The University of Texas at Austin

In 1912, during the rebellion of Pascual Orozco, Villa aroused the suspicion of Gen. Victoriano Huerta, who condemned him to death, but Madero ordered a stay of execution and sent Villa to prison instead. Villa escaped from prison in November and fled to the United States. After Madero's assassination in 1913, Villa returned to Mexico and formed a military band of several thousand men that became known as the famous División del Norte (Division of the North). Combining his force with that of Venustiano Carranza, Villa revolted against the increasingly repressive and inefficient dictatorship of Huerta, once again revealing his military talents by winning several victories. In December 1913 Villa became governor of the state of Chihuahua and with Carranza won a decisive victory over Huerta in June 1914. Together they entered Mexico City as the victorious leaders of a revolution.

Rivalry between Villa and Carranza, however, soon led to a break between the two, and Villa was forced to flee Mexico City with the revolutionary leader Emiliano Zapata in December 1914. Badly defeated by Carranza in a series of battles, he and Zapata fled to the mountains of the north. But in order to demonstrate that Carranza did not control northern Mexico, Villa executed 16 U.S. citizens at Santa Isabel in early 1916 and soon thereafter attacked Columbus, N.M. Pres. Woodrow Wilson then sent an expedition under General Pershing to that area, but, because of Villa's popularity and intimate acquaintance with the terrain of northern Mexico and because of the Mexican government's dislike of Pershing's presence on Mexican soil, it proved impossible to capture Villa.

Villa continued his guerrilla activities as long as Carranza remained in power. After the overthrow of Carranza's government in 1920, Villa was granted a pardon and a ranch near Parral, Chihuahua, in return for agreeing to retire from politics. Three years later he was assassinated on his ranch.

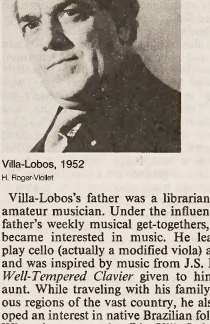
Villa Acuña (Mexico): *see* Ciudad Acuña.

Villa d'Este, estate in Tivoli near Rome with buildings, fountains, and terraced gardens designed (1550) by the Mannerist architect Pirro Ligorio for the governor Cardinal Ippolito II d'Este. Before being confiscated to serve as a residence, the property had been a Benedictine convent.

Franz Liszt occupied the top floor from 1865 until his death in 1886. Today the villa itself is less noteworthy than the spacious park and the magnificent fountains, which are supplied with water by two canals dug especially for the purpose. The residence was converted into a hotel in 1873.

Villa Giulia, Museo Nazionale di (Italian: National Museum of Villa Giulia), museum in Rome principally devoted to antiquities of the pre-Roman period from ancient Umbria, Latium, and southern Etruria. It is housed in the Villa Giulia, or Villa di Papa Giulio (Pope Julius), which was built in the mid-16th century for Pope Julius III. The museum has been housed in the villa since 1889. Celebrated sculptures include the painted terra-cotta Apollo and Hercules from Formello (Veii), excavated in 1916 and 1939, considered to be among the best examples of late 6th- or early 5th-century-BC Etruscan sculptures. There is a fine terra-cotta sarcophagus showing male and female figures feasting, a rare example from the necropolis at Caere. Many artifacts such as vases, bronzes, armour, mirrors, and votive statuettes are among the treasures of the collection. The fine collection of Greek vases includes the famous Chigi vase, found at Veii, a fine example of Proto-Corinthian vase painting dating from the first half of the 6th century BC. The Castellani Collection comprises Greek vases.

Villa-Lobos, Heitor (b. March 5, 1887, Rio de Janeiro, Braz.—d. Nov. 17, 1959, Rio de Janeiro), Brazilian musician and one of the foremost Latin American composers of the 20th century, whose music combines indigenous melodic and rhythmic elements with Western classical music.



Villa-Lobos, 1952
H. Roger-Viollet

Villa-Lobos's father was a librarian and an amateur musician. Under the influence of his father's weekly musical get-togethers, the boy became interested in music. He learned to play cello (actually a modified viola) at age six and was inspired by music from J.S. Bach's *A Well-Tempered Clavier* given to him by an aunt. While traveling with his family to various regions of the vast country, he also developed an interest in native Brazilian folk music. When they returned to Rio, Villa-Lobos began associating and performing with the city's popular musicians and learned to play the guitar. He left home at age 18 because his widowed mother opposed his "delinquent" friends and wanted him to become a doctor. Instead he became a musical vagabond, playing cello and guitar to support himself while traveling throughout the states of Espírito Santo, Bahia, and Pernambuco, absorbing Brazilian folk music and composing his own pieces.

During this period Villa-Lobos enrolled briefly at the Instituto Nacional de Música in Rio, but he was to continue his travels for three more years. He then returned to Rio with a large group of manuscripts and an intimate knowledge of the Afro-Brazilian music of the North and Northeast. He began a serious study of the works of Bach, Richard Wagner, and Giacomo Puccini, whose influence can be noted in his compositions. A 1915 concert in Rio featured his compositions, and his career was given a vital boost that same year when the firm of Artur Napoleão began publishing his music. Although many critics initially attacked the dissonance and modernity of his work, he persisted in his efforts to merge Western music and the Brazilian vernacular. In 1919 he met the pianist Artur Rubinstein, who helped advance Villa-Lobos's reputation by playing his music in concerts throughout the world. Villa-Lobos composed ceaselessly (about 2,000 works are credited to him in all), and by the time of his first trip to Europe in 1923 had produced a long list of compositions in every form, from solo pieces for guitar to trios, quartets, concerti, vocal music, and symphonies. The success of his first trip—he made Paris his home base for the remainder of the 1920s—encouraged him to organize and perform in a number of concerts; during this period he published more of his work and solidified an international reputation.

In Brazil for a performance in 1930, Villa-Lobos presented a plan for music education in the São Paulo school system and was appointed director of musical education there. In 1932 he took charge of musical education throughout Brazil. He established a conservatory for choral singing in 1942 and, with fellow composer Oscar Lorenzo Fernandez, cofounded the Brazilian Academy of Music in 1945. Between 1944 and 1949 he traveled widely in the United States and Europe, where he wrote music for several films, received many honours, and was much in demand as a conductor.

Villa-Lobos's works are characterized by a singular blend of Western classical music and Brazilian folk songs and rhythms. One of his best-known works is *Bachianas brasileiras* (written 1930–44), a set of nine pieces for various instrumental and vocal groups, in which a contrapuntal technique in the manner of Bach is applied to themes of Brazilian origin. A similar series of 14 works, composed between 1920 and 1929, bears the generic title *Chôros* (the *choro* is a Brazilian country dance). Each of his 12 symphonies alludes to a historic event or place. Among his many other works are two cello concerti (1915, 1955), *Momoprecoce* for piano and orchestra (1929), *Guitar Concerto* (1951), *Harp Concerto* (1953), *Harmonica Concerto* (1955), 16 string quartets, *Rudepoema* for piano solo (1926; orchestrated 1942), and the symphonic poems *Uirapurú* (1917), *Amazonas* (1929), and *Dawn in a Tropical Forest* (1954).

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Villa María, city, east-central Córdoba province, north-central Argentina, on the Río Tercero at the northwestern limits of the Pampas. Founded in 1867, it was nominated but rejected as the site for the national capital in 1871. It is a road junction and commercial and manufacturing centre for the hinterland, in which livestock are raised and various grains are grown. Dairies, cement factories, canneries, and textile and flour mills are located in the city, and a military gunpowder and explosives factory is nearby. Villa María is linked by railroad and highway to Córdoba, the provincial capital, and to Buenos Aires. Pop. (1999 est.) 60,000.

Villa Mercedes (Argentina): *see* Mercedes.

Villa Nueva, also called GUAYMALLÉN, suburb east of the city of Mendoza, in north Mendoza province, western Argentina, in the intensively irrigated Río Mendoza valley, at the base of the Andes fronting on the west. It is both an agricultural centre, producing wine grapes, peaches, apples, plums, and olives, and a built-up area with wineries, sawmills, and barrel factories. Villa Nueva is one of the six localities that constitute Greater Mendoza. Pop. (1999 est.) 224,116.

Villa Obregón, delegation (administrative subdivision), north-central Federal District, central Mexico, in the Valley of Mexico. Formerly known as San Angel and San Jacinto Tenanitla, the original settlement dates from the colonial era. The cool climate and attractive landscape attracted wealthy families from Mexico City, whose large estates still remain. The church and monastery of El Carmen date from 1615; a monument to Gen. Álvaro Obregón stands at the site of his assassination in 1928. Situated in a fruit-growing district, Villa Obregón also has light industries, including a paper mill and a chemical plant. Various avenues lead to central Mexico City, 9 mi (14 km) to the north-northeast, and the city is on the peripheral expressway. Pop. (1990) 642,753.

Villa Sierra, Fernando de Valenzuela, marqués de (marquess of): *see* Valenzuela, Fernando de.

Villach, city, *Bundesland* Kärnten (federal province of Carinthia), southern Austria, on the Drava (Drau) River at the eastern foot of the Villacher Alps, west of Klagenfurt. It

originated as the Roman town of Bilachinium and formed part of the bishopric of Bamberg from 1007 to 1759. An important trade centre in the Middle Ages, it declined after new trade routes were opened up. Commerce revived in the 19th century. Notable landmarks in the city are the parish church of St. Jakob (reconstructed 14th–15th centuries) with a detached tower (311 ft [95 m]), the Heiligenkreuzkirche (1726–38), and the town hall (*c.* 1570), which was rebuilt after its destruction in World War II. Villach is the commercial centre of Kärnten and its main railway junction and second largest city. Manufactures include cellulose, wood products, machinery, and chemicals; there are also breweries and food-processing plants. Warmbad Villach, noted for its mineral baths, is nearby, and Villach itself is a tourist centre for the Kärnten lake district. Pop. (1998 est.) 57,063.

Villafranca, Conference of, meeting between French emperor Napoleon III and Emperor Francis Joseph I of Austria, resulted in a preliminary peace (July 11, 1859) ending the Franco-Piedmontese war against Austria (1859); it marked the beginning of Italy's unification under Piedmontese leadership. Napoleon made peace without consulting the Piedmontese, not wishing them to become too powerful by acquiring all of northern Italy from Austria. He also feared that France would be open to a Prussian attack along the Rhine if he remained engaged in a long war with the Austrians in Italy. Sixteen days after the bloody Battle of Solferino, the preliminary peace was signed at Villafranca 10 miles (16 kilometres) southwest of Verona in northeastern Italy. Austria gave up Lombardy, excluding Mantua and Peschiera, to France; an Italian confederation was to be formed under the presidency of the Pope; Austria would be a member of the confederation by virtue of its Italian territories; and the dukes of Parma, Modena, and Tuscany were to be restored peacefully to their thrones after having been deposed by nationalist forces. It was understood that Lombardy would be ceded by France to its ally Piedmont. Piedmontese king Victor Emmanuel II accepted these terms, but his prime minister, Count Cavour, resigned over the compromise with Italian nationalist aims. The terms of Villafranca were confirmed in a formal treaty at Zurich (Nov. 10, 1859). Italian nationalists reacted very strongly against its terms, and by January 1860 Cavour could return to office without feeling bound in any way by them.

Villafranchian Stage, major division of early Pleistocene deposits and time (the Pleistocene Epoch began about 2,000,000 years ago and ended about 10,000 years ago). The Villafranchian Stage was named for a sequence of terrestrial sediments studied in the region of Villafranca d'Asti, an Italian town near Turin. Deposits assigned to the Villafranchian have a widespread distribution; the name Villafranchian is also applied to a land-mammal faunal assemblage that is distinctive. Some dispute exists as to the actual time span included within the Villafranchian. The Villafranchian may include sediments that are partly Pliocene in age and partly Pleistocene or it may be entirely Pleistocene. It is likely that the Villafranchian includes within it the Pliocene–Pleistocene boundary. This boundary is determined by Villafranchian mammals, which include the first appearances of such distinctive forms as zebrine horses and true elephants, as well as distinctive associated forms. The Villafranchian is in part contemporaneous with the Blancan Stage of North America. The Blancan, however, is clearly Pliocene in part and apparently begins earlier than the Villafranchian. Further study is necessary to determine the most precise placement of the Pliocene–Pleistocene boundary and its relationship to the Villafranchian.

The Villafranchian also is significant because within it the earliest hominids that clearly evolved into modern man (the australopithecines) appeared, although australopithecine history may well be shown to extend into the Pliocene Epoch. The australopithecines were small, erect, efficiently bipedal creatures with brain capacities scarcely exceeding that of the modern apes but with distinctly human dentitions and other skeletal features. In Mediterranean Europe, Villafranchian deposits grade into marine sediments, allowing marine and terrestrial correlations to be made.

Villahermosa, city, capital of Tabasco state, southeastern Mexico. It is in the Gulf lowlands at 33 ft (10 m) above sea level, on the Río Grijalva. Founded in 1596 as Villa Felipe II, the settlement has also been known as San Juan de Villa Hermosa and as San Juan Bautista; it was given its present name, meaning "beautiful city," in 1915. The city's cathedral was built in 1614; its archaeological museum is one of the best in Mexico.

As well as a political centre, Villahermosa is the state's chief distributing, processing, and agricultural city. Its industries, which use the regional tropical products, include sugar refineries, distilleries, rice and lumber mills, and factories manufacturing cigars, soap, and clothing. The city is situated on the highway linking Mexico City, to the west-northwest, with the Yucatán Peninsula. A road leads south to Teapa, through which the main Veracruz–Yucatán railroad passes. Villahermosa is also served by domestic airlines. The Benito Juárez Autonomous University of Tabasco was established in Villahermosa in 1959. Pop. (2000 prelim.) 519,873.

villancico, genre of Spanish song, most prevalent in the Renaissance but found also in earlier and later periods. It is a poetic and musical form and was sung with or without accompanying instruments. Originally a folk song, frequently with a devotional song or love poem as text, it developed into an art music genre.

The *villancico* consisted of two parts, beginning with the refrain, or *estribillo,* which alternates with the stanza, or *copla.* The *copla* has two parts, the *mudanza* and the *vuelta.* The *vuelta* rhymes with the last line of the *mudanza* but is sung to the melody of the *estribillo.* This overlap of poetic and musical form is characteristic of the *villancico.*

The *villancico* repertory of the late 15th–early 16th centuries is found in several *cancioneros,* or song collections. The pieces were in three or four voice parts, the musical texture being either homophonic chordal or contrapuntal. An important composer was Juan del Encina. Around 1500, settings of *villancicos* as solo songs accompanied by *vihuela,* a guitar-shaped lute, appeared, some in Portuguese as well as Spanish. Composers included some of the great masters of the *vihuela,* such as Luis Milán and Miguel de Fuenllana.

The *villancico* of the 17th century has a sacred text, often for Christmas. The *estribillo,* elaborately written in four-part polyphony, alternates with *coplas,* short, simple, four-line songs with organ accompaniment. Other instruments are frequently included. In the 18th century this form expanded into a dramatic cantata with arias and choruses. In the 20th century the use of the term is restricted to the Spanish Christmas carol.

villanella, secular Italian composition of the Renaissance, usually for three voices, with no characteristic stanzaic design or poetic form other than a refrain. The villanella was most often written in chordal style with clear, simple rhythm. Traditional rules of composition were sometimes broken; for instance, the normally forbidden movement of voices in parallel fifths was common in the villanella. The villanella was not a folk form but a reaction against the more refined madrigal, often parodying well-known madrigal texts and music.

The villanella originated in Naples and hence was also called *villanella alla napoletana.* Although some villanelle appeared earlier, the form was most important during the second half of the 16th century, maintaining its popularity until *c.* 1700. The earliest master of the villanella was Giovan Tommaso di Maio (d. *c.* 1550); its most important composer was Gian Domenico da Nola (d. 1592). Villanelle in more artistic style were written by such major composers of madrigals as Adriaan Willaert, Orlando di Lasso, and Luca Marenzio. The villanella was closely related to several other light vocal forms, including the *mascherata, moresca, greghesca,* and *giustiniana.*

villanelle, rustic song in Italy, where the term originated (Italian *villanella* from *villano:* "peasant"); the term was used in France to designate a short poem of popular character favoured by poets in the late 16th century. Du Bellay's "Vanneur de Blé" and Philippe Desportes' "Rozette" are examples of this early type, unrestricted in form. Jean Passerat (died 1602) left several villanelles, one so popular that it set the pattern for later poets and, accidentally, imposed a rigorous and somewhat monotonous form: seven-syllable lines using two rhymes, distributed in (normally) five tercets and a final quatrain with line repetitions.

The villanelle was revived in the 19th century by Philoxène Boyer and J. Boulmier. Leconte de Lisle and, later, Maurice Rollinat also wrote villanelles. In England, the villanelle was cultivated by W.E. Henley, Austin Dobson, Andrew Lang, and Edmund Gosse. Villanelles in English include Henley's "A Dainty Thing's the Villanelle," which itself describes the form, and Dylan Thomas' "Do Not Go Gentle into That Good Night."

Villani, Giovanni (b. *c.* 1275, Florence—d. 1348, Florence), Italian chronicler whose European attitude to history foreshadowed Humanism.

In 1300 Villani became a partner in the banking firm of Peruzzi, for which he travelled to Rome (1300–01), where he negotiated with the pope, and (1302–07) to France, Switzerland, and Flanders. In 1308, back in Italy, he left the Peruzzi company. He took an active part in Florentine life and three times (1316, 1317, and 1321) was appointed head of a guild. He was prosecuted for embezzlement but was found innocent in 1345 he was involved in the bankruptcy of the Bardi and other companies and was imprisoned, but released on bail. He died during the plague of 1348.

His *Cronica,* or *Storia fiorentina,* is a vast and ambitious universal history in 12 books. It was planned as a history of events from the fall of the Tower of Babel to Villani's own time, seen from and focussed on Florence. Villani began the work in about 1308. The most interesting part covers the period 1266–1346.

On Florentine history Villani achieved considerable impartiality; although a supporter of the Guelfs, he was not partisan in his views and reflected the outlook of the wealthy *borghesi* ("bourgeoisie") of the time. His work is of particular value for its inclusion of detailed statistical information on the administration and finance of the Florence of his own time; it is the first introduction of statistics as a positive element in history. For the purity of its Florentine vocabulary, the *Cronica* is considered a classic of the Italian language.

After Giovanni's death, his brother Matteo added 10 books to the *Cronica,* covering the years 1348–63. Matteo's son, Filippo, added another book for the year 1364.

Villanovan culture, Early Iron Age culture in Italy, named after the village of Villanova, near Bologna, where in 1853 the first of the characteristic cemeteries was found. The Villanovan people branched from the cremating Urnfield cultures of eastern Europe and appeared in Italy in the 10th or 9th century BC. The earliest burial rites were usually with cremation; the ashes of the dead were placed in a decorated pottery ossuary of a biconical, or two-storied, form and covered with a bowl. The lid of the urn was sometimes a pottery imitation of a helmet, either the knobbed bell helmet of eastern central Europe or the crested helmet of northern Europe, the Villanovan helmet par excellence.

The Villanovans living in Tuscany also used the terra-cotta hut urn, which imitated a hut of wattle and daub on a frame of poles. The hut urn is characteristic of northern European urn fields, whereas the two-storied urn may be related to similar urns from Hungary and Romania.

The Villanovans controlled the rich copper and iron mines of Tuscany and were accomplished metalworkers. In the second half of the 8th century the Villanovans of Tuscany were influenced artistically by Greece; also, inhumation became the predominant burial rite, as it did during the same period in Greece.

During the first quarter of the 7th century an Orientalizing civilization, presumably introduced by Etruscans, was superimposed on the Villanovan in Tuscany. The northern Villanovans of the Po Valley, however, continued to produce a geometric art as late as the last quarter of the 6th century, when Etruscan expansion obliterated their culture.



Biconical ossuary covered with a crested helmet, from Tarquinii, Villanovan civilization, c. 10th–9th century BC; in the collection of the American School of Prehistoric Research, Harvard University

By courtesy of the American School of Prehistoric Research, Peabody Museum, Harvard University, Cambridge, Mass.

Villanueva, Carlos Raúl (b. May 30, 1900, Croydon, Surrey, Eng.—d. Aug. 16, 1975, Caracas), Venezuelan architect often credited with being the father of modern architecture in his country.

Villanueva's best known works were buildings for the Ciudad Universitaria, Caracas;



Auditorium (Aula Magna), University City, Caracas, by Carlos Villanueva, 1950–51

By courtesy of OAS Photos, Washington, D.C.

the Olympic Stadium (1951); the Auditorium (Aula Magna) and covered plaza (Plaza Cubierta), both 1952–53; and the School of Architecture (1957). The Auditorium was particularly notable for its ceiling, from which are suspended floating panels of various sizes and colours, designed by the sculptor Alexander Calder in association with the acoustical specialist Robert Newman.

Villanueva, in association with others, designed a number of large housing developments in Caracas, including one of the world's largest—the Cerro Piloto development (1955–57). For Expo 67, Montreal, Villanueva designed the Venezuelan pavilion. Consisting of three cubes, it was considered an outstanding example of the application of minimal art to architectural design.

Villanueva y Geltrú, city, Barcelona province, in the autonomous community (region) of Catalonia, northeastern Spain, southwest of Barcelona. The city was chartered by James I of Aragon in 1274. It has a museum founded by the Catalan writer-politician Victor Balaguer containing an "Annunciation" of El Greco. The restored castle of La Geltrú dates from the 12th century. A seaside resort and manufacturing centre, Villanueva produces textiles, electric cables, metal pipes, brandy, and rubber products. Wine and hazelnuts come from the surrounding area. Pop. (1981) 43,560.

Villard DE HONNECOURT (b. *c.* 1225, Picardy, Fr.—d. *c.* 1250), French architect remembered primarily for the sketchbook compiled while he travelled in search of work as a master mason. The book is made up of sketches and writings concerning architectural practices current during the 13th century.

Honnecourt spent most of his life travelling to such places as Rheims, Chartres, Laon, Meaux, and Lausanne. He visited Hungary in 1245, possibly to work there as an architect. His sketches indicate that he was well acquainted with the great churches that were built during his lifetime. Little mention is made of Honnecourt's own architectural contributions, although he may have been active in the building of Saint-Quentin. In his notes Honnecourt described the work he did on the rose window of Lausanne cathedral.

The architect's sketchbook was originally devoted entirely to sketches marked by sinuous figures in draped robes. Eventually, Honnecourt compiled a manual that gave precise instructions for executing specific objects with explanatory drawings. In his writings he fused principles passed on from ancient geometry, medieval studio techniques, and contemporary practices. The author includes sections on technical procedures, mechanical devices, suggestions for making human and animal figures, and notes on the buildings and monuments he had seen. He also offers insights into the variety of interests and work of the 13th-century master mason in addition to providing an explanation for the spread of Gothic architecture in Europe.

Villard, Henry, original name FERDINAND HEINRICH GUSTAV HILGARD (b. April 10, 1835, Speyer, Bavaria—d. Nov. 12, 1900, Dobbs Ferry, N.Y., U.S.), U.S. journalist and financier, who became one of the major United States railroad and electric utility promoters.

Villard emigrated to the U.S. in 1853 and was employed by German-American newspapers and later by leading American dailies. He reported (1858) the Lincoln–Douglas debates for eastern newspapers and the Pikes Peak gold rush (1859) for the *Cincinnati Daily Commercial.* During the Civil War he was a war correspondent, first for *The New York Herald* and then for the *New York Tribune.* In 1881 he purchased *The Nation* and the *New York Evening Post.*

As an agent for German bondholders, Villard became involved in railway organization. In 1875 he helped reorganize the Oregon and California Railroad and the Oregon Steamship Company and the following year became president of both companies. He organized the Oregon Railway and Navigation Company in 1879 and built a railroad along the Columbia River from Portland, Ore., to Wallula, Wash. In 1881 he secured control of the Northern Pacific, of which he became president. Its transcontinental line was completed under his management, but the costs so far exceeded the estimate that financial pressures forced him to resign from the presidency in 1884. He later recouped his losses, and from 1888 to 1893 he served as chairman of the board of directors of the same company. He bought the Edison Lamp Company, Newark, N.J., and the Edison Machine Works, Schenectady, N.Y., and formed them into the Edison General Electric Company in 1889, serving as president until its reorganization in 1893 as the General Electric Company.

Villarreal de los Infantes, city, Castellón province, in the autonomous community (region) of Valencia, eastern Spain. The city is northeast of Valencia city on the Río Mijares, just southwest of Castellón de la Plana. It was founded in 1274 by King James I of Aragon, who reconquered the kingdom of Valencia from the Moors. A flourishing trade centre during the Middle Ages, it subsequently occupied a prominent place in the affairs of Valencia. In 1904 King Alfonso XIII raised it to city and municipal status. An agricultural centre specializing in citrus fruits and vegetables, Villarreal also produces mosaics, motors, explosives, pumps, refrigerators, paper, woollens, and chemical fertilizers. The shrine of San Pascual contains the tomb of the city's patron, the Franciscan San Pascual Bailón (died 1592). Pop. (1981) 38,385.

Villarrica, capital, Guairá department, southern Paraguay. Founded in 1576 on the Paraná River, the settlement was moved in 1682 to its present site at the edge of the westward extension of the Brazilian Highlands, including the Ybytyruzú mountains at 820 ft (250 m) above sea level. Now Paraguay's third largest city, Villarrica is a commercial, manufacturing, and religious centre. Industrial establishments in the city include sawmills, textile and flour mills, sugar refineries, liquor distilleries, wineries, tanneries, plants processing maté (tea), and shoe factories. The principal exports are maté, tobacco, cotton, sugarcane, oranges, wine, cattle, and hides. Its cathedral and shrine make Villarrica a pilgrimage centre. The city has various schools, a hospital, and a theatre. It is accessible by highway or railroad from Asunción and Encarnación. Pop. (1982 prelim.) 21,203.

Villars, Claude-Louis-Hector, duc de (duke of) (b. May 8, 1653, Moulins, Fr.—d. June 17, 1734, Turin, Italy), French soldier, King Louis XIV's most successful commander in the War of the Spanish Succession (1701–14).

The son of an army officer turned diplomat, Villars distinguished himself as a colonel of a cavalry regiment in Louis XIV's war against the Dutch (1672–78). He was made a commissary general of the cavalry upon the outbreak of the War of the Grand Alliance (1689–97)



Villars, engraving by Louis Roger, late 18th century, after a drawing by Sergent-Marceau
By courtesy of the Bibliotheque Nationale, Paris

between France and the other major European powers. In 1698 he became ambassador to Vienna.

Three years later the dispute over the succession to the Spanish throne brought France and Spain to war with the British, the Austrians, and the Dutch. Assigned to protect Upper Alsace from invasion, Villars crossed the Rhine and severely defeated the forces of Louis of Baden at Friedlingen (October 1702). His troops then hailed him as a marshal of France, and Louis XIV granted the appointment and gave him the command of the French army in Germany. Although Villars defeated an Austrian army at Höchstädt an der Donau in September 1703, he asked to be recalled after quarreling bitterly with his ally Maximilian II Emanuel, elector of Bavaria, who had rejected his plan for a march on Vienna.

Villars was fighting Huguenot rebels (Camisards) in the Cévennes in southern France when the British general John Churchill, 1st Duke of Marlborough, and the Austrian commander Prince Eugene of Savoy inflicted a catastrophic defeat on Franco-Bavarian forces at Blenheim in August 1704. The following year he was made a duke and sent back to the Rhine to prevent Marlborough from invading France. He crossed the Rhine in 1707 and advanced deep into Swabia before being forced to retreat.

Appointed commander of the severely demoralized French forces in Flanders in 1709, Villars inflicted extremely heavy casualties on the armies of Marlborough and Prince Eugene at the Battle of Malplaquet on September 11. Because Marlborough would not risk another such encounter, France was saved from invasion. After Marlborough lost his command, Villars defeated Prince Eugene at Denain (July 24, 1712), thereby ending the struggle in Flanders. Returning to the Rhine, Villars captured Landau and Freiburg in 1713 and then concluded with Prince Eugene the Treaty of Rastatt (March 1714), which became part of the final peace settlement of Utrecht.

Villars was a member of the Council of Regency in the opening years of the reign of young Louis XV (ruled 1715–74). At the beginning of the War of the Polish Succession (1733–38) he was given the exceptional title of marshal general of France and sent to attack Austrian possessions in northern Italy. He died less than a year later.

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Villavicencio, capital of Meta *departamento,* central Colombia, situated on the eastern slopes of the Andean Cordillera (mountains) Oriental. Founded in 1840, the city was named after Antonio Villavicencio, who was an early advocate of the struggle for independence from Spain. It serves as an important manufacturing and commercial centre for the llanos (plains) and rain forests of eastern Colombia. Industries in Villavicencio include a distillery, a brewery, soap factories, coffee-roasting plants, rice mills, and saddleries. The city is accessible by highway from Bogotá, 65 miles (100 km) northwest, and is a hub for roads from northeastern and southern Meta department. It is served by domestic airlines. Pop. (1985) mun., 191,001.

Villaviciosa, port town, Asturias *provincia* and *comunidad autónoma* ("autonomous community"), northwestern Spain, in the Costa Verde resort area. The town is a fishing port northeast of Oviedo city, where the Villaviciosa Inlet enters the Bay of Biscay. Used by the ancient Romans as a landing place, it was first called Tierra de Maliayo or Maleayo ("Corrupt Land"), which evolved to Villaviciosa ("Town of Vices"). Alfonso X gave it a charter in 1308. Charles I of Spain (Holy Roman Emperor Charles V) landed in 1517 at nearby Tazones when he arrived from Flanders to take possession of Castile; the Casa de Hevia, where he stayed, is still preserved. The area is famous for its ecclesiastical architecture, notably the Church of Santa María de Villaviciosa (13th century) and the convent of Valdediós (8th century).

Economic activities, apart from fishing and tourism, include the production of sparkling cider and apple by-products, dairy foods, and chocolate. Pop. (1981) 15,703.

Ville-de-Paris, *département,* Île-de-France *région,* France, established in 1964 as part of the administrative reorganization of the Paris metropolitan area. It is coextensive with the municipality of Paris. With the exception of the Bois de Boulogne, the Bois de Vincennes, and some streets formerly in peripheral suburbs, the *département* is contained within the last line of fortifications built around Paris in 1841–45 and demolished after World War I. Like other *départements,* it has a *préfet* as representative of the central government, but the Conseil de Paris resembles a municipal council rather than a departmental assembly. The 20 *arrondissements* have been maintained, each of which comprises a *canton.* Area: 41 square miles (105 square km). Pop. (1989 est.) 2,038,800.

Villefranche-sur-Mer, harbour town and Mediterranean resort, Alpes-Maritimes *département,* Provence–Alpes–Côte d'Azur *région,* southeastern France. Situated on the wooded slopes surrounding the magnificent roadsteads immediately east of Nice, the town is dominated by Mount Boron. It is connected by a corniche (cliffside) road with Beaulieu to the east and with Saint-Jean-Cap-Ferrat to the southeast on the scenic Cape Ferrat peninsula, where notable properties include the former Riviera residence of Leopold II, king of the Belgians (reigned 1865–1909).

Villefranche, a picturesque old town, was founded early in the 14th century. Its ancient Saint-Pierre chapel was entirely decorated by the French 20th-century writer and artist Jean Cocteau. The citadel was built in 1560, under the rule of the Duke of Savoy. The town overlooks a fruitful roadstead, well sheltered and often utilized by the French navy for warships. There is a little fishing along the coast. Pop. (1982) 6,627.

Villefranche-sur-Saône, town, Rhône *département,* Rhône-Alpes *région,* east-central France, located 1 mile (1.6 km) west of the Saône River. Founded in the 12th century, the town became the capital of the Beaujolais district. After enduring three sieges in the 15th and 16th centuries, the town walls were finally dismantled early in the 19th century. An important wine-trading centre, Villefranche-sur-Saône has metallurgical, textile, and chemical industries. The Autoroute du Sud, running along the right bank of the Saône, skirts the town to the east. Pop. (1982) 28,858.

Villegagnon Island, Portuguese ILHA DE VILLEGAGNON, island in Guanabara Bay, southeastern Brazil, connected by a causeway to Rio de Janeiro's Santos Dumont Airport on the mainland. In 1555 French Huguenots from nearby Laje Island under Nicolas Durand de Villegaignon established the colony of La France Antarctique and Fort Coligny. In 1560 the fort was destroyed by Portuguese troops, and the Huguenots were forced to abandon the island. Villegagnon is the site of Brazil's National Naval Academy.

Villegas, Esteban Manuel de (b. 1589, Matute, near Nájera, Spain—d. Sept. 3, 1669, Matute), Spanish lyric poet who achieved great popularity with an early book of poems, *Poesías eróticas y amatorias* (1617–18).

He first studied classics at the University of Madrid, translating works of the 6th-century-BC Greek poet Anacreon at the age of 14, and later obtained a law degree from the University of Salamanca. Intending to devote his life to literature, he was forced to practice law to support his family. In 1659 he was jailed by the Inquisition because of satires he had published. Returning to Nájera, he spent his remaining years on a translation of the 5th-century-AD Roman scholar Boethius' *De Consolatio philosophiae* (*Consolation of Philosophy*).

Villegas was a poet who essentially exhausted his art in his early youth. The *Poesías eróticas,* most of which were written in his teens, are a mixture of translations and imitations of Horace and Anacreon, satires, and idylls. Some critics regard these poems as possessing a grace and delicacy unequaled in Spanish literature.

Villehardouin, Geoffrey of, French GEOFFROI DE VILLEHARDOUIN (b. *c.* 1150, near Bar-sur-Aube, Burgundy [France]—d. *c.* 1213, Greece?), French soldier, chronicler, marshal of Champagne, and one of the leaders of the Fourth Crusade (1199–1207), which he described in his unfinished *Histoire de l'empire de Constantinople.* He was the first serious writer of an original prose history in French.

Although he was only one of the lesser nobility, Villehardouin was from the start accepted as one of the leaders of the Fourth Crusade. In 1205 his consummate generalship saved the Frankish army from destruction at the hands of the Bulgars outside Adrianople (modern Edirne, Tur.) and led them without loss through hostile country to safety in Constantinople.

Villehardouin's *Histoire,* usually known as the *Conquête de Constantinople* ("Conquest of Constantinople"), initiated the great series of histories that so distinguishes medieval French literature. His achievement is remarkable because neither in style nor form did he have any models on which to base his work; his Latin predecessors were probably unknown to him at first hand. He probably started writing his chronicle about 1209. In it, he describes the "crusade," a war in which French knights and their Venetian allies invaded the Byzantine Empire and captured its capital Constantinople (1204). It was after the city's fall that Villehardouin distinguished himself in the conflict with the Bulgars.

Villejuif, town, Val-de-Marne *département,* Paris *région,* southern suburb of Paris, France. It has a psychiatric hospital and a cancer re-

search institute and manufactures glass, sheet metal, and aircraft parts. Pop. (1982) 42,852.

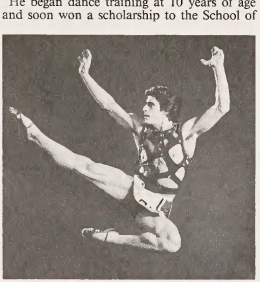
Villèle, (Jean-Baptiste-Guillaume-)Joseph, comte de (count of) (b. April 14, 1773, Toulouse, Fr.—d. March 13, 1854, Toulouse), French conservative politician and prime minister during the reign of Charles X.

Villèle was educated for the navy, made his first voyage in July 1789, and served in the West and East Indies. In 1807 he returned to France after having amassed a considerable fortune during his travels. He was elected mayor of his commune near Toulouse (1808) and mayor of Toulouse (1815) as well as a deputy in the intransigently royalist chamber of 1815–16. From 1813 he was a member of the royalist secret society Les Chevaliers de la Foi (The Knights of the Faith), and he sat on the extreme right with the ultra-royalists. In 1820 he was made a minister without portfolio. He resigned in July 1821, but in the following December, after the fall of the government of the Duc de Richelieu, Villèle returned as minister of finance and soon became the real head of the Cabinet. He was backed at court by intimates of King Louis XVIII, who in 1822 created him comte and made him premier.

Villèle muzzled the opposition by imposing stringent censorship on the press (1822). In 1825, after the stubbornly reactionary Charles X had succeeded to the throne, Villèle's government provided a long-sought indemnity for the émigrés who had lost their estates in the Revolution, financing it by lowering the rate of interest paid on government bonds. Though the measure was unfair to the bondholders, by satisfying the claims of the émigrés it had the salutary effect of ending the uncertainty over the legal ownership of the lands confiscated during the Revolution. During Villèle's administration the more conservative Catholic elements had great influence, especially in the universities, from which they purged professors with liberal views. All these policies were highly controversial and divisive, but particularly damaging to Villèle was his disregard, perhaps at the insistence of Charles X, of the widespread sentiment in favour of some sort of constitution. When in the elections of 1827 he failed to obtain a rightist majority, he resigned (January 1828), and Charles replaced him with the vicomte de Martignac, a centrist, in a futile effort to appease public discontent. Villèle took no further part in politics.

Villella, Edward (b. Oct. 1, 1936, New York City), American ballet dancer, one of the principal performers of the New York City Ballet, noted for his powerful technique, particularly his soaring leaps and jumps.

He began dance training at 10 years of age and soon won a scholarship to the School of American Ballet. Later he entered New York City's School of Performing Arts. After a four-year hiatus he joined the New York City Ballet in 1957 and became a soloist within a year. A notable interpreter of the dramatic title role of George Balanchine's *Prodigal Son,* Villella also appeared as the Faun in Jerome Robbins' *Afternoon of a Faun* and created the roles of Oberon in *A Midsummer Night's Dream* (1962) and Harlequin in *Harlequinade* (1965), both by Balanchine. He also excelled in the nonvirtuosic but deeply dynamic *Watermill* (1972), created for him by Robbins. He performed in a number of pas de deux with Patricia McBride on television. From 1979 he served as artistic coordinator and choreographer of the Eglevsky Ballet Company (until 1984) and as director of the Miami City Ballet (from 1987).



Villella in *The Prodigal Son*
Martha Swope

Villemin, Jean Antoine (b. Jan. 28, 1827, Prey, Vosges, Fr.—d. Oct. 6, 1892, Paris), French physician who proved tuberculosis to be an infectious disease, transmitted by contact from humans to animals and from one animal to another.

Villemin studied at Bruyères and at the military medical school at Strasbourg, qualifying as an army doctor in 1853. He was sent for further study to the Val-de-Grâce, the military medical school in Paris. As an army doctor he observed that healthy young men from the country often developed tuberculosis while living in the close quarters of the barracks. Aware that glanders in horses, a similar disease, is transmitted by inoculation, Villemin began his experiments by inoculating a rabbit with tuberculous material from a deceased human patient. Tuberculous lesions were found in the rabbit three months later. He also found that rabbits inoculated with tuberculous material from cows developed the disease.

His results, presented in 1867, were at first ignored. The French believed tuberculosis was hereditary, and German scientists knew that introducing a foreign body into a tissue would produce something like a tubercule. Villemin tried valiantly to spread the doctrine of contagion, but it was some time before his position was vindicated by the experiments of other scientists. He later proved by injection that sputum and blood from tubercular patients can transmit the disease to animals.

Villena, city, Alicante *provincia,* in the *comunidad autónoma* ("autonomous community") of Valencia, southeastern Spain. It lies about 45 miles (70 km) northeast of Murcia. Dating from Roman times, Villena was later part of the Moorish kingdom of Valencia and was taken by the Christians in the 13th century. The locality was devastated by an earthquake in 1829. The city is on the right bank of the Vinalopó River and is the centre of a grape-growing area. The city's industries produce wine, soap, and salt. Architectural features include the Gothic churches of Santiago and Santa María and the medieval castle of the marquéses de Villena, on San Cristóbal Hill. Pop. (1981) 28,279.

Villeneuve, Pierre-Charles-Jean-Baptiste-Silvestre de (b. Dec. 31, 1763, Valensole, Fr.—d. April 22, 1806, Rennes), French admiral who commanded the French fleet at the Battle of Trafalgar (1805).

Belonging to a noble family, he entered the French Royal Navy and received rapid promotion, being named post captain in 1793 and rear admiral in 1796. He commanded a section of the French fleet in Napoleon's expedition to Egypt. His flagship, the *Guillaume Tell,* along with the *Généreux,* were the only warships to escape the French fleet's general destruction during the ensuing Battle of the Nile (Aug. 1, 1798).

Villeneuve played a key role in the failed execution of Napoleon's scheme for the invasion of England in 1805. In the autumn of 1804 Napoleon had named Villeneuve commander of the fleet at Toulon. The duty of Villeneuve's fleet was to draw the British admiral Horatio Nelson's fleet to the West Indies, return rapidly in secret, and, in combination with other French and Spanish ships, enter the English Channel with an overwhelming naval force for the invasion of England. Villeneuve apparently had little confidence in the success of this operation, but nevertheless he took the command in November. In March 1805 he sailed out of Toulon and succeeded in drawing Nelson after him in a cruise out to the West Indies. Villeneuve's fleet then returned to Europe in June–July, during which time it fought an indecisive encounter off El Ferrol, Spain, with an English squadron led by Sir Robert Calder.

Villeneuve then turned south to the port of Cádiz, disregarding Napoleon's standing orders to proceed immediately to the Channel and rendezvous with the other French and Spanish naval forces gathered there. This act of timidity on Villeneuve's part effectively ended Napoleon's hopes for an invasion of England while Nelson's fleet was somewhere else. In Cádiz Villeneuve then received orders to sail his fleet into the Mediterranean for an attack upon Naples, but, while making his preparations, he learned that another officer had been sent to replace him in his command. In a spasm of wounded vanity, he embarked his fleet out of Cádiz to face the waiting fleet of Nelson, and the result was the Battle of Trafalgar (*q.v.*) of October 1805. Villeneuve's impulsive decision to leave Cádiz and give battle to Nelson's better-prepared fleet has been severely criticized.

At Trafalgar Villeneuve showed personal courage, but the incapacity of the Franco-Spanish fleet to maneuver gave him no opportunity to influence the course of the battle, which ended for the French in complete defeat. Villeneuve himself was captured and was taken as a prisoner to England, but he was soon released. Shortly after returning to France he committed suicide at an inn in Rennes, where he had been waiting to learn the extent of the emperor's displeasure with him.

Villeurbanne, city, Rhône *département,* Rhône-Alpes region, east-central France. Villeurbanne forms the eastern part of the metropolitan agglomeration of Lyon. It is located on the right bank of the Rhône River. The first skyscrapers in France were built there. The city's industries include metallurgy and the manufacture of chemicals and rayon. Pop. (1982) 115,378.

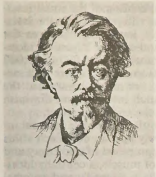
Villiers, Barbara: *see* Cleveland, Barbara Villiers, duchess of.

Villiers, George: *see* Buckingham, George Villiers, 1st duke of; Buckingham, George Villiers, 2nd duke of.

Villiers, George William Frederick: *see* Clarendon, George William Frederick Villiers, 4th earl of.

Villiers de L'Isle-Adam, (Jean-Marie-Mathias-Philippe-) Auguste, comte de (count of) (b. Nov. 7, 1838, Saint-Brieuc, Fr.—d. Aug. 19, 1889, Paris), French poet, dramatist, and short-story writer whose work reflects a revolt against Naturalism and a combination of Romantic idealism and cruel sensuality. His hatred of the mediocrity of a materialistic age and his compelling personality made a considerable impression on later writers.

Villiers, the descendant of an aristocratic family, lived most of his life in considerable poverty and spent some time planning to marry a rich heiress; when he did finally marry, on his deathbed, it was to his mistress, a former chambermaid. He was a friend of the leading writers of his time but was not more



Villiers de L'Isle-Adam, drawing by Paterne Berrichon
Collection Viollet

widely known until about five years before he died.

His most enduring works are the drama *Axël* (1885–86) and the short stories in *Contes cruels* (1883; *Cruel Tales,* 1963). The latter, inspired by the works of Edgar Allan Poe, satirize bourgeois morality. Splendidly written, they often have an element of horror or even sadism that reveals both the desire to shock and some of Villiers's private obsessions.

Axël combines symbolism and occult themes in the story of the lord of a German castle, in the cellars of which a mysterious treasure is hidden, and his doomed love for an escaped nun who has discovered the secret. *Axël* is unperformable in its full version; it was revived, in 1962, in a version lasting four hours. Villiers's *Correspondance* was published in 1962.

Villiers Saint-Paul, François Hotman, sieur de (lord of): *see* Hotman, François.

Villmanstrand (Finland): *see* Lappeenranta.

Villon, François, pseudonym of FRANÇOIS DE MONTCORBIER, of FRANÇOIS DES LOGES (b. 1431, Paris—d. after 1463), one of the greatest French lyric poets. He was known for his life of criminal excess, spending much time in prison or in banishment from medieval Paris. His chief works include *Le Lais,* or *Le Petit Testament, Le Grand Testament,* and various ballades, chansons, and rondeaux.



Villon

Faulce beaultre qui tãt me couste cher
Rude en effet pour cuire douleur
Amour dure plus que fer a maschet
Nommer te puis de ma befacon seur
cercher selon la mort dun poure cueur
Dequeil musse à gens met au mourir
peulx sãs pitie ne deult droit ne rigueur
Sans empirer vng pouure secourir

François Villon, woodcut from the first edition of Villon's works published by Pierre Levet, 1489; the first letter of each line of the ballade "Faulce beaulte" ("Fausse beauté"), printed below the portrait, spells out the poet's name, François, in the form of an acrostic
By courtesy of the Bibliotheque Nationale, Paris

Life. Villon's father died while he was still a child, and he was brought up by the canon Guillaume de Villon, chaplain of Saint-Benoît-le-Bétourné. The register of the faculty of arts of the University of Paris records that in March 1449 Villon received the degree of bachelor, and in May–August 1452, that of master. On June 5, 1455, a violent quarrel broke out in the cloisters of Saint-Benoît among himself, some drinking companions, and a priest, Philippe Sermoise, whom Villon killed with a sword thrust. He was banished from the city but, in January 1456, won a royal pardon. Just before Christmas of the same year, however, he was implicated in a theft from the Collège de Navarre and was again obliged to leave Paris.

At about this time he composed the poem his editors have called *Le Petit Testament,* which he himself entitled *Le Lais* (*The Legacy*). It takes the form of a list of "bequests," ironically conceived, made to friends and acquaintances before leaving them and the city. To his barber he leaves the clippings from his hair; to three well-known local usurers, some small change; to the clerk of criminal justice, his sword (which was in pawn).

After leaving Paris, he probably went for a while to Angers. He certainly went to Blois and stayed on the estates of Charles, duc d'Orléans, who was himself a poet. Here, further excesses brought him another prison sentence, this time remitted because of a general amnesty declared at the birth of Charles's daughter, Marie d'Orléans, on Dec. 19, 1457. Villon entered his ballade "Je meurs de soif auprès de la fontaine" ("I die of thirst beside the fountain") in a poetry contest organized by the Prince, who is said to have had some of Villon's poems (including the "letter" dedicated to the young child, "Épître à Marie d'Orléans") transcribed into a manuscript of his own work.

At some later time, Villon is known to have been in Bourges and in the Bourbonnais, where he possibly stayed at Moulins. But throughout the summer of 1461 he was once more in prison. He was not released until October 2, when the prisons were emptied because King Louis XI was passing through.

Free once more, Villon wrote his longest work, *Le Testament* (or *Le Grand Testament,* as it has since been known). It contains 2,023 octosyllabic lines in 185 *huitains* (eight-line stanzas). These *huitains* are interspersed with a number of fixed-form poems, chiefly ballades (usually poems of three 10-line stanzas, plus an *envoi* of between 4 and 7 lines) and chansons (songs written in a variety of metres and with varied verse patterns), some of which he had composed earlier.

In *Le Testament* Villon reviews his life and expresses his horror of sickness, prison, old age, and his fear of death. It is from this work especially that his poignant regret for his wasted youth and squandered talent is known. He re-creates the taverns and brothels of the Paris underworld, recalling many of his old friends in drunkenness and dissipation, to whom he had made various "bequests" in *Le Lais.* But Villon's tone is here much more scathing than in his earlier work, and he writes with greater ironic detachment.

Shortly after his release from the prison at Meung-sur-Loire he was arrested, in 1462, for robbery and detained at the Châtelet in Paris. He was freed on November 7 but was in prison the following year for his part in a brawl in the rue de la Parcheminerie. This time he was condemned to be *pendu et etranglé* ("hanged and strangled"). While under the sentence of death he wrote his superb "Ballade des pendus," or "L'Épitaphe Villon," in which he imagines himself hanging on the scaffold, his body rotting, and he makes a plea to God against the "justice" of men. At this time, too, he wrote his famous wry quatrain "Je suis Françoys, dont il me poise," "I am François, they have caught me." He also made an appeal to the Parlement, however, and on Jan. 5, 1463, his sentence was commuted to banishment from Paris for 10 years. He was never heard from again.

Poetry. The criminal history of Villon's life can all too easily obscure the scholar, trained in the rigorous intellectual disciplines of the medieval schools. While it is true that his poetry makes a direct unsentimental appeal to our emotions, it is also true that it displays a remarkable control of rhyme and reveals a disciplined composition that suggests a deep concern with form, and not just random inspiration. For example, the ballade "Fausse beauté, qui tant me couste chier" ("False beauty, for which I pay so dear a price"), addressed to his friend, a harlot, not only supports a double rhyme pattern but is also an acrostic, with the first letter of each line of the first two stanzas spelling out the names Françoys and Marthe. Even the arrangement of stanzas in the poem seems to follow a determined order, difficult to determine, but certainly not the result of happy accident. An even higher estimate of Villon's technical ability would probably be reached if more were known about the manner and rules of composition of the time.

A romantic notion of Villon's life as some sort of medieval *vie de bohème*—a conception reinforced by the 19th-century Symbolist poet Arthur Rimbaud, who saw him as the "accursed poet"—has been challenged by modern critical studies. David Kuhn has examined the way most texts were made to yield literal, allegorical, moral, and spiritual meanings, following a type of biblical exegesis prevalent in that theocentric age. He has discovered in *Le Testament* a numerical pattern according to which Villon distributed the stanzas. If his analysis is correct, then it would seem *Le Testament* is a poem of cosmic significance, to be interpreted on many levels. For example, stanza 33—the number of years in Christ's age—Kuhn believes refers directly to Jesus, and this would certainly be impossible to regard as the random inspiration of a "lost child." The critic Pierre Guiraud sees the poems as codes that, when broken, reveal the satire of a Burgundian cleric against a corps of judges and attorneys in Paris.

That Villon was a man of culture familiar with the traditional forms of poetry and possessing an acute sense of the past is evident from the poems themselves. There is the ballade composed in Old French, parodying the language of the 13th century; *Le Testament,* which stands directly in the tradition of Jehan Bodel's *Congés* ("Leave-takings"), poetry that poets such as Adam de la Halle and Bodel before him had composed when setting out on a journey; best of all, perhaps, there is his "Ballade des dames du temps jadis" ("Ballade of the Ladies of Bygone Times," included in *Le Testament*), with its famous, incantatory refrain "Mais où sont les neiges d'antan?" ("But where are the snows of yesteryear?").

However farfetched some of these insights into Villon may appear to be, it is not surprising that the poet—given the historical context of learning—should inform his own work with depth of thought, meaning, and significance. But an "intellectual" approach to Villon's work should not distract from its burning sincerity nor contradict the accepted belief that fidelity to genuine, often painful, personal experience was the source of the harsh inspiration whereby he illuminated his largely traditional subject matter—the cortège of shattered illusions, the regrets for a lost past,

the bitterness of love betrayed, and, above all, the hideous fear of death so often found in literature and art at that time of pestilence and plague, massacre and war.

The little knowledge of Villon's life that has come down to the present is chiefly the result of the patient research of the 19th-century French scholar Auguste Longnon, who brought to light a number of historical documents—most of them judicial records—relating to the poet. But after his banishment by the Parlement in 1463 all trace of Villon is lost. Still, it is a wonder that any of his poetry should have survived, and there exist about 3,000 lines, the greater part published as early as 1489 by the Parisian bookseller Pierre Levet, whose edition served as the basis for some 20 more in the next century. Apart from the works mentioned, there are also 12 single ballades and rondeaux (basically 13-line poems with a sophisticated double rhyme pattern), another 4 of doubtful authenticity, and 7 ballades in *jargon* and *jobelin*—the slang of the day. Two stories about the poet were later recounted by Rabelais: one told of his being in England, the other of his seeking refuge at the monastery of Saint-Maixent in Poitou. Neither is credible, nor is it known when or where François Villon died.

Assessment. Perhaps the most deeply moving of French lyric poets, Villon ranges in his verse from themes of drunkenness and prostitution to the unsentimental humility of a ballade-prayer to "Our Lady," "Pour prier Nostre-Dame," written at the request of his mother. He speaks, with marvelous directness, of love and death, reveals a deep compassion for all suffering humanity, and tells unforgettably of regret for the wasted past.

His work marks the end of an epoch, the waning of the Middle Ages, and it has commonly been read as the inspiration of a "lost child." But as more becomes known about the poetic traditions and disciplines of his day, this interpretation seems inadequate. It is probably either too early or too late fully to understand Villon's work, as one critic has suggested; but although the scholar must still face a variety of critical problems, enough is known about Villon's life and times to mark him as a poet of genius, whose work is charged with meaning and great emotional force.

(R.Pe.)

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Villon, Jacques, pseudonym of GASTON ÉMILE DUCHAMP (b. July 31, 1875, Damville, Normandy, Fr.—d. June 9, 1963, Puteaux, near Paris), noted French painter and printmaker who helped bridge the gap between the purely abstract and the realistic schools of modern art.

Villon was the brother of the artists Suzanne Duchamp (Crotti), Raymond Duchamp-Villon, and Marcel Duchamp. He prepared for a law career as a young man but in 1894 went to Paris, where he spent the next 12 years contributing illustrations and cartoons to newspapers. After 1906 he was able to devote himself primarily to painting. Villon's mature style of painting combined a Cubist use of flat, geometric shapes with a palette of luminous colours. He exhibited at early Cubist shows in Paris in 1911 and 1912 and in the New York City Armory Show in 1913. His compositions eventually brought him international acclaim after World War II. Called a "master of the Paris school" because of his influence on a generation of younger painters, Villon won the Grand Prix at the Venice Biennale in 1956.

Villon's portraits and landscapes done after World War II marked a partial return to realistic treatment and were acclaimed for their synthesis of Impressionist colours and Cubist analysis of form. He was also a prolific printmaker. He completed more than 600 colour lithographs, drypoints, engravings, and etchings, among which were many illustrations of literary works by Racine, Hesoid, and Virgil. Two retrospective shows of his paintings and prints were held in New York City in 1953.

villota, plural VILLOTE, type of 16th-century Italian secular song similar to the villenella but having its origins in folk music. The villota has no structural uniformity and usually weaves a popular or street song into its poetic–musical fabric. Clearly, it was meant to be entertaining, with nonsense syllables in the text (which might also be of a bawdy nature) and a dance-like rhythm. Frequently, the longer and more complex villote will conclude with a separate section, called a *nio,* which acts as a refrain and is set off from the main part (or verse) by its faster tempo and occasionally, contrasting metre. Villote often reveal their local origin, either by means of a dialect employed or by regional identifications, as in *villote alla paduana* (Padua), *alla veneziana* (Venice), or *alla mantovana* (Mantua).

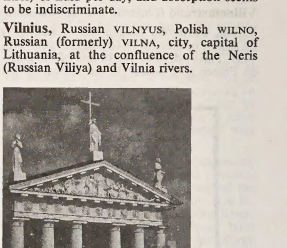
villus, plural VILLI, in anatomy, any of the small, slender, vascular projections that increase the surface area of a membrane. Important villous membranes include the sac that encloses unborn (fetal) mammals and the mucous-membrane coating of the small intestine. In humans the villi project into the intestinal cavity, greatly increasing the area for food absorption and adding digestive secretions. The villi number about 6,000 to 25,000 per square inch (10 to 40 per square millimetre) of tissue. They are most prevalent at the beginning of the small intestine and diminish in number toward the end of the tract.

The large number of villi give the internal intestinal wall a velvety appearance. Each villus has a central core composed of one artery and one vein, a strand of muscle, a centrally located lymphatic capillary (lacteal), and connective tissue that adds support to the structures. The blood vessels are thought to transport proteins and carbohydrates absorbed by the villi's cells, while the lymphatic capillary removes droplets of emulsified fat (chyle). The muscle strand allows the villi to contract and expand; it is believed that these contractions empty the contents of the lacteal into larger lymphatic vessels.

Covering the core of a villus is the surface mucous-membrane layer. This is mainly composed of two cell types: tall, narrow, columnar cells that absorb the substances passed into the blood and lymphatic vessels; and goblet cells, rounded at the end, that secrete mucus into the intestinal cavity. On the surface of each columnar cell there are about 600 very fine projections called microvilli that further increase the absorptive area of each villus.

Villi of the intestine move in swaying, contracting motions. These movements are believed to increase the flow of blood and lymph and to enhance absorption. The villi of the small intestine absorb about 2 gallons (7½ litres) of fluid per day, and absorption seems to be indiscriminate.

Vilnius, Russian VILNYUS, Polish WILNO, Russian (formerly) VILNA, city, capital of Lithuania, at the confluence of the Neris (Russian Viliya) and Vilnia rivers.



The cathedral at Vilnius, Lith.
Chris Lisle—Corbis

A settlement existed on the site in the 10th century, and the first documentary reference to it dates from 1128. In 1323 the town became capital of Lithuania under Grand Duke Gediminas; it was destroyed in 1377 by the Teutonic Knights. Subsequently rebuilt, Vilnius received its charter of self-government in 1387, and a Roman Catholic bishopric was established there. The town and its trade flourished and grew; in 1525 a printing press was set up, and in 1579 a Jesuit academy was opened. The city underwent many calamities—Russian occupation in 1655–60, Swedish capture in 1702 and 1706, French occupation in 1812, and recurrent fires and plagues. In 1795 Vilnius passed to Russia in the Third Partition of Poland. It was occupied by the Germans in World Wars I and II and suffered

heavy damage. From 1920 to 1939 it was included in Poland (*see* Vilnius dispute); it was taken by Soviet troops in 1939 and restored to Lithuania. The Soviets annexed Lithuania, including Vilnius, in June 1940. Soviet rule brought mass deportations (1940–41, 1946–50) of ethnic Lithuanians from Vilnius, and many Russians moved into the city. In 1970 the population of Vilnius was 43 percent ethnically Lithuanian (up from 34 percent in 1959) and 18 percent Polish. In 1991 Vilnius again became the capital of independent Lithuania.

A prominent feature of the city before World War II was its Jewish community, for nearly 150 years the centre of eastern European Jewish cultural life. Traceable as far back as 1568, this community comprised 20 percent of the city's population by the middle of the 17th century. In the 18th century, under the influence of Rabbi Elijah ben Solomon (*q.v.*), it underwent a decisive religious and spiritual growth, becoming renowned for rabbinical studies that between 1799 and 1938 produced texts of the Mishna, Jerusalem Talmud, and other works that are still standard. In the 19th century the community became a centre for the Haskala (Enlightenment) and was the home also of the first Jewish socialists in Russia; by the beginning of the 20th century it had become the focus of the Zionist movement in Russia as well. A flourishing source of Hebrew and Yiddish literature, with numerous newspapers and literary, scientific, and cultural periodicals, it was the birthplace of the YIVO Institute for Jewish Research (founded 1924). The German occupation during World War II destroyed the community, reducing the city's Jewish population from 80,000 in 1941 to 6,000 by 1945.

Many historic buildings survive, representing the Gothic, Renaissance, Baroque, and classical styles of architecture. The ruins of the Castle of Gediminas on Castle Hill dominate the old town, with its narrow, winding streets that climb the wooded slopes surrounding the confluence of the rivers. There are a 16th-century Gothic Church of St. Anne and a dozen 17th-century Baroque churches, notably the Church of SS. Peter and Paul. The cathedral dates originally from 1387, but in its present form from 1801. Around the old town are the newer sectors of the city, with a rectangular street plan, large apartment blocks, administrative buildings, and modern factories.

Present-day Vilnius is an important industrial centre, producing machine tools, agricultural machinery, electronic calculators and other electrical and electronic apparatus, textiles, clothing, and foodstuffs. The city is the cultural centre of Lithuania. The V. Kapsukas State University is the successor to the Jesuit academy of 1579, and the Vilnius Civil Engineering Institute was founded in 1969. There are institutes of fine arts and teacher-training schools and several theatres and museums. The art gallery occupies the former town hall, built in the 18th century. Pop. (2000 est.) 577,969.

Vilnius dispute, Vilnius also spelled WILNO, post-World War I conflict between Poland and Lithuania over possession of the city of Vilnius (Wilno) and its surrounding region.

Although the new Lithuanian government established itself at Vilnius in late 1918, it evacuated the city when Soviet forces moved in on Jan. 5, 1919. A few months later Polish forces drove the Red Army out of Vilnius and occupied it themselves (April 20, 1919). The Lithuanians rejected the demands of the Polish chief of state, Józef Piłsudski, for union with Poland, and hostilities were avoided only by the Allies' creation of a demarcation line (the Foch Line) to separate the armies of the two countries; Vilnius was left on the Polish side of the line. In the summer of 1920, however, the Red Army reoccupied Vilnius, and on July 12 Soviet Russia ceded the city to Lithuania. Subsequently, violence broke out between Lithuania and Poland. The League of Nations arranged a partial armistice (Oct. 7, 1920) that put Vilnius under Lithuanian control and called for negotiations to settle all the border disputes. Two days later the Polish general Lucjan Żeligowski drove the Lithuanian troops out, proclaimed the independence of central Lithuania, and established its government at Vilnius. For the next year and a half, negotiations continued under the aegis of the League of Nations, which finally abandoned its role as mediator on Jan. 13, 1923.

Five days earlier, however, General Żeligowski, again prompted by Piłsudski, called for elections for a regional Diet, which on February 20 voted to incorporate central Lithuania into Poland. That arrangement was later accepted by the League's council, which set the border almost along the Foch Line (Feb. 3, 1923)—a decision that was confirmed on March 15 by the conference of ambassadors of the Allied Powers. Lithuania, however, rejected the settlement and, on the basis of the continuing Vilnius dispute, refused to arrange regular diplomatic relations with Poland. Only in 1938, under the pressure of a Polish ultimatum (issued March 17), did Lithuania agree to receive a Polish representative. Vilnius was restored to Lithuania on Oct. 10, 1939.

Vilyuy River, also spelled VILIUI, river in east-central Siberia, flowing mainly through Yakutiya in eastern Russia. The longest tributary of the Lena, it has a length of 1,647 mi (2,650 km) and a drainage basin of about 190,000 sq mi (491,000 sq km). Rising on the Central Siberian Plateau in the Evenky autonomous *okrug*, it flows in a winding course, first east (soon entering Yakutiya), then south and southeast, then generally east again, until it joins the Lena about 200 mi northwest of Yakutsk.

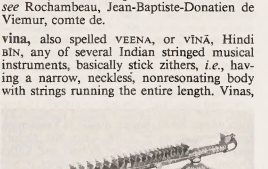
The Vilyuy Valley is sparsely populated; small riparian settlements are Vilyuysk (founded 1634), Verkhnevilyuysk, and Suntar (the traditional head of navigation, about 500 mi from the river mouth).

In 1954 rich diamond deposits were discovered at Mirny, near the river 450 mi from its mouth. Access roads and an airport were built and the Vilyuy Dam complex was begun, near the mine site, on the Vilyuy at Chernyshevsky. Power is used for the diamond concentrators at Mirny, and a power line extends 250 mi north to diamond deposits at Aykhal (1964) and Udachny (1968). The dam project has radically altered both the natural fluvial regime of the Vilyuy and the economy of its valley.

Vimeur, Jean-Baptiste-Donatien de: *see* Rochambeau, Jean-Baptiste-Donatien de Viemur, comte de.

vina, also spelled VEENA, or VĪNĀ, Hindi BĪN, any of several Indian stringed musical instruments, basically stick zithers, *i.e.*, having a narrow, neckless, nonresonating body with strings running the entire length. Vinas, usually seven-stringed and fretted, appeared in many sizes and shapes after the 7th century. The classical vina of northern Indian, or Hindustani, music, a difficult solo instrument, has a large resonating gourd under each end of the body and high, movable frets. On the vina of southern Indian, or Carnatic, music, the lower gourd is replaced by a pear-shaped body, making the instrument a lute rather than a zither. Like the northern vina it has four melody strings and three drones. Its frets are small metal bars. It occupies in Carnatic music the dominant position held by the sitar, which is a form of vina, in Hindustani music. A special group in southern India holds the secret to making the wire strings for this fine solo instrument.

"Vina" may also refer generically to stringed instruments. Prior to about 1000, it usually referred to an arched harp.



Northern Indian classical vina; in the Metropolitan Museum of Art, New York City

By courtesy of the Metropolitan Museum of Art, New York City, gift of Alice E. Getty, 1946

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Viña del Mar, Pacific Ocean resort, Valparaíso region, central Chile, just northeast of Valparaíso city. A large municipal gaming casino, beaches, and a pleasant summer climate attract substantial numbers of domestic and foreign vacationers. Hotels, exclusive clubs, a racecourse, public gardens and plazas, museums, and theatres are added attractions. Army and navy garrisons, petroleum depots, and processing and fabricating industries (including foods, textiles, and paints) add to the city's economic base. The Cerro Castillo, summer palace of Chilean presidents, is on a coastal bluff. Bus and rail communications link it with Santiago, the national capital, 120 mi (190 km) southeast. In the mid-20th century Viña del Mar grew rapidly as a residential suburb of Valparaíso. Pop. (1999 est.) mun., 330,736.



Beach resort of Viña del Mar, Chile

Paul Mihoilan—Photo Researchers

vinaigrette, small metal perfume container usually made of gold or silver and containing a pierced metal tray beneath which was placed a piece of sponge soaked in an aromatic substance such as vinegar combined with lavender. Vinaigrettes were made as boxes and many more novel forms from the late 18th to the late 19th century. Most English examples were made in Birmingham.

Vinaya Piṭaka (Pāli and Sanskrit: "Basket of Discipline"), the oldest and smallest of the three sections of the Buddhist canonical *Tipiṭaka* ("Triple Basket") and the one that regulates monastic life and the daily affairs of monks and nuns according to rules attributed to the Buddha. It varies less from school to school than does either the *Sutta* (discourses of the Buddha and his disciples) or *Abhidhamma* (scholastic) sections of the canon, and the rules themselves are basically the same

even for Mahāyāna schools, although some of the latter greatly extended the accompanying narrative and commentarial material. Three works comprise the Pāli *Vinaya:*

1. *Sutta-vibhaṅga* ("Classification of the Suttas"; corresponds to *Vinaya-vibhaṅga* in Sanskrit), an exposition of the monastic rules (*pātimokkha, q.v.*) and the disciplinary actions prescribed for each offense, arranged according to severity—from transgressions requiring expulsion from the order to those needing only to be confessed—plus minor rules of conduct. Each rule is accompanied by (*a*) the story of the incident that first prompted the Buddha's ruling, (*b*) an early word-for-word commentary on the rules, and (*c*), in some instances, a later discussion of exceptions.

2. *Khandhaka* ("Divisions"; Sanskrit *Vinaya-vastu,* "Vinaya Subjects"), a series of 22 pieces (at least in the Pāli version) dealing with such matters as admission to the order; monastic ceremonies; rules governing food, clothing, lodging, and the like; and procedures for handling offenses and disputes. As in the *Sutta-vibhaṅga,* an account is given of the occasion when each regulation was formulated by the Buddha. The arrangement is chronological, and stories of major events are included, thus providing a picture of the evolving life of the early monastic community.

3. *Parivāra* ("Appendix"), a classified digest of the rules in the other *Vinaya* texts, apparently confined to the Theravāda school.

Vincennes, city, Val-de-Marne *département.* Paris region, eastern residential suburb of Paris, France, immediately outside the city limits. It is connected to Paris by the Métro (subway).

The château of Vincennes, which succeeded an earlier fortified hunting lodge on the site, consists of four principal buildings—the keep, the chapel, and two pavilions—enclosed by



The keep of the château of Vincennes, Fr.
Rosine Mazin—TOP

an enceinte with nine towers. The magnificent and well-preserved keep, the finest surviving in France, 170 ft (52 m) in height, was begun under Philip VI, completed under Charles V (reigned 1364–80), and used thereafter as a royal residence until Versailles was built. The chapel, not completed until 1552 but in Gothic style, has a Flamboyant facade and a great rose window. The two pavilions—the Pavillon du Roi and the Pavillon de la Reine—were built by Louis Le Vau, under the direction of Cardinal Mazarin, during the third quarter of the 17th century.

After the court deserted the château, it had a checkered history, being used as a porcelain factory, a cadet school, and a small-arms factory. In 1791, during the Revolution, the Marquis de Lafayette saved it from destruction. Napoleon converted it into an arsenal, and in 1840 it was turned into a fortress. The army was removed in 1930 and restoration started, to be interrupted during World War II when the Germans had a supply depot there; in 1944 part of the Pavillon de la Reine was destroyed by an explosion.

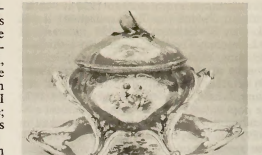
The château has many associations with French history. Four kings of France died there—Louis X, Philip V, Charles IV, and Charles IX—as did Henry V of England and Mazarin. During the reign of Louis XIII it was used as a state prison, and its prisoners included the Great Condé, the Cardinal de Retz, Denis Diderot, and the Comte de Mirabeau; the Duc d'Enghien was shot there in 1804.

The Bois de Vincennes was enclosed in the 12th century and, as a royal hunting preserve, was the reason for the château being built there. The surviving forest is a park, with a zoo, a racecourse, and a sports stadium. Pop. (1982) 42,852.

Vincennes, city, seat (1790) of Knox County, southwestern Indiana, U.S., on the Wabash River, 51 mi (82 km) north of Evansville. Indiana's oldest city, from the time of its settlement (1702) by French traders on the site of an Indian village, it figured prominently in early national American history. A fort, one of a chain from Quebec to New Orleans, was erected by the French in 1732; and in 1736 the settlement around it was named for François-Marie Bissot, sieur de Vincennes, its commandant. Ceded to the British at the end of the French and Indian War (1763), the settlement was virtually self-governing until the outbreak of the Revolution and remained predominantly French in population and tradition for almost 100 years after that. A British force occupied the fort for a brief period, but briefly in 1778 and finally in 1779 it was taken by American forces under George Rogers Clark. Clark's victory at Vincennes, followed by the passage of the Northwest Ordinance (1787), brought an influx of settlers from Kentucky, Virginia, and Pennsylvania. From 1800 to 1813 Vincennes was the capital of Indiana Territory (commemorated by a state memorial). The *Indiana Gazette,* the first territorial newspaper, was published there in 1804 by Elihu Stout. At Vincennes, also, Gov. (later Pres.) William Henry Harrison negotiated several treaties with the Indians and launched the campaign that culminated in the Battle of Tippecanoe (November 1811). The George Rogers Clark National Historical Park (1966), Grouseland (1803–04; the Harrison mansion), and Vincennes University, a junior college founded in 1806, are among the 42 historic sites in the city. Indiana University–Southwest Campus opened there in 1971.

The city is a commercial centre for an agricultural and coal-mining region and has some light industries including auto seat assembling and the manufacture of batteries, paper products, and glass. Inc. 1856. Pop. (1990) 19,859.

Vincennes ware, pottery made at Vincennes, near Paris, from *c.* 1738, when the factory was probably founded by Robert and Gilles Dubois, until 1756 (three years after it had become the royal manufactory), when the concern moved to Sèvres, near Versailles. After 1756 pottery continued to be made at Vincennes, under Pierre-Antoine Hannong; both tin-glazed earthenware (officially) and soft-paste porcelain (clandestinely, in defiance of a Sèvres monopoly) were made until royal intervention forced Hannong's dismissal in 1770. The factory continued until *c.* 1788. Histories of the royal porcelain manufactory of France usually discuss products before 1756 under the name Vincennes and those after 1756 under the name Sèvres, though when



Soup tureen and stand from a service ordered by Catherine II the Great of Russia, Vincennes soft-paste porcelain modelled by Jean-Claude Duplessis and decorated by Dodin and Pierre, 1756; in the Museum of Fine Arts, Boston
Courtesy, Museum of Fine Arts, Boston; Forsyth Wickes Collection

it comes to questions of patronage and style, pottery authorities refer freely to the Vincennes–Sèvres administration.

Some of the innovations for which Sèvres became famous actually began during the Vincennes period. Soft paste (a porcellaneous material but not true porcelain) was made from 1745 by François Gravant and a company formed with a monopoly of the production of "porcelain in the style of the Saxon." Typical of Vincennes were biscuit figures (white mat, unglazed figures in soft paste) introduced *c.* 1751–53 by J.-J. Bachelier, and flowers (*c.* 1748), also modelled in soft paste, on wire stems or applied to vases.

Vincent DE PAUL, SAINT (b. April 24, 1581, Pouy, now Saint-Vincent-de-Paul, Fr.—d. Sept. 27, 1660, Paris; canonized 1737; feast day September 27), French saint, founder of the Congregation of the Mission (Lazarists, or Vincentians) for preaching missions to the peasantry and for educating and training a pastoral clergy.

Educated by the Franciscans at Dax, Fr., he was ordained in 1600 and graduated from the University of Toulouse in 1604. He was allegedly captured at sea by Barbary pirates but escaped. He spent a year in Rome, then went to Paris, where he remained permanently. He placed himself under the spiritual guidance of the celebrated Cardinal Pierre de Bérulle, who entrusted him with the parish of Clichy, Fr.

After founding the Congregation of the Mission in 1625, Vincent de Paul established in and around Paris the Confraternities of Charity—associations of laywomen who visited, fed, and nursed the sick poor. The wealth of these women, many of noble family, aided him in establishing the foundling and other hospitals. With St. Louise de Marillac he cofounded the Daughters of Charity (Sisters of Charity of St. Vincent de Paul), an association patterned after the Confraternities of Charity.

Vincent FERRER, SAINT (b. *c.* 1350, Valencia, Aragon—d. April 5, 1419, Vannes, Fr.; canonized 1455; feast day April 5), Aragonese friar and renowned preacher who helped to end the Great Western Schism.

In 1367 he entered the Dominican Order at Valencia, where he became professor of theology. In 1394 the antipope Benedict XIII made him his confessor and theologian to his court at Avignon, but five years later Vincent resigned to undertake missions. Travelling through Burgundy, southern France, Switzerland, northern Italy, and Spain, he attracted crowds everywhere and had notable success in winning Jewish converts.

In an effort to end the schism, he had tried twice to persuade Benedict to relinquish his papal claim. In 1412 he was one of nine judges who elected Ferdinand I king of Aragon, and he persuaded Ferdinand to cease supporting Benedict, thus helping to end the schism. The last two years of his life were devoted to preaching in northern France.

Vincent OF BEAUVAIS (b. *c.* 1190, Beauvais?, Fr.—d. 1264, Paris), French scholar and encyclopaedist whose *Speculum majus* ("Great Mirror") was probably the greatest European encyclopaedia up to the 18th century.

After he had entered the Dominican order in Paris (*c.* 1220) and become a priest and theologian, Vincent conceived the idea of creating a systematized compilation of universal knowledge and spent the years up to 1244 on that project. About 1250 he was appointed lector and chaplain to the French royal court of Louis IX, where he wrote an influential pedagogical treatise, *De eruditione filiorum nobilium* (1260–61; "On the Education of Noble Sons").

The original *Speculum majus* consisted of three parts, historical, natural, and doctrinal. A fourth part, the *Speculum morale* ("Mirror of Morals"), was added in the 14th century by an unknown author. An immense undertaking, the work covered all of Western human history from the Creation to the time of Louis IX, summarized all natural history and science known to the West, and provided a thorough compendium on European literature, law, politics, and economics. Perhaps the most notable aspect of Vincent's encyclopaedia is his familiarity with Greco-Roman classical scholarship and his obvious respect for the classics, particularly the Greek philosopher Aristotle, the Roman statesman-philosopher Cicero, and the Greek physician Hippocrates. This was an indication of the disappearing hostility to antiquity after the 12th-century renaissance of learning.

The final synthesis of the three sections included 80 books, an enormous project for a single scholar. Vincent denied his own originality (although his own chronicle of 1223–50 on the reigns of Louis VIII and Louis IX was used by many later chroniclers); he gave full credit to the ancient and medieval writers from whom he had drawn his excerpts. His completed project remains one of vast erudition and serves as an excellent gauge of the state of knowledge in the 13th century. It was extremely influential in its own day, particularly on the English poet Geoffrey Chaucer. It was translated into French in 1328 and printed in Paris in 1495–96, and it was well known to humanist scholars of the Italian Renaissance.

Vincent OF LÉRINS, SAINT, pseudonym PEREGRINUS (b. possibly Toul, Belgica [now in France]—d. *c.* 450; feast day May 24), Gallo-Roman saint, the chief theologian of the Abbey of Lérins, known especially for his heresiography *Commonitoria* ("Memoranda").

Supposedly the brother of Lupus of Troyes, Vincent may possibly have been a soldier before joining, before about 425, the Abbey of Lérins, on the Mediterranean island of Lérins, near Cannes, Fr. Vincent was later ordained priest and spent his monastic life at Lérins, where he acquired a preeminent reputation in scriptural learning and dogma.

About four years after the Council of Ephesus (431), Vincent, under the pseudonym of Peregrinus ("Pilgrim"), wrote *Commonitoria*, which attempted to reply to current heresies. It is unclear whether the work once consisted of two books, the second of which was lost and replaced by a résumé made by Vincent, or whether it is complete in its present form.

For the Semi-Pelagians of whom Vincent was a leading spokesman, St. Augustine of Hippo was a dangerous innovator teaching contrary to tradition. The *Commonitoria* is now generally admitted to be an indirect attack on Augustine, who is not named but to whom the work alludes. In the *Commonitoria* Vincent tries to provide a valid criterion for orthodoxy and, in doing so, enunciates the classic formula for traditional doctrine: "What is believed everywhere, at all times, and by all." Most of Vincent's other works are lost.

Vincent's surviving works are in J.-P. Migne's *Patrologia Latina*, vol. 50. Critical editions of the *Commonitoria* include those of R.S. Moxon (1915) and A. Jülicher (1925). R. Morris' English translation, *Vincent of Lérins, the Commonitories*, is in *The Fathers of the Church*, vol. 7 (1949).

Vincentian, also called LAZARIST, member of CONGREGATION OF THE MISSION (C.M.), a Roman Catholic society of priests and brothers founded at Paris in 1625 by St. Vincent de Paul for the purpose of preaching missions to the poor country people and training young men in seminaries for the priesthood. Following the congregation's approval by Pope Urban VIII in 1632, Vincent took possession of the former priory of Saint-Lazare at Paris, whence the name Lazarists. From this headquarters, 550 missions to the rural poor were organized before Vincent's death in 1660. The Vincentians also became involved in the work of clerical training very early. They started giving retreats at Saint-Lazare in 1631 for men about to be ordained, and soon five or six retreats were given each year. The Vincentians opened a permanent house in Rome in 1642, and shortly thereafter the pope directed that all those to be ordained in Rome were obliged to make a retreat with the Vincentians. The French Revolution inflicted great suffering on the Vincentians, but growth began again in the early 19th century. The Vincentians arrived in the United States in 1816, making their first foundation in St. Louis, Mo. To its original work, the congregation has added extensive foreign missions, educational work, and chaplaincies to hospitals, prisons, and the armed forces.

Vincent's gingivitis, also called VINCENT'S INFECTION, VINCENT'S ANGINA, or TRENCH MOUTH, acute and painful infection of the tooth margins and gums that is caused by the symbiotic microorganisms *Bacillus fusiformis* and *Borrelia vincentii*. The chief symptoms are painful, swollen, bleeding gums; small, painful ulcers covering the gums and tooth margins; and fetid breath. The ulcers may spread to the throat and tonsils. Fever and malaise may also be present. Vincent's gingivitis can occur after a prolonged failure to brush one's teeth, though there are many other predisposing factors, such as vitamin deficiencies, emotional stress, and so on. The infection is readily treated by bed rest, the administration of penicillin or other antibiotics, and the use of antiseptic mouth rinses. Regular tooth brushing is the chief preventive measure.

Vinci, Leonardo (b. 1690, Strongoli, Kingdom of Naples [Italy]—d. May 27, 1730, Naples), Italian composer who was prominent among the Neapolitan school of opera composers that included G.B. Pergolesi and Leonardo Leo.

Vinci's first known work was a comic opera in the Neapolitan dialect, *Lo cecato fauzo* (1719; "The False Blind Man"). He served as chapelmaster to the prince of Sansevero and in 1725 received a conductorship of the royal chapel at Naples, a post he held until his death. His earlies' extant serious opera, *Silla dittatore* (1723; "Silla the Dictator"), inaugurated a series of about 40 operas, of which 25 were written for Naples and 11 for Rome. Arias from his operas were published in London in 1758 under the title *Collection of Songs*. In addition to his operas, Vinci also composed oratorios, masses, and motets.

Vinci, Leonardo da: *see* Leonardo da Vinci.

Vindava (Latvia): *see* Ventspils.

Vindex, Gaius Julius (d. May AD 68, Vesontio, Germania Superior [now Besançon, Fr.]), governor of the Roman province of Lugdunensis (east-central and northern Gaul) who led a revolt in Gaul against the emperor Nero. His rebellion, begun in March 68, was followed by other revolts in Spain, Africa, and Egypt and set in motion a series of events that led to Nero's suicide the following June.

Born to a royal family among one of the Gallic peoples of Aquitania, Vindex was a Roman citizen, senator, and possibly praetor before becoming governor. Coins minted during his rule confirm his allegiance to the traditional ideals of the Roman ruling class.

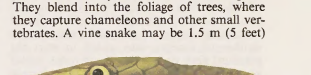
According to the historian Dio Cassius, Vindex inveighed against Nero and swore to act in the interest of the Roman Senate and people and to foster a return to the Augustan model of empire. Some modern scholars, however, have regarded Vindex' rebellion as a move toward Gallic independence. In any event, discontent was rife in the empire and he won the support of Galba, a governor in Spain. Vindex committed suicide after vainly trying to resist the Roman armies of the Rhine under the command of Verginius Rufus.

Vindhya Range, broken range of hills forming the southern escarpment of the central upland of India. From Gujarāt state on the west, it extends about 675 miles (1,086 km) across Madhya Pradesh state to abut on the Ganges River valley near Vārānasi (Benares). The mountains form the southern edge of the Mālwa Plateau and then divide into two branches: the Kaimur Range, running north of the Son River into western Bihār state, and the southern branch, running between the upper reaches of the Son and Narmada rivers to join the Sātpura Range in the Amarkantak Plateau.

The Vindhya Range, at an elevation of 1,500–3,500 feet (450–1,100 m), gives rise to the main southern tributaries of the Ganges–Yamuna system, including the Chambal, Betwa, Ken, and Tons rivers. Because of their horizontal sandstone structure, the mountains tend to be flat-topped and plateaulike. The Vindius of the 2nd-century-AD Greek geographer Ptolemy, the range is regarded as marking the border between northern and peninsular India.

vine cactus (plant): *see* ocotillo.

vine snake, any of several venomous (rear-fanged) members of the family Colubridae that are extremely slender—almost stringlike. They blend into the foliage of trees, where they capture chameleons and other small vertebrates. A vine snake may be 1.5 m (5 feet)



Vine snake (*Oxybelis*)
Painting by Gilbert H. Emerson

long but is so light that it can extend half of its body into midair when crossing from branch to branch.

The African vine snake (*Thelotornis kirtlandi*) is greenish gray, with indistinct crossbands. It uses its black-tipped yellow or red tongue as a lure. People have died of its bite. The New World tropics has five species of *Oxybelis*, *O. aeneus* of Brazil to Mexico barely enters the United States, in Arizona.

Vineberg, Arthur Martin (b. May 24, 1903, Montreal—d. March 26, 1988, Montreal), Canadian heart surgeon, noted chiefly for his development, in 1950, of a surgical procedure for correction of impaired coronary circulation.

The "Vineberg procedure" involved implanting the left internal mammary artery into the heart wall. Later he combined this procedure with transferring fatty tissue from around the intestines to around the heart. The transferred

tissue then developed new vascular connections with the heart muscle.

Vineberg received his M.S. degree (1928) and his Ph.D. (1933) in physiology from McGill University, Montreal. He studied in Paris and New York City before joining the staff of the Royal Victoria Hospital, Montreal, where in 1957 he was named head of the department of cardiac surgery. He wrote *How to Live with Your Heart: The Family Guide to Heart Health* (1975) and, with Lorene Freeman, *Myocardial Revascularization by Arterial/Ventricular Implants* (1982).

vinegar, sour liquid that is made by the fermentation of any of numerous dilute alcoholic liquids into a liquid containing acetic acid. Vinegar may be produced from a variety of materials: apples or grapes (wine or cider vinegar); malted barley or oats (malt vinegar); and industrial alcohol (distilled white vinegar). There are also vinegars made from beer, sugars, rice, and other substances. As a commercial product, however, vinegar was probably first made from wine (French *vin,* "wine"; *aigre,* "sour").

Vinegar can be made from any liquid that is capable of being converted into alcohol in a two-step process. The fruit juice or other liquid contains sugar, which is converted into alcohol and carbon dioxide gas by the actions of yeast enzymes. The alcohol thus formed combines with atmospheric oxygen by the action of *Acetobacter* bacteria, forming acetic acid and water. Organic acids and esters derived from the fruit or other source material are also present and are responsible for the flavour and aroma variations of vinegar. Table vinegar contains approximately 4 percent acetic acid.

In 1864 the French physicist Louis Pasteur showed that it is *Acetobacter* bacteria that cause the conversion of alcohol to acetic acid. These bacteria work together symbiotically, producing enough acetic acid to prevent invasion by other organisms.

Despite its ancient origin, the technology of vinegar production advanced slowly, improvements consisting principally of better methods of aeration. The Orleans process, best-known of the old methods, used a barrel of about 50 gallons (200 l) capacity. A mash consisting of wine or other alcoholic liquid was poured into the barrel, and a small amount of vinegar containing a mass of vinegar bacteria, called mother of vinegar, was added to start the reaction. One or two small air holes drilled above the liquid level exposed the surface to aeration. The finished vinegar was drawn off through a wooden spigot near the bottom. Care was taken in refilling the barrel with the new charge of raw ingredients to avoid breaking up the surface film of bacteria.

Early in the 18th century, a Dutch technologist, Hermann Boerhaave, found that the rate of acid production in the vinegar process was directly proportional to the amount of surface exposed to air. Thus, subsequent methods attempted to introduce more air into the casks. In the 20th century, continuous aeration—air bubbles pumped through the mash—was developed.

Vinegar's principal uses are the flavouring of foods and the preservation, or pickling, of meat products, fish, fruit, and vegetables. For use as a condiment, vinegar is often flavoured with garlic, onions, tarragon, or other herbs and spices. Mixed with oil and seasonings it becomes a classic cold sauce—vinaigrette—used as a dressing on vegetable salads and served as a sauce with cold cooked vegetables, meats, and fish. Vinegar is also a common ingredient in marinades and is widely used in the pickling of cucumbers and other vegetables.

vinegar fly, also called POMACE FLY, insect of the genus *Drosophila* of the family Drosophilidae (order Diptera). *Drosophila* species number about 1,000. Some species, particularly *D. melanogaster,* are used extensively in laboratory and field experiments on genetics and evolution because they are easy to raise and



Vinegar fly (*Drosophila melanogaster*)
E.S. Ross

have a short life cycle (less than two weeks at room temperature). More data have been collected concerning the genetics of the vinegar fly than have been obtained for any other animal. *Drosophila* chromosomes, especially the giant ones in the salivary glands of mature larvae, are used in studies involving heritable characteristics and the basis for gene action.

The biology of *Drosophila* in its natural habitats is not well known. The larvae of some species live in rotting or damaged fruits, the adults being strongly attracted to, and feeding on, fermenting plant juices. Other larvae develop in fungi or in fleshy flowers.

vinegarroon, species of whip scorpion (*q.v.*).

Vineland, city, Cumberland county, southern New Jersey, U.S. It lies along the Maurice River (there dammed for flood control and drainage). The community was established in 1861 when Charles K. Landis purchased a 20,000-acre (8,097-hectare) tract of land and brought in settlers from New England and Italy. It was incorporated in 1880 as a borough and became a city in 1952 after its consolidation with Landis Township.

Vineland is a market centre for a truck-farming and poultry region and has diversified manufactures, notably glass and clothing. Institutions include a training school of the American Institute for Mental Studies, the Vineland State School (1888), the American Institute for Mental Studies (1888), the New Jersey Memorial Home for Disabled Veterans, their Wives and Widows (1900), and Cumberland County College (1963). Pop. (1990) city, 54,780; Vineland-Millville-Bridgeton PMSA, 138,053.

Viner, Jacob (b. May 3, 1892, Montreal—d. Sept. 12, 1970, Princeton, N.J., U.S.), Canadian-born American economist who made major contributions to the theory of cost and production, international economics, and the history of economics.

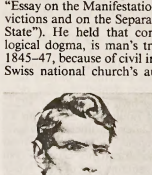
Viner graduated from McGill University (1914) and then immigrated to the United States, obtaining his Ph.D. from Harvard University in 1922. He was a professor at the University of Chicago (1925–46)—with which his name is particularly associated—and Princeton University (1946–60), where he was emeritus after 1960. Early in his career he became associated with the economist Frank Taussig, who greatly influenced Viner's theories on international trade.

These theories are embodied in three works in particular: *Canada's Balance of International Indebtedness* (1924), a study of balance of payments adjustment; *Studies in the Theory of International Trade* (1937), a major work in the history of economic thought; and *The Customs Union Issue* (1950), containing the now-familiar trade-creation/trade-diversion distinction. These works are regarded as classics in their field. Viner's work on international trade covered the entire field from pure theory to policy. He was one of the greatest writers in economic history, combining erudition and critical acuteness to an extraordinary degree. But he was a highly competent theorist over a much wider field than international economics, and in *The Long View and the Short* (1931) he made what many regard as a fundamental contribution to the theory of costs by clarifying the relationship between long- and short-run costs. This work presented his now-famous envelope cost curve.

Vinet, Alexandre-Rodolphe (b. June 17, 1797, Ouchy, Switz.—d. May 4, 1847, Clarens), French-Swiss theologian, moralist, and literary critic who was instrumental in establishing the Reformation in French-speaking Switzerland.

After studying theology at the University of Lausanne, he taught French at the University of Basel (1817–37) before returning to Lausanne as professor of practical theology (1837–45) and French literature (1845–46) at the Académie.

Ordained in 1819, he advocated freedom of religious practice (*Mémoire en faveur de la liberté des cultes,* 1826; "A Report Favouring the Freedom of Sects") and defended the separation of church and state (*Essai sur la manifestation des convictions religieuses et sur la séparation de l'Église et de l'État,* 1842; "Essay on the Manifestation of Religious Convictions and on the Separation of Church and State"). He held that conscience, not theological dogma, is man's true moral guide. In 1845–47, because of civil interference with the Swiss national church's autonomy, he led a



Vinet, detail of a drawing by Amélie Munier-Romilly; in the Bibliothèque Nationale Suisse, Bern
By courtesy of the Bibliotheque Nationale Suisse, Bern

secession that took the name of Free Church. His emphasis on personal religious observance and his pragmatic approach to church dogma proved influential in France and England as well as in Switzerland.

Vinet was also a noteworthy critic, as is evident in his *Études sur Blaise Pascal* (1848; *Studies of Blaise Pascal*). Most of his purely literary work, such as *Études sur la littérature française au dix-neuvième siècle,* 3 vol. (1849–51; "Studies of French Literature in the Nineteenth Century"), was published posthumously.

Vingt, Les, also called SOCIÉTÉ DES VINGT, English THE TWENTY, or THE SOCIETY OF THE TWENTY, group of artists who exhibited together in Belgium during the years 1891–93, having been brought together by a common interest in Symbolist painting. Like their French and German contemporaries, these painters, who were centred on Brussels, had shifted the emphasis in their works from the world of daily life outside the artist, which the Impressionists had caught, to the inner life, a world that celebrated mystery, allusion, and symbol.

Belgian symbolist painting employed simplified forms, heavy outlines, a subjective use

of colour, and a heightened spiritual content inspired by religious, exotic, and primitive cultures. These techniques were demonstrated in the paintings and graphics of James Ensor, Jan Toorop, and Henry van de Velde, all members of Les Vingt. The Société des Vingt members, and in particular Henry van de Velde, eventually transformed their own Symbolist styles into the designs of the Art Nouveau movement.

Vinh, city, north-central Vietnam, located on the Ca River delta, 160 miles (260 km) south of Hanoi. The Ca River enters the Gulf of Tonkin just northeast of Vinh. An important trade centre for the surrounding region, the city is the focus of a densely populated agricultural area. It is also the site of an electric power plant and has chemical and textile industries. Manganese and phosphates are mined nearby. Pop. (1989) 110,793.

Vinh Long, town, Mekong delta region, southern Vietnam. It is a river port on the right bank of the Tien River; it has a hospital and commercial airport. It also has served as the focal point of the Roman Catholic church in the Mekong delta; a large Catholic cathedral is located in the town. Vinh Long's cultural attractions include a late 18th-century governor's palace and a Cantonese pagoda. Pop. (1989) 81,620.

Vinh San (Vietnamese emperor): *see* Duy Tan.

Vinita, city, seat (1907) of Craig county, northeastern Oklahoma, U.S. It lies northeast of Tulsa along the old Osage Trace (later Texas Road), a route used by fur trappers and pioneers in the 1880s. Founded in 1871 when the railroads arrived, it was named for Vinnie Ream, who sculpted the statue of Abraham Lincoln in the Capitol in Washington, D.C. Vinita is an agricultural community where livestock raising and shipping and meatpacking are important. There are oil wells in the vicinity. The city is the seat of the Eastern State Hospital (for the mentally ill). The humorist Will Rogers went to school in Vinita, and the Will Rogers Memorial Rodeo is held each August. Grand Lake (Lake O' the Cherokees), impounded by Grand River Dam to the east, furnishes electric power and recreation. Inc. 1898. Pop. (1992 est.) 5,811.

Vinje, Aasmund Olafson (b. April 6, 1818, Vinje, Norway—d. July 30, 1870, Gran), poet and journalist who wrote some of the finest lyric poems in Norwegian literature.

The son of a poor tenant farmer, Vinje took a law degree but then struggled to support himself by teaching, writing, and doing clerical work for the government. In 1851 he began writing for an Oslo newspaper, and in 1858 he started a newspaper of his own, *Dølen* ("The Dalesman"), in which he used the new standardized rural variant of the Norwegian language known as New Norwegian, or Nynorsk. In his own newspaper Vinje wrote about everything from philosophy and literature to politics. It was not until he was 40 that Vinje started writing poetry, mostly lyrics about mountain scenes and other aspects of nature. His best-known work is *Ferdaminni fraa sumaren 1860* (1861; "Travel Memoirs from the Summer of 1860"); this book combines essays and poems in a witty and amusing account of Vinje's journey on foot from Oslo to Trondheim to report on the coronation of the new Swedish-Norwegian king. His other more widely known works are the poetic cycle *Storegut* (1866) and his English-language account of his tour of England in *A Norseman's View of Britain and the British* (1863). Vinje's lyric poems are notable for their simplicity and directness and their deep appreciation of nature. His prose writings are marked by their abundant common sense and an amusing, and sometimes caustic, wit.

Vinland, the wooded land in North America that was visited and named by Leif Eriksson about the year AD 1000. Its exact location is not known, but it was probably somewhere along the Atlantic coastline of what is now eastern or northeastern Canada.

The most detailed information about the Vikings' visits to Vinland is contained in two Norse sagas, the *Saga of the Greenlanders* and the *Saga of Erik the Red.* These two accounts differ somewhat. According to the *Greenlanders' Saga,* Bjarni Herjulfsson became the first European to sight mainland America when his Greenland-bound ship was blown westward off course about 986. He apparently sailed along the Atlantic coastline of eastern Canada and then returned to Greenland. About 1000 a crew of 35 men led by Leif Eriksson set out to try to find the land accidentally sighted by Bjarni. (The *Saga of Erik the Red* presents Leif himself as the first to sight Vinland.) Leif's expedition came first to an icy, barren land which they called Helluland ("Flat-Stone Land"); sailing southward, they encountered a flat, wooded land which they named Markland ("Wood Land"). Again they set sail southward, and the warmer, wooded area that they found they named Vinland. There they built some houses and explored the region before returning to Greenland. In 1003 Leif's brother Thorvald led an expedition to Vinland and spent two years there. In 1004 (or 1010, according to other historians) Thorfinn Karlsefni, encouraged by Thorvald's reports of grapes growing wild in Vinland, led a colonizing expedition of about 130 people (or 65, according to one saga) to Vinland. By the time they had stayed there three years, the colonists' trade with the local Indians had turned to mutual warfare, and so the colonists gave up and returned to Greenland. About 1013 Erik the Red's daughter Freydis led an unsuccessful expedition to Vinland and soon afterward returned to Greenland. So ended the Norse attempts to the Americas as far as the historical record is concerned.

The Norsemen's name for the land they discovered, Vinland, means "Wine Land." Thorfinn reported that he found "wine berries" growing there, and these were later interpreted to mean grapes, though the Norsemen referred to any berry as a "wine berry," and it is probable that they had actually come upon cranberries. This fruit evidently proved disappointing to Thorfinn's colonists, for when they became disgruntled during the third year of the colonizing expedition, they made a grievance out of not having seen much of the wine that had been promised them.

Nevertheless, the Vinland name was retained by the Scandinavians, and it was as a wine land that the North American continent entered the literature of continental Europe, almost certainly first in 1075 through the *History of the Archbishops of Hamburg-Bremen* written by Adam, head of the cathedral school of Bremen (*see* Adam of Bremen). Adam mentioned Vinland on the authority of King Sweyn II Estridsen of Denmark, who told of Iceland, Greenland, and other lands of the northern Atlantic known to the Scandinavians. Adam says of King Sweyn: "He spoke also at yet another island of the many found in that ocean. It is called Vinland because vines producing excellent wines grow there."

In the 1960s Helge Ingstad adopted the view of the Swedish philologist Sven Söderberg that Vinland did not mean "wine land" but rather "grassland" or "grazing land." Ingstad discovered in 1963 the remains of house sites and other artifacts of a Norse settlement at L'Anse aux Meadows, at the northernmost tip of Newfoundland. Dating techniques have conclusively proved that the remains date from about 1000 AD—*i.e.,* the time of the Norsemen's reputed visits. Further evidence of Viking exploration came in 1965, when the Yale University Press published a medieval map showing the outlines of continental Europe, Iceland, Greenland, and Vinland, the latter being described in a notation on the map as "Island of Vinland, discovered by Bjarni and Leif in company." The authenticity of this map, however, has been sharply debated.

viññāṇa (Pāli), in the Buddhist chain of dependent origination, thought or knowledge giving rise to name and form. *See* pratītya-samutpāda.

Vinnytsya, Russian VINNITSA, also spelled VINNICA, *oblast* (province), west-central Ukraine. It is located on the Volyn-Podilsk Upland and includes part of the basins of the Southern (Pivdennyy) Buh and Dniester rivers. Its gently rolling hills are greatly dissected by river valleys and widespread erosion gullies. The north consists of forest-steppe and the south of true steppe, but more than seventenths of the surface has been plowed. Agriculture is intensively developed, and about half of the population is rural. The *oblast* lies in the heart of the chief sugar-beet zone of Ukraine. Other important industrial crops are sunflowers and tobacco; grains are dominated by wheat and corn (maize); orchards are extensive. Dairying and the keeping of beef cattle, pigs, and poultry are well developed. The *oblast*'s communities, apart from Vinnytsya, the administrative centre, are small and are engaged in processing farm produce, especially sugar refining. Area 10,200 square miles (26,500 square km). Pop. (1991 est.) 1,908,400.

Vinnytsya, Russian VINNITSA, also spelled VINNICA, city and administrative centre of Vinnytsya *oblast* (province), west-central Ukraine. It lies along the Southern (Pivdennyy) Buh River. Founded in 1363 as a fortress by Prince Algirdas of Lithuania, it was often sacked by the Tatars and passed later to Poland and finally, in 1793, to Russia. Town status was conferred in 1795, although the settlement's growth accelerated only after the building of the Kiev-Odessa railway through the town in 1870. Modern Vinnytsya, as the centre of a major agricultural region, produces fertilizers and has food-processing industries in addition to electronics, agricultural equipment, light engineering, clothing, and footwear industries. The city has teacher-training and medical institutes, several theatres, and a philharmonic society. Pop. (1993 est.) 387,000.

Vinogradoff, Sir Paul Gavrilovitch, Russian PAVEL GAVRILOVICH VINOGRADOV (b. Nov. 18 [Nov. 30, New Style], 1854, Kostroma, near Moscow, Russia—d. Dec. 19, 1925, Paris, France), Anglo-Russian legal scholar and medievalist who was perhaps the greatest authority in his time on the feudal laws and customs of England.

Educated at the University of Moscow (Ph.D., 1884), Vinogradoff was appointed professor there and became active in Russian educational reform. When university authorities curtailed the students' freedom of expression, he resigned his professorship (1902) and left Russia for England, where in 1903 he became professor of jurisprudence at Oxford. He was knighted in 1917, one year before he became a British subject.

Vinogradoff's most important work is *Villeinage in England* (1892; originally published in Russian, 1887), in which he advanced the theory that the Anglo-Norman manor developed not from a society based on serfdom but from a free village community. His most ambitious work, *Outlines of Historical Jurisprudence* (1920–22), was incomplete at his death.

Vinogradov, Ivan Matveyevich (b. Sept. 2 [Sept. 14, New Style], 1891, Milolyub, Russia—d. March 20, 1983, Moscow), Soviet mathematician known for his contributions

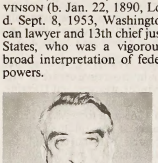
to the analytical theory of numbers, including a partial solution of the Goldbach conjecture proving that every sufficiently large odd integer can be expressed as the sum of three odd primes.

Vinogradov graduated from the University of St. Petersburg in 1914. He taught at the University of Perm from 1918 to 1920 and was then appointed professor of mathematics at Leningrad Polytechnic Institute (now St. Petersburg Technical University). From 1925 he also served as head of the department of numbers theory at Leningrad (now St. Petersburg) State University. He became director of the V.A. Steklov Institute of Mathematics of the Academy of Sciences of the U.S.S.R. in 1932 and, in 1934, professor of mathematics at Moscow State University.

Among his published works are *The Method of Trigonometrical Sums in the Theory of Numbers* (1954; originally published in Russian, 2nd Russian ed., 1980) and *An Introduction to the Theory of Numbers* (1955; originally published in Russian, 7th Russian ed., 1965). His collected works were published in Russian in 1953.

Vinogradsky, Sergey Nikolayevich: *see* Winogradsky, Sergey Nikolayevich.

Vinson, Fred M., in full FREDERICK MOORE VINSON (b. Jan. 22, 1890, Louisa, Ky., U.S.—d. Sept. 8, 1953, Washington, D.C.). American lawyer and 13th chief justice of the United States, who was a vigorous supporter of a broad interpretation of federal governmental powers.



Vinson

By courtesy of the Library of Congress, Washington, D.C.

Following completion of his legal studies at Centre College in Danville, Ky., in 1911, Vinson entered private practice in Louisa and quickly assumed an active role in local political affairs. In 1923 he was appointed to fill a vacancy in the U.S. House of Representatives. The following year he was elected to the seat as a Democrat and, except for one two-year period, served as a member of Congress until 1938.

As a congressman Vinson was recognized as an outstanding expert in tax and fiscal policy. From 1938 to 1943 he served as associate justice of the U.S. Court of Appeals for the District of Columbia. Between 1943 and 1945 he held a succession of high executive posts in emergency agencies of World War II, and in 1945 he became secretary of the Treasury in the cabinet of President Harry S. Truman. In this office he helped establish the International Bank for Reconstruction and Development and the International Monetary fund.

Upon appointment by President Truman, Vinson became chief justice of the U.S. Supreme Court on June 24, 1946. It is generally believed that his tact reduced personal animosities that had arisen on the court. As a judge his interpretation of the powers of the federal government often led him to reject claims of individual right asserted in opposition to the exercise of governmental authority. Perhaps his best-known opinions, however, are those upholding the rights of members of racial minorities under the equal protection clause of the Fourteenth Amendment to the Constitution. He spoke for the court in refusing to permit a state court to enforce a private agreement ("restrictive covenant") to sell real property to white persons only (*Shelley* v. *Kraemer,* 1948). His opinion for the court in 1947 upheld the power of the federal courts to enjoin a strike in coal mines then under control of the federal government. He strongly dissented from the court's opinion holding unconstitutional the president's seizure of the strike-threatened steel industry during the Korean War (*Youngstown Sheet & Tube Co.* v. *Sawyer,* 1952).

Vinson Massif, peak in the Sentinel Range of the Ellsworth Mountains of western Antarctica, overlooking Ronne Ice Shelf. Discovered in 1935 by the American explorer Lincoln Ellsworth, it is, at 16,066 feet (4,897 m) above sea level, the highest mountain on the continent. The massif slopes gently to the northwest.

vint, also called RUSSIAN WHIST, card game resembling both whist and bridge. It is sometimes called Russian whist because of its popularity in that country toward the end of the 19th century, when bridge was becoming popular in the Western world. Vint is similar to bridge in the auction to determine the bid and the trump, and to whist in the play of the cards. Like both games, it is a four-handed game with partnerships of two.

In bidding, the suits rank, from low to high, spades, clubs, diamonds, hearts, and no-trump. Contract is established after eight consecutive passes. Regardless of the trump situation, each contracted odd trick (those beyond the book of six tricks) scores (below the line) 10 times the value of the contract (10 if the bid was one trick, 20 if it was two, and so on). The first side to make 500 below the line wins. Above-line bonuses are 1,000 for winning a game, 2,000 for winning the rubber (two games); for taking 13 tricks, the bonus is 2,000 + 5,000 if six was bid, 10,000 if seven was bid. A player who defeats a contract gets 100 times the trick value per undertrick.

vinyl acetate, colourless, liquid organic compound, the polymer of which is polyvinyl acetate (*q.v.*).

vinyl chloride, also called CHLOROETHYLENE, a colourless, flammable, toxic gas belonging to the family of organic halogen compounds, and used principally in making polyvinyl chloride (*q.v.*), an important synthetic resin.

Vinyl chloride was first prepared in 1835 by the reaction of ethylene chloride with caustic potash; its slow transformation into a flaky solid when exposed to sunlight also was noted but not recognized as polymerization until many years later. An industrial process for making vinyl chloride from acetylene and hydrogen chloride in the presence of mercury(II) chloride was discovered early in the 20th century, but commercial production was not begun until World War II, when substitutes for natural rubber were required. The process based on acetylene has remained important in Europe, but in the United States vinyl chloride is commonly manufactured from ethylene chloride, either by heating it to temperatures of 480°–510° C (900°–950° F) or by treating it with a dilute solution of caustic soda. Its chemical properties are similar to those of olefins, but, apart from its conversion to polymers, its only important reaction is that with hypochlorous acid, forming chloroacetaldehyde, which is used in making pharmaceuticals such as sulfathiazole. Prolonged exposure of humans and laboratory animals to vinyl chloride vapour has been linked to several forms of cancer.

vinyl compound, any of various organic chemical compounds, including acrylic compounds and styrene and its derivatives, that are useful in making plastic film; sheeting; upholstery; floor tile; inflatable and solid toys; buttons; molded and extruded articles; fibres for weaving into fabric; insulation for wire; screening; tubing, especially for chemicals; substitutes for rubber; and components of water-base paints and textile finishes.

Vinyl compounds contain the hydrocarbon vinyl group (CH_2=CH−). The molecules of a single vinyl compound can be made to polymerize; that is, to join end to end, forming a polyvinyl compound such as polyvinyl chloride. The molecules of two different compounds can also be made to link up, forming a copolymer, such as the plastic Vinylite and the textile fibre vinyon. *See also* polyvinyl acetate; polyvinyl alcohol; polyvinyl chloride; vinyl chloride; vinylidene chloride.

vinyl fluoride, also called FLUOROETHYLENE, a colourless, flammable, nontoxic, chemically stable gas belonging to the family of organic halogen compounds and used as the starting material in making polyvinyl fluoride (*q.v.*), a plastic used in films for coating structural materials. Vinyl fluoride, first prepared in 1901, is manufactured by the reaction between acetylene and hydrogen fluoride.

vinylidene chloride, also called 1,1-DICHLOROETHYLENE, a colourless, dense, toxic, volatile, flammable liquid belonging to the family of organic halogen compounds, used principally in combination with vinyl chloride, acrylonitrile, or methyl methacrylate for the manufacture of a class of plastics called saran. Vinylidene chloride is also used as a starting material for making methylchloroform, or 1,1,1-trichloroethane, a solvent useful in cleaning electrical machinery.

Vinylidene chloride is produced by the reaction of 1,1,2-trichloroethane (itself derived from acetylene or ethylene) with lime or with caustic soda; it usually is prepared only as it is needed because it is rapidly attacked by oxygen to form peroxides that catalyze the formation of undesired polymers.

viol, also called VIOLA DA GAMBA, bowed, stringed musical instrument used principally in chamber music of the 16th to the 18th century. The viol shares with the Renaissance lute the tuning of its six strings (two fourths,



Man playing a bass viol, from Simpson's *Division Violist,* 1659; in the British Museum, London

By courtesy of the trustees of the British Museum, London; photograph, J.R. Freeman & Co. Ltd

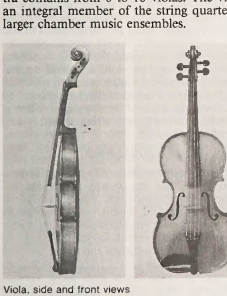
a major third, two fourths) and the gut frets on its neck. It was made in three sizes: treble, tenor, and bass, with the bottom string tuned, respectively, to d, G (or A), and D. To these sizes was later added the violone, a double bass viol often tuned an octave below the bass.

Viols are characterized by sloping shoulders; deep ribs; thin, flat backs; and, above all, a vertical playing position, with the bottom of the instrument resting on the knee or held between the legs—hence viola da gamba (Italian: "leg viol"). The breadth of the bridge, which was arched to give the bow separate access to each string, made forceful playing impossible, and the supine position of the bow hand, palm uppermost, encouraged a smooth playing style. The frets gave to each note the clarity of an open string—a clear, ringing, penetrating tone that was much prized.

By the second half of the 16th century the viol acquired a significant repertory of music for ensemble, for solo bass, and for the lyra viol, a small bass viol (also called *viola bastarda*). But as the style of instrumental composition changed during the 17th century, an expressive, vocal sound in the soprano register was emphasized, and the tenor and treble viols declined in favour of the violin, with which they were unable to compete because their deep bodies created a hollow, nasal timbre.

The bass viol, however, had by the mid-16th century developed a repertory of complex solo divisions, or ornate variations on a melody, often played on a small bass called a division viol. When that fashion died out in the late 1600s, the normal-sized solo bass viol, or viola da gamba (the name became synonymous with the bass viol as the other viols fell into disuse), was used in the instrumental forms of the Baroque period. Solo bass-viol playing continued in Germany and France into the 18th century. Elsewhere the bass viol survived chiefly because its sustained tone lent a pleasing support to the harpsichord. This combination, using the basso continuo, or thorough bass, technique, provided harmonic support for the Baroque instrumental ensemble. When composers in the newer Classical style began to write complete harmonies in the upper instrumental parts, the viol, deprived of its last useful function, dropped out of use altogether. In the 20th century viols were successfully revived for the performance of Renaissance and Baroque music.

viola, stringed musical instrument, the tenor of the violin family. It is built in proportions similar to the violin but has a body length of 37 to 43 cm (14.5 to 17 inches), about 5 cm (2 inches) longer than a violin. Its four strings are tuned c–g–d′–a′, beginning with the C below middle C. The viola's tone is darker, more weighty, and warmer than that of the violin. The modern symphony orchestra contains from 6 to 10 violas. The viola is an integral member of the string quartet and larger chamber music ensembles.

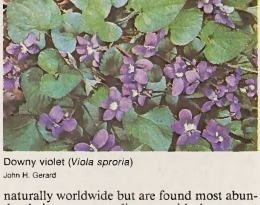


Viola, side and front views
EB Inc

In the 18th-century orchestra the viola usually doubled cello parts. Christoph Willibald Gluck, Wolfgang Amadeus Mozart, and Joseph Haydn gave it distinctive treatment, and it gradually assumed an independent orchestral role. Hector Berlioz included a long viola solo in his *Harold in Italy;* in Richard Strauss's *Don Quixote* the viola carries the theme of Sancho. The viola also gained in prominence through the viola sonatas of Paul Hindemith, Béla Bartók's viola concerto, and violists such as William Primrose and Walter Trampler. It was frequently used in 20th-century chamber music ensembles; *e.g.,* by Arnold Schoenberg and Pierre Boulez.

The viola d'amore is a viol-violin hybrid played like a violin. It is of 18th-century origin, has six or seven melody strings and several sympathetic strings, and is unfretted. A 17th-century violin with five wire strings was also called viola d'amore. The viola da braccio, or viola da brazzo (Italian: "arm viol"), was the original name for violin-family instruments, in contrast to the viola da gamba ("leg viol"), or viol, family. *See also* stringed instrument.

Viola, genus of about 500 species of herbs or low shrubs, including the small, solid-coloured violets and the larger-flowered, often multicoloured violas and pansies. *Viola* occur



Downy violet (*Viola sprorii*)
John H. Gerard

naturally worldwide but are found most abundantly in temperate climates, with the greatest variety occurring in the Andes Mountains of South America. They have also been widely cultivated in gardens and nurseries. The popular florist's violets, consisting of several hybrids (many of them *V. odorata*) are usually called sweet violets.

Wild *Viola* may be annuals or perennials. Because *Viola* freely hybridize, however, it is often difficult to identify their species. The flower usually grows singly on a stalk and has five petals, four arranged in unlike pairs, the fifth with a spur. The flower's colour is usually blue, violet, lilac, reddish purple, yellow, or white. The leaves may grow on the same stalk as the flower (stemmed *Viola*) or on separate stalks (stemless *Viola*). Though the best-known *Viola* have heart-shaped leaves, the leaves of other species may have different shapes.

Typically, *Viola* grow in meadows or damp woods. All wild species bloom early in the spring, but some cultivated varieties bloom later. Many species have two types of flowers, fertile and infertile. The infertile flower is showy and appears in the spring. The fertile, less conspicuous flower appears in the summer and is completely closed and self-fertilizing.

Among the most common North American species are the common blue, or meadow, violet (*V. papilionacea*) and the bird's-foot violet (*V. pedata*). The common blue violet grows up to 20 cm (8 inches) tall and has heart-shaped leaves with finely toothed margins. The flowers range in colour from light to deep violet, or they may be white. The bird's-foot violet, a perennial named for its deeply cleft leaves, has variably coloured flowers, with lilac and purple combinations.

The pansy (*q.v.*) is a hybrid that has been grown in gardens for centuries. The so-called African violet (*q.v.*) belongs not to the order Violales but to Scrophulariales, the figwort order.

viola da gamba (musical instrument): *see* viol.

Violales, the violet order of flowering plants, belonging to the class Magnoliopsida (dicotyledons; characterized by two seed leaves). The Violales order consists chiefly of shrubs and trees, but it also contains herbaceous (non-woody) plants, including the large family of violets.

A brief treatment of Violales follows. For full treatment, *see* MACROPAEDIA: Angiosperms.

Violales is closely related to the orders Theales, Malvales, Salicales, Capparales, and possibly others, and recently it has even been considered an offshoot of the Theales by some authorities. As a consequence, there are many different classifications of the components of the order, with various authorities including as few as 9 or as many as 24 families in it. A conservative listing includes the families Violaceae, Flacourtiaceae, Cucurbitaceae, and Passifloraceae within the order.

Except for the cosmopolitan violet family (Violaceae), the order is mostly confined to tropical and subtropical regions. Its members are typically small trees and shrubs that grow as low vegetation beneath the taller trees of forests. They rarely, if ever, form the dominant plant life of an area.

The family Cucurbitaceae, which is occasionally placed in its own order, includes such food plants as gourds, melons, squashes, and pumpkins. Among its best-known species are the watermelon (*Citrullus lanatus*), the cucumber (*Cucumis sativus*), cantaloupes and muskmelons (*Cucumis melo*), and the gourds, melons, squashes, and pumpkins of the genus *Cucurbita.* Another well-known family in the order is the Violaceae, members of which are found on all continents. Violets, both wild and cultivated varieties, are favourite ornamental garden plants. The passion-flower family (Passifloraceae) contains many tendril-bearing vines with characteristic flowers. A few of the many species in the large Indian plum family (Flacourtiaceae) produce small fruits used in the tropics for jams and preserves.

The members of the order vary widely in their characteristics. Most members of the Violales order are shrubs or small trees, either evergreen or deciduous. Flowers generally consist of five sepals and five petals and exhibit radial symmetry; most have the male and female reproductive structures in the same flower. All but one genus in the order are characterized by parietal placentation—that is, the seeds are attached to the inner wall of the fruit. The fruit is either a berry or a dry capsule with a number of openings for release of the seeds. Leaves are simple, grow alternately and spirally on the plant stems, and have paired stipules (leaflike appendages) at the bases of the leaf stalks.

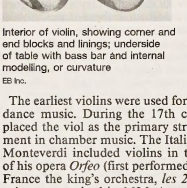
violin, byname FIDDLE, bowed, stringed musical instrument that evolved during the Renaissance from earlier bowed instruments: the medieval fiddle; its 16th-century Italian offshoot, the *lira da braccio;* and the rebec. The violin is probably the best known and most widely distributed musical instrument in the world.

A brief treatment of violins follows. For full treatment, *see* MACROPAEDIA: Musical Instruments.

Like its predecessors but unlike its cousin the viol, the violin has a fretless fingerboard. Its strings are hitched to tuning pegs and to a tailpiece passing over a bridge held in place by the pressure of the strings. The bridge

transmits the strings' vibrations to the violin belly, or soundboard, which is made of pine and amplifies the sound. Inside the instrument, beneath the treble foot of the bridge and wedged between the violin belly and back, which is made of maple, is the sound post, a thin stick of pine that transmits the string vibrations to the instrument's back, contributing to the characteristic violin tone. The belly is supported from beneath by the bass bar, a narrow wood bar running lengthwise and tapering into the belly. It also contributes to the resonance of the instrument. The sidewalls, or ribs, are constructed of pine-lined maple.

The violin was early recognized for its singing tone, especially in Italy, its birthplace, where the earliest makers—Gasparo da Salò, Andrea Amati, and Giovanni Paolo Maggini—had settled its average proportions before the end of the 16th century. During its history the violin has been subject to modifications that have progressively adapted it to its evolving musical functions. In general, the earlier violins are more deeply arched in the belly and back; the more modern, following the innovations of Antonio Stradivari (1644–1737), are shallower, yielding a more virile tone. In the 19th century, with the advent of large auditoriums and the violin virtuoso, the violin underwent its last changes in design. The bridge was heightened, the sound post and bass bar were thickened, and the body became flatter. The neck was angled back, giving greater pressure of the strings on the bridge. The result was a stronger, more brilliant tone in place of the delicate, intimate tone of the violin of the 18th century.



Interior of violin, showing corner and end blocks and linings; underside of table with bass bar and internal modelling, or curvature
EB Inc.

The earliest violins were used for popular and dance music. During the 17th century it replaced the viol as the primary stringed instrument in chamber music. The Italian composer Monteverdi included violins in the orchestra of his opera *Orfeo* (first performed in 1607). In France the king's orchestra, *les 24 violons du roi,* was organized in 1626. Arcangelo Corelli, a virtuoso violinist, was among the earliest composers to contribute to the new music for the violin, as did Vivaldi, J.S. Bach, and the violinist Giuseppe Tartini. Most major composers from the 18th century on wrote solo music for the violin, among them Mozart, Beethoven, Schumann, Brahms, Edvard Grieg, Paul Hindemith, Arnold Schoenberg, and Alban Berg. Such virtuosos as Francesco Geminiani, Niccolò Paganini, Joseph Joachim, Fritz Kreisler, David Oistrakh, Yehudi Menuhin, and Isaac Stern stimulated the composition of fine violin music. The violin was assimilated into the art music of the Middle East and South India and, as the fiddle, is played in the folk music of many countries. The tenor violin, known in the 16th–18th century, was midway in size between the viola and cello. It was tuned F–c–g–d′. "Tenor violin" also occasionally referred to the viola.

Viollet-le-Duc, Eugène-Emmanuel (b. Jan. 27, 1814, Paris—d. Sept. 17, 1879, Lausanne, Switz.), French Gothic Revival architect, restorer of French medieval buildings, and writer whose theories of rational architectural design linked the revivalism of the Romantic period to 20th-century Functionalism.



Viollet-le-Duc
Archives Photographiques, Paris

Viollet-le-Duc was a pupil of Achille Leclère but was inspired in his career by the architect Henri Labrouste. In 1836 he travelled to Italy, where he spent 16 months studying architecture. Back in France he was drawn irrevocably to Gothic art. J.-B. Lassus first trained Viollet-le-Duc as a medieval archaeologist on the restoration of Saint-Germain-l'Auxerrois (1838). In 1839 his friend, the writer Prosper Mérimée, placed him in charge of the restoration of the abbey church of La Madeleine at Vézelay (1840), the first edifice to be restored by a modern state commission. Mérimée, a medievalist of note, was inspector of the recently formed Commission des Monuments Historiques, an organization in which Viollet-le-Duc soon became a focal figure. In 1840 he worked with F.-L.-J. Duban on restoring the Sainte-Chapelle in Paris, and in 1845 he and Lassus were appointed to restore Notre-Dame de Paris and to build a new sacristy in the Gothic style; this commission was regarded as an official sanction for the Gothic Revival movement in France. Another important early restoration was the work done in 1846 on the abbey church of Saint-Denis. After 1848 he was associated with the Service des Édifices Diocésains, supervising the restoration of numerous medieval buildings, the most important being the cathedral of Amiens (1849), the synodal hall at Sens (1849), the fortifications of Carcassonne (1852), and the church of Saint-Sernin at Toulouse (1862).

Viollet-le-Duc can be said to have dominated 19th-century theories of architectural restoration; his initial aim was to restore in the style of the original, but his later restorations show that he often added entirely new elements of his own design. Twentieth-century archaeologists and restorers have severely criticized these fanciful reconstructions and added structures posing as restorations, for they often destroy or render obscure the original form of the edifice.

Of his original works, all his designs for ecclesiastical buildings were in a weak Gothic style, notably the churches of Saint-Gimer (1853–59) at Carcassonne, and Nouvelle Aude (1855) at Carcassonne, and Saint-Denis-de-l'Estrée at Saint-Denis. In his own work, however, he was not a confirmed medieval revivalist, for all but one of his secular buildings are in an uneasy Renaissance mode.

His numerous written works, all finely illustrated, provide the foundation on which Viollet-le-Duc's distinction rests. He wrote two great encyclopaedic works containing exact structural information and extensive design analysis: *Dictionnaire raisonné de l'architecture française du XIe au XVIe siècle* (1854–68; "Reasoned Dictionary of French Architecture from the XIth to the XVIth Century") and the *Dictionnaire raisonné du mobilier française de l'époque carlovingienne à la Rénaissance* (1858–75; "Reasoned Dictionary of the French Bank from the Carlovingians to the Renaissance"). Running to 16 volumes, these two works provided the vital visual and intellectual inspiration required to sustain the Gothic Revival movement. He determined, however, to think his way beyond the Romantic attractions of the Gothic style. Pursuing the inquiries of 18th-century French architectural theorists, he envisaged a rational architecture for the 19th century based on the coherent system of construction and composition that he had observed in Gothic architecture, but which would in no way imitate its forms and details. Architecture, he thought, should be a direct expression of current materials, technology, and functional needs. Ironically he was unable to accept the challenge of his own ideas, for both he and his French disciples continued to design buildings in eclectic styles.

Viollet-le-Duc's general theory of architecture, which affected the development of modern organic and functional concepts of design, was set forth in his book *Entretiens sur l'architecture* (1858–72). Translated into English as *Discourses on Architecture* (1875), this work, containing information on the construction of iron skeletons enclosed by nonbearing masonry walls, especially influenced the late 19th-century architects of the Chicago school, particularly John W. Root. Other important writings by Viollet-le-Duc include *L'Art russe* (1877; "Russian Art") and *De la décoration appliquée aux édifices* (1879; "On Decoration Applied to Buildings").

violoncello (musical instrument): *see* cello.

Viotti, Giovanni Battista (b. May 12, 1755, Fontanetto da Po, Piedmont—d. March 3, 1824, London), Italian violinist and composer, principal founder of the 19th-century school of violin playing.

In 1768 he went to Turin, where he studied with the virtuoso Gaetano Pugnani. He travelled with Pugnani in Germany, Poland, and Russia and made his debut in Paris as a violinist in 1782. He became court musician to Marie-Antoinette and established himself as a teacher and opera impresario. In 1792 he went to London, where he conducted Italian operas and appeared as soloist in his own violin concerti at the Salomon Concerts. In 1798 he went to Germany but returned to London in 1801 to enter the wine business. He was director of the Italian opera in Paris from 1819 to 1822.

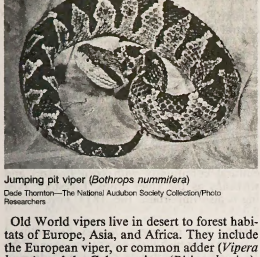
Viotti greatly developed the violin concerto, using the sonata form and a skilled orchestration. He wrote 29 violin concerti, of which *No. 22 in A Minor* is especially well known; 10 piano concerti, some of them transcriptions of the violin concerti; and string quartets and other chamber works.

Vipāśā (India): *see* Beās River.

viper, any of more than 200 species of venomous snakes of the family Viperidae belonging to two groups: pit vipers (subfamily Crotalinae) and Old World vipers (subfamily Viperinae). Vipers are characterized by a pair of long, hollow, venom-injecting fangs attached to movable bones of the upper jaw (the maxillaries) that are folded back in the mouth when not in use. Their eyes have vertical pupils, and their scales are keeled. Vipers range in length from less than 25 cm (10 inch-

es) in the Namaqua dwarf viper (*Bitis schneideri*) of southern Africa to more than 3 metres (10 feet) in the bushmaster (*Lachesis muta*) of the Amazon basin and Central America.

The pit vipers are found from desert to rainforest, primarily in the New World. This group includes copperheads, rattlesnakes, and fer-de-lances (genus *Bothrops*), among others. Except for the egg-laying bushmaster, all pit vipers are live-bearers (viviparous). Pit vipers are distinguished by a pit organ, located on each side of the head midway between each nostril and eye, that is sensitive to infrared radiation, enabling the snake to "see" images of warm-blooded prey. Some Old World vipers have infrared receptors in the same area, although there is no external evidence of them.



Jumping pit viper (*Bothrops nummifera*)
Dade Thornton—The National Audubon Society Collection/Photo Researchers

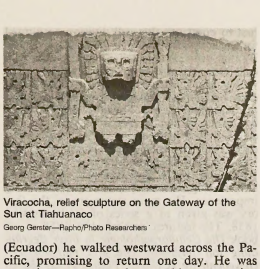
Old World vipers live in desert to forest habitats of Europe, Asia, and Africa. They include the European viper, or common adder (*Vipera berus*), and the Gaboon viper (*Bitis gabonica*). Some species lay eggs; others produce live young.

Vir Singh, Bhai (b. 1872, Punjab, India—d. 1957, Punjab), Sikh writer and theologian who was chiefly responsible for raising the Punjabi language to a literary level never before attained.

He wrote at a time when Sikh religion and politics and the Punjabi language were under such strong attack by the English and Hindus that the Sikhs had begun to doubt the value of their way of life. With his versatile pen, he extolled Sikh courage, philosophy, and ideals, gathering respect for the Punjabi language as a literary vehicle. The core of his philosophy is that man must overcome his pride or ego before he can realize God. Once the battle of self is won, man can then know God in all of his manifestations.

Bhai Vir Singh founded the weekly paper *Khālsā Samāchār* ("News of the Khalsa") in Amritsar (1899), where it is still published. Among his novels are *Kalgīdhar Camathār* (1935), a novel on the life of the 17th-century gurū Gobind Singh, and *Gurū Nānak Camathār*, 2 vol. (1936; "Stories of Guru Nanak"), a biography of the originator of the Sikh religion. Other novels on Sikh philosophy and martial excellence include *Sundarī* (1943), *Bijai Singh* (1899), and *Bābā Noudh Singh* (1946). He used poetical and literary forms never before known to Punjabi, such as short metre and blank verse. His poem "The Vigil" was published posthumously. The Punjab University recognized his contribution by awarding him an honorary doctorate.

Viracocha, also spelled HUIRACOCHA, or WIRAQOCA, creator deity originally worshipped by the pre-Inca inhabitants of Peru and later assimilated into the Inca pantheon. A god of rain, he was believed to have created the sun and moon on Lake Titicaca. After forming the rest of the heavens and the earth, Viracocha traditionally wandered through the world teaching men the arts of civilization. At Manta



Viracocha, relief sculpture on the Gateway of the Sun at Tiahuanaco
Georg Gerster—Rapho/Photo Researchers

(Ecuador) he walked westward across the Pacific, promising to return one day. He was sometimes represented as an old man wearing a beard (a symbol of water gods) and a long robe and carrying a staff.

The cult of Viracocha was extremely ancient, and it is likely that he is the weeping god sculptured in the megalithic ruins at Tiahuanaco, near Lake Titicaca. He probably entered the Inca pantheon at a relatively late date, possibly under the emperor Viracocha (died *c.* 1438), who took the god's name. The Incas believed that Viracocha was a remote being who left the daily working of the world to the surveillance of the other deities that he had created. He was actively worshipped by the nobility, primarily in times of crisis.

viral hemorrhagic fever, any of a variety of highly fatal viral diseases characterized by massive external or internal bleeding or bleeding into the skin. Other symptoms often include fever, malaise, muscle aches, vomiting, and shock. Viral hemorrhagic fevers are caused by viruses of four families: Flaviviridae, Arenaviridae, Bunyaviridae, and Filoviridae.

The most common viral hemorrhagic fevers are dengue and yellow fever (*qq.v.*), caused by the related mosquito-borne flaviviruses. Yellow fever is the only major viral hemorrhagic fever for which an effective preventive vaccine exists and is widely used. Most cases of dengue, seen in tropical areas, are mild and influenza-like, but all four dengue viruses may produce dengue hemorrhagic fever or its severe form, dengue shock syndrome. However, even severe cases can be effectively treated with simple fluid administration.

The arenaviruses are highly adapted to specific rodent hosts, which may become silently infected and excrete the virus in feces, urine, and saliva. When humans come into contact with food or soil contaminated by these rodent excreta, disease may result. The arenaviruses cause the diseases Lassa fever (occurring in Africa), Argentine hemorrhagic fever, Bolivian hemorrhagic fever, Brazilian hemorrhagic fever, and Venezuelan hemorrhagic fever.

Hantaviruses, Rift Valley fever virus (genus *Phlebovirus*), and Crimean-Congo hemorrhagic fever virus (genus *Nairovirus*) belong to the family Bunyaviridae. The hantaviruses, like the arenaviruses, are spread by rodent contact. Hantaviruses cause Korean hemorrhagic fever and hantavirus pulmonary syndrome, which is highly fatal due to accumulation of fluid in the lungs. Rift Valley fever, a mosquito-borne disease that is fatal in sheep and cattle, occurs in eastern and southern Africa and the Middle East. Most people who contract Rift Valley fever virus survive, but a minority develop fatal hemorrhagic fever, encephalitis, or severe eye disease. Crimean-Congo hemorrhagic fever, found in eastern and southern Africa, the Middle East, and Russia, is a tick-borne disease of cattle and other farm animals that is occasionally transmitted to humans.

The filoviruses, seen in central and East Africa, include Ebola virus and Marburg virus. These are among the most highly fatal of the hemorrhagic fevers; some strains of Ebola (*q.v.*) cause death in up to 90 percent of victims. The filoviruses may also cause disease in primates. Marburg virus was discovered when it went with imported monkeys to Marburg, Ger., causing a fatal outbreak.

Vīraśaiva (Hindu sect): *see* Liṅgāyat.

Virchow, Rudolf (Carl) (b. Oct. 13, 1821, Schivelbein, Pomerania, Prussia—d. Sept. 5, 1902, Berlin), German pathologist and statesman, one of the most prominent physicians of the 19th century. He pioneered the modern concept of pathological processes by his application of the cell theory to explain the effects of disease in the organs and tissues of the body. He emphasized that diseases arose, not in organs or tissues in general, but primarily in their individual cells. Moreover, he campaigned vigorously for social reforms and contributed to the development of anthropology as a modern science.

Early career. In 1839 Virchow began the study of medicine at the Friedrich Wilhelm Institute of the University of Berlin and was graduated as a doctor of medicine in 1843. As an intern at the Charité Hospital, he studied pathological histology and in 1845 published a paper in which he described one of the two earliest reported cases of leukemia. This paper became a classic. Virchow was appointed prosector at the Charité, and in 1847 he began, with his friend Benno Reinhardt, a new journal, *Archiv für pathologische Anatomie und Physiologie, und für klinische Medizin* ("Archives for Pathological Anatomy and Physiology, and for Clinical Medicine"). After Reinhardt's death in 1852, Virchow continued as sole editor of the journal, now known as *Virchows Archiv,* until his own death 50 years later.

Early in 1848 Virchow was appointed by the Prussian government to investigate an outbreak of typhus fever in Upper Silesia; his subsequent report laid the blame for the outbreak on social conditions and on the government. The government was annoyed, but it had to deal with the revolution of 1848 in Berlin. Eight days after his return from Silesia, Virchow was fighting at the barricades. After the revolution Virchow embraced the cause of



Virchow
By courtesy of Bildarchiv Preussischer Kulturbesitz BPK, Berlin

such medical reforms as abolition of the various grades of physicians and surgeons, and from July 1848 to June 1849 he published a weekly paper, *Die Medizinische Reform,* much of which he wrote himself. His liberal views led the government, on March 31, 1849, to suspend him from his post at the Charité, but a fortnight later he was reinstated, with the loss of certain privileges.

In 1849 Virchow was appointed to the newly established chair of pathological anatomy at the University of Würzburg—the first chair of that subject in Germany. During his seven

fruitful years in that post, the number of medical students in the university increased from 98 to 388. Many men who later attained fame in the medical field received training there from him. In 1850 he married Rose Mayer, with whom he had three sons and three daughters. At Würzburg Virchow published many papers on pathological anatomy. He began there the publication of his six-volume *Handbuch der speziellen Pathologie und Therapie* ("Handbook of Special Pathology and Therapeutics"), most of the first volume of which he wrote himself. At Würzburg he also began to formulate his theories on cellular pathology and started his anthropological work with studies of the skulls of cretins (dwarfed, mentally deficient individuals) and investigations into the development of the base of the skull.

In 1856 a chair of pathological anatomy was established for Virchow at the University of Berlin; he accepted the call subject to certain conditions, one of which was the erection of a new pathological institute, which he used for the rest of his life. During much of this second Berlin period, Virchow actively engaged in politics. In 1859 he was elected to the Berlin City Council, on which, for the rest of his life, he focused on public health matters, such as sewage disposal, the design of hospitals, meat inspection, and school hygiene. He supervised the design of two large new Berlin hospitals, the Friedrichshain and the Moabit, opened a nursing school in the Friedrichshain Hospital, and designed the new Berlin sewer system.

In 1861 Virchow was elected to the Prussian Diet. He was a founder of the Fortschrittspartei (Progressive Party) and a determined and untiring opponent of Otto von Bismarck, who in 1865 challenged him to a duel, which he wisely declined. In the wars of 1866 and 1870 Virchow confined his political activities to the erection of military hospitals and the equipping of hospital trains. In the Franco-German War he personally led the first hospital train to the front. He was a member of the Reichstag from 1880 to 1893.

Medical investigations. By 1848 Virchow had disproved the then-prevailing view that phlebitis (inflammation of a vein) causes most diseases. He demonstrated that masses in the blood vessels resulted from "thrombosis" (his term) and that portions of a thrombus could become detached to form an "embolus" (also his term). An embolus set free in the circulation might eventually be trapped in a narrower vessel and lead to a serious lesion in the neighbouring parts.

Virchow's concept of cellular pathology was initiated while he was at Würzburg. Until the latter part of the 18th century, diseases were supposed to be due to an imbalance of the four fluid humours of the body (blood, phlegm, yellow bile, and black bile). This was the "humoral pathology," which dated back to the Greeks. In 1761 an Italian anatomist, Giovanni Battista Morgagni, showed that diseases were due not to an imbalance of the humours but to lesions in organs. Around 1800 a French anatomist, Xavier Bichat, demonstrated that the body was made up of 21 different kinds of tissues, and he conceived that in a diseased organ only some of its tissues might be affected. The later events in the complex history of the cell theory were taking place while Virchow was a youth. At Würzburg he began to realize that one form of the cell theory, which postulated that every cell originated from a preexisting cell rather than from amorphous material, could give new insight into pathological processes. In this he was influenced by the work of many others, notably by the views of John Goodsir of Edinburgh on the cell as a centre of nutrition and by the investigations of Robert Remak, a German neuroanatomist and embryologist, who in 1852 was one of the first to point out that cell division accounted for the multiplication of cells to form tissues. By that year Remak had concluded that new cells arose from existing cells in diseased as well as healthy tissue. Remak's writings, however, had little influence on pathologists and medical practitioners. Thus the idea expressed by Virchow's *omnis cellula e cellula* ("every cell is derived from a [preexisting] cell") is not completely original. Even this aphorism is not Virchow's; it was coined by François Vincent Raspail in 1825. But Virchow made cellular pathology into a system of overwhelming importance. His main statement of the theory was given in a series of 20 lectures in 1858. The lectures, published in 1858 as his book *Die Cellularpathologie in ihrer Begründung auf physiologische und pathologische Gewebenlehre* (*Cellular Pathology as Based upon Physiological and Pathological Histology*), at once transformed scientific thought in the whole field of biology.

Virchow shed new light on the process of inflammation, though he erroneously rejected the possibility of migration of the leukocytes (white blood cells). He distinguished between fatty infiltration and fatty degeneration, and he introduced the modern conception of amyloid (starchy) degeneration. He devoted great attention to the pathology of tumours, but the importance of his papers on malignant tumours and of his three-volume work on that subject (*Die krankhaften Geschwülste,* 1863–67) was somewhat marred by his erroneous conception that malignancy results from a conversion (metaplasia) of connective tissue. His work on the role of animal parasites, especially trichina, in causing disease in humans was fundamental and led to his own public interest in meat inspection. In 1874 he introduced a standardized technique for performing autopsies, by the use of which the whole body was examined in detail, often revealing unsuspected lesions.

Virchow's attitude to the new science of bacteriology was complex. He was somewhat resistant to the idea that bacteria had a role in causing disease, and he rightly argued that the presence of a certain microorganism in a patient with a particular disease did not always indicate that that organism was the cause of the disease. He suggested, long before toxins were actually discovered, that some bacteria might produce these substances. Though it is sometimes said that Virchow was antagonistic to Charles Darwin's theory of the origin of species by natural selection, the fact is that he accepted the theory as a hypothesis but maintained throughout his later years that there was insufficient scientific evidence to justify its full acceptance.

Work in anthropology. In 1865 Virchow discovered pile dwellings in northern Germany, and in 1870 he started to excavate hill forts. Meanwhile he had been using his enormous influence in the cause of anthropology. In 1869 he was part founder of the German Anthropological Society, and in the same year he founded the Berlin Society for Anthropology, Ethnology, and Prehistory, of which he was president from 1869 until his death. During the whole of that period, he edited its *Zeitschrift für Ethnologie* ("Journal of Ethnology").

In 1874 Virchow met Heinrich Schliemann, the discoverer of the site of Troy, and he accompanied Schliemann to Troy in 1879 and to Egypt in 1888. It was due largely to Virchow that Schliemann gave his magnificent collection to Berlin. In 1881 and in 1894 Virchow made personal expeditions to the Caucasus. Virchow was the organizer of German anthropology.

In 1873 Virchow was elected to the Prussian Academy of Sciences. He declined to be ennobled as "von Virchow," but in 1894 he was created *Geheimrat* ("privy councillor").

(E.A.U.)

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Virden, town, southwestern Manitoba, Canada. It lies near the Assiniboine River, 47 miles (76 km) west of Brandon. A farming and grain-shipping centre, the community prospered after the discovery of oil in 1951 and has become the operational headquarters of the province's oil industry. Some wells have been drilled within the town limits. There are also extensive local potash deposits. The town's economic activities include flour milling, feed and dairy production, metalworking, and printing. Originally called Gopher Creek, it was renamed Manchester in 1882. Later it was called Virden for the Scottish home of Lord Mountstephen, a railway financier, when some of his kinsmen settled in the locality. Inc. village, 1890; town, 1904. Pop. (1991) 2,894.

Virden, city, Macoupin county, southwest-central Illinois, U.S. Laid out in 1852 along the Chicago and Mississippi Railroad, it was named for John Virden, a local innkeeper. Once a coal-mining town, Virden was the scene of a mine riot on Oct. 12, 1898, in which at least 10 people were killed. The city was under martial law for several days, and the union movement credited the incident as an important milestone, especially in the winning of the eight-hour day. The mines have since ceased operation. Virden is now an agricultural community with corn (maize) and soybeans as the chief crops. Livestock raising is also important. Inc. 1873. Pop. (1990) 3,635.

virelai, one of several *formes fixes* ("fixed forms") in French lyric poetry and song of the 14th and 15th centuries (*compare* ballade; rondeau). It probably did not originate in France, and it takes on several different forms even within the French tradition. Similar forms can be found in most of the literatures of medieval and early Renaissance Europe: in the Galician *cantiga,* the Arabic *muwashshaḥ,* the Italian *lauda* and *frottola,* the Spanish *villancico,* and the English carol (*qq.v.*), as well as in the Arabic *zajal* and the Italian *hallata.*

The standard virelai form has three stanzas, each preceded and followed by a refrain. Each stanza is in three sections, the first two having the same rhyme scheme and the last having the rhyme scheme of the refrain. In a musical setting the third section of each stanza therefore takes the same music as the refrain, while the first two sections have different music. In the following diagram uppercase letters represent a repeat of the same music with the same text, lowercase the same music with different text; R means refrain and Roman numerals refer to stanzas:

R	I	R	II	R	III	R
A	bba	A	bba	A	bba	A

The musical history of the virelai in France has three distinct stages. First came the monophonic (single-part) settings of simply rhythmized and syllabic melodies. Guillaume de Machaut (*c.* 1300–77), who is more famous as the earliest known composer systematically to write polyphonic songs, wrote most of his virelais in this monophonic style. He preferred to call them *chansons balladées,* though he allowed that they could also be called virelais.

The next stage, in the second half of the 14th century, was one of large polyphonic settings. Their tremendous length was made acceptable by the often lighthearted nature of virelai texts. Jean Vaillant, Solage, Jacob de Senleches, and other composers included imitations of bird calls and the sounds of nature in their virelais; and to judge from the number of surviving sources, the songs achieved exceptional popularity.

The virelai fell out of favour in the first half

of the 15th century but then returned in a curtailed form with just one stanza, thereby providing the form for some of the most attractive songs of the later 15th century. This revived virelai had taken on an entirely different set of characteristics: in the 14th century the virelai, like each of the other *formes fixes,* had a musical and a poetic style associated specifically with it, but none of this is apparent in its 15th-century revival. For the later composers, especially Antoine Busnois and Jean d'Ockeghem, the main attraction of the virelai seems to have been that the music written for the first two sections of the stanza could be entirely different from that for the refrain; and it was usually even written in a different metre. The form thus allowed more musical variety than did the rondeau. These later virelais with only one stanza are often called *bergerettes.*

Virén, Lasse (b. July 22, 1949, Myrskalä, Finland), Finnish distance runner and the first athlete to win gold medals for both the 5,000- and 10,000-metre races in consecutive Olympic Games: at Munich in 1972 and at Montreal in 1976.

Virén began running as a youth. At the age of 19 he dropped out of school to train under Rolf Haikkola, a follower of the New Zealand coach Arthur Lydiard, who stressed building up endurance by running very long distances. While winning the gold medals in the Olympic Games at Munich, Virén set a world record for the 10,000-metre race of 27 min 38.4 sec (broken in 1973). He had also set a world record for the 5,000-metre race in 1972 of 13 min 16.4 sec (broken in 1972).

vireo, any of 42 species of New World birds constituting the family Vireonidae (order Passeriformes). This includes pepper-shrikes and shrike-vireos—about five tropical species sometimes separated as the families Cyclarhidae and Vireolaniidae, respectively. About 15 tropical forms are called greenlets—formerly the usual name for all vireos.



White-eyed vireo (*Vireo griseus*)
Thase Daniel—Bruce Coleman Inc./EB Inc

Vireos are the most primitive of the New World songbirds. The slightly notched and hook-tipped bill is stout but narrow, with fine bristles at the base. Vireos are 10 to 18 cm (4 to 7 inches) long and are plain gray or greenish in colour, with white or yellow touches (sexes alike). They occur in woodlands and thickets, where they glean insects from foliage, and repeat loud short phrases over and over. The vireo's nest is a cuplike structure suspended from a small fork of a branch, and the bird's eggs are white and sparsely speckled with reddish brown. The best-known and most widely distributed species of vireo is the red-eyed vireo (*Vireo olivaceus*), which breeds from southern Canada to Argentina. It is 15 cm (6 inches) long, with a black-outlined, white eye-stripe that contrasts with the bird's gray crown. Similar in general appearance is the white-eyed vireo (*V. griseus*).

Viret, Pierre (b. 1511, Orbe, Switz.—d. May 4, 1571, Orthez, Fr.), champion of the Reformation in the Swiss canton of the Vaud and the most important native religious Reformer of French-speaking Switzerland.

In 1531 Viret came under the influence of the fugitive French religious Reformer Guillaume Farel and began preaching in the Vaud soon after. As pastor at Neuchâtel (1533), he won the favour of the Bernese, who, following their annexation of the Vaud (1536), supported his reforming efforts in the Vaudois capital of Lausanne. Viret led the disputation of Lausanne (October 1536) and subsequently organized the Reformed Church throughout the Vaud. His lengthy pastorate at Lausanne was disrupted by disagreements with the Bernese, however, and in 1559 he was forced to leave the city. Viret died in the service of Jeanne d'Albret (the mother of the future French king Henry IV) as a professor at the academy in Orthez.

Virgil, Virgil also spelled VERGIL, Latin in full PUBLIUS VERGILIUS MARO (b. Oct. 15, 70 BC, Andes, near Mantua [Italy]—d. Sept. 21, 19 BC, Brundisium), the greatest Roman poet, best known for his epic, the *Aeneid* (from *c.* 30 BC; unfinished at his death).

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

The son of a prosperous farmer in the Roman province of Cisalpine Gaul, Virgil received a thorough education. Although his life was quiet, his poetry reflects the general turbulence in Italy during an extended period of civil war and then the trend toward stability that followed the rise of Octavian (afterward the emperor Augustus) to undisputed power in 31–30 BC. Virgil became a member of Augustus' court circle and was aided by the imperial minister Maecenas, one of the most famous patrons of the arts. He died of a fever contracted on a visit to Greece.

Virgil's first major work, the collection of 10 pastoral poems, called the *Eclogues* (42–37 BC), may be read as a visionary prophecy of local tranquillity and world peace—conditions that, in his last years, he saw imposed to a considerable degree by Augustus. His *Georgics* (37–30 BC) points toward a Golden Age in the form of immediate practical goals: the repopulation of rural Italy and the rehabilitation of agriculture by the government as soon as the civil wars shall have ended. Finally, the 12 completed books of the *Aeneid* celebrate the dual birth of Rome. The legendary founding of Rome by Aeneas of Troy and the Roman unification of the world by Augustus are viewed as extraordinary tasks, glorious achievements, and divinely ordained necessities.

Virgilian series, major division of Late Carboniferous rocks and time in the United States (the Late Carboniferous epoch, approximately equivalent to the Pennsylvanian period, began about 320 million years ago and ended about 286 million years ago). Named for exposures studied in the region of Virgil, Kan., it is the uppermost series of the Late Carboniferous and overlies rocks of the Missourian series. In the midcontinental region of the United States, the Virgilian consists of sandstones, shales that are often variegated, thin limestones, and some coal deposits. Cyclothems, which are rhythmically repetitive stratigraphic sequences, are often evident in Virgilian strata. Three important subdivisions of the Virgilian are recognized; the lowermost Douglas group is followed by the Shawnee and Wabaunsee groups, each of which is further divided into formations.

Virgin Birth, fundamental doctrine of orthodox Christianity that Jesus Christ had no natural father but was conceived by Mary through the power of the Holy Spirit. The doctrine that Mary was the sole natural parent of Jesus is based on the infancy narratives contained in the Gospel accounts of Matthew and Luke. It was universally accepted in the Christian church by the 2nd century, was enshrined in the Apostles' Creed, and, except for several minor sects, was not seriously challenged until the rise of Protestant theological liberalism in the 19th century. It remains a basic article of belief in the Roman Catholic, Orthodox, and most Protestant churches. Muslims also accept the Virgin Birth of Jesus.

A corollary that has been deduced from the doctrine of Mary's virginity in the conception of Jesus is the doctrine of her perpetual virginity, not only in conception but in the birth of the child (*i.e.,* she was exempt from the pain of childbirth) and after the birth throughout her life. This doctrine, which poses problems of biblical interpretation, was found in the writings of the Church Fathers and was accepted by the Council of Chalcedon (451). It is part of the teaching of the Orthodox and Roman Catholic churches and is also maintained by some Anglican and Lutheran theologians.

Virgin Gorda Island, one of the British Virgin Islands, in the West Indies, lying 80 miles (130 km) east of Puerto Rico. It has an area of 8.25 square miles (21 square km) and forms two rectangles joined by a spit, or point, of land. The peninsula in the southwest is flat and strewn with enormous granite boulders,



Spring Bay on the coast of Virgin Gorda Island
Luis Villota

some more than 30 feet (9 m) high. The north rises straight from the water to hills, the highest of which is Virgin Peak at 1,359 feet (414 m).

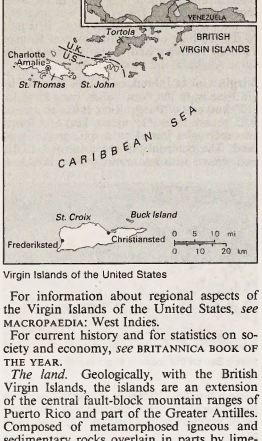
Virgin Gorda was settled by planters leaving Anguilla after 1680. Agriculture is economically important, and tourism is increasing. There were once copper workings at Copper Mine Point. Pop. (1995 est.) 2,800.

Virgin Islands: *see* British Virgin Islands; Virgin Islands of the United States.

Virgin Islands National Park, conservation area covering nearly two-thirds of the island of St. John, in the U.S. Virgin Islands, West Indies. The park (area 14,696 ac [5,947 ha]) has steep mountains, deep valleys, white beaches, and coral reefs. Most of the tree cover was removed for sugarcane cultivation in the 17th and early 18th centuries, but when the plantations were abandoned the land reverted to forest. The relatively moist interior highlands are dominated by evergreen hardwoods, and the drier slopes by broad-leaved forests,

but only a few tropical plants have become established, the most prominent of which are figs, mahogany, cinnamon-bay, mango, guava, breadfruit, mangrove, hibiscus, frangipani, and bougainvillea. Most of the 100 species of birds are land birds, but some herons, egrets, and pelicans can be found. The only native land mammal is the bat; the mongoose was introduced from Europe to control rodents and snakes. The original inhabitants, the peaceful, agricultural Arawak Indians, have left remains of villages and some rock carvings.

Virgin Islands of the United States, organized unincorporated island territory of the United States, at the eastern end of the Greater Antilles, about 40 miles (64 km) east of Puerto Rico, in the northeastern Caribbean Sea. Composed of three large islands, St. Croix, St. John, and St. Thomas, and about 50 small islets and cays, the islands cover 136 square miles (352 square km). The population in 1990 was estimated at 105,000, and the capital is Charlotte Amalie on St. Thomas.



Virgin Islands of the United States

For information about regional aspects of the Virgin Islands of the United States, *see* MACROPAEDIA: West Indies.

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

The land. Geologically, with the British Virgin Islands, the islands are an extension of the central fault-block mountain ranges of Puerto Rico and part of the Greater Antilles. Composed of metamorphosed igneous and sedimentary rocks overlain in parts by limestone and alluvium, they rise off the continental shelf to maximum heights of 1,556 feet (474 m) at Crown Mountain on St. Thomas, 1,277 m (389 m) at Bordeaux Mountain on St. John, and 1,088 feet (332 m) at Mount Eagle on St. Croix (the largest of the islands, with an area of 84 square miles [218 square km]). St. Thomas and St. John are very rugged, but St. Croix's mountains are confined to the north, with a large rolling-to-level plain opening to the south. All the islands are surrounded by fringing coral reefs, and ancient elevated reefs ring the main islands.

The climate is pleasant, with temperatures at St. Thomas averaging a maximum of 82° F (28° C) during the day in January and 88° F (31° C) in July and being tempered throughout the year by northeasterly trade winds. Nighttime minimum temperatures are about 11° F (6° C) cooler, and the relative humidity is low for the tropics. Rainfall averages 45 inches (1,100 mm) annually, with a marked rainy season from September to December. Droughts occur periodically, and hurricanes may strike the islands on rare occasions. Early plantation clearance destroyed the islands' tropical forest, which is now found only in a few places on St. Thomas and has elsewhere been replaced by secondary woodland and scrub. Island fauna is sparse, save for birds, but the surrounding seas abound in commercial and game species.

The people. About 80 percent of the population is black or mulatto, and most of the remainder are Hispanic (mainly Puerto Rican) or recent white immigrants. Less than half of the population is native-born. English is the official language, but some French is spoken on St. Thomas, and Spanish on St. Croix among Puerto Ricans. The population is predominantly Christian, but there is also an Orthodox Jewish community. The population increased rapidly from the early 1960s to the mid-1970s primarily because of substantial immigration from the U.S. mainland, the eastern Caribbean, and Puerto Rico. Since the mid-1970s population growth has been slower than average for the West Indies, largely because of the territory's comparatively low birth rate. The infant mortality rate and overall death rate are also comparatively low, while life expectancy, at 69 years, is among the highest in the region. Charlotte Amalie, the capital, is also the only town with a population of more than 10,000.

The economy. The U.S. Virgin Islands have a developing free-enterprise economy based on tourism and manufacturing. The gross national product (GNP) is growing faster than the population; the GNP per capita is the highest in the Caribbean region. About one-fifth of the total land area is farmland, most of it on St. Croix. Agricultural production in the 1970s through the '80s underwent transition from the traditional reliance on sugarcane to more diversified crops. Citrus fruits, tamarinds, mangoes, bananas, sorghum (for animal feed), and vegetables, all for internal consumption, are the main crops grown. Cattle (ranched on St. Croix), goats, sheep, and pigs are the main livestock. St. Croix produces milk, sufficient for island needs. The government has built dams on St. Croix and St. Thomas to improve farmers' water supply.

Only 6 percent of the land is forest, but the government has planted large areas of St. Croix with mahogany and also has reforested parts of St. Thomas. A bay-tree forest on St. John supplies leaves for the bay-rum industry.

Fishing is restricted to supplying local needs and to sportfishing. A marine-biology laboratory has been established on St. John.

Manufacturing has diversified beyond the traditional rum-distilling industry to include petroleum refining, watch assembly, and the manufacture of chemicals, pharmaceuticals, and clothing. Electrical energy is produced by thermal-power plants. The U.S. government has encouraged industry by allowing certain manufactures to enter the United States duty-free, and the local government has offered tax incentives.

Tourism, based on the pleasant tropical climate, attractive scenery, good fishing, proximity to the U.S. mainland, and free-port status, has rapidly expanded and dominates the economy. The Virgin Islands National Park, covering two-thirds of St. John, and the Buck Island National Monument, set on the islet's coral reef, are other major attractions. Souvenir and handicraft industries have developed for the tourist market.

The leading sectors in employment are government service; retail trade, including personal, business, and domestic services; manufacturing; agriculture and self-employment; and hotels.

The islands' extensive road network is mostly paved. St. Croix and St. Thomas have scheduled bus service. Charlotte Amalie, on St. Thomas, and Frederiksted and Limetree Bay, on St. Croix, are deep-water ports. A new container port on the southern coast of St. Croix handles most of the islands' cargo traffic. There is ferry service between the three main islands and also to the British Virgin Islands. There are two international airports, on St. Thomas and on St. Croix. Interisland seaplanes serve the islands and also Puerto Rico, the British Virgin Islands, and Saint Martin.

Exports total more than four-fifths of imports in value annually. Refined petroleum, clothing, watches, and rum are the main exports, shipped mainly to the United States, Puerto Rico, and the British Virgin Islands. The main imports are crude petroleum, food products, and semimanufactures and components.

Government and social conditions. The government is organized under the Organic Act of the Virgin Islands, passed by the U.S. Congress in 1936, amended in 1954 and subsequently. The governor, elected by universal suffrage to a four-year term, appoints heads of the executive branches and administrative assistants for St. Croix and St. John with approval of the unicameral legislature, or Senate; its 15 members are elected by universal suffrage to four-year terms. The people are U.S. citizens and elect a nonvoting representative to the U.S. House of Representatives but do not vote in U.S. national elections. The U.S. Department of the Interior appoints a federal comptroller who supervises revenue and expenditure. There are three political parties, the Democratic and the Republican, affiliated to the U.S. parties, and the Independent Citizens Movement. The District Court of the Virgin Islands operates under federal law, and the judges and district attorney are appointed by the U.S. president with the advice and approval of the U.S. Senate. There is also a territorial court.

St. Thomas and St. Croix have hospitals, and the Public Health Service operates mobile medical units for outlying areas, as well as a program for immunization, clinical services, home-care services, and special programs. Health conditions are excellent, as improved housing and sanitation have eradicated tropical diseases.

Education is compulsory and free for children between ages 5½ and 16 in public primary, secondary, and vocational schools. Higher education and teacher training are available at the University of the Virgin Islands, a U.S. land-grant institution with campuses on St. Thomas and St. Croix. The main public library, located on St. Thomas, has branches in St. Croix and St. John. The Department of Conservation and Cultural Affairs administers museum and library services.

History. The islands probably were originally settled by Arawak Indians, but they were inhabited by the warlike Caribs when Christopher Columbus landed on St. Croix in 1493. They had extensive farms and settlements on the island. Columbus named the islands Santa Ursula y las Once Mil Virgenes, in honour of the legendary St. Ursula and the 11,000 martyred virgins. In 1555 a Spanish expedition defeated the Caribs and claimed the islands for Spain, but by 1625 English and French settlers were farming on St. Croix, and it had become a haven for pirates. In 1650 the Spaniards evicted the remaining English settlers, but the French took the islands later that same year. St. Croix was willed to the Knights of Malta in 1653, but they sold it to the French West India Company. Dutch buccaneers had established themselves on Tortola, but the English evicted them in 1666, while Denmark claimed St. Thomas and St. John. Dividing the islands into plantations, the Danes began growing sugarcane, first using convicted criminals and, after 1673, African slaves for labour. Com-

merce developed from the triangular trade in slaves brought from Africa, rum and molasses sent to Europe, and European goods shipped back to the islands. St. Thomas became a major slave market for the Caribbean. Denmark purchased St. Croix in 1733, and it became a major centre of sugarcane production. Alexander Hamilton, the U.S. statesman, was born on Nevis Island in 1755, brought to St. Croix in 1765, and worked there as a countinghouse clerk. By the early 19th century the sugar industry began to decline and two slave revolts had shaken the plantation economy. Slavery was abolished in 1848, and the United States began negotiations to purchase the islands from Denmark. The sale was made in 1917 for U.S. $25,000,000. Administered by the U.S. Navy, they were transferred to the Department of the Interior in 1931, and civilian governors appointed by the president ruled the islands. Tourism began to develop in 1945. In 1954 the Organic Act of the Virgin Islands was revised and created the current governmental structure. In 1970 the first popularly elected governor took office, and in 1976 the islands were given the right to draft a constitution, subject to approval by the U.S. Congress and president. Completed in 1978, the islands' constitution was rejected in a referendum (1979) and again rejected after amendment (1981). Substantial immigration from the mainland United States, the eastern Caribbean, and Puerto Rico (1960–75) produced social tension between islanders and the new settlers.

Virgin Mary, Presentation of the, feast celebrated in the Roman Catholic and Eastern churches on November 21. Based on a legend contained in the Protevangelium of James, a 2nd-century work not included in the Bible, the feast commemorates a visit by the three-year-old Mary to the Temple in Jerusalem, where she was consecrated to the service of God. It was celebrated in the Eastern church in the 6th century but did not become widely accepted in the West until the 15th century. Pope Pius V (1566–72) suppressed it, but in 1585 Pope Sixtus V reestablished the feast.

virginal, also called VIRGINALS, or PAIR OF VIRGINALS, musical instrument of the harpsichord family, of which it may be the oldest member. The virginal may take its name from Latin *virga* ("rod"), referring to the jacks, or wooden shafts that rest on the ends of the keys and hold the plucking mechanism. Unlike the harpsichord and spinet, the virginal's single set of strings runs nearly parallel to the keyboard. By building the instrument with its keyboard at one side or the other of the front of the



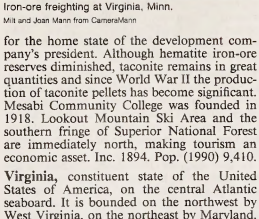
English virginal (with jack rail removed) made by Robert Hatley, London, 1664; in the Benton-Fletcher Collection, the National Trust, Hampstead, London
From the Benton-Fletcher Collection at the National Trust Property, Fenton House, Hampstead, London

rectangular case, different tone colours can be obtained because of the change in plucking point of the string.

Italian virginals, often polygonal in shape, differed from the rectangular Flemish and English virginals in having the keyboard centrally placed, thus producing a characteristic mellow tone. Sometimes two virginals were built together, a small one fitting like a drawer into the case of the larger. The smaller played at a higher pitch and could sometimes be mounted over the keys of the larger virginal so that one player could control both. Virginals were particularly popular in 16th- and 17th-century England, where the name was also used generically to mean any harpsichord. The 17th-century *Fitzwilliam Virginal Book* contains pieces that are characteristic of the English repertory. The cases of virginals were frequently decorated with paintings, inlays, and carvings.

Virginia, town and gold-mining centre, north-central Orange Free State, South Africa, in one of the world's richest goldfields. Virginia was a former whistle stop (named, 1892) on the line between Johannesburg and Cape Town. A modern, well-planned town, it was founded in 1954, after gold was discovered in the vicinity. Mining, gold-extraction plants, and processing plants recovering uranium and sulfuric acid as a by-product from gold ore form the basis of the economy. Pop. (1985) 17,624.

Virginia, city, St. Louis county, northeastern Minnesota, U.S., in the Mesabi Range region. First a lumbering town, it developed as a mining centre after 1890, when Leonidas Merritt and his five brothers discovered rich iron-ore deposits. It was laid out in 1892 and named



Iron-ore freighting at Virginia, Minn.
Milt and Joan Mann from CameraMann

for the home state of the development company's president. Although hematite iron-ore reserves diminished, taconite remains in great quantities and since World War II the production of taconite pellets has become significant. Mesabi Community College was founded in 1918. Lookout Mountain Ski Area and the southern fringe of Superior National Forest are immediately north, making tourism an economic asset. Inc. 1894. Pop. (1990) 9,410.

Virginia, constituent state of the United States of America, on the central Atlantic seaboard. It is bounded on the northwest by West Virginia, on the northeast by Maryland, on the east by the Atlantic Ocean, on the south by North Carolina and Tennessee, and on the west by Kentucky. The capital is Richmond.

A brief treatment of Virginia follows. For full treatment, *see* MACROPAEDIA: United States of America: *Virginia.*

Virginia was Great Britain's first American colony, founded in 1607 at Jamestown. The colony faltered at first, but by 1619 it had its own representative assembly and a growing tobacco industry. Virginia grew rapidly during the 18th century and on the eve of the American Revolution was the largest of the 13 Colonies. Its citizens were among the leaders of the American Revolutionary period and contributed four of the country's first five presidents, but they hesitated to ratify the Constitution (June 1788) and were early exponents of states' rights and nullification. Virginia was the scene of Nat Turner's slave insurrection of 1831, and, as agriculture declined, it became known for slave breeding. It wavered on secession until President Abraham Lincoln issued the call for volunteers, but the western part of the state refused to secede and split off to become West Virginia in 1863. Virginia, whose own capital of Richmond was also the capital of the Confederacy, bore the brunt of military action during the war. Already in economic difficulty before the American Civil War, the state was plagued by the war's devastation for decades. Only after World War I was Virginia able to achieve basic financial reforms and begin agricultural diversification and industrial development.

Virginia is divided into three physiographic regions. The Coastal Plain, also known as the Tidewater, lies east of the fall line; major rivers separate the Northern Neck Peninsula, the Middle Peninsula, and The Peninsula, all west of Chesapeake Bay, and across the bay lies the Eastern Shore area on the Delmarva Peninsula. The Piedmont of middle Virginia is a region of rolling hills extending westward to the Blue Ridge. The mountain region of the west is made up of the Appalachian Plateau, the Ridge and Valley Province, and the Blue Ridge.

The state's climate is generally mild and equable but varies according to elevation and proximity to Chesapeake Bay and the Atlantic. In the southeast, winter temperatures rarely go below 15° F (−9° C), or in summer above 100° F (38° C). In the mountains, winter temperatures of 0° F (−18° C) may occur, but cool nights in summer follow daytime highs that usually stay below 90° F (32° C). Rainfall averages from about 32 to 48 inches (810 to 1,200 mm) yearly.

Most of eastern Virginia was first settled by the English. During the 1700s, the Welsh, together with French Huguenots, were the prominent immigrants, and a large number of people of Scots-Irish and German descent moved into the Shenandoah Valley from Pennsylvania. Black slaves were the foundation of the state's plantation agriculture and at the start of the Civil War comprised about half of the state's population, but the proportion of blacks thereafter declined steadily to about one-fifth of the population in the late 20th century. More than two-thirds of Virginia's population is in urban areas, mostly in suburban Washington, D.C., and in a corridor connecting Washington to Richmond and Norfolk. The population was growing faster than the national average in the late 20th century, largely because of substantial net immigration, most of it to the metropolitan areas.

The federal government is Virginia's largest employer. Income derived from military installations alone is considerable. Manufacturing is the second largest employer, with chemicals and allied products the major items of manufacture followed by food processing, tobacco products, textiles, and apparel. Agriculture is no longer dominated by tobacco. Truck farms, whose products include milk, cheese, and vegetables, dot the eastern shore. Apple and peach orchards are found in the northwest. Pine timber is the main forest product. Extracted nonmetals include coal, stone, clay, sand, and gravel.

Virginia's port of Hampton Roads is one of the nation's leading ports in foreign-trade-tonnage handled. Primary and secondary roads of more than 65,000 miles (105,000 km) comprise the nation's third largest state-maintained system. Most traffic is north–south, adding to Virginia's status as a "bridge" state. There is a dense network of railway track that includes

Amtrak passenger service. Washington's two major airports are located in Virginia.

There is a state Commission of the Arts and Humanities, and the Museum of Fine Arts in Richmond was established in 1934. Historical sites abound and include Colonial Williamsburg, George Washington's Mount Vernon, Thomas Jefferson's Monticello, the Civil War battlefields of Bull Run and Appomattox, and General Robert E. Lee's house, now in Arlington National Cemetery. The College of William and Mary (founded in 1693) is the country's second oldest college. The University of Virginia in Charlottesville was largely the creation of Thomas Jefferson. Area 40,767 square miles (105,586 square km). Pop. (2000) 7,078,515.

Virginia, University of, American institution of higher education in Charlottesville, Va., on a campus of 1,000 acres (405 hectares) near the foothills of the Blue Ridge Mountains. Founded by Thomas Jefferson, it was chartered in 1819. Jefferson was aided by Joseph C. Cabell (1778–1856), a member of the Virginia Senate and the chief fund-raiser. The school elected Jefferson its first rector of the board of visitors (the governing body). James Madison and James Monroe were other U.S. presidents who served on the university's board.

Jefferson laid out the campus of his "academical village," designed its buildings, supervised the construction of the Rotunda (designed by him after the Pantheon in Rome), planned the curriculum, and selected the faculty. The school opened in 1825 with a faculty of eight. Jefferson introduced an elective system of study and opposed the granting of degrees as "artificial embellishments." By the time of the American Civil War, the university was second only to Harvard in size of faculty and student body. The bachelor of science degree was offered from 1868, and in 1899 the bachelor's degree became the primary degree offered. (The university had approved a master of arts degree in 1831, the primary degree in the 19th century; the M.D. was first awarded in 1829 and a degree in law in 1840.)

In 1904 Edwin A. Alderman was elected the first president. The chief administrative officer had been previously the chairman of the faculty. Under Alderman (1904–31), the university established its basic modern structure. The McIntire School of Commerce was established in 1952 and the Center for Advanced Studies in 1965. Special programs include Asian, Afro-American, Latin-American, and Russian studies and environmental and computer sciences.

Enrollment is largest in the College of Arts and Sciences. Other schools teach architecture, education, engineering and applied sciences, and nursing. Graduate professional schools are the Colgate Darden School of Business Administration, the Graduate School of Arts and Sciences, and schools of law and of medicine.

Mary Washington College for Women (chartered in 1908) was consolidated with the university from 1944 to 1972. By the 1970s women were enrolled in all units of the university; previously, they could attend only selected programs and the graduate schools. Clinch Valley College at Wise, Va., is an affiliated school.

Virginia and Kentucky Resolutions (1798 and 1799), in U.S. history, measures passed by the legislatures of Virginia and Kentucky as a protest against the Federalist Alien and Sedition Acts. The resolutions were written by James Madison and Thomas Jefferson (then vice president in the administration of John Adams), but the role of those statesmen remained unknown to the public for almost 25 years. Generally, the resolutions argued that because the federal government was the outcome of a compact between the states, all powers not specifically granted to the central authority were retained by the individual states or by the people. For this reason, they maintained that the states had the power to pass upon the constitutionality of federal legislation.

The Virginia and Kentucky Resolutions were primarily protests against the limitations on civil liberties contained in the Alien and Sedition Acts rather than expressions of full-blown constitutional theory. Later references to the resolutions as authority for the theories of nullification and secession were inconsistent with the limited goals sought by Jefferson and Madison in drafting their protests.

Virginia Beach, independent city, southeastern Virginia, U.S., on the Atlantic coast and Chesapeake Bay; adjacent to the cities of Norfolk and Chesapeake. The city extends southward to the North Carolina border, covering 259 square miles (671 square km) of land and water, with 38 miles (61 km) of ocean front. Back Bay is a brackish lagoon and a national wildlife refuge, paralleling the ocean in the south of the city. Founded in 1887, Virginia Beach developed as a resort following construction of a hotel and a railroad linking it with Norfolk. After World War I it became an important base in the national coastal-defense system. In 1963 Virginia Beach and the former Princess Anne county merged as the City of Virginia Beach.

The city's economy is based on tourism, military installations (Little Creek Naval Amphibious Base, Fentress Naval Air Station, the Fleet Combat Direction Systems Warfare Training Center at Dam Neck, and Fort Story), agriculture (grains, vegetables, and dairy products), and diversified manufactures.

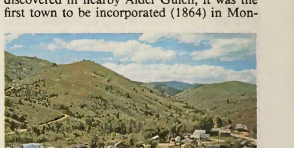
Virginia Wesleyan College (1966), which is headquartered in Norfolk, straddles the city boundary. Cape Henry Memorial, situated at the entrance to Chesapeake Bay, marks the first landing (1607) of the Jamestown colonists. Nearby is the Cape Henry Lighthouse (1791). The Alan B. Shepard Civic Center (1957) was one of the first geodesic-domed structures in the U.S. Facilities for water recreation and fishing are available from the city's boardwalks, bays, and beaches. Virginia Beach is known for seafood, especially the Lynnhaven oyster. Inc. town, 1906; city, 1952. Pop. (2000) city, 425,257; Norfolk–Virginia Beach–Newport News MSA, 1,569,541.

Virginia Capes, Battle of (Sept. 5, 1781), in the U.S. War of Independence, French naval victory over a British fleet that took place outside Chesapeake Bay. The outcome of the battle was indispensable to the successful Franco-American Siege of Yorktown from August to October.

In late summer 1781 Lord Cornwallis led the main British army of the South onto the Yorktown Peninsula, Virginia, where he confidently awaited rescue by reinforcements from the British fleet. In the meantime the French admiral Count de Grasse proceeded with his entire fleet of 24 ships from the West Indies to Chesapeake Bay.

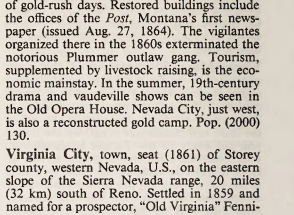
From New York, a British fleet of 19 ships under the command of Admiral Thomas Graves confronted the French at Virginia Capes on September 5. Only the leading squadrons of the two fleets engaged in moderate fighting in the late afternoon. Although British losses were heavier, the contest was by and large undecided, and the two partly becalmed fleets drifted along parallel courses for the next three days without incident. Then, reinforced by additional vessels and siege guns from Newport, R.I., the French sailed back into Chesapeake Bay to take final control of the harbour, while the British fleet returned to New York. British naval historian Sir William M. James labeled this the "decisive battle of the war," one that sealed the fate of Cornwallis and of the British cause in America. *See also* Siege of Yorktown.

Virginia City, town, seat (1876) of Madison county, southwestern Montana, U.S., on the Ruby River. Founded in 1863 when gold was discovered in nearby Alder Gulch, it was the first town to be incorporated (1864) in Montana and was the territorial capital (1865–75). The mines are no longer productive but the town has been reconstructed in the style of gold-rush days. Restored buildings include the offices of the *Post*, Montana's first newspaper (issued Aug. 27, 1864). The vigilantes organized there in the 1860s exterminated the notorious Plummer outlaw gang. Tourism, supplemented by livestock raising, is the economic mainstay. In the summer, 19th-century drama and vaudeville shows can be seen in the Old Opera House. Nevada City, just west, is also a reconstructed gold camp. Pop. (2000) 130.



Virginia City, Mont.
Herb and Dorothy McLaughlin

Virginia City, town, seat (1861) of Storey county, western Nevada, U.S., on the eastern slope of the Sierra Nevada range, 20 miles (32 km) south of Reno. Settled in 1859 and named for a prospector, "Old Virginia" Penni-



Victorian-style Fourth Ward School, Virginia City, Nev.
Shostal—EB Inc.

more, it became a booming mining camp after the discovery of the Comstock Lode (chiefly silver) on nearby Mount Davidson. When the Nevada Territory was created by Congress in 1861, Virginia City had more than three-fourths of the new territory's population. In the 1870s its population reached 30,000, and there were 6 churches and more than 100 saloons. In 1875 the town was devastated by a fire.

The "bonanza barons" such as George Hearst and John MacKay who made millions in the mines built Victorian-style mansions, and even public buildings were elaborately decorated. A reporter on the city's newspaper, the *Territorial Enterprise,* during its boom period was Samuel Clemens, who first signed his pen name, Mark Twain, to one of his newspaper stories.

After 25 years of frantic mining activity, Virginia City's population dwindled as the ore was worked out in the 1880s. It soon became a ghost town. The remaining business houses—mainly saloons and popular museums and some old mansions—are maintained for the tourist trade. The Virginia and Truckee Railroad (1869), which tapped the Comstock, has been partially restored. The area has been designated a national historic district. Pop. (1988 est.) 600.

Virginia creeper, also called WOODBINE, or AMERICAN IVY (*Parthenocissus quinquefolia*), woody vine, in the grape family (Vitaceae), that climbs by means of disk-tipped tendrils. It is commonly found in eastern North America and is often grown as a covering vine for



Virginia creeper (*Parthenocissus quinquefolia*)
Louise K. Broman—Root Resources

walls, fences, and trunks of large trees. Its fall colour ranges from yellow to red-purple. Several cultivated varieties, with smaller leaves and shorter tendrils, have been developed to provide denser coverage. A related woody vine, Boston ivy, is similarly used.

Virginia Declaration of Rights, in U.S. constitutional history, declaration of rights of the citizen adopted June 12, 1776, by the constitutional convention of the colony of Virginia. It was a model for the Bill of Rights added to the U.S. Constitution 15 years later. The Virginia declaration, largely the work of George Mason, was widely read by political leaders on both sides of the Atlantic. It declared that "all men are by nature equally free and independent and have certain inherent rights" of which they cannot deprive themselves or their posterity. These rights were "the enjoyment of life and liberty, with the means of acquiring and possessing property, and pursuing and obtaining happiness and safety." Specific civil liberties enumerated included freedom of the press, the free exercise of religion, and the injunction that no man be deprived of his liberty except by the law of the land or by the judgment of his peers.

Virginia deer: *see* white-tailed deer.

Virginia reel, spirited American country dance for couples. It stems from the *rinnce fadha,* a pre-Christian Irish dance that evolved into the English dance called the Sir Roger de Coverley. Brought to Virginia by English colonists, the Sir Roger de Coverley in time became the Virginia reel, the several versions of which range from the polished form danced in the ballrooms of 18th-century Virginia to the livelier present-day version.

The Virginia reel is a progressive dance for couples in longways formation—*i.e.,* a double line, partners facing. To violin accompaniment and the calls of the fiddler, the dancers execute several figures. In the characteristic "reel" figure, the partners at the head of the set alternately swing each other and the other dancers as they move to the bottom of the set. The dance concludes after each couple has progressed to the head of the set.

Virginius affair (1873), seizure of the Cuban ship *Virginius* (fraudulently flying the U.S. flag and carrying U.S. registration) by Spanish authorities and the summary execution of 53 of its passengers and crew, among them U.S. and British citizens. Hostilities between the United States and Spain were averted when Spain returned the ship and paid an indemnity of $80,000 to the families of the executed Americans. Spain also paid an indemnity to Great Britain for the executed British subjects. A promise to punish the Spanish officers responsible for the incident was never fulfilled.

Virgo, in astronomy, zodiacal constellation lying between Leo and Libra, at about 13 hours right ascension (the coordinate on the celestial sphere analogous to longitude on the Earth) and 2° south declination (angular distance south of the celestial equator). The constellation's brightest star, Spica (Alpha Virginis), is of the first magnitude.

In astrology, Virgo is the sixth sign of the zodiac, considered as governing the period from about August 23 to about September 22. It is represented as a young maiden carrying a sheaf of wheat. She is variously identified as a



Virgo, illumination from a Book of Hours, Italian, *c.* 1475; in the Pierpont Morgan Library, New York City (MS. G.14)
By courtesy of the Pierpont Morgan Library, New York, the Glazier Collection

fertility goddess (the Babylonian and Assyrian Ishtar, among others) or the harvest maiden (the Greek Persephone and others).

Virgo A, catalog numbers M87 and NGC4486, giant elliptical galaxy in the constellation Virgo whose nucleus provides the strongest observational evidence for the existence of a black hole. Virgo A is the most powerful known source of radio energy among the thousands of galactic systems comprising the so-called Virgo Cluster. It is also a powerful X-ray source, which suggests the presence of very hot gas in the galaxy. A luminous gaseous jet projects outward from the galactic nucleus. Both the jet and the nucleus emit synchrotron radiation, a form of nonthermal radiation released by charged particles that are accelerated in magnetic fields and travel at speeds near that of light. Virgo A lies about 50 million light-years from the Earth.

In 1994 the Hubble Space Telescope obtained images of Virgo A that showed a disk of hot, ionized gas about 500 light-years in diameter at a distance of about 60 light-years from the galaxy's centre. The disk's gases are revolving about the nucleus at a speed of about 550 km per second, or about 1.9 million km (1.2 million miles) per hour, a velocity so great that only the gravitational pull of an object with a mass two to three billion times that of the Sun would be capable of holding the disk together. This supermassive object could occupy a region as small as the galactic nucleus only if it were a black hole. Gravitational energy released by gas spiraling down into the black hole produces a beam of electrons accelerated almost to the speed of light; the bright gaseous jet that emanates from Virgo A is thought to be radiation from this beam of electrons.

virion, an entire virus particle, consisting of an outer protein shell called a capsid and an inner core of nucleic acid (either ribonucleic or deoxyribonucleic acid—RNA or DNA). The core confers infectivity, and the capsid provides specificity to the virus. In some virions the capsid is further enveloped by a fatty membrane, in which case the virion can be inactivated by exposure to fat solvents such as ether and chloroform. Many virions are spheroidal—actually icosahedral—the capsid having 20 triangular faces, with regularly arranged units called capsomeres, two to five or more along each side; and the nucleic acid is densely coiled within. Other virions have a capsid consisting of an irregular number of surface spikes and the nucleic acid loosely coiled within. Virions of most plant viruses are rod-shaped; the capsid is a naked cylinder (lacking a fatty membrane) within which lies a straight or helical rod of nucleic acid.

viroid, an infectious particle smaller than any of the known viruses, an agent of certain plant diseases. The particle consists only of an extremely small circular RNA (ribonucleic acid) molecule, lacking the protein coat of a virus. Viroids appear to be transmitted mechanically from one cell to another through cellular debris. Viroids are of much interest because of their subviral nature and their obscure mode of action. Potato spindle tuber disease is viroid-induced. Whether viroids occur in animal cells is still uncertain.

virology, branch of microbiology that deals with the study of viruses.

Although diseases caused by viruses have been known since the 1700s and cures for many were (somewhat later) effected, the causative agent was not closely examined until 1892, when a Russian bacteriologist, D. Ivanovski, observed that the causative agent (later proved to be a virus) of tobacco mosaic disease could pass through a porcelain filter impermeable to bacteria. Modern virology began when two bacteriologists, Frederick William Twort in 1915 and Félix d'Hérelle in 1917, independently discovered the existence of bacteriophages (viruses that infect bacteria).

Direct visualization of viruses became possible after the electron microscope was introduced about 1940. In 1935 tobacco mosaic virus became the first virus to be crystallized; in 1955 the poliomyelitis virus was crystallized. (A virus "crystal" consists of several thousand viruses and, because of its purity, is well suited for chemical studies.) Virology is a discipline of immediate interest because many human diseases, including smallpox, influenza, the common cold, and AIDS, as well as a host of economically important plant and animal diseases, are caused by viruses.

Virtanen, Artturi Ilmari (b. Jan. 15, 1895, Helsinki, Russian Finland—d. Nov. 11, 1973, Helsinki, Fin.), Finnish biochemist whose investigations directed toward improving the production and storage of protein-rich green fodder, vitally important to regions characterized by long, severe winters, brought him the Nobel Prize for Chemistry in 1945.

As a chemistry instructor at the University of Helsinki (1924–39), where he became professor of biochemistry (1939–48), Virtanen studied the fermentation processes that spoil stores of silage. Knowing that the fermentation product, lactic acid, increases the acidity of the silage to a point at which destructive fermentation ceases, he developed a procedure (known by his initials, AIV) for adding dilute hydrochloric or sulfuric acid to newly stored silage, thereby increasing the acidity of the fodder beyond that point. In a series of experiments (1928–29), he showed that acid treatment has no adverse effect on the nutritive value and edibility of the fodder and of products derived from animals fed the fodder.

Virtanen was also a professor of biochemistry at the Helsinki University of Technology (1931–39) and director of Finland's Biochemical Research Institute, Helsinki, from 1931. He did valuable research on the nitrogen-fixing bacteria in the root nodules of leguminous plants, on improved methods of butter preservation, and on economical, partially synthetic cattle feeds. His *AIV System as the Basis of Cattle Feeding* appeared in 1943.

Virtsjärv (Estonia): *see* Võrtsjärv.

virtual reality (VR), the use of computer modeling and simulation to enable a person to interact with an artificial three-dimensional visual or other sensory environment. VR applications immerse the user in a computer-generated environment that simulates reality through the use of interactive devices, which send and receive information and are worn as goggles, headsets, gloves, or body suits. In a typical VR format, a user wearing a helmet with a stereoscopic screen for each eye views animated images of a simulated environment. The illusion of being there (telepresence) is effected by motion sensors that pick up the user's movements and adjust the view on the screens accordingly, usually in real time (the actual time during which something takes place). Thus, a user can tour a simulated suite of rooms, experiencing changing viewpoints and perspectives convincingly related to his own head turnings and steps. Wearing data-gloves equipped with force-feedback devices that provide the sensation of touch, the user can even pick up and manipulate objects that he sees in the virtual environment. The term virtual reality is also applied to the branch of computer science concerned with the development of such systems.

The basis of virtual reality technology emerged in the 1960s in simulators that taught pilots how to fly planes by using head-mounted displays with tracking systems. Virtual reality came of age in the 1980s, when the U.S military and the National Aeronautics and Space Administration began creating new systems for interactive computer-generated imagery. Varying degrees of VR technology are now used in games, exhibits, and sales presentations as well as in aerospace simulators. Virtual reality has potential applications in many different fields, notably entertainment, medicine and biotechnology, engineering, design, and marketing.

virtue, in Christianity, any of the seven virtues selected as being fundamental to Christian ethics. They consist of the four "natural" virtues, those inculcated in the old pagan world that spring from the common endowment of humanity, and the three "theological" virtues, those specifically prescribed in Christianity and arising as special gifts from God.

Virtue has been defined as "conformity of life and conduct with the principles of morality." The virtues are thus the practical attitudes and habits adopted in obedience to those principles. They have been conventionally enumerated as seven because that number is supposed, when combined with its opposite number of seven deadly sins, to cover the whole range of human conduct.

The natural virtues are sometimes known as the four cardinal virtues (from Latin *cardo,* "hinge") because on them all lesser attitudes hinge. They are prudence, temperance, fortitude, and justice. This enumeration is said to go back to Socrates and is certainly to be found in Plato and Aristotle. Late Roman and medieval Christian moralists—such as Ambrose, Augustine, and Thomas Aquinas—took over the list as a convenient summary of the teaching of the ancient philosophers and of the highest excellence at which they aimed.

To these four, Christianity added the three theological virtues of faith, hope, and love. This classification was taken over directly from the Apostle Paul, who not only distinguished these three as the specifically Christian virtues but singled out love as the chief of the three: "So faith, hope, love abide, these three; but the greatest of these is love." According to Christian teaching, the theological virtues do not originate from the natural man. They are imparted by God through Christ.

Virunga Mountains, Viruṅga also spelled BIRUNGA, also called M'FUMBIRO MOUNTAINS, volcanic range north of Lake Kivu in east-central Africa, extending for about 50 miles (80 km) along the borders of Congo (Kinshasa), Rwanda, and Uganda. The range runs east-west, perpendicular to the rift valley in which lie Lakes Kivu and Edward. Of its eight major volcanic peaks, the highest is Karisimbi, at 14,787 feet (4,507 m). The name Virunga ("Volcanoes"), probably of Swahili derivation, has prevailed over the earlier M'fumbiro ("That Which Cooks"), which is still used in Uganda. Individual volcanoes bear Rwandan descriptive names, such as Sabinio (Sabinyo; "Old Man with Large Teeth") and Muhavura ("Landmark," or "Guide").

The six volcanoes of the centre and east are extinct. Mikeno and Sabinio are the oldest of these, dating from the early part of the Pleistocene Epoch (the Pleistocene began about 1,800,000 years ago and lasted until about 10,000 years ago); their craters have disappeared and erosion has imposed a jagged relief. In the Middle Pleistocene Epoch (900,000 to 130,000 years ago), Karisimbi, Visoke, Mgahinga, and Muhavura appeared, all but Karisimbi possessing a crater summit. The crater of Muhavura contains a small lake. Not more than 20,000 years ago, Nyiragongo and Nyamulagira emerged at the western end of the chain, both with extensive craters. The main crater of Nyiragongo is about three-quarters of a mile (1.2 km) across and contains a liquid lava pool. The lava field of these two volcanoes has remained active, and some of the flows have reached as far as Lake Kivu, notable eruptions occurring in 1912, 1938, and 1948. In 2002 lava from Nyiragongo destroyed much of the nearby city of Goma, Congo.

The Virunga Mountains rise out of densely populated plateaus that are inhabited mostly by Rwandan cultivators and, in certain areas, by cattle herders. The southern sector of Congo's Virunga National Park (*q.v.*) includes those portions of the mountains that are within Congo; the southern flanks of the central and eastern mountains comprise Volcanoes National Park in northwestern Rwanda; and Gorilla National Park includes the Uganda slopes of Mgahinga. Conservation protects the mountains' alpine vegetation, as well as wildlife that includes the golden monkey and the mountain gorilla.

Virunga National Park, formerly ALBERT NATIONAL PARK, park in northeastern Congo (Kinshasa). It was created in 1925 and has an area of 3,050 square miles (7,900 square km). Its southern tip touches the northern shore of Lake Kivu, bypassing the town of Goma to the east. The Virunga Mountains lie between Lakes Kivu and Edward and extend from Congo to Rwanda and Uganda. The great volcanoes of this range, clothed with cloud forests, include the dormant Mikeno, Karisimbi, Visoke, and Sabinio (Sabinyo) and the active Nyiragongo and Nyamulagira. Farther north are the Rutshuru Falls and the Mai ya Moto sulfur springs. Much of the park's central region is occupied by Lake Edward. To the northeast the Ruwenzori Range (*q.v.*) soars to more than 16,000 feet (4,880 m). The park has abundant wildlife, including elephants, hippopotamuses, and mountain gorillas, and okapis. In 1979 UNESCO designated the park a World Heritage site. Deforestation and poaching have resulted from increasing human settlement, including large numbers of refugees from conflicts in Rwanda.

virus, an infectious agent of small size and simple composition that can multiply only in living cells of animals, plants, or bacteria.

A brief treatment of viruses follows. For full treatment, *see* MACROPAEDIA: Viruses.

Viruses are microscopic; they range in size from about 20 to 400 nanometres in diameter (1 nanometre = 10^{-9} metre). By contrast, the smallest bacteria are about 400 nanometres in size. A virus consists of a single- or double-stranded nucleic acid and at least one protein surrounded by a protein shell, called a capsid; some viruses also have an outer envelope composed of fatty materials (lipids) and proteins. The nucleic acid carries the virus's genome—its collectuses of genes—and may consist of either deoxyribonucleic acid (DNA) or ribonucleic acid (RNA). The protein capsid provides protection for the nucleic acid and may contain enzymes that enable the virus to enter its appropriate host cell. Some viruses are rod-shaped, others are icosahedral (a roughly spherical shape that is actually a 20-sided polygon), and still others have complex shapes consisting of a multisided "head" and a cylindrical "tail."

Viruses are classified on the basis of their nucleic acid content, their size, the shape of the capsid, and the presence of a lipoprotein envelope. Thus, the primary division is into two classes: RNA viruses and DNA viruses.

Outside of a living cell, a virus is a dormant particle; but within an appropriate host cell, it becomes an active entity capable of subverting the cell's metabolic machinery for the production of new virus particles.

The virus's developmental cycle begins with the entrance of the particle's nucleic acid, and in some cases its proteins, into a susceptible host cell. Bacterial viruses adsorb and firmly attach to the surface of the bacterium and then penetrate the rigid cell wall, transmitting the viral nucleic acid into the host. Animal viruses enter host cells by a process called endocytosis. Plant viruses, by contrast, enter through wounds in the cell's outer coverings—*e.g.*, through abrasions made by wind or through punctures made by insects.

Once inside the host cell, the viral genome usually directs the production of new viral components—new viral protein is synthesized and new viral nucleic acid is produced. These components are then assembled into complete virions (entire virus particles containing nucleic acid enclosed within a protein capsule), which are discharged from the host cell.

Among bacterial viruses, called bacteriophages, or phages, the release of the new virions is accomplished by lysing (bursting) the host cell. This pattern is called a lytic type of infection. Bacteriophages sometimes, however, show a different pattern of infection, called the lysogenic, or temperate, type. In a lysogenic infection, the viral genome is integrated into the chromosome of the host cell and becomes known as a prophage, which replicates in concert with that chromosome prior to cell

division. In such cases, no progeny virions are produced and the host cell remains intact. The viral genome, however, is being passed on to each new generation of cells that stem from the original host. At some point, the prophage can be excised from the host cell's genome, usually owing to an environmental trigger such as ultraviolet radiation. The viral genome is then able to replicate, with the subsequent bursting of the host cell and the release of new virions.

Occasionally during the prophage's exit, some of the host cell's genetic material will be removed as well. If this phage subsequently infects another host bacterium, the piece of DNA from the previous host may become part of the new host's genome. This exchange of genetic information is called transduction, and the phage capable of carrying out the process is called a transducing phage.

Viral infections of plant and animal cells resemble those of bacterial cells in many ways. The release of new virions from plant and animal cells does not, however, always involve the lysing of the host cell as it does in bacteria. Particularly among animal viruses, the new virions may be released by budding off from the cell membrane, a process that is not necessarily lethal to the host cell.

In general, a viral infection produces one of four effects in a plant or animal cell: inapparent effect, in which the virus lives dormantly in the host cell; cytopathic effect, in which the cell dies; hyperplastic effect, in which the cell is stimulated to divide prior to its death; and cell transformation, in which the cell is stimulated to divide, take on abnormal growth patterns, and become cancerous.

There are a number of different ways an animal can respond to a viral infection. Fever is a general response; many viruses are inactivated at temperatures just slightly above the host's normal body temperature. The secretion of interferon by infected animal cells is another general response. Interferon stimulates infected cells and those close by to produce proteins that interfere with virus replication. Humans and other vertebrates also can mount an immunological attack against a specific virus. The immune system produces antibodies and sensitized cells that are tailor-made to neutralize the infecting virus. These immune defenders circulate through the body long after the virus has been neutralized, thereby providing long-term protection against reinfection by this virus. This long-term immunity is the basis for active immunization against viral diseases. In active immunization, a weakened or inactivated strain of an infectious virus is introduced into the body. This virus does not provoke an active disease state, but it does stimulate the production of immune cells and antibodies, which then protect against subsequent infection by the virulent form of the virus. Active immunizations are now routine for such viral diseases as measles, mumps, poliomyelitis, and rubella.

In contrast, passive immunization is the injection of antibodies from the serum of an individual who has already been exposed to the virus. Passive immunization is used to give short-term protection to individuals who have been exposed to such viral diseases as measles and hepatitis. It is useful only if provided soon after exposure, before the virus has become widely disseminated in the body.

The treatment of an established viral infection usually is restricted to palliation of the specific symptoms; for example, fluid therapy may be used to control dehydration, or aspirin may be given to relieve aches and reduce fever. There are few drugs that can be used to directly combat an infecting virus. This is because viruses use the machinery of living cells for replication; drugs that inhibit viral development also inhibit the functions of the host cell. Nonetheless, a small number of antiviral drugs are available for specific infections.

The most successful controls over viral diseases are epidemiological. Large-scale active immunization programs, for example, can break the chain of transmission of a viral disease. Worldwide immunization is credited with the eradication of smallpox, once one of the most feared viral diseases. Because many viruses are carried from host to host by insects or contaminated food, insect control and hygienic food handling can help eliminate a virus from specific populations.

Historical descriptions of viral diseases date as far back as the 10th century BC. The concept of the virus, however, was not established until the last decade of the 19th century, when several researchers obtained evidence that agents far smaller than bacteria were capable of causing infectious diseases. The existence of viruses was proved when bacteriophages were independently discovered by researchers in 1915 and 1917.

Vis, Italian LISSA, Croatian island in the Adriatic Sea, the outermost major island of the Dalmatian archipelago. Its area is 35 square miles (90 square km), and its highest point is Mount Hum, at 1,926 feet (587 m). Its climate and vegetation are Mediterranean and subtropical, with palms, Mediterranean pines, citrus, eucalyptus, cacti, and early vegetables. Fishing and canning are economically important. Wine making is also important, and Vis has a long history of fine wines.

The town of Vis itself contains the ruins of the Greek colony of Issa, founded in 390 BC. The people were allied with Rome during several of its wars and became part of the empire in 47 BC. Slav settlers began arriving in the 8th century AD, and during the Middle Ages, Byzantium held sway over the island. Thereafter, it was ruled by Venice, Austria, Napoleon's short-lived Illyrian Provinces, and the Austro-Hungarian Empire. It became part of the new Yugoslav state in 1918 and of independent Croatia in 1991.

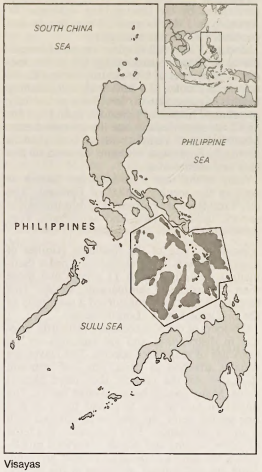
Major naval engagements were fought in nearby waters: in 1811 between Franco-Venetian and British fleets, the latter being victorious; and in 1866 between Austrian and Italian navies, the first clash of modern ironclad steam fleets, in which the Austrians won the day. During World War II the island was liberated from the Germans by Yugoslav Partisan forces and became a centre for joint Allied operations. Pop. (1991) 4,338.

Visalia, city, seat (1853) of Tulare county, south-central California, U.S. It lies on the Kaweah River delta in the San Joaquin Valley, 42 miles (68 km) southeast of Fresno. Founded in 1852 by Nathaniel Vise, it developed as an agricultural (olives, grapes, cotton) and livestock-shipping centre, now supplemented by light manufacturing. It is the seat of the College of the Sequoias (1925). Sequoia and Kings Canyon national parks lie to the east and northeast. Inc. town, 1874; city, 1923. Pop. (1993 est.) city, 82,154; Visalia-Tulare-Porterville MSA, 334,462.

Visayan, also spelled BISAYAN, any of three cultural-linguistic groups of the Philippines—Cebuano, Hiligaynon, and Samaran (*qq.v.*).

Visayas, also called BISAYAS, island group, central Philippines. The Visayas group consists of seven large and several hundred smaller islands clustered around the Visayan, Samar, and Camotes seas. They have a total area of 23,582 square miles (61,077 square km). The seven main islands are Bohol, Cebu, Leyte, Masbate, Negros, Panay, and Samar (*qq.v.*). These islands and their smaller neighbours make up the central group of the Philippine archipelago.

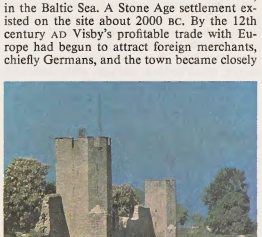
High mountains characterize most of the Visayas with the exception of Samar and Masbate, which are exceedingly hilly. Panay has extensive eastern plains where sugarcane and rice are farmed. Negros has large western plains on which sugarcane is grown. Corn (maize), coconuts, bananas, tobacco, abaca, and root crops also are widely grown, and fishing is also important in the Visayas.



Visayas

The densely populated Visayas island group constitutes an ethnolinguistic region defined by the dominance of the three major Visayan languages: Cebuano (which is the mother tongue of about one-quarter of the Philippines' population), Hiligaynon, and Samaran. Cebuano speakers live mainly on Cebu, Bohol, eastern Negros, and western Leyte. The Hiligaynon are concentrated on Panay, western Negros, and Masbate, while the Samarans are found mainly on Samar and eastern Leyte. The two major Visayan urban centres are Cebu City on Cebu and Iloilo City on Panay. Pop. (1990 prelim.) 13,847,000.

Visby, city and capital of the *län* (county) of Gotland, southeastern Sweden. It lies on the northwest coast of the island of Gotland, in the Baltic Sea. A Stone Age settlement existed on the site about 2000 BC. By the 12th century AD Visby's profitable trade with Europe had begun to attract foreign merchants, chiefly Germans, and the town became closely


Section of the medieval city wall, Visby, Swed.
Sven Samelius

associated with Lübeck and other Hanseatic towns. It reached its zenith in the 13th century as a leading commercial centre of Europe, coining its own money and developing an international maritime code. After the conquest of Gotland by the Danish king Valdemar IV Atterdag in 1361, however, Visby lost its importance in international trade.

Modern Visby still displays traces of its medieval heritage. Surrounding the city's medieval section is a 13th-century wall with 40 towers, 2.1 miles (3.4 km) long and reaching heights of more than 30 feet (9 m). A few lofty merchants' houses of limestone from the 13th and 14th centuries still line the narrow streets. Many relics of Visby's past are contained in Gotlands Fornsal, a museum devoted to history and medieval art.

Visby is the seat of a Lutheran bishop as well as the secular capital of Gotland. The city's residents are employed in administrative service, industry, trade, and handicrafts. Pop. (1990 est.) 21,253.

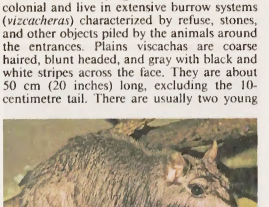
Viscaceae, one of the mistletoe families of flowering plants of the sandalwood order (Santalales), including about 11 genera and more than 450 species of semiparasitic shrubs. This family is sometimes considered a subfamily of the mistletoe family (Loranthaceae).

Members of the Viscaceae are primarily tropical in distribution and are parasites on the branches of many tree species. The leaves are usually attached in pairs, one leaf opposite the other on the branch; they have parallel veins. Many species have scalelike leaves. The unisexual flowers are tiny, and the fruit is a one-seeded berry, the seed being covered with a sticky substance. The European mistletoe (*Viscum album*) and North American mistletoes of the genera *Phoradendron* and *Arceuthobium* are well-known members of the family.

viscacha, any member of two genera of South American rodents belonging to the family Chinchillidae (order Rodentia), found in rocky, mountainous country (mountain viscacha) or on the Argentine pampas (plains viscacha).

Mountain viscachas, or mountain chinchillas (*Lagidium*), are large eared, rabbitlike, and about 35 cm (13.5 inches) long excluding the black, 25-centimetre tail. The soft fur, which is mixed with wool and used for yarn, is tan or grayish, often with a black middorsal stripe. These viscachas are diurnal and gregarious and shelter in burrows or crevices. They are agile and feed on plants. Litters, usually of one young, are born two or three times a year; gestation is about three months.

Plains viscachas (*Lagostomus maximus*) are colonial and live in extensive burrow systems (*vizcacheras*) characterized by refuse, stones, and other objects piled by the animals around the entrances. Plains viscachas are coarse haired, blunt headed, and gray with black and white stripes across the face. They are about 50 cm (20 inches) long, excluding the 10-centimetre tail. There are usually two young per litter; gestation takes about four months. Agile and fast, plains viscachas are considered pests because of their burrowing and because they feed on grasses needed for domestic animals.



Plains viscacha (*Lagostomus maximus*)
Tom McHugh—Photo Researchers

visceral arch (anatomy): *see* branchial arch.

visceral leishmaniasis (disease): *see* kala-azar.

Vischer FAMILY, sculptors and brass founders working in Nürnberg in the 15th and 16th centuries. Hermann the Elder (d. Jan. 13, 1488) established the foundry. His son Peter the Elder (1460–1529) was the most celebrated member of the family, producing monumental brasswork and bronzework that attracted patrons from as far off as Poland and Hungary. Works by Peter, who was assisted by his five sons, include the tomb of Archbishop Ernst von Sachsen in Magdeburg Cathedral (1494–95); the colossal bronze figures of Theodoric and King Arthur (1513) for the tomb planned by the emperor Maximilian I; and the Shrine of St. Sebaldus (1516) in the Church of St. Sebaldus in Nürnberg.

Vischer, Friedrich Theodor von (b. June 30, 1807, Ludwigsburg, Württemberg [Germany]—d. Sept. 14, 1887, Gmunden, Austria), German literary critic and aesthetician known for his efforts to create a theoretical basis for literary realism.

Vischer's theories of aesthetics, based on ideas of G.W.F. Hegel, began to develop while he was teaching at the University of Tübingen, where he had studied. He became a professor at Tübingen in 1844 but was suspended for two years because of an outspokenly liberal inaugural address. His work was finally published in six volumes as *Asthetik, oder Wissenschaft des Schönen* (1846–57; "Aesthetics, or Fine Arts"). In 1855 he became professor at Zürich, but he returned to Tübingen in 1866.

Vischer's other works include *Kritische Gänge,* 2 vol. (1844; "Critical Path"), a collection of essays, and *Altes und Neues* (1881; "Old and New"). He also wrote a whimsical popular novel, *Auch Einer,* 2 vol. (1879; *The Humour of Germany*).

viscometer, instrument for measuring the viscosity (resistance to internal flow) of a fluid. In one version, the time taken for a given volume of fluid to flow through an opening is recorded. In the capillary tube viscometer, the pressure needed to force the fluid to flow at a specified rate through a narrow tube is measured. Other types depend on measurements of the time taken for a sphere to fall through the fluid, or of the force needed to rotate the inner cylinder of a coaxial pair (the space between the two cylinders being filled with the fluid under test), or of the rate at which oscillations of a disk vibrating in the fluid die out.

Visconti FAMILY, Milanese family that dominated the history of northern Italy in the 14th and 15th centuries.

Originating in the minor nobility, the family probably obtained the hereditary office of viscount of Milan early in the 11th century, transforming the title into a surname. The Visconti gained ascendancy in Milan through Pope Urban IV, who appointed Ottone Visconti (1207–95) archbishop of Milan in 1262 to counterbalance the power of the ruling Della Torre family. Ottone defeated the Della Torre at the Battle of Desio (1277), claimed the old temporal powers of the archbishops of Milan, and gradually transferred authority to his grandnephew Matteo I (*see* Visconti, Matteo I).

Acquiring the titles of imperial vicar (representative of the empire) and *signore* (lord) of Milan, the Visconti extended their sovereignty over many north Italian cities, arousing the opposition of Pope John XXII, who placed Milan under interdict and went so far as to preach a crusade against the Visconti.

After Matteo's abdication (1322) in favour of his son Galeazzo I (*c.* 1277–1328), the dynasty consolidated its power, continuing its territorial expansion and concluding marriage alliances with the rulers of other Italian cities and with princely families of France, Germany, and Savoy. When Galeazzo I was succeeded by his son Azzo (1302–39), peace was concluded with the pope (1329). A crisis created by Azzo's death without heirs in 1339 was solved with the election of his uncles Luchino (1292–1349) and Giovanni (1290–1354), younger sons of Matteo I, as joint lords. Under their rule, territory lost during the struggle against the pope was regained, and the boundaries of the state were further extended. After Luchino's death in 1349, the title of *signore* became hereditary. Giovanni Visconti, who also had become archbishop of Milan in 1342, continued as lord of Milan, while its territory was increased by the temporary annexation of Bologna and Genoa in the 1350s.

After Giovanni's death, the Visconti dominions were shared among his three nephews. When Matteo II (*c.* 1319–55) died, Bernabò (1323–85) and Galeazzo II (*c.* 1321–78) divided Milan and its territory, Bernabò taking the eastern area and Galeazzo II the western. Established at Pavia (south of Milan), Galeazzo II became a patron of artists and poets, including Petrarch, and founded the University of Pavia. Ruling independently, the brothers pursued a coordinated policy, their territorial interests involving them in all the Italian wars of the time, mainly against Florence and the popes.

After Galeazzo II died in 1378, Bernabò contracted a military alliance with the French prince Louis of Anjou. In 1385 Galeazzo II's son Gian Galeazzo seized Bernabò, who died in prison a few months later.

Under Gian Galeazzo the Visconti reached their greatest power. At his death in 1402, the Visconti were dukes of Milan and counts of Pavia, and the family controlled most of northern Italy (*see* Visconti, Gian Galeazzo). His rule was followed by the catastrophic reign of his elder son, Giovanni Maria (1388–1412), under whom Gian Galeazzo's conquests were lost and many Lombard cities reverted to local lords. Described by contemporaries as incompetent and morbidly cruel, perhaps insane, Giovanni Maria was assassinated by conspirators in 1412.

His brother Filippo Maria (1392–1447), succeeding to the dukedom, managed, by marriage to the widow of the condottiere (mercenary captain) Facino Cane, to gain control of Cane's troops and territories and gradually reconstructed the Visconti dominions. A neurotic recluse beset by bad health, Filippo Maria nevertheless succeeded in dominating Italian affairs. In Milan he reorganized the government finances and introduced the silk industry. In 1447, when a Venetian army advanced on Milan, Filippo Maria appealed for help to his son-in-law the condottiere Francesco Sforza, husband of his only daughter Bianca Maria. Filippo Maria died suddenly, however, leaving the duchy to be contested between Sforza and King Alfonso V of Aragon, whom Filippo Maria had designated his heir. Sforza won and soon restored the Visconti state under his own dynasty. Visconti governmental institutions survived into the 18th century, and, although the Visconti name disappeared with Bianca Maria, Visconti blood was transmitted through the female line to the great dynasties of Europe: the Valois of France, the Habsburgs of Austria and Spain, and the Tudors of England.

Visconti, Gian Galeazzo, byname COUNT OF VALOUR, Italian CONTE DI VIRTÙ (b. 1351, Milan—d. Sept. 3, 1402, Melegnano, near Milan), Milanese leader who brought the Visconti dynasty to the height of its power and

almost succeeded in becoming the ruler of all northern Italy.

The son of Galeazzo II Visconti, who shared the rule of Milan with his brother Bernabò, Gian Galeazzo was married in 1360 to Isabella of Valois, daughter of the king of France. After his father's death in 1378, Gian Galeazzo succeeded him as ruler of the western half of Milan and its territory, with headquarters at Pavia, south of Milan. In 1382, when Bernabò contracted a military alliance with the French prince Louis of Anjou and planned to marry his daughter Lucia to Louis's son, Gian Galeazzo took alarm, viewing the marriage as an enhancement of Bernabò's position and a threat to his own. In 1385 he ambushed and captured Bernabò. Two months later, when Bernabò's granddaughter Isabella of Bavaria married Charles VI and became queen of France, the feud between uncle and nephew became an element in French politics. Bernabò died in prison the same year, possibly from poisoning. In 1387 Gian Galeazzo's daughter Valentina was married to the French king's brother Louis, duc d'Orléans, a union that later resulted in the claims of Louis XII and Francis I to the duchy of Milan.

Gian Galeazzo united all the Visconti dominions in his own hands and further amplified them by his military power and his clever manipulation of rival cities. An able administrator, he aimed at transforming his territories into a united state, and encouraged the training of government officials at the University of Pavia. During the second year of his reign, the building of the cathedral of Milan was begun, and in 1396 he founded the celebrated Carthusian monastery, the Certosa di Pavia. He was strongly influenced by the poet Petrarch, who had lived at Galeazzo II's court and had directed the collection of the Visconti library.

Overthrowing the della Scala dynasty of Verona in 1387, Gian Galeazzo gained control of the greater part of the March of Treviso (north of Venice). In return for a large bribe, the German king Wenceslas made him a hereditary prince of the Holy Roman Empire, with titles of duke of Milan (1395) and count of Pavia (1396). Pisa and Siena accepted Gian Galeazzo's lordship in 1399, Perugia and other Umbrian towns in 1400. In 1402 he annexed Bologna. Only Florence stood between him and the lordship of all northern Italy. Three months after the seizure of Bologna, his armies had been mustered for an attack on Florence when he died of the plague.

Visconti, Louis-Tullius-Joachim (b. Feb. 11, 1791, Rome—d. Dec. 23, 1853, Paris), Italian-born French designer of the tomb of Napoleon I and one of the architects of the French Bibliothèque Nationale.

Visconti's father, a celebrated Italian archaeologist, fled Rome with the boy in 1798. Visconti studied architecture with Charles Percier at the École des Beaux-Arts in Paris. He was awarded a second *grand prix d'architecture* and the *prix départemental* by the Academy and in 1825 was appointed architect of the Bibliothèque Nationale, where his chief responsibility was the restoration of the public reading room.

Visconti made his early reputation as a domestic architect, although he built a number of public fountains in Paris, including the Fontaine Gaillon (1824–28), the Fontaine Louvois (1835–39), and the Fontaine Molière (1841–43). He participated in the Picturesque and Gothic revivals, his works reflecting those fashions including the Château de Lussy (1844), which is modelled after an English cottage.

In 1842 Louis-Philippe ordered the ashes of Napoleon brought back to the Hôtel des Invalides, and Visconti was commissioned to design an appropriate tomb; the result was a sumptuous structure in variously coloured marbles. After the accession of Napoleon III, Visconti was given the task of designing a connecting structure between the old Louvre and the Tuileries. Visconti's design was eventually carried out but with extensive decorative modifications by H.-M. Lefuel.

Visconti, Luchino, in full DON LUCHINO VISCONTI, CONTE (count) DI MODRONE (b. Nov. 2, 1906, Milan—d. March 17, 1976, Rome), Italian motion-picture director whose realistic treatment of individuals caught in the conflicts of modern society contributed significantly to the post-World War II revolution in Italian filmmaking and earned him the title of father of Neorealism. He also established himself as an innovative theatrical and opera director in the years immediately after World War II.

Born into an aristocratic family, Visconti was well acquainted with the arts: his mother was a talented musician, and throughout his childhood his father engaged performers to appear at their private theatre. He studied cello for 10 years and spent a short time as a theatrical set designer. He also had a solid classical education. In 1935 Visconti was hired as an assistant to the French motion-picture director Jean Renoir, who developed his sensitivity to social and political issues.

Ossessione (1942; "Obsession"), an adaptation of James M. Cain's novel *The Postman Always Rings Twice*, established his reputation as a director. In it he used natural settings, combined professional actors with local residents, experimented with long-travelling camera shots, and incorporated sequences taken with hidden cameras to enhance authenticity. A masterpiece of realism, this film foreshadowed the postwar Neorealist work of such internationally important filmmakers as Roberto Rossellini and Vittorio De Sica. Six years later *La terra trema* (1948; *The Earth Trembles*), a documentary-style study of Sicilian fishermen filmed entirely on location and without actors, won the Grand Prize at the Venice Film Festival. Visconti's other widely acclaimed films include *Bellissima* (1951; *The Most Beautiful*) and *Siamo donne* (1953; *We the Women*), both starring Anna Magnani; *Rocco e i suoi fratelli* (1960; *Rocco and His Brothers*); and *Il gattopardo* (1963; *The Leopard*), based on the novel by Giuseppe di Lampedusa about a traditional aristocrat with liberal convictions, a character with whom Visconti strongly identified; *Lo straniero* (1967; *The Stranger*); *La caduta degli dei* (1969; *The Damned*); and *Morte a Venezia* (1971; *Death in Venice*). At the time of his death he had nearly finished editing his last film, *L'innocente* (*The Innocent*), based on the novel by Gabriele D'Annunzio.

As a theatrical director Visconti introduced to Italy the work of such French and U.S. playwrights as Jean Cocteau, Jean-Paul Sartre, Arthur Miller, Tennessee Williams, and Erskine Caldwell. He built up a repertory company that supplied actors for later films.

During the 1950s Visconti produced internationally recognized operas starring the soprano Maria Callas. Combining realism and spectacle, he scored artistic successes with productions of *La traviata* (1955), *La sonnambula* (1955), and *Don Carlos* (1958, Covent Garden, London).

Visconti, Matteo I, byname MATTEO THE GREAT, Italian MATTEO IL GRANDE (b. Aug. 15, 1250, Invorio, Lombardy—d. June 24, 1322, Milan), early head of the powerful dynasty of the Visconti, who for almost two centuries ruled Milan.

Installed as captain of the people in 1287 with the help of his great-uncle Ottone Visconti, archbishop of Milan, Matteo succeeded in extending his six-month term to five years and in being several times reelected. In 1294 the German king Adolf of Nassau made him imperial vicar in Milan. Exiled in 1302, when the Della Torre family, rulers of the city in the first half of the 13th century, returned to power, he recovered Milan in 1310 with the aid of the Holy Roman emperor Henry VII. His position was strengthened by the Emperor's sojourn in Italy, and by 1315 he ruled through his own military efforts and those of his sons the important north Italian cities of Piacenza, Bergamo, Lodi, Como, Cremona, Alessandria, Tortona, Pavia, Vercelli, and Novara. Opposed in his drive for power by Pope John XXII, Matteo in 1317 renounced the title of imperial vicar to placate the Pope, assuming that of lord of Milan. The Pope, nevertheless, excommunicated him in 1320, accusing the Visconti of heresy and witchcraft, and declared an interdict against the city. In May 1322 Matteo abdicated in favour of his son Galeazzo I and died a month later.

Visconti, Tedaldo, Tedaldo also spelled TEBALDO (pope): *see* Gregory X, Blessed.

Visconti-Venosta, Emilio, Marchese (Marquess) (b. Jan. 22, 1829, Milan—d. Nov. 24, 1914, Rome), Italian statesman whose political-diplomatic career of more than 50 years spanned Italian history from the Risorgimento to the power politics of World War I.

A youthful participant in the revolutionary movement against Austrian rule that began in 1848, Visconti-Venosta was forced in 1859 to flee to Piedmont; he served the government there in a diplomatic capacity during the War of Italian Independence (1859–60) that unified most of Italy under the Piedmont-Savoy dynasty. By 1863 he had become minister of foreign affairs of the new Italy. Falling from power because of his part in concluding the Convention of 1864 (in which France agreed to withdraw its troops from Rome in return for moving the Italian capital from Turin to Florence), he briefly became ambassador to Turkey before returning to the Foreign Ministry for the Six Weeks' War of 1866—a portfolio he briefly lost but resumed from 1869 to 1876, during which period Rome was the national capital.

For the next 20 years he was out of the government as a man of the right; the disastrous Battle of Adowa (1896) in Ethiopia, which compromised the foreign policy of the left ministry, brought a new government in which Visconti-Venosta was again foreign minister. In the altered diplomatic world to which he returned, he undertook to improve Italy's relations with France in order to reduce dependence on Germany and Austria-Hungary, Italy's partners in the Triple Alliance. He negotiated an agreement in 1896 by which Italy recognized the French protectorate over Tunisia in return for a guarantee of the rights of Italians in Tunisia. After a year out of office he returned in May 1899 and continued the policy of rapprochement with France, paving the way for the agreement of 1902 by which Italy and France conceded each other a free hand in Morocco and Libya, respectively. He was the Italian delegate to the Algeciras Conference of 1906.

By the time of his death, Visconti-Venosta had seen his pro-French policy produce two gains, first the Italian occupation of Libya after the war with Turkey in 1911–12 and, more significantly, Italy's neutral posture on the outbreak of World War I.

viscosity, resistance of a fluid (liquid or gas) to a change in shape, or movement of neighbouring portions relative to one another. Viscosity denotes opposition to flow. The reciprocal of the viscosity is called the fluidity, a measure of the ease of flow. Molasses, for example, has a greater viscosity than water. Because part of a fluid that is forced to move carries along to some extent adjacent parts,

viscosity may be thought of as internal friction between the molecules; such friction opposes the development of velocity differences within a fluid. Viscosity is a major factor in determining the forces that must be overcome when fluids are used in lubrication and transported in pipelines. It controls the liquid flow in such processes as spraying, injection molding, and surface coating.

For many fluids the tangential, or shearing, stress that causes flow is directly proportional to the rate of shear strain, or rate of deformation, that results. In other words, the shear stress divided by the rate of shear strain is constant for a given fluid at a fixed temperature. This constant is called the dynamic, or absolute, viscosity and often simply the viscosity. Fluids that behave in this way are called Newtonian fluids in honour of Sir Isaac Newton, who first formulated this mathematical description of viscosity.

The viscosity of liquids decreases rapidly with an increase in temperature; the viscosity of gases increases with an increase in temperature. Thus, upon heating, liquids flow more easily, whereas gases flow more sluggishly.

The dimensions of dynamic viscosity are force times time divided by area. The unit of viscosity, accordingly, is newton-second per square metre.

For some applications the kinematic viscosity is more useful than the absolute, or dynamic, viscosity. Kinematic viscosity is the absolute viscosity of a fluid divided by its mass density. (Mass density is the mass of a substance divided by its volume.) The dimensions of kinematic viscosity are area divided by time; the appropriate units are metre squared per second.

viscount, feminine VISCOUNTESS, a European title of nobility, ranking immediately below a count, or earl.

In the Carolingian period of European history, the *vicecomites,* or *missi comitis,* were deputies, vicars, or lieutenants of the counts, whose official powers they exercised by delegation. As the countships eventually became hereditary, the lieutenancies did so too: for instance, the viscounts in Narbonne, in Nîmes, and in Albi appear to have made their office hereditary by the beginning of the 10th century. Even so, viscounts remained for some time with no other status than that of the count's officers, either styling themselves simply *vicecomites* or qualifying their title with the name of the countship whence they derived their powers.

France. By the end of the 11th century, the universal tendency of feudalism to associate status with the possession of land caused the French viscounts to qualify their title with the name of their own most important fief. In Aquitaine, of which the counts of Poitiers were dukes, and in the county of Toulouse the viscounts were great barons often able to assert themselves against their suzerain (*e.g.,* those of Limoges, of Turenne, of Béziers, and of Carcassonne). In the Île-de-France, in Champagne, and in part of Burgundy, on the other hand, the viscounts by the end of the 12th century were surviving only as minor feudatories, having lost their special administrative functions to the *prévôts.*

In Normandy, however, the judicial functions of the viscounts as deputies of the duke remained important for some time longer. By the middle of the 11th century most of the country was administratively divided into *vicomtés* (this explains the Norman use of the name *viscounte* or *vicecomes* for the sheriff in England); and under Henry I of England the hereditary holders of the *vicomtés* in his Norman possessions were to a large extent replaced by ducal officials.

England. In England the viscountcy was not introduced into the peerage until nearly 400 years after the Norman conquest: John, Lord Beaumont, who had been created Count of Boulogne in 1436, was in 1440 created Viscount Beaumont in the peerage of England, with precedence over all barons. The oldest English viscountcy surviving in the second half of the 20th century was that of Hereford, created in 1550; the oldest Irish one, however, that of Gormanston, was considerably senior, having been created in 1478.

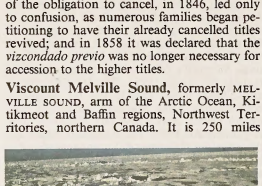
Spain. Viscounts had been set up in Catalonia by Charlemagne in the 8th century, whence the title had spread, with diminishing functions and increasing nobility, to Aragon and to Castile. Philip IV of Spain introduced the system of *vizcondados previos* (regulations of 1631 and of 1664); under this, no one could proceed to the rank of *conde* (count) or *marqués* (marquess) unless he had previously

Viscount, viscountess
foreign-language equivalents

	masculine	feminine
French	vicomte	vicomtesse
Italian	visconte	viscontessa
Japanese	shishaku	shishaku-fujin
Latin	vicecomes	vicecomitissa
Portuguese	visconde	viscondessa
Spanish	vizconde	vizcondesa

been *vizconde;* a fee of 750 ducats had to be paid for this habilitating title (except in the case of counts' sons); and a further fee of 750 ducats was required for the obligatory cancellation of the *vizcondado* when the time came for conferring the higher rank. The removal of the obligation to cancel, in 1846, led only to confusion, as numerous families began petitioning to have their already cancelled titles revived; and in 1858 it was declared that the *vizcondado previo* was no longer necessary for accession to the higher titles.

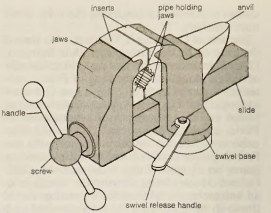
Viscount Melville Sound, formerly MELVILLE SOUND, arm of the Arctic Ocean, Kitikmeot and Baffin regions, Northwest Territories, northern Canada. It is 250 miles



Viscount Melville Sound from the deck of the icebreaker *Manhattan* during its voyage through the Northwest Passage, 1969
Joe Rychetnik—Photo Researchers

(400 km) long and 100 miles (160 km) wide. The discovery of this body of water, reached from the east by Sir William Edward Parry (1819–20) and from the west (1850–54) by Sir Robert McClure, proved the existence of the Northwest Passage and provided passage through the Arctic archipelago. A crossroads of Arctic waterways, the sound lies between Banks, Victoria, and Prince of Wales islands on the south and Melville and Bathurst islands on the north. This section of the Northwest Passage is navigable only under favourable weather conditions.

vise, also spelled VICE, device consisting of two parallel jaws for holding a workpiece; one of the jaws is fixed and the other movable by a screw, a lever, or a cam. When used for holding a workpiece during hand operations,



Bench and pipe vise

such as filing, hammering, or sawing, the vise may be permanently bolted to a bench. In vises designed to hold metallic workpieces, the active faces of the jaws are hardened steel plates, often removable, with serrations that grip the workpiece; to prevent damage to soft parts, the permanent jaws can be covered with temporary jaws made from sheet copper or leather. Pipe vises have double V-shaped jaws that grip in four places instead of only two. Woodworking vises have smooth jaws, often of wood, and rely on friction alone rather than on serrations.

For holding workpieces on the tables of machine tools, vises with smooth hardened-steel jaws and flat bases are used. These machine vises are portable but may be clamped to the machine table when in use; means may also be provided for swivelling the active part of the vise so that the workpiece can be held in a variety of positions relative to the base. For holding parts that cannot be clamped with flat jaws, special jaws can be provided.

Viseu, *distrito* ("district") northern Portugal. Framed by the Caramulo, Arada, and Montemuro mountains in the west, the district is drained by the upper basin of the Mondego and Vouga rivers. It is densely populated in the more humid western plateaus, with impressive flights of cultivated terraces on the deep valley slopes, which produce chiefly corn (maize), cabbage, grapes, and sheep. The chief town is Viseu, which is the district capital. There are uranium and tin deposits in the region. Area 1,933 square miles (5,007 square km). Pop. (1990 est.) 419,400.

Viseu, town, capital, and *concelho* (township), Viseu *distrito* ("district"), northern Portugal, southeast of Porto. The town's notable landmarks include the Romanesque and Gothic cathedral (12th and 16th centuries) and the Grão-Vasco Museum, which is dedicated to the works of a 16th-century school of painting headquartered in Viseu. Nearby are the ancient city of Vaca and the Cava de Viriato, a Roman military colony founded in the 2nd century BC. The locality is famous for its wine (called Dão) and annual agricultural fair. Local handicrafts include black pottery, bobbin lace, embroidery, and copper and wrought iron articles. Pop. (1981) town, 21,454; (1987 est.) *concelho,* 83,500.

Vishākhapatnam, city, northeastern Andhra Pradesh state, southern India. It lies on the Bay of Bengal, about 380 miles (612 km) northeast of Madras. Vishākhapatnam lies along a small bay, and its natural harbour is formed by two promontories, the southern one of which is separated from the city by a small river. Vishākhapatnam's port has grown greatly in importance because it has the only protected harbour on the Coromandel Coast. Improvements to the harbour have made it capable of accommodating ships with a draft of 33.5 feet (10.2 m). The city is also an important shipbuilding centre; the first steamer to be built in India was launched in Vishākhapatnam's harbour in 1948. The suburb of Waltair, at the north end of the bay, is the site of

Andhra University. Vishākhapatnam exports manganese and oilseeds and has an oil refinery. A medical college and medical museums are located there.

The surrounding area is dominated on the west by the well-forested Eastern Ghāts and farther east is drained by numerous rivers, among them the Godāvari and Indrāvati. Agriculture is the mainstay of the region's economy. Pop. (1991 prelim.) city, 750,024; metropolitan area, 1,051,918.

Vishinsky, Andrey Yanuaryevich: *see* Vyshinsky, Andrey Yanuaryevich.

Vishnu, Sanskrit VIṢṆU, one of the principal Hindu deities, worshiped as the protector and preserver of the world and restorer of dharma



Vishnu, brass statue, South India, possibly 14th century

By courtesy of the Museum of Fine Arts, Boston, the Marianne Brimmer Fund

(moral order). Vishnu, like Śiva (the other major god of Hinduism), is a syncretic personality who combines many lesser cult figures and local heroes. He is known chiefly through his avatars (incarnations), particularly Rāma and Krishna.

Vishnu was not a major deity in the Vedic period. A few Rigvedic hymns (*c.* 1400–1000 BC) associate him with the sun and relate the always popular legend of his three strides across the universe (which later formed the basis of the mythology of his avatar Vāmana, the dwarf). Legends of other avatars are found in the early literature and by the time of the *Mahābhārata* they begin to be identified with Vishnu. In theory, Vishnu manifests a portion of himself anytime he is needed to fight evil, and his appearances are innumerable; but in practice, 10 are most commonly recognized (*see* avatar).

Temple images of Vishnu depict him either sitting, often in the company of his consorts Lakṣmī (also called Śrī) and Bhūmidevī (Earth); standing holding various weapons; or reclining on the coils of the serpent Śeṣa, asleep on the cosmic ocean during the period between the periodic annihilation and renewal of the world. The standing Vishnu is dressed in royal garments and holds in his four (sometimes two) hands the *śaṅkha* (conch), *cakra* (discus), *gadā* (club), or *padma* (lotus). On his chest is the curl of hair known as the *śrīvatsa* mark, a sign of his immortality, and around his neck he wears the auspicious jewel Kaustubha. In painting, Vishnu is usually shown as dark complexioned, a distinguishing feature also of his incarnations.

Vishnu's mount is the bird Garuḍa; his heavenly abode is called Vaikuṇṭha. Among the 1,000 names of Vishnu (repeated as an act of devotion by his worshipers) are Vāsudeva, Nārāyaṇa, and Hari.

Vishnuism (Hinduism): *see* Vaishnavism.

Vishnupur (India): *see* Bishnupur.

Vishtaspa (king of Parsa): *see* Hystaspes.

visible trade, in economics, exchange of physically tangible goods between countries, involving the export, import, and re-export of goods at various stages of production. It is distinguished from invisible trade, which involves the export and import of physically intangible items such as services.

Countries lacking various raw materials will import needed substances such as coal or crude oil from nations able to export such materials. Sometimes raw materials will be partially processed or converted into producer goods within the country from which they originate. Goods may also be processed into consumer goods prior to export or import and prior to the ultimate purchase by the buyer. These consumer goods may be durable (consumed over a period of time), as are appliances or automobiles, or nondurable (consumed almost immediately), as is food. Visible trade also includes the export and import of goods used directly in the production of other goods and services (capital goods) such as industrial machinery and equipment.

The relationship of visible trade exports to imports is reflected in a country's balance of trade or visible balance. A surplus in the balance of trade occurs when exports exceed imports and a deficit occurs when imports are greater than exports. The balance of trade is the major component of a country's balance of payments, which includes debits and credits resulting from invisible trade.

Visigoth, member of a division of the Goths (*see* Goth). One of the most important of the Germanic peoples, the Visigoths separated from the Ostrogoths in the 4th century AD, raided Roman territories repeatedly, and established great kingdoms in Gaul and Spain.

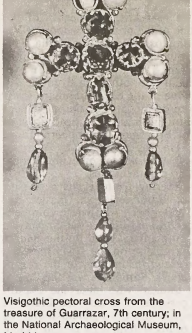
The Visigoths were settled agriculturists in Dacia (now in Romania) when they were attacked by the Huns in 376 and driven southward across the Danube River into the Roman Empire. They were allowed to enter the empire but the exactions of Roman officials soon drove them to revolt and plunder the Balkan provinces, assisted by some Ostrogoths. On Aug. 9, 378, they utterly defeated the army of the Roman emperor Valens on the plains outside Adrianople, killing the emperor himself. For four more years they continued to wander in search of somewhere to settle. In October 382 Valens' successor, Theodosius I, settled them in Moesia (in the Balkans) as federates, giving them land there and imposing on them the duty of defending the frontier. It was apparently during this period that the Visigoths were converted to Arian Christianity. They remained in Moesia until 395, when, under the leadership of Alaric, they left Moesia and moved first southward into Greece and then to Italy, which they invaded repeatedly from 401 onward. Their depredations culminated in the sack of Rome in 410. In the same year Alaric died and was succeeded by Ataulphus, who led the Visigoths to settle first in southern Gaul, then in Spain (415).

In 418 they were recalled from Spain by the patrician Constantius, who later became emperor as Constantius III, and were settled by him as federates in the province of Aquitania Secunda between the lower reaches of the Garonne and Loire rivers. Their chieftain Wallia died soon after the settlement in Aquitaine was carried out, and he was succeeded by Theodoric I, who ruled them until he was killed in 451 fighting against Attila in the Battle of the Catalaunian Plains. Theodoric I is the first Visigothic leader who can properly be described as a monarch.

While persistently trying to extend their territory, often at the empire's expense, the Visigoths continued to be federates until 475, when Theodoric's son Euric declared himself an independent king. Euric also codified the laws issued by himself and his predecessors and fragments of his code, written in Latin, have survived. It was under him, too, that the Gallic kingdom, of which the capital was at Toulouse, reached its widest extent. It stretched from the Loire to the Pyrenees and to the lower reaches of the Rhône River and included the greater portion of Spain. Euric, a fervent Arian, was succeeded by his tolerant son Alaric II, who in 507 was defeated and killed by Clovis and the Franks at the decisive battle of Vouillé near Poitiers.

As a result of Vouillé the Visigoths lost all their possessions in Gaul apart from Septimania, a strip of land stretching along the coast from the Pyrenees to the Rhône with Narbonne as its capital, which the Franks were never able to wrest from them. Henceforth, until they were finally destroyed by the Muslims in 711, the Visigoths ruled Septimania and much of Spain, with Toledo as their capital.

Visigothic art, artistic style produced in southern France and Spain under the Visigoths, who ruled the region between the 5th and the 8th century AD. The style is largely the result of local Roman traditions combined with Byzantine influences. The effect of Germanic metalworking techniques is also seen in the decorative arts, but the ornamentation of



Visigothic pectoral cross from the treasure of Guarrazar, 7th century; in the National Archaeological Museum, Madrid

Archivo Mas, Barcelona

these pieces, most notably a collection of jeweled crowns and crosses known as the treasure of Guarrazar, owes nothing to the Germanic artistic traditions. Instead, plant and animal motifs from the Mediterranean and Eastern traditions are used.

The architecture of the Visigoths was small in scale, but its masonry work was excellent, stone vaulting was often employed, and horseshoe arches were characteristic. Buildings of the 7th century, such as San Juan Bautista, Baños de Cerrato (661), were most often basilican in plan and short and wide in elevation. Ornamental sculpture was a distinctive feature of these churches.

vision, physiological process of distinguishing, usually by means of an organ such as the eye, the shapes and colours of objects. *See* eye; photoreception; sense.

Vision of Adamnan, The (Gaelic tale): *see* Adamnan, Vision of.

vision quest, among the American Indian hunters of the eastern woodlands and the Great Plains, an essential part of a young boy's (or, more rarely, a girl's) initiation into adulthood. The youth was sent out from the camp on a solitary vigil involving fasting and prayer in order to gain some sign of the presence and nature of his guardian spirit (*q.v.*). The specific techniques varied from tribe to tribe, as did the age at which the quest was to be undertaken, its length and intensity, and the nature of the sign.

In some traditions the youth would watch for an animal who behaved in a significant way; in others he discovered an object (usually a stone), which resembled some animal. In the predominant form, he had a dream in which his guardian appeared (usually in animal form), instructed him, took him on a visionary journey, and taught him songs. Upon receiving these signs and visions he returned to his home, indicated his success, and sought out a religious specialist for help in interpreting his visions.

The techniques of the vision quest are not confined only to those at puberty. They underlie every visionary experience of the Indian, from those of the ordinary man who seeks to gain contact with and advice from his guardian to the visions of the great prophets and shamans (religious personages with healing and psychic transformation powers). Among the South American Indians, the vision quest, like the guardian spirit, is confined exclusively to the shaman.

Viśiṣṭādvaita (Sanskrit: Nonduality of the Qualified), one of the principal schools of Vedānta, an orthodox philosophy of India. This school grew out of the Vaiṣṇava (worship of the god Vishnu [Viṣṇu]) devotional movement prominent in South India from the 7th century on. One of the early Brahmans (class of priests) who began to guide the movement was Nāthamuni (10th century), head priest of the temple at Śrīraṅgam (in modern Tamil Nadu state). He was succeeded by Yāmuna (11th century), who wrote some philosophic treatises but no commentaries.

The most towering figure is his successor, Rāmānuja, or Rāmānujācārya (master Rāmānuja, *c.* 1050–1137), who wrote commentaries on the *Brahma-sūtras* (the *Śribhāṣya,* "Beautiful Commentary") and on the *Bhaqavadgītā;* and a treatise on the *Upaniṣads,* the *Vedārthasaṃgraha* ("Summary of the Meaning of the Veda"). Rāmānuja was the first of the Vedānta thinkers who made the identification of a personal God with the Brahman of the *Upaniṣads* and the *Vedānta-sūtras* the cornerstone of his system. As a personal God, Brahman possesses all the good qualities in a perfect degree, and Rāmānuja does not tire of mentioning them. He interprets the relationship between the unitary and infinite Brahman and the plural and finite world in a novel way, which, however, has some support in the *Upaniṣads.* For him the relation between the infinite and the finite is like that between the soul and the body. Hence nonduality is maintained, while differences can still be stated. Soul and matter are totally dependent on God for their existence, as is the body on the soul.

God has two modes of being, as cause and as product. As cause, he is in his essence qualified only by his perfections; as product, he has as his body the souls and the phenomenal world. There is a pulsating rhythm in these periods of creation and absorption. For Rāmānuja, release is not a negative separation from transmigration, or series of rebirths, but, rather, the joy of the contemplation of God. This joy is attained by a life of exclusive devotion (*bhakti*) to God, singing his praise, performing adulatory acts in temple and private worship, and constantly dwelling on his perfections. God will return his grace, which will assist the devotee in gaining release.

Viśiṣṭādvaita flourished after Rāmānuja, but a schism developed over the importance of God's grace. For the southern, Sanskrit-using school, the Vaḍakalai, God's grace in gaining release is important, but man himself should make his best efforts. This school is represented by the thinker Veṅkaṭanātha, who was known by the honorific name of Vedāntadeśika (Teacher of Vedānta). The northern, Tamil-using school, the Teṅkalai, holds that God's grace alone is necessary.

The influence of Viśiṣṭādvaita spread far to the north, where it played a role in the devotional renaissance of Vaiṣṇavism, particularly under the Bengal devotee Caitanya (1485–1533). In southern India the philosophy itself is still an important intellectual influence.

visit and search, procedure adopted by a belligerent warship to ascertain whether a merchant vessel is liable to seizure. If an inspection of the papers shows the ship to be an enemy vessel or to be carrying contraband, breaking blockade, or engaging in unneutral service, it is immediately captured. More often there is merely suspicion of such activities, in which case the vessel may be searched. If the searchers are satisfied the vessel is innocent, it is allowed to proceed. If suspicion remains, it may be brought into port for a more thorough search. If it is finally declared innocent and a prize court considers there was no probable cause for capture, the court may order damages to be paid.

As the size of modern ships makes it impossible to search them thoroughly on the high seas, the practice of taking them automatically into port for search was adopted by British warships in World War I. The United States, however, protested on the ground that international law did not permit diversion of the vessel unless search at sea showed probable cause for capture. As a result, the British adopted the navicert system in 1916. The navicert issued by the belligerent's representative in a neutral country was tantamount to a ship's passport, possession of which ensured, in the absence of suspicious circumstances, that the vessel would be allowed to proceed on its way.

While the principle of freedom of the seas normally forbids visit and search of foreign merchant vessels on the high seas in time of peace, the practice has occasionally been extended to "pacific blockades" instituted as measures of reprisal, usually by a large state against a small one. On Oct. 23, 1962, for example, U.S. Pres. John F. Kennedy proclaimed a "quarantine" of Cuba, under which any vessel suspected of carrying prohibited materials, especially missiles, to Cuba would be intercepted within a designated zone around Cuba, stopped, visited, searched, and, if found to be carrying such materials, diverted. If it attempted to escape or resist, it would be shot at and perhaps sunk. A few Soviet vessels were diverted, but none were sunk, and the crisis was soon terminated. This procedure, which resembled pacific blockade, was criticized as contrary to the UN Charter, which prohibited the use or threat of force except in defense against armed attack.

visitador (Spanish: "inspector"), plural VISITADORES, royally appointed official sent periodically in the late Middle Ages to investigate the administration of justice in the towns of the Spanish Kingdom of Castile. In the late 15th century, the *visitadores* were also enjoined to inspect the other aspects of civic administration, including finances and the state of repair of roads and bridges.

The institution of the *visita* ("inspection") was applied also to the Spanish colonies in the Americas. The *visitador* reported to the Council of the Indies (colonial office) in Madrid. *Visitas* were to be initiated without warning; they might concern only one official or province or an entire principal colonial jurisdiction (a viceroyalty or captaincy general), in which case the inspector was called a *visitador general.* Nonroyal appointees were investigated by inspectors appointed by the viceroy or president (chief colonial officials) with the collaboration of the *audiencia* (the administrative and judicial tribunal within their jurisdictions).

King Philip II of Spain (1556–98) made the *visita* a regular feature of colonial government. *Visitas* were usually initiated when complaints against specific colonial officials were lodged with the government in Madrid. The Council of the Indies might order a further investigation if one of the involved parties challenged the original report of the *visitador.* The *visita* (1765–71) of José Gálvez, appointed by Charles III, in New Spain resulted in widespread reforms throughout the Spanish-American colonies. Unlike many *visitadores,* Gálvez forcefully and ruthlessly executed his royal commission even in the face of strong opposition by colonial officials with vested interests, including the viceroy, who was replaced at Gálvez' suggestion.

Visitandine, member of VISITATION ORDER, formally CONGREGATION OF THE VISITATION OF HOLY MARY (V.H.M.), a Roman Catholic order of nuns founded by St. Francis de Sales and St. Jane Frances de Chantal at Annecy, Fr., in 1610. The order was originally destined for charitable work, visiting and caring for the sick and poor in their homes, as well as for prayer. But, after five years of this work, the founders were obliged to accept a rule of strict enclosure, or cloistered life, which at the time was considered an indispensable adjunct of the religious life for women. Although Francis de Sales did not intend for the Visitation nuns to embrace the teaching apostolate, they nevertheless were conducting private academies before 1641. In modern times many Visitandines are devoted to education. The unifying apostolate of the order is the spread of devotion to the Sacred Heart of Jesus. When Francis de Sales died in 1622, there were 13 monasteries; in 1641, the year of Jane de Chantal's death, the number was 85; on the eve of the French Revolution, the order numbered nearly 200 monasteries, with about 7,000 religious. In the late 20th century there were about 190 monasteries.

Visitation, the visit, described in the Gospel According to Luke (1:39–56), made by the Virgin Mary, pregnant with the infant Jesus, to her cousin Elizabeth. At the sound of Mary's greeting, the pregnant Elizabeth felt the infant St. John the Baptist leap in her womb, which, according to later doctrine, signified that he had become sanctified and cleansed of original sin. Mary then said the Magnificat (*q.v.*). The Feast of the Visitation of the Blessed Virgin Mary is celebrated in the Roman Catholic Church on May 31 (or, until 1969, on July 2).

Until the 12th century, representations of the visitation showed the two women greeting each other either with formality and reserve (in the severe tradition of Hellenistic art) or with a tender embrace (of Syrian origin). The more emotional version, in accordance with a later medieval taste for realism, became predominant from the 12th century on. The growing importance of the Virgin as an object of devotion brought about another change at the beginning of the 15th century: Elizabeth was shown kneeling before her cousin. Also in the 15th century, a peculiar version of Byzantine origin began to gain popularity in the west and was widely adopted for a time; it showed the child John the Baptist, visible in the womb of Elizabeth, saluting the Child Jesus,



"Visitation," oil painting by Rogier van der Weyden, *c.* 1435; in the Museum der bildenden Künste zu Leipzig, Germany

By courtesy of the Museum der bildenden Künste zu Leipzig, Germany; photograph, Gerhard Reinhold, Leipzig-Molkau

visible in Mary's womb. This representation was outlawed by the Counter-Reformation Council of Trent, which considered it undignified, and the more sedate version showing Elizabeth kneeling was later imposed.

Visitation Order (nuns): *see* Visitandine.

Viṣṇu (Hindu god): *see* Vishnu.

Viṣṇuism (Hinduism): *see* Vaishnavism.

Visscher, Anna (Roemersdochter) (b. Feb. 2?, 1583, Amsterdam, Neth.—d. Dec. 6, 1651, Alkmaar), Dutch poet and daughter of the Renaissance man of letters Roemer Visscher. She was admired and praised in verse by such poets as Constantijn Huygens and Pieter Corneliszoon Hooft.

Anna Visscher's poetry is rather stiff and impersonal; she wrote for the most part sonnets and *lofliederen*, cleverly devised odes to important personages. She spent 12 years (1602–14) translating *Cent emblèmes Christiens* ("A Hundred Christian Emblems") by Georgette Montenay (first published 1854), but her main contribution to Dutch literature was her publication of a revised and improved version of Roemer Visscher's *Sinnepoppen* ("Emblems") in 1640.

Visscher, Roemer (Pieterszoon) (b. 1547, Amsterdam, Spanish Habsburg domain [now in The Netherlands]—d. Feb. 19, 1620, Amsterdam), poet and moralist of the early Dutch Renaissance who was at the centre of the cultural circle that included the young poets Pieter C. Hooft, Joost van den Vondel, and Gerbrand Bredero. A friend of Henric L. Spieghel and Dirck Coornhert, he was foremost in the movement for the purification and standardization of the Dutch language and the extension of its use in education.

Like most versatile Renaissance men of letters, Visscher did not take himself seriously as a poet. He called his only poetry volume *Brabbeling* ("Jabbering"), and it was first published in 1612 without his knowledge. For the most part love poems, the work as a whole contains many allusions to Dutch social, political, and domestic life, presenting an authoritative picture of Visscher's Amsterdam. The style of the poems varies from fashionable wordplay to a simple, individual use of language that occasionally produces a poignancy rarely found in poetry of the time.

Visscher's other main work, *Sinnepoppen* (1614; "Emblems"), is a collection of short moral pieces, again showing the writer's preference for essentially Dutch themes and objects.

Visser 't Hooft, Willem Adolph (b. Sept. 20, 1900, Haarlem, Neth.—d. July 4, 1985, Geneva, Switz.), Dutch clergyman and theologian who led the World Council of Churches as its secretary-general from 1948 to 1966.

Visser 't Hooft was educated at the Haarlem Gymnasium and prepared for the ministry of the Netherlands Reformed Church at the University of Leiden. His long career as a leader of Christian organizations began with the post of secretary of the World Committee of the Young Men's Christian Association in 1924, which he left in 1931 to become general secretary of the World Student Christian Federation. He was ordained a minister of the Reformed Church of Geneva in 1936.

The movement for cooperation and fellowship between the various Christian churches had resulted in the provisional formation in 1937 in Utrecht, Neth., of the World Council of Churches, and Visser 't Hooft was chosen to be its secretary-general in 1938. After the interruption of this work during World War II, Visser 't Hooft emerged in the postwar decades as a pivotal figure in the ecumenical movement. Under his leadership the World Council of Churches was officially constituted in 1948 by 147 Protestant and Orthodox Catholic denominations, and the organization grew to include nearly 300 denominations in the following decades. Visser 't Hooft played a major role in the inclusion of churches from communist countries in the World Council, and he also sought to enlarge the role played by African, Asian, and Orthodox churches in the organization. His efforts to include the Roman Catholic church as a member proved unsuccessful, however.

Visser 't Hooft served as editor of the *Ecumenical Review* from 1948 to 1966. He was also the author of numerous books on the ecumenical movement and the nature and functions of the church.

Vistula Lagoon, German FRISCHES HAFF, Polish ZALEW WIŚLANY, Russian VISLINSKY ZALIV, shallow, marsh-fringed lagoon on the Baltic coast, bisected by the Polish-Russian border and considered part of the Gulf of Gdańsk. Covering 330 square miles (855 square km), it is 56 miles (90 km) long, 6 to 15 miles (10 to 19 km) wide, and up to 17 feet (5 m) deep. The Nogat, the eastern distributary of the Vistula River delta, is the principal river entering the lagoon. The long, narrow Vistula Spit protects the lagoon from the main body of the Gulf of Gdańsk (northwest); and a narrow, dredged channel offers access to the gulf and the Baltic for the important port of Kaliningrad (Russia). Other ports include Elbląg (Poland) and Baltiysk (Russia). The lagoon has important fisheries.

Vistula River, Polish WISŁA, largest river of Poland and of the Baltic Sea's drainage basin, rising in the Beskid mountains of southern Poland.

The following article summarizes information about the Vistula River. For full treatment, *see* MACROPAEDIA: Europe.

The Vistula flows east and then north through Poland, entering the Baltic Sea through an extensive delta region east of the city of Gdańsk. Its length is 651 miles (1,047 km), and it drains an area of 75,067 square miles (194,424 square km), of which more than four-fifths lies in Polish territory.

The course of the Vistula may be said to consist of three principal sections. Its upper reaches extend from its source generally eastward through Kraków to where it receives the San River near Sandomierz. Along its middle reaches, the Vistula flows northward in a great curve from the mouth of the San to that of the Narew River, near Warsaw. Passing Warsaw, it flows northwestward past Toruń, until, near Bydgoszcz, it turns sharply northeastward to enter the Baltic Sea; in the past there were two main branching channels to the Baltic—the Nogat to the Vistula Lagoon and the Leniwka (now called the Martwa Vistula) to the Gulf of Gdańsk—but the main branch is now a channel running directly to the sea from Świbino. The main right-bank tributaries of the Vistula include the Bug, Wieprz, San, Wisloka, and Dunajec rivers; the Nida, Pilica, Brda, and Wierzyca enter from the left bank.

Climatic variations in the Vistula River basin cause a diversity in runoff and hence marked oscillations in the water level of the river. The Vistula is only navigable by small vessels upstream from the San River; below this point it is accessible to steamers (carrying coal, lumber, and industrial products) between the heavy-industrial centres of Poland in Silesia and the Baltic ports. Eastward the Bug and Narew rivers and the Dnieper-Bug Canal link the Vistula with the inland-waterway systems of Belarus, Ukraine, and Russia.

visual-field defect, a blind spot (scotoma) or blind area within the normal bounds of vision. In most cases the blind spots or areas are persistent, but in some instances they may be temporary and shifting, as in the scotomata of migraine headache. Narrowing of the fields of vision may be due to syphilitic inflammation of the optic nerves or to glaucoma. In this type of defect the field of vision widens as the distance from the observed object increases. In hysteria another type of narrowed vision sometimes occurs, called tunnel vision, or shaft vision, in which the field does not widen with distance.

Constriction of the visual field with enlargement of the natural blind spot at the centre of the field comes from papilledema, the abnormal collection of fluid in the optic disk. The optic disk is the point at which the optic nerve enters the eye; the small blind spot normally present in the centre of the visual field results from the absence of retinal visual cells—rods and cones—in the optic disk.

Blind spots in the interior of the visual fields can result from a number of other causes, including poisoning with wood alcohol or with quinine, diseases that attack the nerve sheaths, deficiency diseases, and atherosclerosis, a form of blood vessel disease in which fatty plaques form in the innermost layer of the vessels.

Blindness in one-half of each of the visual fields is also encountered. This may be in corresponding halves of the fields (homonymous hemianopia) or in the inner or the outer halves (nasal or temporal hemianopia). Similarly, a quarter of each field may be involved. The extent and the location of the blind areas in the visual fields may be clues concerning the location of the lesion responsible. Bitemporal hemianopia—blindness in the two outer halves of the visual fields—suggests, for example, a lesion in the optic chiasma, the point at which the optic nerves from the two eyes meet and at which some of the nerve fibres from one retina cross over to the opposite side of the brain. A tumour of the pituitary may press upon the chiasma and have this effect.

visual pigment, any of a number of related substances that function in light reception by animals by transforming light energy into electrical (nerve) potentials.

It is believed that all animals employ the same basic pigment structure, consisting of a coloured molecule, or chromophore (the

carotenoid retinal, sometimes called retinene), and a protein, or opsin, of moderate size. Retinal$_1$ is derived from vitamin A_1; retinal$_2$ is derived from vitamin A_2.

Many vertebrate animals have two or more visual pigments. Scotopsin pigments are associated with vision in dim light and, in vertebrates, are found in the rod cells of the retina; the retinal$_1$ forms are called rhodopsins, and the retinal$_2$ forms porphyropsins. Photopsin pigments operate in brighter light than scotopsins and occur in the vertebrate cone cells; they differ from the scotopsins only in the characteristics of the opsin fraction. The retinal$_1$ forms are called iodopsins; the retinal$_2$ forms cyanopsins.

visual purple (biochemistry): *see* rhodopsin.

Višvakarman (Sanskrit: "All Accomplishing"), in Hindu mythology, the architect of the gods. The name was originally used as an epithet of any powerful god but later came to personify creative power. Višvakarman is the divine carpenter and master craftsman who fashioned the weapons of the gods and built their cities and chariots. He is the architect of the mythical city, Laṅkā, and is also said to have made the great image of Jagannātha at Puri (Orissa). He revealed the sciences of architecture and mechanics to men and is the patron deity of workmen, artisans, and artists.

Vitaceae, the grape family of flowering plants, in the buckthorn order (Rhamnales), comprising 12 genera of woody plants, most of them tendril-bearing vines. The largest genus, which is pantropic in distribution, is *Cissus,* containing about 350 species. *Vitis,* with about 60 to 70 species, is the one genus in the family of great economic importance; it includes the European wine grape (*V. vinifera*) and the North American fox grape (*V. labrusca*), the parent species of most of the cultivated slip-skin American grapes. The Boston ivy (*q.v.; Parthenocissus tricuspidata*) and the Virginia creeper (*q.v.; P. quinquefolia*) are well-known woody vines common in the eastern United States.

Vital, Ḥayyim ben Joseph (b. 1543, Safed, Palestine [now Zefat, Israel]—d. May 6, 1620, Damascus [now in Syria]), one of Judaism's outstanding Kabbalists (expounder of Jewish esoteric or occult doctrine).

In Safed, Palestine, in about 1570, Vital became the disciple of Isaac ben Solomon Luria, the leading Kabbalist of his time, and after Luria's death (1572) Vital professed to be the sole interpreter of the Lurian school. He became the leader of Palestinian Jewish Kabbalism and served as rabbi and head of a yeshiva (school of advanced Jewish learning) in Jerusalem (1577–85). His major work was the *'Etz ḥayyim* ("Tree of Life"), a detailed exposition of Lurian Kabbala, which also appeared in altered editions by rivals that he repudiated. His son Samuel published accounts of Vital's dreams and visions posthumously under the title *Shivḥe R. Ḥayyim Vital.*

vital rates, relative frequencies of vital occurrences that affect changes in the size and composition of a population. When calculated per 1,000 inhabitants—as is conventional in vital-statistics publications—they are referred to as crude rates. More refined rates often must be used in the more meaningful analysis of population change.

Principal among vital rates are the crude birth rate and the crude death rate; *i.e.,* annual numbers of births or of deaths per 1,000 population, based on the midyear population estimate. The difference between these two rates is the rate of natural increase (or decrease, if deaths exceed births). Rates of natural increase are a net result of fertility trends, health conditions, and variations in the age composition of the population. They approximate rates of population growth, a result of natural increase and the balance of migration (immigrants minus emigrants), when the latter is comparatively small.

The marriage rate records the annual number of marriages per 1,000 inhabitants. It is a crude measure, since, aside from the effects of age composition and preferred ages at marriage, it also is influenced by remarriages of previously widowed or divorced persons. More importantly, it does not include marriage unions that are not legally formalized, and there are differences in the definition of legal marriage. Some countries, for example, recognize common-law marriages as legal, while others do not; and in some Latin-American countries, marriages performed under indigenous tribal rites are not recorded as legal. Divorce rates and the infant mortality rate complete the set of most widely published vital rates. The infant mortality rate is calculated as the number of infant deaths (deaths of children under 12 months of age) occurring in a given year per 1,000 live births occurring in the same year.

These vital rates are widely used and facilitate much useful comparison of time trends and of local variations within or among countries. Being summary measures, they do not reveal many factors that may have a distorting effect for purposes of more specialized comparison. Chief among these factors is the variable age composition of the population. Thus, the crude birth rates are somewhat distorted measures of reproductivity, because the percentage of total population at reproductive ages is not taken into account. The crude death rates distort the comparison of mortality conditions to an even greater extent. Even under the best health conditions, mortality is at least relatively high at advanced ages; therefore, the proportion of aged persons in the population—*e.g.,* those aged 65 and over—has a large effect. *See also* mortality.

For international statistical data on the principal vital rates, *see* the *Britannica World Data* section in the BRITANNICA BOOK OF THE YEAR.

Vitale DA BOLOGNA, Vitale also spelled VIDOLINI, or VIDOLINO, also called VITALE D'AIMO DE' CAVALLI, or VITALE DELLE MADONNE (b. *c.* 1309, Bologna, Emilia [Italy]—d. 1361), Italian painter of the Bolognese school whose early 14th-century paintings in the International Gothic style show a marked Sienese influence.

The first official record of Vitale was in Bologna, where he painted the Odofredi Chapel in the Church of San Francesco. During this period he is credited with painting the "Last Supper" (1340; Pinacoteca, Bologna) for a room of the Monastery of San Francesco, as well as lyrical frescoes for the Chapel of San Lorenzo and the guesthouse of San Francesco.

In 1348 he went to Udine, where he painted the Chapel of San Nicolo in the cathedral there. The frescoes of the life of St. Nicholas in this church have a Giottoesque monumentality of form. The "Madonna dei Battuti" (Vatican Museum) and "Madonna dei Denti" (1345; Galleria Davia-Bargellini, Bologna) are among the only signed works of the artist. The influence of Giovanni Pisano as well as of the Sienese can be seen in the "Madonna dei Denti." The frescoes in the Church of Santa Maria dei Servi in Bologna and in the apse of the Santa Maria in Pomposa (1351) have also been attributed to Vitale. The fresco of the story of St. Eustase, in Pomposa, shows Vitale's use of more violent movement in his compositions.

Vitale's defined work generally displays a play of masses defined by a restless Gothic line. He returned to the serene elegance of his earlier work, however, in the frescoes of the Church of Santa Maria dei Servi in Bologna (*c.* 1355). Other works attributed to Vitale are a Nativity fresco (Pinacoteca Nazionale, Bologna), believed to have been painted in 1350; the "Adoration of the Magi" (National Gallery, Edinburgh); a "St. Anthony" (Pinacoteca Nazionale), and a "St. George and the Dragon" (Pinacoteca, Bologna).

Vitale II Michiel: *see* Michiel, Vitale II.

Vitalian, SAINT, Latin VITALIANUS (b. Segni, Duchy of Rome—d. *c.* Jan. 27, 672, Rome; feast day January 27), pope from 657 to 672.

Consecrated as St. Eugenius I's successor on July 30, 657, Vitalian soon dealt peacefully with monothelitism, a heresy maintaining that Christ had only one will. In 648 the Byzantine emperor Constans II had issued his Typos, an edict forbidding discussion of the monothelite question and attempting to impose unity on the church. Instead, the Typos caused a schism between the Eastern and Western churches. Vitalian avoided condemnation of the Typos, whereupon Constans confirmed his election to the papacy. In 663 Constans visited Rome, where he was royally received by the pope. Constans, in return, however, confiscated all the bronze ornaments of Rome.

In 668 Vitalian consecrated St. Theodore of Tarsus as the first archbishop of Canterbury to rule the whole English church.

vitalism, school of scientific thought—the germ of which dates from Aristotle—that attempts (in opposition to mechanism and organicism) to explain the nature of life as resulting from a vital force peculiar to living organisms and different from all other forces found outside living things. This force is held to control form and development and to direct the activities of the organism. Vitalism has lost prestige as the chemical and physical nature of more and more vital phenomena have been shown.

vitamin, any of various organic compounds that are required in minute quantities in the diet of most animals for the maintenance of normal metabolic functions. Vitamins act especially as coenzymes and precursors of coenzymes in the regulation of metabolic processes. Unlike the macronutrients (proteins, carbohydrates, and fats), they do not provide energy or serve as building units.

A brief treatment of vitamins follows. For full treatment, *see* MACROPAEDIA: Biochemical Components of Organisms.

The value of certain foods in maintaining health was recognized long before the first vitamins were actually identified. In the 18th century, for example, it had been demonstrated that the addition of citrus fruits to the diet would prevent the development of scurvy. In the 19th century it was shown that substituting unpolished for polished rice in a rice-based diet would prevent the development of beriberi. Despite these observations, however, it was not until the early 20th century that the existence of vitamins was actually established. In 1906 the British biochemist Sir Frederick Hopkins demonstrated that foods contained necessary "accessory factors" in addition to proteins, carbohydrates, fats, minerals, and water. Then, in 1912, the chemist Casimir Funk identified that the antiberiberi substance in unpolished rice was an amine (a type of nitrogen-containing compound), so Funk proposed that it be named vitamine—*i.e.,* vital amine. This term soon came to be applied to the "accessory factors" in general, all of which were originally thought to be closely related. It was later discovered that different vitamins have different chemical properties and different functions and that many of them do not contain amines at all. Because of its wide currency, Funk's term continued to be used, but the final *e* was dropped.

In 1912 Hopkins and Funk advanced the vitamin hypothesis of deficiency, a theory

that postulates that the absence of sufficient amounts of a particular vitamin in a system may lead to certain diseases, such as scurvy or beriberi. The letters which were assigned to vitamins in the early days of vitamin research categorize them according to their function. As further research revealed the chemical structure of these substances, they received scientific names, although they are still popularly known by their letter classifications (*e.g.*, vitamin B_2 for riboflavin).

Although the need for vitamins has been demonstrated in a wide range of animals—and even in heterotrophic bacteria and yeasts—a substance that is a vitamin for one species is not necessarily a vitamin for another. Moreover, a substance that can be manufactured by an organism may still be considered a vitamin for that organism if the synthesis of the substance is not always sufficient to meet the organism's metabolic needs. The human nutrient vitamin D, which is essential for bone growth, is an example of such a substance. A form of vitamin D is synthesized in the skin when that tissue is exposed to sunlight. If this tissue synthesis of vitamin D is not sufficient to meet a person's metabolic needs (as is often the case in children, whose rapid skeletal growth requires relatively large amounts of vitamin D), the substance must be provided from the diet. A somewhat similar situation exists with the human nutrient vitamin K. This substance cannot be made by the human body, but it is readily synthesized by the bacteria that normally flourish in the human colon. This bacterial product is absorbed through the colon wall, thereby providing the metabolic needs of the human. It is only when the normal bacterial flora of the colon has been destroyed—for example, by large doses of antibiotics—that vitamin K must be provided in the diet.

In regard to human nutrition, the vitamins can be divided into two categories: water-soluble vitamins (the B vitamins and vitamin C) and fat-soluble vitamins (A, D, E, and K).

Water-soluble vitamins are absorbed by the intestine and carried by the circulatory system to the specific tissues in which they will be put into use. They are distinguished from each other by the degree to which they are soluble in water, a factor that influences their route inside the body. When intake of water-soluble vitamins exceeds a person's need for them, they are stored to a limited extent in body tissue, but most of the excess is excreted in urine.

In their free state, B vitamins are inactive. They must go through several chemical processes to perform their function within the body. Only with the addition of other substances or parts of other molecules do they reach their functional, or coenzyme, form. The coenzyme is a compound that unites with a protein component called an apoenzyme to form an active enzyme. The enzyme then acts as a catalyst in various metabolic and regulatory processes.

The physiological functions of vitamin C are well known, but its precise metabolic mechanisms are less certain. It is not known whether vitamin C acts as a coenzyme. Vitamin C is essential for the growth of bones and teeth, for the maintenance of the subcutaneous tissues and the walls of the blood vessels, and for the healing of wounds. A highly debated medical hypothesis which suggests that the intake of high quantities of vitamin C can help prevent or cure some diseases (such as the common cold and some infectious and malignant diseases) continues to be investigated but with no clear scientific data to support the claims.

The intestine absorbs fat-soluble vitamins with the help of bile salts. The lymph system carries these vitamins to the different parts of the body. The body can store larger amounts of fat-soluble vitamins than of water-soluble ones. The liver provides the chief storage tissue for vitamins A and D, while vitamin E is stored in body fat and to a lesser extent in reproductive organs. Relatively little vitamin K is stored.

The fat-soluble vitamins perform different functions. Vitamin A combines with proteins in the retina of the eye to aid in night vision. It may have other functions that are as yet uncertain. Vitamin D is essential to the growth of the organism, especially in calcium metabolism for bone growth. Vitamin E also facilitates animal growth; deficiencies in the substance cause infertility in some species. Vitamin K is necessary in the enzymatic processes in blood clotting.

vitamin A, a fat-soluble alcohol, most abundant in fish and especially in fish-liver oils. Vitamin A is also found in butter and in the liver fat of various animals. Vitamin A is not present in plants, but many vegetables and fruits contain one or more of a class of pigments that can be converted to vitamin A in the body; of these pigments, β-carotene (provitamin A) is an excellent source of the vitamin. The colour of carrots largely results from their β-carotene content.

Vitamin A is readily destroyed upon exposure to heat, light, or air. The vitamin, which functions directly in vision, is a component of a pigment, called visual purple, present in the retina of the eye.

Several closely related compounds with the effects of vitamin A are found in animal fats. Freshwater-fish oils, for example, contain, in addition to vitamin A_1 vitamin A_2, which differs from the former by having two fewer hydrogen atoms. Vitamin A_2 can also form a visual pigment.

Vitamin A is required by humans in very small amounts; the recommended dietary allowance for adults is 1.0 mg. This can be provided by 6 mg of β-carotene.

The existence of vitamin A was first clearly recognized in 1913; its chemical nature was established in 1933; and it was first synthesized in 1947.

vitamin A deficiency, dietary lack of vitamin A resulting in various disorders that most commonly involve the eye and the epithelial tissues (the skin and the mucous membranes lining the internal body surfaces).

In humans, one of the earliest signs of vitamin A deficiency is night blindness (nyctalopia), the visual failure to adapt promptly from light to darkness and to see in the dark. This aspect of vision is normally dependent on visual purple, or rhodopsin, a protein found in the eye that maintains its photosensitivity only in the presence of vitamin A.

If the deficiency is severe and persists, especially in malnourished infants and children, a condition known as xerophthalmia may develop. In xerophthalmia, the eyes are sensitive to light, the secretion of lubricating tears is stopped, and the eyelids become swollen and sticky with pus. The mucous surfaces of the eye may become eroded in spots, allowing infection to set in, thus leading to ulceration and other destructive changes of the cornea (the transparent outer covering of the eye) and other eye structures. This condition will eventually result in blindness.

Early signs of vitamin A deficiency may also be reflected in changes in the mucous membranes of the mouth, throat, and respiratory and genito-urinary passages. These lining membranes become atrophied and dry and lose their cilia, the tiny hairlike projections that normally help in clearing away foreign particles. The defective mucous surfaces have weakened resistance to bacterial invasion, and their susceptibility to various infections increases. If insufficient intake of vitamin A is prolonged, the skin may become dry and rough, with the appearance of plugs of horny material about the hair follicles (follicular hyperkeratosis).

Vitamin A deficiency may also result in defective bone and teeth formation and in poor general growth. In experimental rats and in cattle, reproduction may either fail totally or result in few live births.

Vitamin A is found in all animal livers (where it is normally stored) and in milk products containing milk fat. In addition, many yellow and green leafy vegetables contain carotenes, chemically related substances that are converted to vitamin A in the body.

Except in the later stages, when cellular damage in the cornea and associated deeper structures is too extensive, xerophthalmia can be effectively treated with vitamin A. It is usually most effective when supported by a well-balanced diet rich in protein. Although xerophthalmia is seldom encountered in countries where dairy products are readily available, it has been a serious problem in certain parts of the world. Xerophthalmia is common among poor preschool children in Indonesia, Bangladesh, India, and the Philippines. It also occurs in some parts of Africa. The global incidence has been estimated at some 500,000 new cases per year, half of which lead to blindness.

vitamin A excess, also called HYPERVITAMINOSIS A, toxic condition most frequently produced by a high intake of vitamin A, generally 150 mg daily over a period of several months. Unlike the water-soluble vitamins (*e.g.*, ascorbic acid, thiamine, riboflavin), vitamin A is soluble in fat, and a surplus in the body is not eliminated in the urine but rather is stored in the liver, where it may eventually reach toxic levels.

General signs of toxicity include nausea, coarsening and loss of hair, drying and scaling of the skin, bone pain, fatigue, and drowsiness. There may also be blurred vision and headache in adults and growth failure, enlargement of the liver, and nervous irritability in infants. Prognosis is good when vitamin A intake is reduced.

Although hypervitaminosis A is most often caused by an excessive, regular intake of vitamin A concentrate, it has also been known to occur among explorers and inhabitants of the Arctic, following large meals of the vitamin A-rich polar bear liver.

Carotene, the yellowish pigment (found in such foods as carrots, sweet potatoes, and egg yolks) that is converted to vitamin A in the body, is not toxic per se, but the blood plasma may contain a high enough concentration of the pigment to impart a yellowish colour to the skin, a condition known as carotenemia.

Consult the INDEX *first*

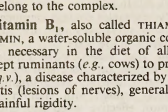
vitamin B complex, several vitamins that traditionally have been grouped together because of loose similarities in their properties, their distribution in natural sources, and their physiological functions, which overlap considerably. All the B vitamins, like vitamin C, are soluble in water, in contrast to the fat-soluble vitamins A, D, E, and K.

Most of the B vitamins have been recognized as coenzymes (substances that participate with enzymes in accelerating the interconversion of chemical compounds), and they all appear to be essential in facilitating the metabolic processes of all forms of animal life. The complex includes pantothenic acid, nicotinic acid, biotin, folic acid (*qq.v.*), riboflavin (*see* vitamin B_2), thiamine (*see* vitamin B_1), pyridoxine (*see* vitamin B_6), and cyanocobalamin (*see* vitamin B_{12}). The compounds carnitine, choline

(*qq.v.*), and lipoic acid, myoinositol (*see* inositol), and *para*-aminobenzoic acid (*q.v.*) perform analogous functions in the animal body and have been included among the B vitamins by certain authorities.

Two growth-promoting substances, tentatively named vitamins B_{13} and B_{15}, also may belong to the complex.

vitamin B_1, also called THIAMINE, or THIAMIN, a water-soluble organic compound that is necessary in the diet of all animals except ruminants (*e.g.*, cows) to prevent beriberi (*q.v.*), a disease characterized by multiple neuritis (lesions of nerves), general debility, and painful rigidity.



Vitamin B_1 (thiamine)

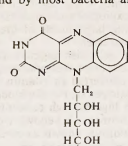
Thiamine was the first vitamin to be isolated in pure form (1926). Its structure was fully elucidated and the vitamin synthesized in 1936.

Thiamine plays an important role in carbohydrate metabolism. It carries out these functions in its active form, as a component of the coenzyme thiamine pyrophosphate.

Thiamine is found most abundantly in cereal grains and in certain other seeds. Pork is one of the richest animal sources. The recommended daily intake of thiamine is 1.0 to 1.1 mg for adult women and 1.2 to 1.4 mg for adult men.

vitamin B_1 deficiency: *see* beriberi.

vitamin B_2, also called RIBOFLAVIN, a yellow, water-soluble organic compound that occurs abundantly in whey (the watery part of milk) and in egg white. An essential nutrient for animals, it can be synthesized by green plants and by most bacteria and fungi. The



Vitamin B_2 (riboflavin)

greenish yellow fluorescence of whey and egg white is caused by the presence of vitamin B_2. Riboflavin was isolated in pure form in 1933 and was first synthesized in 1935.

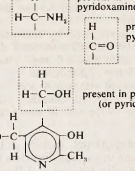
Vitamin B_2 functions as part of metabolic systems concerned with the oxidation of carbohydrates and amino acids, the constituents of proteins. Like vitamin B_1 (thiamine), it is active not in the free form but in more complex compounds known as coenzymes, such as flavin mononucleotide (FMN) and flavin adenine dinucleotide (FAD), or flavoprotein. Vitamin B_2 is widely distributed in both plants and animals, but its abundance varies considerably. Milk, eggs, leafy vegetables, kidney, and liver are good dietary sources. An adult human needs 1.2 to 1.7 mg of the vitamin per day.

vitamin B_2 deficiency, also called RIBOFLAVIN DEFICIENCY, a condition caused by a dietary lack of riboflavin (vitamin B_2), an organic compound of the vitamin B complex. Deficiency is characterized by variable symptoms that may include reddening of the lips with cracks at the corners of the mouth (cheilosis); inflammation of the tongue (glossitis); ocular disturbances, such as vascularization of the eyeball with eyestrain and abnormal intolerance of light; and a greasy, scaly inflammation of the skin. Some disagreement persists as to the characteristic syndrome of riboflavin deficiency in humans because it tends to be associated with a deficiency of other vitamins, notably niacin (*see* pellagra).

vitamin B_6, a water-soluble organic compound that is an essential micronutrient for microorganisms and animals. It occurs in three forms: pyridoxine (or pyridoxol), pyridoxal, and pyridoxamine. Pyridoxine was first isolated in 1938 and synthesized in 1939. Pyridoxal and pyridoxamine, which were discovered in the 1940s, are responsible for most of the vitamin B_6 activity in organisms.

Vitamin B_6 is active in its coenzyme form of pyridoxol phosphate and functions in the formation and breakdown of amino acids, and hence indirectly of protein, in living tissues. It is also involved in the synthesis of serotonin and norepinephrine (two neurotransmitters) and of heme (a molecular constituent of hemoglobin).

No human disease has been found to be caused by a deficiency of vitamin B_6 in the diet, although certain human ailments of obscure origin respond to its administration. In experimental animals, vitamin B_6 deficiency



Vitamin B_6 (pyridoxine form)

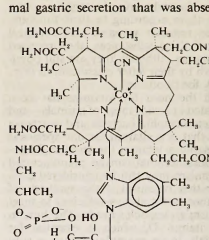
produces symptoms that depend to some extent on the other constituents of the diet; *e.g.*, the skin lesions in rats may not appear if certain fats are present in the food.

About 1950 vitamin B_6 deficiency was produced experimentally in human infants. In infants the deficiency first manifests itself in a convulsion that is readily controlled by administration of the vitamin. Many cases of such convulsions have been reported in infants fed a human-milk substitute with insufficient amounts of vitamin B_6. Because heat treatment of cows' milk destroys the vitamin, the deficiency can be corrected by altering the processing of the milk. An adult human needs 2.0 to 2.2 mg of vitamin B_6 daily.

Pyridoxal, pyridoxamine, and pyridoxine are equally effective in the nutrition of animals, although in microorganisms pyridoxal and pyridoxamine are much more active than pyridoxine. Vitamin B_6 is widely distributed in foodstuffs and is particularly abundant in cereal grains, meats, nuts, and some fruits and vegetables.

vitamin B_{12}, also called CYANOCOBALAMIN, a complex water-soluble organic compound that is essential to a number of microorganisms and animals, including humans. Vitamin B_{12}, known as the anti–pernicious-anemia factor, is also known as the extrinsic factor—a substance from outside the body—that aids in the development of red blood cells in higher animals. The vitamin, which is unique in that it contains a metallic ion, cobalt, has a complex chemical structure. Vitamin B_{12} occurs in several forms, called cobalamins; cyanocobalamin is the principal one used in vitamin supplements and pharmaceuticals.

In the 1930s the American physician W.B. Castle isolated an "intrinsic factor" in normal gastric secretion that was absent in the



Vitamin B_{12}

stomachs of persons suffering from pernicious anemia, an acute and sometimes fatal disorder of the red blood cells. Castle postulated that an "extrinsic factor" that alleviated or prevented pernicious anemia was to be found in animal liver, because improvement had been noted when diets of these patients included large amounts of liver. In 1948–49 simultaneous studies by the chemists Karl Folkers in the United States and Alexander Todd (later created Baron Todd) in England isolated and identified vitamin B_{12} as the pure antianemia factor present in liver. The human daily requirement for vitamin B_{12} is 3 micrograms; good dietary sources are eggs, meat, and dairy products.

So far as is known, vitamin B_{12} is not present in higher plants. It is required in the diet of all higher animals that have been studied. It is synthesized by bacteria, fungi, and algae, and the ultimate source of the vitamin in liver and other animal materials generally appears to be microorganisms of various kinds. Microorganisms that synthesize vitamin B_{12} occur in the rumen (the first stomach chamber) of cows and sheep. From the rumen it is transferred to the muscle and other tissues, which humans eat. Several kinds of bacteria unable to make the substance require minute amounts for growth.

Vitamin B_{12} is involved in cellular metabolism in two active coenzyme forms—methylcobalamin and 5-deoxyadenosylcobalamin. Vitamin B_{12} cooperates with folate in the synthesis of DNA. A deficiency of either compound leads to disordered production of DNA and, hence, to the impaired division of red blood cells that is the cause of pernicious anemia (*q.v.*). Vitamin B_{12} also has a separate biochemical role, unrelated to folate, in the synthesis of fatty acids in the myelin sheath that surrounds nerve cells.

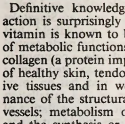
vitamin B_{12} deficiency, a condition in which an organism fails to receive a sufficient quantity of vitamin B_{12} (cyanocobalamin), a micronutrient that is essential to human and animal digestion and nutritional absorption and which is known to prevent pernicious anemia (*q.v.*). Lack of vitamin B_{12} occasions defective formation of the papillae (small projections) of the tongue, giving an appearance of abnormal smoothness. A deficiency of vitamin B_{12} often causes defective function of the intestine, resulting in indigestion and sometimes constipation or diarrhea. A very serious effect is degeneration of certain motor and sensory tracts of the spinal cord: if the degeneration continues for some time, treatment with vitamin B_{12} may not correct it. Initial numbness and tingling of fingers

or toes may, without treatment, progress to great instability of gait or virtual paralysis.

Because vitamin B_{12} is found in animal but not vegetable foods, complete vegetarianism may lead to deficiency. Deficiency may also result from competition for vitamin B_{12} by the broad tapeworm or by intestinal bacteria growing in cul-de-sacs or above partial obstructions in the digestive tract. Additional nutritional deficiencies, such as those of folic acid or iron, are likely to develop in such cases, as in primary intestinal diseases such as chronic celiac disease, tropical sprue, or regional ileitis, all of which affect the absorptive capacity of the small bowel.

vitamin C, also called ASCORBIC ACID, water-soluble, carbohydrate-like substance that is involved in certain of the metabolic processes of animals. Although most animals can synthesize vitamin C, it is necessary in the diet of some, including humans and other primates and guinea pigs, in order to prevent scurvy (*q.v.*), a disease characterized by debility, blood changes, spongy gums, and hemorrhages in the tissues of the body. First isolated in 1928, vitamin C was identified as the curative agent for scurvy in 1932. It has since been the object of continued active laboratory research.

Definitive knowledge of the details of its action is surprisingly scant, even though the vitamin is known to be essential in a variety of metabolic functions, including synthesis of collagen (a protein important in the formation of healthy skin, tendons, bones, and supportive tissues and in wound healing); maintenance of the structural strength of the blood vessels; metabolism of certain amino acids; and the synthesis or release of hormones in the adrenal glands. It has also been suggested that vitamin C plays a part in protecting the body against infection, though scientific data do not clearly support this claim.

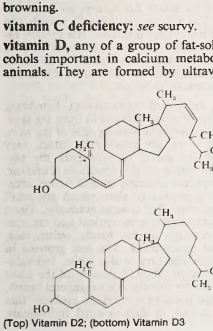


Vitamin C

Relatively large amounts of vitamin C are required—*e.g.*, an adult man is said to need about 70 mg per day. Citrus fruits and fresh vegetables are the best dietary sources of the vitamin. Because vitamin C is easily destroyed by reactions with oxygen, especially in neutral or alkaline solution or at elevated temperatures, it is difficult to preserve in foods. The vitamin is added to certain fruits to prevent browning.

vitamin C deficiency: *see* scurvy.

vitamin D, any of a group of fat-soluble alcohols important in calcium metabolism in animals. They are formed by ultraviolet ir-



(Top) Vitamin D2; (bottom) Vitamin D3

radiation (sunlight) of sterols present in the skin. The most important of these sterols are 7-dehydrocholesterol, formed by metabolic processes in animals, and ergosterol (*q.v.*), present in vegetable oils. The action of sunlight converts these two compounds, respectively, to cholecalciferol, or vitamin D_3, and calciferol, also called ergocalciferol, or vitamin D_2. Vitamins D_2 and D_3 are equivalent in human metabolism, but in birds vitamin D_2 is much less effective than D_3, which therefore is preferred in the formulation of poultry-feed supplements.

After the vitamins are formed from the sterols, further chemical reaction, which occurs in the liver, changes them into compounds that participate in absorption of calcium into the bloodstream and formation of bone. It is not usually essential that vitamin D be taken in food, but winter sunshine in northern regions and sunlight that has passed through certain kinds of glass or through clouds or the contaminated air of cities may lack sufficient amounts of ultraviolet rays to bring about adequate production of the vitamin. Under these conditions, supplementary vitamin D must be ingested. In the United States and Canada it is customarily added to milk. Vitamin D is one of the most active vitamins in terms of the amount required per day. About 10 micrograms (400 International Units) is considered adequate for a growing child.

Lack of vitamin D causes rickets (*q.v.*). A prolonged high intake of the vitamin can cause a toxic reaction (*see* vitamin D excess).

vitamin D deficiency: *see* rickets.

vitamin D excess, also called HYPERVITAMINOSIS D, toxic symptoms resulting from a prolonged high intake of vitamin D, a fat-soluble nutrient. Unlike the water-soluble vitamins, a surplus of vitamin D in the body is not eliminated in the urine but remains in the body, sometimes reaching toxic levels.

A vitamin D-poisoned individual may complain of weakness, fatigue, loss of appetite, nausea, and vomiting. Examination may reveal small yellowish deposits beneath the fingernails, in the eyes, and scattered over the skin. In infants and children there may be growth failure. Because vitamin D is involved in the intestinal absorption of calcium, this mineral may reach abnormally high concentrations in the blood (hypercalcemia), and autopsies have revealed widespread deposition of calcium phosphate throughout the body, particularly in the kidneys. Toxic manifestations have been observed in adults receiving 50,000 to 100,000 International Units daily and in infants on relatively low daily intakes of 2,000 to 4,000 International Units.

vitamin E, a fat-soluble compound (tocopherol) found principally in certain plant oils and the leaves of green vegetables. Wheat-germ oil is a particularly rich source. Vitamin E, first recognized in 1922, was first obtained in a pure form in 1936; it was identified chemically in 1938. A number of similar compounds having vitamin E activity and called tocopherols have been isolated.

Vitamin E acts as an inhibitor of oxidation processes in body tissues. It protects unsaturated fats in the body from oxidation by peroxides and other free radicals. The possibility that vitamin E may help prolong an active life-span by slowing the rate of oxidative destruction of biological membranes is under study. The tocopherols are used commercially as antioxidants to retard the rancidification of fats, especially vegetable oils.

For the effects of depriving animals of this vitamin, *see* vitamin E deficiency.

vitamin E deficiency, dietary lack of vitamin E (a collective term referring to a family of compounds known as tocopherols), which plays an active role as an inhibitor of oxidation processes in body tissues.

The richest sources of vitamin E are vegetable oils and foods that are high in vegetable fats, such as nuts and wheat germ. Lettuce and other leafy green vegetables are also good sources. A naturally occurring dietary deficiency of the vitamin is unlikely.

In experimental animals, the characteristic signs of induced vitamin E deficiency vary with the species. In the mature female rat, reproduction fails because of absorption of the fetus; in the mature male rat, sterility results from degeneration of the germinal tissues. The vitamin deficiency in rabbits and guinea pigs is characterized mainly by acute muscular dystrophy, or wasting away of the muscles. In the chick, vitamin E deficiency leads to abnormalities in the vascular system and muscular weakness. In monkeys experiencing the vitamin deficiency, an anemia usually accompanies muscular weakness.

Humans with a deficiency of vitamin E display, among other symptoms, a mild anemia and a low concentration of tocopherols in the blood plasma. Patients with a chronic deficiency exhibit prolonged malabsorption of fats, as well as mild anemia, unsteadiness (ataxia) and pigmentary changes in the retina. These symptoms respond to prolonged vitamin E treatment.

vitamin K, any of several fat-soluble naphthoquinone compounds present in the leaves of plants. Vitamin K is required for the bodily synthesis of four of the blood's coagulation factors: prothrombin and factors VII, IX, and X. A deficiency of vitamin K in the body leads to an increase in clotting time of the blood (*see* vitamin K deficiency).

In 1929 a previously unrecognized fat-soluble substance present in green leafy vegetables was found to be required for coagulation of the blood to take place. The substance was called vitamin K for Koagulation vitamin. A pure form of the vitamin was isolated and analyzed structurally in 1939; several related compounds having vitamin K activity have also been isolated and synthesized. Vitamin K_1, the compound recognized in 1939, is synthesized by plants, whereas vitamin K_2 is of microbial origin and is the important form in mammalian tissue. All other forms of vitamin K are converted to vitamin K_2 in the body. There are a number of closely related compounds of the vitamin K_2 series.

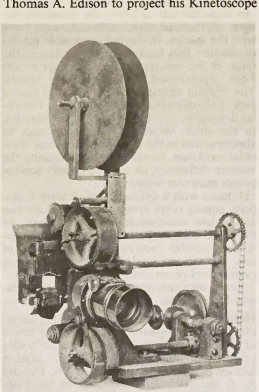
Besides the natural compounds, many synthetic compounds having vitamin K activity are used to decrease blood-clotting time.

vitamin K deficiency, lack of vitamin K in the body, resulting in impaired clotting of the blood and internal bleeding. Blood clotting is delayed or prevented because vitamin K is unavailable to act as a cofactor in the synthesis of the four required coagulation factors (especially prothrombin).

Vitamin K deficiency is seldom naturally encountered in higher animals because the vitamin is usually adequately supplied in the diet, besides being synthesized by intestinal bacteria. In humans, deficiency may occur following the administration of certain drugs that inhibit the growth of the vitamin-synthesizing bacteria or as a result of constitutional disorders affecting the production or flow of bile, which itself is necessary for the intestinal absorption of vitamin K. In newborn infants, the absence of large intestinal bacteria coupled with the absence of body stores of vitamin K may result in a condition known as hemorrhagic disease of the newborn, which can be prevented by the administration of vitamin K to the infant shortly after birth, or to the mother during labour.

Vitascope, motion-picture projector patented by Thomas Armat in 1895; its principal fea-

tures are retained in the modern projector: sprocketed film operated with a mechanism (the "Maltese cross") to stop each frame briefly before the lens, and a loop in the film to ease the strain. The Vitascope was adopted by Thomas A. Edison to project his Kinetoscope



Vitascope, patented by Thomas Armat in 1895
By courtesy of the Smithsonian Institution, Washington, D.C.

films, leading first to the Nickelodeon theatre and soon to the full-length motion picture. *See also* Cinématographe; Kinetoscope.

Vitebsk, *oblast* (province), northeastern Belarus. It has an area of 15,500 square miles (40,100 square km) and lies mostly in the broad, shallow basin of the Western Dvina River. To the east and south the land rises in a series of gently undulating uplands. Swamps are extensive in the Western Dvina basin, but most of the *oblast* is in mixed forest of pine, spruce, oak, birch, and alder; the uplands have been largely cleared for agriculture, bringing about serious soil erosion. Flax and rye are the main crops, and the raising of dairy and beef cattle and pigs is important. In the south are many orchards. Apart from Vitebsk city, Orsha, and the oil-refining centre at Novopolotsk, the towns are small and engaged in timber working and in processing farm produce. Much peat is cut for fueling electric-power stations. Pop. (1991 est.) 1,434,200.

Vitebsk, city and administrative centre of Vitebsk *oblast* (province), northeastern Belarus. It lies along the Western Dvina River at the latter's confluence with the Luchesa River. Vitebsk, first mentioned in 1021, was a major fortress and trading centre and had a stormy history. It passed to Lithuania in 1320, later to Poland, and then to Russia in 1772. It was destroyed by the Poles in the 16th century, by the Swedes in the Great Northern War, by Napoleon I in 1812, and by the Germans in World War II. Modern Vitebsk is a major industrial centre, producing machine tools, electrical instruments, and a range of consumer goods, including textiles, meat and dairy products, and other foodstuffs. The city has medical, veterinary, teacher-training, and polytechnic institutes. Pop. (1991 est.) 361,500.

Vitellius, Aulus (b. AD 15—d. 69, Rome), Roman emperor, the last of Nero's three short-lived successors.

Aulus was the son of the emperor Claudius' colleague as censor, Lucius Vitellius, who was also consul three times. Aulus himself became consul in AD 48 and proconsul in Africa (*c.* 61). He was appointed commander of the Lower German army in 68. In the midst of the disturbances following Nero's death, he was proclaimed emperor by his troops (Jan. 2, 69).

He marched on Italy, and on April 16 the rival emperor Otho committed suicide. Vitellius entered Rome in July, but on July 1 a commander of the eastern legions, Vespasian, had also been proclaimed emperor. After Vespasian's troops defeated Vitellius' forces, Vitellius considered abdication; but his Praetorian Guard forbade such a move, and, when



Aulus Vitellius, marble bust; in the Capitoline Museum, Rome
Alinari—Art Resource

troops loyal to Vespasian entered Rome on December 20, Vitellius was murdered with great barbarity by his own soldiers.

Viterbo, city, capital of Viterbo province, Lazio (Latium) region, central Italy. It is situated at the foot of the Cimini Mountains, northwest of Rome. Of Etruscan origin, the town was taken by the Romans about 310 BC. In 774 Viterbo was included among the Lombard towns of Tuscany, and it was given by Matilda of Tuscany to the pope in the 11th century. An independent commune and an episcopal see from 1193, Viterbo occasioned three centuries of disputes between the papacy and the Holy Roman Empire before it became a papal possession in 1396. Viterbo rivaled Rome as the papal residence after 1257, but it again declined in importance after the removal of the papacy to Avignon, Fr., in 1309.

Though almost 70 percent of the town was destroyed in World War II, it was one of the first towns in Italy to complete postwar reconstruction. Viterbo's medieval quarter, enclosed by 11th- to 13th-century walls and towers, remains practically unchanged, with its Romanesque arcades and 13th- and 14th-century houses and palaces. Notable landmarks, besides the famous papal palace, include the 12th-century Cathedral of San Lorenzo and the 13th-century Church of San Francesco (each containing the tombs of two popes), the Renaissance town hall, and the 12th-century Church of Santa Maria della Verità, housing the Civic Museum. The body of St. Rose of Viterbo is preserved in the church named in her honour.

The city's industries are primarily agricultural. Pop. (1990 est.) mun., 59,798.

Viti Levu, largest island (4,011 square miles [10,388 square km]) of Fiji, west of the Koro Sea in the South Pacific. Its name means "great Fiji." Sighted (1789) by Captain William Bligh of the British navy, the island is split by a central mountain range with many inactive volcanoes. Tomanivi (Mount Victoria), the highest point in Fiji, rises to 4,341 feet (1,323 m). The mountain range divides the island climatically into a wet southeastern



Gold mine at Vatukoula, on Viti Levu, Fiji
G.R. Roberts, Nelson, N.Z.

section (120 inches [3,050 mm] of rain annually) and a dry northwestern section (70–90 inches (1,800–2,300 mm).

Suva (*q.v.*), the Fijian capital, is situated on the island's southeastern coast and has an excellent harbour. Lautoka, on the northwestern coast, is a port for a sugarcane-growing region. Sugar, pineapples, cotton, rice, and tobacco are cultivated in the fertile valleys and deltas of Navua Creek and the Rewa and Singatoka (Sigatoka) rivers. There is a goldfield, first developed in the 1930s, in the north-central part of the island at Vatukoula, a community that is privately owned by associated mining companies. Nadi, in the west, has an international airport, and an oil-fuel installation is at nearby Vunda Point. The population of the island comprises Indians and Melanesians. Pop. (1986) 340,561.

viticulture, the cultivation of grapes. *See* grape.

Vitier, Cintio, Cintio also spelled CYNTHIO (b. 1921, Key West, Fla., U.S.), Cuban poet, anthologist, critic, and scholar of Cuban poetry.

Vitier began as a writer of extremely difficult, hermetic poetry. His poetry until *Canto Llano* (1954; "Clear Song") was primarily concerned with the nature of poetry, the function of memory, and the intricate role of language in the creative process. The essay "Poética" (1961) is a lucid exposition of his artistic credo. With the advent of the Castro revolution, Vitier radically changed his poetic style. His poems became direct, clear, and accessible to most readers. Some critics assert that he captured the spirit of the revolution without resorting to propaganda. His poetic work was collected in *Vísperas* (1953; "Vespers") and *Testimonios* (1968).

He compiled three anthologies of Cuban poetry, and his study *Lo cubano en la poesía* (1958; "The Cuban in Poetry") reveals the depth of his critical intuition. His literary essays, especially those on the works of José Martí, contributed to his reputation as one of the most important and influential scholars of Latin-American literature.

vitiligo, also called LEUKODERMA, hereditary patchy loss of melanin pigment from the skin. Though the pigment-making cells of the skin, or melanocytes, are structurally intact, they have lost the ability to synthesize the pigment. The reason for this condition is unclear. Vitiligo appears clinically as milk-white, irregularly oval patches of skin, which are small at the beginning but enlarge gradually. These patches are roughly symmetrical and are seen most commonly on the hands, wrists, face, neck, and upper trunk. The hair growing in the depigmented area is also white. Individuals with vitiligo (about 1 percent of the adult population) are usually in good general health, but vitiligo presents a cosmetic problem that can be serious in dark-skinned individuals.

The normal skin colour rarely returns and there is no known cure.

Vitim Plateau, Russian VITIMSKOYE PLOSKOGORYE, gently rolling plateau area of eastern Siberia, in Buryatiya and in Chita *oblast* (province), eastern Russia. The plateau is drained by the Vitim River and varies in height between 4,000 and 5,250 ft (1,200 and 1,600 m). It consists of a series of granites, granite-gneisses and gneiss-granites, while in the centre and southwest are basalts and basalt lavas extruded by numerous small and now extinct local volcanoes. The rivers have eroded canyon-like courses.

Vitim River, river and tributary of the Lena River in eastern Siberia, Russia. It rises on the eastern slopes of the Ikat Mountains near the town of Bagdarin in Buryatiya and flows in a generally northerly direction to join the Lena in a delta at the town of Vitim. It has a length of 1,229 mi (1,978 km), and the area of its basin is 87,650 sq mi (227,000 sq km). The Vitim is navigable to the town of Bodaybo, the centre of the Bodaybo goldfields, located 185 mi from its mouth.

Vitória, city, capital of Espírito Santo state, eastern Brazil, situated on the western side of Ilha (island) de Vitória, in Baía (bay) do Espírito Santo. Founded in 1535 by Vasco Fernandes Coutinho, who was given the original captaincy of Espírito Santo by the Portuguese crown, Vitória attained city status and was made a provincial capital in 1823. It is



Vitória and Espírito Santo Bay, Brazil
Plessner International

the seat of Universidade Federal do Espírito Santo (1961). In and near the city are textile factories, sugar refineries, and other small manufacturing plants. After World War II Vitória became Brazil's leading iron-ore port, but after 1962 the volume of exports greatly exceeded the old port's capacity. New facilities, which can accommodate the largest ore carriers, were built at Tubarão, just to the north. Vitória exports small amounts of coffee, cocoa, cereals, meats, molasses, alcohol, monazite sands, and lumber. Minerals exported include iron ore, steel, monazite, and coal. There has been oil exploration in the bay. The city has rail connections with Rio de Janeiro (260 mi [418 km] southwest) and Belo Horizonte and is accessible by highway and air as well as by sea. Pop. (2000 prelim.) 291,889.

Vitoria, capital of Álava province, in the autonomous Basque Country, northeastern Spain, lying north of the Montes de Vitoria on the Río Zadorra and southwest of San Sebastián. Founded as Victoriacum by the Visigothic king Leovigild to celebrate his victory over the Basques in 581, it was granted a charter by Sancho VI the Wise of Navarre in the 12th century. In 1200 Alfonso VIII of Castile captured the city and incorporated it into his kingdom. The Vitoria Basin was the scene in 1813 of the Battle of Vitoria, a decisive engagement of the Peninsular War.

The ancient part of Vitoria stands on a hill and is centred around the old cathedral of Santa María (founded in 1180 and reconstructed in the 14th century). A new cathedral is in the lower or modern part of the city. Vitoria's manufactures include furniture, bicycles, agricultural machinery, beet sugar, and playing cards. Pop. (1998 est.) 216,527.

Vitoria, Battle of (June 21, 1813), decisive battle of the Peninsular War that finally broke Napoleon's power in Spain. The battle was fought between a combined English, Spanish, and Portuguese army numbering 72,000 troops and 90 guns under Arthur Wellesley, 1st duke of Wellington, and a French army numbering 57,000 troops and 150 guns commanded by King Joseph Bonaparte. The French occupied a defensive position in the basin of Vitoria, an area about 12 mi (19 km) long and 7 mi deep, surrounded by mountains and protected to the north and west by the Zadorra River, which was spanned by several lightly held bridges. Just after 8 AM the allies advanced in four columns against the whole front, crossed the river at several bridges to the west, and eventually compelled the French left and centre to withdraw in order to cover Vitoria. The French right, after heavy fighting, finally gave way. By 7 PM the French were in full retreat toward Pamplona, leaving behind vast quantities of plunder, baggage, and all their artillery. The French losses (killed, wounded, and captured) were about 8,000 and those of the allies about 5,000. By their victory the British and their allies gained control of the Basque provinces, and compelled the French forces to retreat over the Pyrenees and back into France.

Vitoria, Francisco de (b. probably 1486, Vitoria, Álava, Castile—d. Aug. 12, 1546), Spanish theologian best remembered for his defense of the rights of the Indians of the New World against Spanish colonists and for his ideas of the limitations of justifiable warfare.

Early life and education. Vitoria was born in the Basque province of Álava. He entered the Dominican order and was sent to the University of Paris, where he was to remain as student and then lecturer for nearly 16 years. He returned to Spain in 1523 to lecture in Valladolid, and he had already begun his investigation of the morality of colonization when he was elected in 1526, by an enthusiastic majority of students, to the prime chair of theology at Salamanca.

The aim of Salamanca University was to present the then new Renaissance scholarship in a framework of scholastic reasoning in the medieval style. At Salamanca Vitoria addressed himself to most of the critical debates of his time. In lecturing on the wars between France and Spain, he did not adopt the common Spanish view that the French king must be guilty because he refused to take either heresy or the Turkish menace seriously. Instead, he saw faults on both sides and warned that the Franco-Spanish feud would be the ruin of Christendom. He strongly condemned the behaviour of councillors, courtiers, and governors; he also criticized the clergy for failure to take up residence in their parishes, for holding more than one office at a time, and for their indifference to the poor.

Vitoria's anticolonial views. Vitoria was doubtful of the justice of the Spanish conquest of the New World. As a friar, he refused to agree that war might be made on people simply because they were pagans or because they refused conversion—for belief was an act of the will and could not be forced. Nor could pagans be punished for offenses against God, because Christians committed just as many such offenses as pagans. The pope had no right to give European rulers dominion over primitive peoples; the most he could do was to allocate spheres for missionary work. Pagans had a right to their property and to their own rulers; they were not irrational. One could not speak of discovery as if the lands had been previously uninhabited; thus the only possible justification for conquest might be the protection of the innocent from cannibalism and human sacrifice. If a Christian ruler presumed to rule over a colony, it was his duty to give it benefits equal to those of the home country and to send efficient ministers to see just laws observed. The Indians were as much subjects of the king of Spain "as any man in Seville."

At Salamanca, Vitoria revived the study of the works of St. Thomas Aquinas. None of his lectures survives except in students' notes, but his recapitulations—mandatory summaries of the year's course—survive in unusual numbers. He rewrote his lectures annually, even after 26 years of lecturing, telling his students that lecture notes from the previous year would not be useful. He answered questions both during and after class, and his style is said to have been lively and witty.

Vitoria's writings on war were addressed to the possibility of limiting the horrors of contemporary warfare. In principle, war was not justified except as defense against aggression or to right a very great wrong. In any case, the declaration of war should be preceded by efforts at conciliation and arbitration. A ruler should also consider whether the war might not do more harm than good. Innocent persons might be killed only if it was absolutely impossible to distinguish them from participants. Finally, if a subject's conscience told him a war was wrong, he must not take part in it.

Vitoria's arguments, involving the application of moral principles, led to his being often consulted by the emperor Charles V. In 1530 the Empress wrote to ask him about the divorce of King Henry VIII of England, and this led him to give a course of lectures on matrimony. In 1539 the Emperor himself wrote to inquire about the possibility of sending 12 "learned and pious friars" to Mexico to found a university, and a second time to ask for some of Vitoria's pupils. Vitoria's open criticism did not affect Charles' friendly attitude; in 1541 he wrote to Vitoria twice on the subject of the Indians. In 1545 Prince Philip (later Philip II of Spain) wrote in his father's behalf to invite Vitoria to the Council of Trent. Vitoria declined, saying he was "more likely to go to the other world." He died in the following year at the age of 60.

Influence. Vitoria's influence was widespread; it swept the universities and even affected the royal councils. About 5,000 students passed through his classrooms; 24 of his pupils held chairs of arts or theology at Salamanca; and in 1548 two also held chairs of St. Thomas Aquinas at Alcalá, the rival university.

Vitoria and some of his contemporaries are sometimes credited with being the founders of international law. But, while it is true that their sense of living in an expanding world made them more aware than their predecessors of the unity of mankind and more anxious to assert it, their theory contained no pacts or covenants, only good and useful universal custom, which might be expected to change as nations developed. This position is much closer to the traditional law of nations, or *jus gentium,* than to modern international law.

(B.M.H.)

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Vitória da Conquista, city, south-central Bahia state, northeastern Brazil. It is situated in the Batalha Mountains at 3,040 feet (928 m) above sea level. Elevated to city status in 1891 and formerly called Conquista, the city is the trade and transportation centre for a livestock-raising region. It is accessible by air from Salvador, the state capital (210 miles [340 km] northeast), and lies on the main highway between Rio de Janeiro and Salvador at a junction with an east-west highway. Pop. (2000 prelim.) 225,430.

vitreous enameling: *see* porcelain enameling.

vitriol, any of certain hydrated sulfates or sulfuric acid. Most of the vitriols have important and varied industrial uses. Blue, or roman, vitriol is copper(II) sulfate pentahydrate; green vitriol—also called copperas, a name formerly applied to all the vitriols—is iron(II) sulfate. White vitriol is zinc sulfate; red, or rose, vitriol is cobalt sulfate; and uranvitriol is a native uranium sulfate. Oil of vitriol is concentrated sulfuric acid (*q.v.*).

Vitruvius, in full MARCUS VITRUVIUS POLLIO (fl. 1st century BC), Roman architect, engineer, and author of the celebrated treatise *De architectura* (*On Architecture*), a handbook for Roman architects.

Little is known of Vitruvius' life, except what can be gathered from his writings, which are somewhat obscure on the subject. Although he nowhere identifies the emperor to whom his work is dedicated, it is likely that the first Augustus is meant and that the treatise was conceived after 27 BC. Since Vitruvius describes himself as an old man, it may be inferred that he was also active during the time of Julius Caesar. Vitruvius himself tells of a basilica he built at Fanum (now Fano).

De architectura was based on his own experience, as well as on theoretical works by famous Greek architects such as Hermogenes. The treatise covers almost every aspect of architecture, but it is limited, since it is based primarily on Greek models, from which Roman architecture was soon decisively to depart in order to serve the new needs of proclaiming a world empire. *De architectura* is divided into 10 books dealing with city planning and architecture in general; building materials; temple construction and the use of the Greek orders; public buildings (theatres, baths); private buildings; floors and stucco decoration; hydraulics; clocks, mensuration, and astronomy; and civil and military engines. Vitruvius' outlook is essentially Hellenistic. His wish was to preserve the classical tradition in the design of temples and public buildings, and his prefaces to the separate books of his treatise contain many pessimistic remarks about the contemporary architecture. Most of what Pliny says in his *Natural History* about Roman construction methods and wall painting was taken from Vitruvius, though unacknowledged. Vitruvius' expressed desire that his name be honoured by posterity was realized. Throughout the antique revival of the Renaissance, the classical phase of the Baroque, and in the Neoclassical period, his work was the chief authority on ancient classical architecture.

The text of *De architectura* with an English translation is published in the Loeb Classical Library in two volumes.

Vitry, Philippe de, also called PHILIPPUS DE VITRIACO (b. Oct. 31, 1291, Paris, Fr.—d. June 9, 1361, Meaux), French prelate, music theorist, poet, and composer.

Vitry studied at the Sorbonne and was ordained a deacon at an early age. His earliest-known employment was as secretary to Charles IV. Later he became adviser to Charles and to his successors at the royal court at Paris, Philip VI and John II. Vitry served in many diplomatic and political missions in this capacity, several of them to the papal court in Avignon. During one such visit in 1351, Pope Clement VI appointed him bishop of Meaux.

Vitry was known as a poet and composer and was considered one of the leading intellectuals of his time. His scholarship and dedication were warmly praised by Petrarch, who regarded him as "the unparalleled poet of France." Vitry's historical eminence, however, is mainly derived from his contributions as a musician. He was the author of the famous and authoritative treatise of music *Ars nova* (*c.* 1320; "New Art"), which dealt with the theoretical aspects of French music in the first half of the 14th century. It included an explanation of new theories of mensural notation, a detailed account of the various uses and meanings of the coloured notes, and the introduction of additional durational symbols in the new notational system. (Modern scholars believe that, of the 24 chapters of the *Ars nova,* only the last 10 [dealing with mensural rhythm and notation] are original.)

Most of Vitry's musical output was lost, judging from the many references to his motets that appear in the treatise. The extant pieces were published by Leo Schrade in *Polyphonic Music of the 14th Century,* vol. 1 (1956).

Vitry-sur-Seine, city, Val-de-Marne *département,* Paris *région,* France. Vitry-sur-Seine is a southeastern industrial and residential suburb of Paris, with an area of 4.5 square miles (11.6 square km), and is separated from the city limits of the capital by the suburb of Ivry-sur-Seine. It is connected to Paris by rail (6 miles [10 km]). The Seine River, which flows along Vitry-sur-Seine's eastern border, is heavily industrialized in the area, although market gardening and horticulture still persist. The Church of Saint-Germain in Vitry-sur-Seine has a triple 13th-century nave and a 14th-century choir. Pop. (1999) 78,645.

Vittone, Bernardo Antonio (b. 1702, Turin, Piedmont [Italy]—d. Oct. 19, 1770, Turin), one of the most original and creative of late Baroque church architects in all Europe and a primary figure in the brief flowering of Piedmontese architecture.

Vittone studied painting in Rome. Returning to Turin in 1733, he observed the late works of Filippo Juvarra under construction and, in 1737, edited the papers of Guarino Guarini, the *Architettura civile.*

Vittone obtained spectacular visual and structural effects in a number of small, central-plan churches that he designed in Turin and elsewhere in the Piedmont from 1737 to 1770. These churches had multiple-level interiors and used innovative vaulting techniques for their complex domes. A central dome might have two or even three successive vaults, the lower ones being pierced to allow the viewer to see through them to the ones above. This placing of structures within structures might also be illusionistically achieved or enhanced by skillful painting or by the manipulation of lighting through cleverly placed windows. A prime example is the Church of Santa Chiara at Bra (1742); it has a low vault pierced by windows through which one sees a second shell, painted with heavenly scenes and lit by windows not visible from the interior.

Vittone would frequently place smaller, subsidiary domes around a larger, lower, central dome and would open up the space for viewing by using relatively slim piers whose curving forms contribute to an impression of light, airy soaring movement in the elegantly decorated interior. Among his other masterpieces are the Chapel of the Visitation at Valinotto (1738), and the churches of San Bernardino in Chieri (1740) and Santa Chiara in Turin (1742). His later churches, such as the Assunta at Grignasco (1750) and that of San Michele at Rivarolo Canavese, are larger, simpler, and more monumental but feature the same kinds of diminishing successions of curving, converging vaults and piers.

Where the same name may denote a person, place, or thing, the articles will be found in that order

Vittoria, town, Ragusa *provincia,* southeastern Sicily, Italy. Vittoria is situated on a plain overlooking the Ippari River, west of Ragusa city. The town, which is gracefully laid out on a chessboard pattern, was founded (1607) by and named after Vittoria Colonna, daughter of the viceroy Marco Antonio Colonna and wife of Luigi III Enriquez, count of Modica (a town just south of Ragusa). Notable among the 18th-century buildings in the town are the Madre church, the Santa Maria delle Grazie church, and the Neoclassical Teatro Comunale (Communal Theatre).

Vittoria is an important market centre for wine and olive oil and also exports early fruit and vegetables. Pop. (1999 est.) mun., 59,775.

Vittorini, Elio (b. July 23, 1908, Syracuse, Sicily, Italy—d. Feb. 13, 1966, Milan), novelist, translator, and literary critic, the author of outstanding novels of Italian Neorealism mirroring his country's experience of fascism and the social, political, and spiritual agonies of 20th-century man. With Cesare Pavese he was also a pioneer in the translation into Italian of English and American writers.

The son of a railroad employee, Vittorini left school when he was 17, and six months later he became a road-construction worker in northern Italy. He then moved to Florence, learned English while working as a proofreader, and began to publish short stories in the journal *Solaria.* He made his living until 1941 by translating the works of such American and English writers as William Saroyan, D.H. Lawrence, Edgar Allan Poe, William Faulkner, Daniel Defoe, and Ernest Hemingway, in addition to the British poets T.S. Eliot, W.H. Auden, and Louis MacNeice.

Vittorini's first major novel, *Il garofano rosso* (written 1933–35, published 1948; *The Red Carnation*), while overtly portraying the personal, scholastic, and sexual problems of an adolescent boy, also conveys the poisonous political atmosphere of fascism. In 1936 Vittorini began writing his most important novel, *Conversazione in Sicilia* (1941, rev. ed. 1965; Eng. trans., *Conversation in Sicily,* U.S. title *In Sicily*), the clearest expression of his anti-fascist feelings. The action of the book is less

important than the emotional agony of its hero, brought on by his constant consciousness of fascism, war, and the plight of his brothers.

Recognizing the novel's power, the fascist government censored its serialization in *Letteratura* in 1936–38 and even withdrew an entire issue of that periodical from circulation. In 1942, after publication of the book, Vittorini was called in for questioning and finally was imprisoned in 1943. Released after the German occupation, he continued to fight fascism through the Resistance movement.

After the war Vittorini published the influential politico-cultural periodical *Il Politecnico* (1945–47) and later edited the Milan literary quarterly *Il Menabò* with Italo Calvino. He then became head of the foreign-literature section of a major Italian publishing house.

Among Vittorini's other important works are *Uomini e no* (1945; "Men and Non-Men"), an account of his Resistance experiences; the allegorical Marxist novel *Il sempione strizza l'occhio al frejus* (1947; *The Twilight of the Elephant*); and another allegory, *Le donne di Messina* (1949; *Women on the Road*). Vittorini's critical writings are collected in *Diario in pubblico* (1957; "Public Diary") and the posthumously published *Le due tensione: appunti per una ideologia della letteratura* (1967; "The Two Tensions: Notes for an Ideology of Literature").

Vittorino DA FELTRE, original name VITTORE DEI RAMBOLDINI (b. 1378, Feltre [Italy]—d. Feb. 2, 1446, Mantua), Italian educator who is frequently considered the greatest humanist schoolmaster of the Renaissance.

After 20 years as a student and teacher at the University of Padua, Vittorino was asked, in 1423, to become tutor to the children of the Gonzaga family, the rulers of Mantua. He agreed to do so if he could set up a school away from the court and, hence, from political influence. Enrolled in his school, La Giocosa ("The House of Joy"), besides his royal charges, were about 60 children, including boys of other noble families and poor boys chosen for their ability.

The central features of the curriculum were the languages and literature of Rome and Greece. Other subjects included arithmetic, geometry, and music, as well as games and physical exercises, for the school followed the Greek ideal of development of the body as well as of the mind. Vittorino saw education, however, as a pathway to the Christian life. His pupils pictured him as a successful teacher who loved them, cared for their health and character, and adapted his methods to their abilities. Further, he used no corporal punishment. La Giocosa was possibly Europe's first boarding school.

Vittorino not only educated future Italian rulers and professional men but also taught Latin to Greek scholars who came to him from the East, thus enabling them to translate the Greek manuscripts that were to inspire the great minds of the Renaissance.

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Vittorio (Italian personal name): *see under* Victor.

Vittorio Veneto, formerly (until 1923) VITTORIO, town, Treviso *provincia,* Veneto *regione,* northeastern Italy, located north of Treviso. Formed in 1866 by the union of Serravalle, now the town's residential northern section, and Ceneda, the industrial southern part, it was named for Victor Emmanuel II. It was the scene in 1918 of the Italians' decisive defeat of the Austro-Hungarian army. Serravalle is an old, walled district with 16th-century houses; the cathedral (1755), with an altarpiece by Titian; and the Loggia Serravallese (1462), housing a museum with a Madonna by Andrea Sansovino, who also executed the facade of the Loggia Cenedese. Ceneda has an 18th-century cathedral and the remains of the 15th-century San Martino Castle.

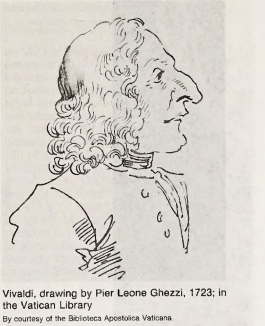
A vacation resort in the Alpine foothills, Vittorio Veneto is also a commercial and industrial centre manufacturing automobiles, motorcycles, machinery, and textiles. Pop. (1988 est.) mun., 29,483.

Vittoriosa, town, eastern Malta, one of the Three Cities (the others being Cospicua and Senglea). It is situated on a small peninsula, just south of Valletta across Grand Harbour. One of the most important towns in medieval Malta, in 1530 it became the first residence on the island of the Hospitalers (Knights of St. John of Jerusalem). It was strongly fortified and served as the Hospitalers' defense bastion against the Turks in the Great Siege of Malta in 1565. Its name, formerly Birgu, was changed to Vittoriosa to commemorate that victory. It served as the Hospitalers' capital until replaced by Valletta in 1570. The town continued to develop in the 17th century with commercial facilities and shipyards. Although severely damaged in World War II, some of its old fortifications remain, including Fort St. Angelo (870; renovated and extended 1530). The Palace of the Inquisitors and most of the 16th-century *auberges* (lodges of the Hospitalers) also survive. Pop. (1983 est.) 4,134.

Vitu Islands (Papua New Guinea): *see* Witu Islands.

Vivaldi, Antonio (Lucio) (b. March 4, 1678, Venice, Republic of Venice [Italy]—d. July 28, 1741, Vienna, Austria), Italian composer and violinist who left a decisive mark on the form of the concerto and the style of late Baroque instrumental music.

Life. His main teacher was probably his father, Giovanni Battista, who in 1685 was admitted as a violinist to the orchestra of the San Marco Basilica in Venice. Antonio, the eldest child, trained for the priesthood and was ordained in 1703. His distinctive reddish hair



Vivaldi, drawing by Pier Leone Ghezzi, 1723; in the Vatican Library
By courtesy of the Biblioteca Apostolica Vaticana

colour would later earn him the soubriquet *Il Prete Rosso* ("The Red Priest"). He made his first known public appearance playing alongside his father in the basilica as a "supernumerary" violinist in 1696. He became an excellent violinist, and in 1703 he was appointed violin master at the Ospedale della Pietà, a home for foundlings. The Pietà specialized in the musical training of its female wards, and those with musical aptitude were assigned to its excellent choir and orchestra, whose much-praised performances assisted the institution's quest for donations and legacies. Vivaldi had dealings with the Pietà for most of his career: as violin master (1703–09; 1711–15), director of instrumental music (1716–17; 1735–38), and paid external supplier of compositions (1723–29; 1739–40).

Soon after his ordination as a priest, Vivaldi gave up celebrating mass on account of a chronic ailment that is believed to have been bronchial asthma. Despite this, he took his status as a secular priest seriously, and even earned the reputation of a religious bigot.

Vivaldi's earliest musical compositions date from his first years at the Pietà. Printed collections of his trio sonatas and violin sonatas respectively appeared in 1705 and 1709, and in 1711 his first and most influential set of concerti for violin and string orchestra (Opus 3, *L'estro armonico*) was published by the Amsterdam music-publishing firm of Estienne Roger. In the years up to 1717, Roger published three more collections of his concerti (Opuses 4, 6, and 7) and one collection of sonatas (Opus 5).

Vivaldi made his debut as a composer of sacred vocal music in 1713, when the Pietà's choirmaster left his post and the institution had to turn to Vivaldi and other composers for new compositions. He achieved great success with his sacred vocal music, for which he later received commissions from other institutions. Another new field of endeavour for him opened in 1713 when his first opera, *Ottone in villa,* was produced in Vicenza. Returning to Venice, Vivaldi immediately plunged into operatic activity in the twin roles of composer and impresario. From 1718 to 1720 he worked in Mantua as director of music for that city's governor, Prince Philip of Hesse-Darmstadt. This was the only full-time post Vivaldi ever held; he seems to have preferred life as a free-lance composer on account of the flexibility and entrepreneurial opportunities it offered. Vivaldi's major compositions in Mantua were operas, though he also composed cantatas and instrumental works.

The 1720s were the zenith of Vivaldi's career. Based once more in Venice, but frequently traveling elsewhere, he supplied instrumental music to patrons and customers all over Europe. Between 1725 and 1729 he entrusted five new collections of concerti (Opuses 8–12) to Roger's publisher successor, Michel-Charles Le Cène. After 1729 Vivaldi stopped having his works published, since he found it more profitable to sell them in manuscript to individual purchasers. During this decade he also received numerous commissions for operas and resumed his activity as an impresario in Venice and other Italian cities.

In 1726 the contralto Anna Girò sang for the first time in a Vivaldi opera. Born in Mantua about 1711, she had come to Venice to further her career as a singer. Her voice was not strong, but she was attractive and acted well. She became part of Vivaldi's entourage and the indispensable prima donna of his subsequent operas, causing gossip to circulate that she was Vivaldi's mistress. After Vivaldi's death she continued to perform successfully in opera until quitting the stage in 1748 to marry a nobleman.

In the 1730s Vivaldi's career gradually declined. The French traveler Charles de Brosses reported in 1739 with regret that his music was no longer fashionable. His impresarial forays became increasingly marked by failure. In 1740 Vivaldi traveled to Vienna, but he fell ill and did not live to attend the production there of his opera *L'oracolo in Messenia* in 1742. The simplicity of his funeral on July 28, 1741, suggests that he died in considerable poverty.

After Vivaldi's death, his huge collection of musical manuscripts, consisting mainly of autograph scores of his own works, was bound

into 27 large volumes. These were acquired first by the Venetian bibliophile Jacopo Soranzo and later by Count Giacomo Durazzo, Christoph Willibald Gluck's patron. Rediscovered in the 1920s, these manuscripts today form part of the Foà and Giordano collections of the National Library in Turin.

Instrumental music. Almost 500 concerti by Vivaldi survive. More than 300 are concerti for a solo instrument with string orchestra and continuo. Of these, approximately 230 are written for solo violin, 40 for bassoon, 25 for cello, 15 for oboe, and 10 for flute. There are also concerti for viola d'amore, recorder, mandolin, and other instruments. Vivaldi's remaining concerti are either double concerti (including about 25 written for two violins), concerti grossi using three or more soloists, *concerti ripieni* (string concerti without a soloist), or chamber concerti for a group of instruments without orchestra.

Vivaldi perfected the form of what would become the classical three-movement concerto. Indeed, he helped establish the fast-slow-fast plan of the concerto's three movements. Perhaps more importantly, Vivaldi was the first to regularly employ in his concerti the ritornello form, in which recurrent restatements of a refrain alternate with more episodic passages featuring a solo instrument. Vivaldi's bold juxtapositions of the refrains (ritornelli) and the solo passages opened new possibilities for virtuosic display by solo instrumentalists. The fast movements in his concerti are notable for their rhythmic drive and the boldness of their themes, while the slow movements often present the character of arias written for the solo instrument.

The energy, passion, and lyricism of Vivaldi's concerti and their instrumental colour and simple dramatic effects (which are obtained without recourse to contrapuntal artifice) rapidly passed into the general language of music. His concerti were taken as models of form by many late Baroque composers, including Johann Sebastian Bach, who transcribed 10 of them for keyboard instruments. The highly virtuosic style of Vivaldi's writing for the solo violin in his concerti reflects his own renowned technical command of that instrument.

Several of Vivaldi's concerti have picturesque or allusive titles. Four of them, the cycle of violin concerti entitled *The Four Seasons* (Opus 8, no. 1–4), are programmatic in a thoroughgoing fashion, with each concerto depicting a different season of the year, starting with spring. Vivaldi's effective representation of the sounds of nature inaugurated a tradition to which works such as Ludwig van Beethoven's *Pastoral Symphony* belong. Vivaldi also left more than 90 sonatas, mainly for stringed instruments. Their form and style are conventional by comparison with the concerti, but they contain many fluent, attractive works.

Vocal music. More than 50 authentic sacred vocal compositions by Vivaldi are extant. They range from short hymns for solo voices to oratorios and elaborate psalm settings in several movements for double choir and orchestra. Many of them exhibit a spiritual depth and a command of counterpoint equal to the best of their time. The mutual independence of voices and instruments often anticipates the later symphonic masses of Joseph Haydn and Wolfgang Amadeus Mozart. As more of this repertory becomes available in modern editions, its reputation seems likely to rise.

The reception of Vivaldi's secular vocal works is more problematic. Nearly 50 operas by him have been identified, and 16 survive complete. In their time they were influential works with appealing melodies and inventive orchestral accompaniments. Nevertheless, the unfamiliarity of modern audiences with Baroque poetry and dramaturgy, which often appear stilted and artificial, is bound to inhibit their appreciation among nonspecialists. Vivaldi's cantatas, numbering nearly 40 works, are more suitable candidates for general revival, though their quality is variable.

(Mi.T.)

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Vivarais, ancient mountainous province of France, centred on the town of Viviers (Viviers-sur-Rhône) and corresponding approximately to the modern *départements* of Ardèche. The ancient Roman site, Vivarium, later became the episcopate seat of Viviers; and the bishop of Viviers was virtual master of Vivarais, even though, from the 9th century, it belonged to the counts of Toulouse. In the 13th century it was united to the French crown. Part Catholic, part Protestant, it suffered severely in the Wars of Religion of the 16th century.

Vivarini, Alvise, also called LUIGI VIVARINI (b. *c.* 1446, Murano?, Republic of Venice [Italy]—d. *c.* 1505), painter in the late Gothic style whose father, Antonio, was the founder of the influential Vivarini family of Venetian artists.

Vivarini's earliest work is an altarpiece at Monte Fiorentino (*c.* 1475). Between 1483 and 1485 he was at work in southern Italy, producing altarpieces at Barletta (1483) and Naples (1485). In 1488, with Giovanni Bellini, he was employed on paintings (now lost) for the Doges' Palace in Venice. His last work, an altarpiece begun in 1503 for Santa Maria dei Frari in Venice, was completed by Marco Basaiti.



"St. Claire," panel painting by Alvise Vivarini, *c.* 1480–85; in the Accademia, Venice

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Alvise was somewhat traditional and conventional in his approach, ignoring, for the most part, the trend away from the forms of Gothic painting. His few late works, however, have a stamp of individuality that distinguishes them from the mainstream of the Venetian style at the time—*e.g.,* his psychologically complex portrait of an unknown Venetian gentleman, signed and dated 1497, now in the National Gallery, London.

To make the best use of the Britannica, consult the INDEX *first*

Vivarini, Antonio (b. *c.* 1415, Murano?, Republic of Venice [Italy]—d. *c.* 1480), painter, one of the most important and prolific Venetian artists of the first half of the 15th century, founder of the studio of the influential Vivarini family of painters.

From 1444 Vivarini collaborated with his brother-in-law Giovanni d'Alemagna (d. 1450); later he worked with his younger brother, Bartolomeo. Surviving altarpieces executed by Antonio and Giovanni d'Alemagna are in the churches of San Zaccaria (1443–44) and San Pantalon (1444) and in the Accademia (1446), all in Venice; and a polyptych is in the Brera, Milan (1448). Between 1447 and 1450 the two artists lived in Padua, where, together with Andrea Mantegna and Niccolò Pizzolo, they executed a cycle of frescoes in the Ovetari Chapel of the Church of the Eremitani (destroyed in World War II).

The styles of Antonio and Giovanni are not easily distinguished, but Antonio was certainly the dominant partner. The soft, rounded figures in his heavily ornamented polyptychs are influenced by Gentile da Fabriano and, more superficially, by Masolino. The earliest work signed by Antonio and Bartolomeo Vivarini is a polyptych, now in the Bologna gallery, commissioned by Pope Nicholas V in 1450. It is couched in the same idiom as the paintings of Antonio's first period, but, in later works, the intervention of his more progressive younger brother resulted in the introduction of Renaissance elements into Antonio's style.

Vivarini, Bartolomeo (b. *c.* 1432, Murano?, Republic of Venice [Italy]—d. *c.* 1499), painter and member of the influential Vivarini family of Venetian artists.

Vivarini was probably a pupil of his brother Antonio, with whom he collaborated after 1450; but, unlike him, Bartolomeo was profoundly influenced by Paduan painting of the circle of Francesco Squarcione. From his first dated work (1448) onward, he reveals a stronger feeling for plasticity and greater formal resource. A painting of St. John of Capistrano (Louvre, Paris) of 1459 is typical of Bartolomeo's austere and individual style. Contact with the paintings of Andrea Mantegna seems to have marked a turning point in Bartolomeo's career, first apparent in an altarpiece of 1464 in the Accademia, Venice. All his most distinguished works date from after that time; among these are altarpieces in Venice in the churches of SS. Giovanni e Paolo (1473), Santa Maria dei Frari (1474), and San Giovanni in Bragora (1478) and in the Accademia (1477). His last dated work is a triptych of 1491 at Bergamo, in Lombardy, where he apparently was active in his last years.

Vivekananda, original name NARENDRANATH DATTA, DATTA also spelled DUTT (b. Jan. 12, 1863, Calcutta—d. July 4, 1902, Calcutta), Hindu spiritual leader and reformer who attempted to combine Indian spirituality with Western material progress, maintaining that the two supplemented and complemented one another. His Absolute was man's



Vivekananda
By courtesy of the Indian High Commission Office, London

own higher self; to labour for the benefit of mankind was the noblest endeavour.

Born into an upper-middle-class Kāyastha family in Bengal, he was educated at a Western-style university where he was exposed to Western philosophy, Christianity, and science. Social reform was given a prominent place in Vivekananda's thought, and he joined the Brahmo Samaj (Society of Brahmā), dedicated to eliminating child marriage and illiteracy and determined to spread education among women and the lower castes. He later became the most notable disciple of Ramakrishna, who demonstrated the essential unity of all religions. Always stressing the universal and humanistic side of the Vedas as well as belief in service rather than dogma, Vivekananda attempted to infuse vigour into Hindu thought, placing less emphasis on the prevailing pacifism and presenting Hindu spirituality to the West. He was an activating force behind the Vedānta (interpretation of the *Upaniṣads*) movement in the United States and England. In 1893 he appeared in Chicago as a spokesman for Hinduism at the World's Parliament of Religions and so captivated the assembly that a newspaper account described him as "an orator by divine right and undoubtedly the greatest figure at the Parliament." Thereafter he lectured throughout the United States and England, making converts to the Vedānta movement.

On his return to India with a small group of Western disciples in 1897, Vivekananda founded the Ramakrishna Mission (*q.v.*) at the monastery of Belur Math on the Ganges River near Calcutta. Self-perfection and service were his ideals, and the order continued to stress them. He adapted and made relevant to the 20th century the very highest ideals of the Vedāntic religion, and although he lived only two years into that century he left the mark of his personality on East and West alike.

viverrid, any member of the family Viverridae, small mammals, order Carnivora, including the civets and mongooses. All are native to the Old World; they evolved from Eurasian forms in the Eocene or Oligocene epochs and later spread throughout Africa. Most have slender bodies with long tails and short legs terminating in four- or five-toed feet. Their necks and heads are typically elongated, their muzzles tapering, their ears small, and their dentition varied (32–40 teeth). Most species have anal scent glands. Some viverrids are nocturnal, some diurnal; they feed principally on small animals and vegetable matter. Many species bear two annual litters, each containing two to four young. Life expectancy ranges from 5 to 15 years.

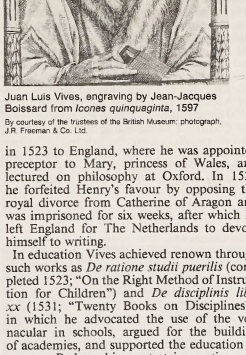
For more information on viverrid species and groups, *see* binturong; civet; fossa; genet; linsang; mongoose; suricate.

Vives, Amadeo (b. Nov. 18, 1871, Collbató, Spain—d. Dec. 1, 1932, Madrid), Spanish composer noted for his nearly 100 light operas.

After study in Barcelona, Vives founded (1891), with Luis Millet, the choral society Orfeó Catalá. His first opera, *Artus*, produced in Barcelona in 1895, made use of Catalan folk songs, and *Euda d'Uriach* (Barcelona, 1900) originally had a Catalan libretto. His most popular opera probably was *Maruxa* (Madrid, 1914). Other well-known operas include *Balada de carnaval* (Madrid, 1919) and *Doña Francis-quita* (Madrid, 1923), the latter inspired by Lope de Vega's play *La discreta enamorata*. Vives also composed more serious music, including *Canciones epigramáticas*, a series of songs with texts from some of the great Spanish poets. He published a book of essays, *Sofia*, in 1923.

Vives, Juan Luis (b. March 6, 1492, Valencia, Aragon—d. May 6, 1540, Bruges), Spanish Humanist and student of Erasmus, eminent in education, philosophy, and psychology, who strongly opposed Scholasticism and emphasized induction as a method of inquiry.

Vives left Spain at the age of 17 to avoid the Inquisition. After studies at Paris (1509–12), he was appointed professor of the humanities at Louvain (1519). Having dedicated his commentary (1522) on St. Augustine's *De civitate Dei* to Henry VIII of England, he went



Juan Luis Vives, engraving by Jean-Jacques Boissard from *Icones quinquaginta*, 1597
By courtesy of the trustees of the British Museum: photograph, J.R. Freeman & Co. Ltd.

in 1523 to England, where he was appointed preceptor to Mary, princess of Wales, and lectured on philosophy at Oxford. In 1527 he forfeited Henry's favour by opposing the royal divorce from Catherine of Aragon and was imprisoned for six weeks, after which he left England for The Netherlands to devote himself to writing.

In education Vives achieved renown through such works as *De ratione studii puerilis* (completed 1523; "On the Right Method of Instruction for Children") and *De disciplinis libri xx* (1531; "Twenty Books on Disciplines"), in which he advocated the use of the vernacular in schools, argued for the building of academies, and supported the education of women. Perhaps his greatest innovation was to recommend the study of nature for boys, applying the principle of induction from personal inquiry and experience that Erasmus had advocated for the study of Scripture and languages.

Vives' claim to eminence in psychology and philosophical method rests on his *De anima et vita libri tres* (1538; "Three Books on the Soul and on Life"), in which he discusses the association of ideas, the nature of memory, and even animal psychology. The work somewhat anticipates the ideas of the great thinkers of the century following his death by its emphasis on induction as a method of psychological and philosophical discovery.

Viviani, René (b. Nov. 8, 1863, Sidi bel Abbès, Alg.—d. Sept. 7, 1925, Le Plessis-Robinson, Fr.), Socialist politician and premier of France during the first year of World War I.

A member of an Italian family that had settled in Algeria, Viviani began his career as a lawyer, first in Algiers, then in Paris; he pleaded in many political actions in behalf of workers and Socialists and acquired a reputation as a brilliant and effective speaker. A Socialist deputy for Paris from 1893 to 1902, he collaborated with Jean Jaurès, the great Socialist politician, in launching *L'Humanité* (1904), an influential Socialist newspaper, and in helping to found a unified Socialist party, the Section Française de l'Internationale Ouvrière (1905). After reelection to the Chamber of Deputies, he joined the government of Premier Georges Clemenceau in October 1906 as France's first minister of labour, leaving the new party and becoming an "Independent" Socialist. During his three years in Clemenceau's Cabinet, no effective reforms were enacted to ameliorate the condition of labour or the poor. Remaining minister of labour under Aristide Briand until November 1910, he was responsible for codifying all social legislation passed since 1900. After serving as minister of education (December 1913–June 1914), he became premier and minister of foreign affairs on June 16, 1914.

When Germany declared war on France (Aug. 3, 1914), Viviani resigned as minister of foreign affairs; at the end of August he formed a government of national union, with representatives of all parties. Criticized for a munitions shortage, he resigned as premier in October 1915 but served as minister of justice until March 1917.

Viviani represented France at the League of Nations at Geneva in 1920 and again in 1921 and at the Washington Naval Conference of that year. He entered the Senate in 1922 but took no further part in politics.

vivianite, phosphate mineral, hydrated iron phosphate $[Fe_3(PO_4)_2 \cdot 8H_2O]$, that occurs as colourless (when freshly exposed) or dark-blue (after long exposure), glassy crystals in the weathered zones of phosphate deposits and as concretions in clays (widespread). It also occurs in recent sediments, in lignite and peat, in forest soils, and as the colouring agent in odontolite. Localities of occurrence include England, Germany, Bolivia, Japan, and Ukraine. It is abundant in New Jersey and Colorado. For detailed physical properties, *see* phosphate mineral (table).

Vivien, Renée, pseudonym of PAULINE M. TARN (b. 1877, London—d. 1909, Paris), French poet whose poetry encloses ardent passion within rigid verse forms. She was an exacting writer, known for her mastery of the sonnet and of the rarely found 11-syllable line (hendecasyllable).

Of mixed Scottish and American ancestry, she was educated in England, but she lived nearly all her life in Paris and wrote in French. Her poetry was influenced by Keats and Swinburne; by Baudelaire; by Hellenic culture; by her extensive travels in Norway, Turkey, and Spain; and by her lesbianism, all of which imparted a certain exoticism to her writings. Like her contemporary Anna de Noailles, she was gifted with beauty, fortune, talent, and fame. Nevertheless, Vivien was deeply unhappy, being unable to adjust to the realities of life. She hated the crassness of her age; her dark, candlelit apartment was decorated with *objets d'art* from past civilizations. Her major works are *Cendres et poussières* (1902; "Ashes and Dust"); *Les Kitharèdes* (1904; "The Women of Kithara"); translations from Sappho, the Greek poetess of Lesbos; and *Sillages* (1908; "Sea Wakes"). Vivien seems to have found

peace shortly before her death with her conversion to Roman Catholicism, intimated in the new austerity of her last works, *Dans un coin de violettes* (1908; "In a Violet Garden") and *Le Vent des vaisseaux* (1909; "Ship Wind"). Her *Poésies complètes* were published in 12 volumes in 1901–10 and in two volumes in 1934.

viviparity, retention and growth of the fertilized egg within the maternal body until the young animal, as a larva or newborn, is capable of independent existence. The growing embryo derives continuous nourishment from the mother, usually through a placenta or similar structure. This is the case in most mammals, many reptiles, and a few lower organisms. A more primitive condition, known as ovoviviparity and found in certain snakes, is the simple retention of the egg until it hatches. In this case the embryo derives food from the yolk present in the egg and is not dependent on the mother except for physical protection. *Compare* oviparity.

Vizcaya, English BISCAY, Basque BIZKAIA, *provincia,* in the autonomous Basque Country (País Vasco), northern Spain; it has an area of 856 square miles (2,217 square km). Originally a tribal territory of the Vascones (4th century AD), it was vested in the crown of Castile and Leon in 1379, but the central government has always had difficulties in ruling the fiercely independent Basques. Charters of rights and privileges (*fueros*) toward some form of regional autonomy were granted to the Basque provinces (Basque: Euskal-Herria; Spanish: Vascongadas), notably in the Economic Accord (Concierto Económico) of 1925 signed with the national exchequer. This agreement was canceled, however, after the Nationalist victory of 1937. In 1980, with Álava and Guipúzcoa, it became one of the three component provinces of the autonomous region of the Basque Country.

The Cantabrian coastal area, in the north, where fishing and tourism represent the economic mainstays, has many high cliffs and inlets (*rías*); Bermeo and Ondárroa are its most important fishing ports. Bilbao (*q.v.*), the provincial capital and seaport, and its environs comprise the industrial (iron, steel, chemicals) and commercial centre of Vizcaya, which has the greatest mineral wealth of any Spanish province. Guernica (now Guernica y Luno), near Bilbao, is the symbol of Basque glory and the subject of a painting by Pablo Picasso inspired by the massacre there during the Spanish Civil War.

The inland Nervión River valley, bordered by the coastal mountain range (Mount Oiz; 3,363 feet [1,025 m]) and by the inland arc of mountains that connects near the Aitzgorri (5,066 feet [1,544 m]) with the Navarrese mountains of Aralar, is an agricultural region where corn (maize) and apples are cultivated and livestock is raised; its cider is famous throughout Spain. The eastern iron district of Vizcaya, between Santander and Burgos, is also important because of its pasturage for livestock. Farms are scattered throughout the province. Isolated *caserios* (settlements), although, in the western valleys of Carranza and Lanestosa, the Castilian influence of hamlets is clear. Pop. (1986 est.) 1,205,557.

Vizcaya, Golfo de: *see* Biscay, Bay of.

Vizetelly FAMILY, originally spelled VIZZETELLI, family of Italian descent active in journalism and publishing from the late 18th century in England and later in France (briefly) and the United States.

James Henry Vizetelly (d. 1838) published *Cruikshank's Comic Almanack* and other British annuals. His son Henry Richard (1820–94) was a correspondent (chiefly in Paris) for *The Illustrated London News* and the founder of two brief competitors. In 1852 he published a best-selling cheap reprint of *Uncle Tom's Cabin,* by the American novelist Harriet Beecher Stowe. Forming his own company in 1882, he published inexpensive editions (later called the "Mermaid Series") of early English dramatists and translations of Gustave Flaubert, Fyodor Dostoyevsky, Leo Tolstoy, and other continental European authors. For publishing the novels of Émile Zola, Vizetelly was fined and then (1889) was jailed on charges of obscenity, the imprisonment permanently damaging his health. In his final years he was nevertheless able to publish a cheerful, anecdotal account of literary life in London and Paris from 1840 to 1870, entitled *Glances Back Through Seventy Years: Autobiographical and Other Reminiscences* (1893). His younger brother Frank (1830–83?) helped to establish (1857) the Paris periodical *Le Monde illustré,* which he edited for two years. He later served for 24 years (1859–83) as a war correspondent for *The Illustrated London News* in Giuseppi Garibaldi's Italy, in Spain, in the American Civil War, and in Egypt. He disappeared (either slain or enslaved) during a British military disaster in the Sudan.

Edward Henry Vizetelly (1847–1903), son of Henry Richard by his first marriage, also was a war correspondent, for the London *Daily News* and *The New York Times.* His brother Ernest Alfred (1853–1922) was a translator and biographer (1904) of Zola and the author of several books on French history from 1852. Francis Horace (afterward Frank) Vizetelly (1864–1938), Henry Richard's only son by a second marriage, emigrated to the United States (1891), where he formed a lifetime association with the publishing house of Funk and Wagnalls. Beginning as assistant on the *Standard Dictionary of the English Language* (1894), he was from 1912 the chief editor of the abridgments and succeeding works, notably the *New Standard Dictionary* (1913). He was a prolific contributor to newspapers and magazines; "The Lexicographer's Easy Chair," his correspondence column in the journal *Literary Digest,* was the most successful American feature-column of its kind. In 1930 he established a school for announcers of the Columbia Broadcasting System; rejecting British pronunciation, he insisted on American standards. Though not fully conversant with modern linguistics, he was a force for linguistic realism. On his death in New York City in 1938, *The New York Times* appraised him as "philologist, instructor, and entertainer in ordinary to the American people."

Vizianagaram, also spelled VIZIANAGRAM, town, northeastern Andhra Pradesh state, southern India. Situated in the heart of the Eastern Ghāts, Vizianagaram is a rail junction and shipping centre for sunn hemp (jute substitute) and jute products. Manganese is mined nearby. The town has several colleges.

Vizianagaram derives its name from the Vijayanagar empire, a powerful Hindu realm that successfully resisted Muslim expansion in southern India in the 14th and 15th centuries. The town, founded in 1712, was the headquarters of the rajas of Vizianagaram, who played a notable role in the history of Andhra Pradesh in the 18th century and were patrons of education and the fine arts. Their fort (1714) lies about 1 mile (1.6 km) east of the railway station. The area is well-served by roads and by branches of the South Eastern Railway. Pop. (1981) 114,806.

vizier, Arabic and Modern Persian WAZĪR, Turkish VEZIR (from old Iranian Pahlavi *vçir,* "judge"), originally the chief minister or representative of the ʿAbbāsid caliphs and later a high administrative officer in various Muslim countries, among Arabs, Persians, Turks, Mongols, and other eastern peoples. The office took shape during its tenure by the Barmakid (Barmecide) family in the 8th century. The ʿAbbāsid vizier stood between sovereign and subjects, representing the former in all matters touching the latter. This withdrawal of the head of state from direct contact with his people was unknown to the previous Umayyad caliphate and was certainly an imitation of Persian usage. Under the early Ottoman sultans, the office was called *pervane* ("advice"), a usage inherited from the Seljuqs of Anatolia. The Ottoman title vizier was first conferred on a military commander about 1380. Thenceforth until the conquest of Istanbul (1453), it denoted the highest rank in the ruling institution and could be held simultaneously by several persons, including the ministers of state. In this period members of the powerful Çandarli family served periodically as ministers and held the rank of vizier.

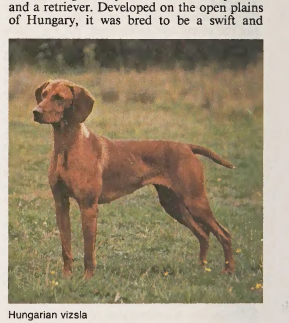
Under the sultan Mehmed II (reigned 1444–46, 1451–81), the Ottomans assumed the old Islāmic practice of giving the title vizier to the office of the chief minister, but they had to use the distinguishing epithet "grand." A number of viziers, known as the "dome viziers," were appointed to assist the grand vizier, to replace him when he was absent on campaign, and to command armies when required. Later the title vizier was granted to provincial governors and to high officials such as the *defterdar* (finance officer).

The grand vizier was the absolute representative of the sultan, whose signet ring he kept as an insignia of office. His actual power, however, varied with the vigour of the sultans. In 1654 the grand vizier acquired an official residence known as the Babāli (Sublime Porte), which replaced the palace as the effective centre of Ottoman government. Beginning in the 19th century the grand viziers presided over the council of ministers, appointed by the sultan; and after 1908 they acquired the right to appoint the Cabinet ministers. The title disappeared with the collapse of the empire.

The term vizier is also customarily applied to a pair of civil officers in ancient Egypt having viceregal powers. The office dates from at least the 4th Dynasty (*c.* 2575–*c.* 2465 BC) and achieved great importance from the reign of Sesostris III (1836–18 BC), when the vizier acquired jurisdiction over the entire bureaucracy of ancient Egypt.

Where the same name may denote a person, place, or thing, the articles will be found in that order

vizsla, breed of sporting dog whose ancestors were probably brought to Hungary by the Magyars more than 1,000 years ago. The vizsla can generally work both as a pointer and a retriever. Developed on the open plains of Hungary, it was bred to be a swift and



Hungarian vizsla
Sally Anne Thompson—EB Inc

cautious hunter, wary of alerting its quarry. It is a graceful, pointerlike dog and has a short, smooth, reddish gold or sandy-yellow coat. It stands 53 to 61 cm (21 to 24 inches) and weighs 18 to 27 kg (40 to 60 pounds).

Vizzetelli FAMILY: *see* Vizetelly family.

Vlaardingen, *gemeente* (commune), Zuidholland *provincie,* southwestern Netherlands. It lies along the Nieuwe Waterweg, just west of Rotterdam. An early Dutch naval victory was won nearby when Dirk IV defeated Emperor Henry III in 1037; the victories of Count William V (1351) near the town established the Bavarian line of the house of Holland. Vlaardingen has developed in the 20th century into one of the largest seaports of The Netherlands. The completion in 1958 of a large shipyard on nearby Rozenburg Island greatly increased the town's importance. Economic facilities include herring fisheries, dairies, and metallurgical and chemical (phosphates) works. Historic landmarks include the weighhouse (1556), the Grote Kerk ("Great Church"; 1643), the town hall (1650), and the fish market (1778). The Benelux Tunnel (completed 1967) begins in Vlaardingen. Pop. (1992 est.) 73,893.

Vlach, also called ROMANIAN, or RUMAN, member of a European people constituting the major element in the populations of Romania and Moldova, as well as smaller groups located throughout the Balkan Peninsula, south and west of the Danube River. Although their Slav neighbours gave them the name Volokh, from which the term Vlach is derived, the Vlachs call themselves Romani, Romeni, Rumeni, or Aromani.

The Vlachs emerged into history in the European Middle Ages, primarily in the region south of the Danube. They traditionally claim to be descendants of the ancient Romans who in the 2nd and 3rd centuries AD occupied Dacia, a Roman province located in the regions of Transylvania and the Carpathian Mountains of modern Romania. Another theory suggests that their ancestors were a Thracian tribe, native to the Roman province of Dacia, which intermarried with the Roman colonists and assimilated their language and culture. After the Romans evacuated Dacia (AD 271), the area was subjected to a series of barbarian invasions. According to some scholars, the Romanized Dacians remained in the area, probably taking refuge in the Carpathian Mountains. They remained there for several centuries as shepherds and primitive farmers, until conditions settled and they returned to the plains.

The Romanized Dacian population may have moved south of the Danube when the Romans left Dacia. After the barbarian invasions subsided, the Vlachs, seen in this theory as a later group of immigrants, moved into the area from their Romanized homelands south of the Danube or elsewhere in the Balkans. This theory cites the major role the Vlachs played in the formation and development of the Second Bulgarian Empire (also known as the Empire of Vlachs and Bulgars; founded 1184) as evidence that the centre of the Vlach population had shifted south of the Danube.

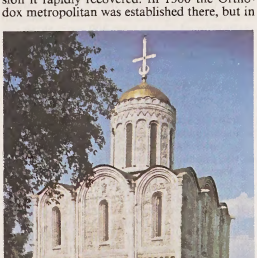
By the 13th century the Vlachs were reestablished in the lands north of the Danube, including Transylvania, where they constituted the bulk of the peasant population. From Transylvania they migrated to Walachia ("Land of the Vlachs") and Moldavia, which became independent principalities in the 13th and 14th centuries and combined to form Romania at the end of the 19th century.

Other Vlachs migrated to other regions of the Balkan Peninsula. The Macedo-Vlachs, or Tzintzars, settled on the mountains of Thessaly. According to the 12th-century Byzantine historian Anna Comnena, they founded the independent state of Great Walachia, which covered the southern and central Pindus Mountain ranges and part of Macedonia. (After the establishment of the Latin Empire at Constantinople in 1204, Great Walachia was absorbed by the Greek Despotate of Epirus; later it was annexed by the Serbs, and in 1393 it fell to the Turks.) Another Vlach settlement, called Little Walachia, was located in Aetolia and Acarnania. In addition, Vlachs known as Morlachs, or Mavrovlachi, inhabited areas in the mountains of Montenegro, Hercegovina, and northern Albania as well as on the southern coast of Dalmatia, where they founded Ragusa (modern Dubrovnik). In the 14th century some Morlachs moved northward into Croatia. In the 15th century others, later called Čiči, settled in the Istrian Peninsula.

Vladikavkaz, also called (1931–44, 1954–90) ORDZHONIKIDZE, or (1944–54) DZAUDZHIKAU, city and capital of North Ossetia republic, southwestern Russia. It lies along the Terek River and on the northern slopes of the Caucasus Mountains. Founded in 1784, Vladikavkaz was designed as the key fortress to hold the Georgian Military Highway through the Terek River valley and the Ossetian Military Highway along the Ardon Valley, the two main routes across the Caucasus. In 1860 it became a town. Vladikavkaz's industries produce nonferrous metals, electrical equipment, vehicle parts, and foodstuffs. The city has several educational and research institutes. Pop. (1991 est.) 306,000.

Vladimir, *oblast* (province), western Russia. It is centred on Vladimir city and lies east of Moscow in the basin of the Oka River. The greater part is a low plain, with extensive swamps in the south. The *oblast* has spruce, pine, and oak, but much of the forest has been cleared. Industries produce textiles, engineering goods, timber goods, and glassware. Agriculture is concentrated chiefly in the northwest, where there is considerable market gardening. Much swampland has been reclaimed. Area 11,200 square miles (29,000 square km). Pop. (1991 est.) 1,659,800.

Vladimir, city and administrative centre of Vladimir *oblast* (province), western Russia, situated on the Klyazma River. Vladimir was founded in 1108 by Vladimir II Monomakh, grand prince of Kiev. The community became the centre of a princedom, deriving importance from trade along the Klyazma. In 1157 Prince Andrew Bogolyubsky moved his capital there from Kiev. The city was twice sacked by the Mongols (1238, 1293); on each occasion it rapidly recovered. In 1300 the Orthodox metropolitan was established there, but in



Cathedral of St. Dmitry at Vladimir, Russia
Shostal

1326 the church authority and in 1328 temporal authority were transferred to Moscow. Thereafter the city, suffering several further Tatar attacks in the 15th century, became a minor local centre, although in 1796 it was made a seat of provincial government.

Post-revolutionary Vladimir grew chiefly on the basis of its textile, machine-building, and chemical industries. The city possesses some superb examples of early Russian architecture. Especially noteworthy among these are the kremlin; the Cathedral of the Assumption, originally built in 1158; the triumphal Golden Gate of 1158, restored under Catherine II the Great; and the Cathedral of St. Dmitry (1197, restored 1835). Pop. (1991 est.) 355,600.

Vladimir I, in full VLADIMIR SVYATOSLAVICH, byname SAINT VLADIMIR, or VLADIMIR THE GREAT, Russian SVYATOY VLADIMIR, or VLADIMIR VELIKY (b. *c.* 956, Kiev, Kievan Rus [now in Ukraine]—d. July 15, 1015, Berestova, near Kiev; feast day July 15), grand prince of Kiev and first Christian ruler in Kievan Rus, whose military conquests consolidated the provinces of Kiev and Novgorod into a single state, and whose Byzantine baptism determined the course of Christianity in the region.

Vladimir was the son of the Norman-Rus prince Svyatoslav of Kiev by one of his courtesans and was a member of the Rurik lineage dominant from the 10th to the 13th century. He was made prince of Novgorod in 970. On the death of his father in 972, he was forced to flee to Scandinavia, where he enlisted help from an uncle and overcame Yaropolk, another son of Svyatoslav, who attempted to seize the duchy of Novgorod as well as Kiev. By 980 Vladimir had consolidated the Kievan realm from Ukraine to the Baltic Sea and had solidified the frontiers against incursions of Bulgarian, Baltic, and Eastern nomads.

Although Christianity in Kiev existed before Vladimir's time, he had remained a pagan, accumulated about seven wives, established temples, and, it is said, taken part in idolatrous rites involving human sacrifice. With insurrections troubling Byzantium, the emperor Basil II (976–1025) sought military aid from Vladimir, who agreed, in exchange for Basil's sister Anne in marriage. A pact was reached about 987, when Vladimir also consented to the condition that he become a Christian. Having undergone baptism, assuming the Christian patronal name Basil, he stormed the Byzantine area of Chersonesus (Korsun, now part of Sevastopol) to eliminate Constantinople's final reluctance. Vladimir then ordered the Christian conversion of Kiev and Novgorod, where idols were cast into the Dnieper River after local resistance had been suppressed. The new Rus Christian worship adopted the Byzantine rite in the Old Church Slavonic language. The story (deriving from the 11th-century monk Jacob) that Vladimir chose the Byzantine rite over the liturgies of German Christendom, Judaism, and Islām because of its transcendent beauty is apparently mythically symbolic of his determination to remain independent of external political control, particularly of the Germans. The Byzantines, however, maintained ecclesiastical control over the new Rus church, appointing a Greek metropolitan, or archbishop, for Kiev, who functioned both as legate of the patriarch of Constantinople and of the emperor. The Rus-Byzantine religio-political integration checked the influence of the Roman Latin church in the Slavic East and determined the course of Russian Christianity, although Kiev exchanged legates with the papacy. Among the churches erected by Vladimir was the Desyatinnaya in Kiev (designed by Byzantine architects and dedicated about 996) that be-

came the symbol of the Rus conversion. The Christian Vladimir also expanded education, judicial institutions, and aid to the poor.

Another marriage, following the death of Anne (1011), affiliated Vladimir with the Holy Roman emperors of the German Ottonian dynasty and produced a daughter, who became the consort of Casimir I the Restorer of Poland (1016–58). Vladimir's memory was kept alive by innumerable folk ballads and legends.

Vladimir II Monomakh, in full VLADIMIR VSEVOLODOVICH MONOMAKH (b. 1053—d. May 19, 1125, near Kiev [now in Ukraine]), grand prince of Kiev from 1113 to 1125.

Vladimir was the son of Grand Prince Vsevolod I Yaroslavich (ruled Kiev 1078–93) and Irina, the daughter of the Byzantine emperor Constantine IX Monomachus. He became active in the politics of Kievan Rus, helping his father and uncle Izyaslav I (ruled at Kiev intermittently 1054–78) defeat his cousins Oleg Svyatoslavich and Boris Vyacheslavich at Chernigov (1078; modern Chernihiv, Ukraine) and succeeding his father as prince of Chernigov when Vsevolod became grand prince of Kiev. Vladimir ruled Chernigov from 1078 to 1094, restoring order among his cousins in Volhynia (1084–86) and assuming a leading role among princes of Rus at the conferences held to avert perpetual warfare among themselves (1097 and 1100). When his cousin Grand Prince Svyatopolk II (ruled Kiev 1093–1113) died, the *veche* (city council) of Kiev named him successor.

During his reign, as prior to it, Vladimir was almost constantly involved in wars, fighting primarily the Polovtsy, who had settled in the steppe region southeast of the Kievan state and had been raiding the lands of Rus since 1061. In his "Testament," which he wrote for his sons and which constitutes the earliest known example of Old Russian literature written by a layman, Vladimir recounted participating in 83 noteworthy military campaigns and recorded killing 200 Polovtsy princes. In addition to his martial qualities, Vladimir Monomakh was known as an adept administrator, whose ability to curtail the internecine warfare among his princely relatives revived, if only temporarily, the declining strength of Kievan Rus. He was also noted as a builder; he founded the city of Vladimir on the Klyazma River in northeastern Russia, which by the end of the 12th century replaced Kiev as the seat of the grand prince.

Vladimir-Suzdal school, school of Russian medieval mural and icon painting that flourished in the 12th and 13th centuries around the neighbouring cities of Vladimir and Suzdal in the Suzdal region of northeastern Russia. Vladimir-Suzdal, along with the city of Novgorod in northwestern Russia, was one of the two areas that inherited the Byzantine artistic traditions of Kiev, which lost preeminence to Vladimir in 1157. Like Kiev a centre of princely authority, Vladimir-Suzdal maintained great continuity with the monumental and aristocratic spirit of Kievan Byzantine art, producing works of exceptional quality.

Stylistic similarities and a scarcity of documentation complicate the attribution of particular works to the Kievan or Vladimir-Suzdal schools. Impossible to dispute are frescoes that decorate the Suzdalian churches, including the Cathedrals of St. Dmitry and the Assumption in Vladimir, the Church of Saints Boris and Gleb in Kideksha, and Suzdal Cathedral. These fragments, the remains of work by Greek artists, depict aristocratic, dignified, classically featured figures painted with a confident impressionist technique. They maintain the delicate balance between the real and the ideal that characterizes Byzantine art and also betray a Russian intensity of emotion.



"The Archangel Michael," icon by an anonymous artist of the Vladimir-Suzdal school, egg tempera on panel, *c.* 1300; in the State Tretyakov Gallery, Moscow

Novosti Press Agency, Moscow

Works of the Vladimir-Suzdal school, while preserving Byzantine illusionistic modeling and solid proportions that lack the elongation characterizing all later Russian art, move toward a more Russian expression: their emotion is intensely ascetic, the anatomy of the figures is uncertain and the hands typically small, and there is an increasingly conscious use of expressive colour. In addition, there is the use of facial expression to portray a variety of specific emotions that is the peculiar achievement of the Vladimir-Suzdal school.

The brilliant artistic development of Vladimir-Suzdal was brought to a sudden end by the mid-13th-century invasions of the Mongols, who conquered all but northwestern Russia and destroyed countless treasures. The grand tradition of Kiev and Vladimir-Suzdal was thus lost, and the development of Russian art continued for the next 200 years along different lines, in the middle-class environment of Novgorod and its satellite city, Pskov. *See also* Novgorod school and Pskov school.

Vladimir-Volynsky (city, Ukraine): *see* Volodymyr-Volynskyy.

Vladimirescu, Tudor (b. *c.* 1780, Vladimiri, Walachia [now in Romania]—d. June 7, 1821, Târgovişte), national revolutionary hero, leader of the popular uprising of 1821 in Walachia.

A former officer in the Russian army, Vladimirescu was influenced by the autonomist movement in Serbia. He initially allied himself with the Greek revolutionary society—the Philikí Etaireía ("Friendly Brotherhood")—that sought to overturn Turkish rule throughout the Balkans. With the Etairist rising in Moldavia under Prince Alexander Ypsilantis (March 1821), however, he disavowed the Greek leadership of the revolution in the Romanian principalities. He organized a popular rising in Walachia to evict the predominantly Greek administration of the Turkish government and end the spoliations of the native Romanian aristocracy (*boiari*). His eventual accommodation to the provisional aristocratic government at Bucharest, however, eroded his considerable initial support. When Ypsilantis suspected Vladimirescu of conspiring with the Turks to cut off the retreat of the Greek revolutionary forces from the Bucharest region, he ordered the arrest of the Romanian leader, who was court-martialed and executed.

Vladislas, also spelled VLADISLAUS, or VLADISLAW, name of rulers grouped below by country and indicated by the symbol •.

Foreign-language equivalents:

Czech	Vladislav
Hungarian	Uládzló
Polish	Władysław

Bohemia

• **Vladislas II** (b. 1456—d. March 13, 1516, Buda, Hung.), king of Bohemia from 1471 and of Hungary from 1490 who achieved the personal union of his two realms.

The eldest son of Casimir IV Jagiełło, king of Poland, Vladislas was elected king of Bohemia in 1471. The early part of his reign was spent in conflict with the Hungarian king Matthias Corvinus, who in 1478 (Treaty of Olomouc) won title to the previously Bohemian crownlands of Moravia, Silesia, and Lusatia. After Matthias died, however, Vladislas was elected king of Hungary as Uládzló II in 1490. During his compliant and vacillating reign, in both Bohemia and Hungary, the nobility widely extended their powers and strengthened their hold over an already oppressed peasantry. Vladislas was also faced with the rivalry of the Holy Roman emperor Maximilian I for the Hungarian crown and was obliged to concede the Habsburg succession to his territories should his own line be extinguished (Peace of Pressburg, 1491; Treaty of Vienna, 1515); that agreement greatly contributed to the eventual formation of a Habsburg Danubian empire.

Hungary

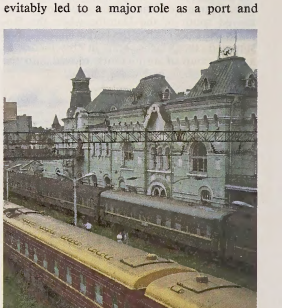
• **Vladislas I:** *see* Władysław III Warneńczyk.

• **Vladislas II:** *see* Vladislas II (Bohemia).

Poland

• **Vladislas I–IV:** *see* Władysław I–IV.

Vladivostok, seaport and administrative centre of Primorsky *kray* (region), extreme southeastern Russia. It is located around Zolotoy Rog ("Golden Horn Bay") on the western side of a peninsula that separates Amur and Ussuri bays on the Sea of Japan. The town was founded in 1860 as a Russian military outpost and was named Vladivostok ("Rule the East"). Its forward position in the extreme south of the Russian Far East inevitably led to a major role as a port and



The train station at Vladivostok, the eastern terminus of the Trans-Siberian Railroad

© Wolfgang Kaehler

naval base. In 1872 the main Russian naval base on the Pacific was transferred there, and thereafter Vladivostok began to grow. In 1880 city status was conferred on it. The city also grew in importance after the construction of the Chinese Eastern Railway across Manchuria to Chita (completed in 1903), which gave Vladivostok a more direct rail connection to the rest of the Russian Empire.

During World War I Vladivostok was the chief Pacific entry port for military supplies and railway equipment sent to Russia from the United States. After the outbreak of the Russian Revolution in 1917, Vladivostok was occupied in 1918 by foreign, mostly Japanese, troops, the last of whom were not withdrawn until 1922. The antirevolutionary forces in Vladivostok promptly collapsed, and Soviet power was established in the region.

During the Soviet period Vladivostok remained the home of the Pacific Fleet, which was greatly enlarged in the decades after World War II. Vladivostok's military importance was such that it was closed to foreign shipping and other contacts from the late 1950s until the waning days of Soviet power in 1990. Its chief role as a commercial port subsequently reemerged, both as a link to other Russian ports of the Far East and as a port of entry for consumer goods from China, Japan, and other countries. The port is the eastern terminus of the Northern Sea Route along Russia's Arctic seaboard from Murmansk and is the principal supply base for the Arctic ports east of Cape Chelyuskin.

The principal exports of Vladivostok are petroleum, coal, and grain, while clothing, consumer electronics, and automobiles are the main imports. Into the port also comes much of the catch or processed fish from other Russian Far Eastern ports for onward transmission to the rest of the country.

The industrial base of Vladivostok was much diversified during the Soviet period. In addition to large ship-repair yards, there are railway workshops and a plant for the manufacture of mining equipment. Light industry includes instrument and radio factories, timber-working enterprises (notably those producing furniture and veneer), a chinaware works, and manufacturers of pharmaceutical products. Food industries—principally the processing of fish and meat and flour milling—and the building industry (prefabricated building panels) are important. A railroad town, Vladivostok is the eastern terminus of the Trans-Siberian Railroad. The city also has an airport.

Vladivostok is the chief educational and cultural centre of the Russian Far East. It is the site of the Far Eastern Scientific Centre, the Far Eastern State University (founded 1920), and medical, art education, polytechnic, trade, and marine-engineering institutes. The city has amateur and professional theatres as well as a philharmonic society and symphony orchestra. There are also museums of local history and of the history of the Pacific Fleet. Pop. (1992 est.) 648,000.

Vlaminck, Maurice de (b. April 4, 1876, Paris, France—d. Oct. 11, 1958, Rueil-la-Gadelière), French painter whose experiments with pure, intense colour drawn straight from the tube and applied in thick daubs earned him a charter âssociation with the Fauves.

Vlaminck was noted for his brash temperament as well as his flair for painting landscapes. His interest in art dated from 1895, with lessons in drawing and study of the Impressionists, and in 1899 he began sharing a studio with André Derain, who had been a friend from childhood. Vlaminck was also at various times a musician, actor, cyclist, and novelist.

In 1901 Vlaminck was overwhelmed by an exhibition of the art of Vincent van Gogh, whose works became a new influence; he also met Henri Matisse and first exhibited at the



Maurice de Vlaminck, 1952
By courtesy of the Art institute of Chicago: photograph, Sanford Roth

Salon des Indépendants, Paris. Though his work remained representational, its freer use of colour was moving in the innovative direction of Fauvism. In 1905 he participated in the controversial group show at the Salon d'Automne, when the term Fauve was first applied to canvases of bold colour, applied in a spontaneous and impulsive manner. By 1908, however, he had turned to painting landscapes of thickly applied grays, whites, and deep blues. His style moved closer to that of the final development of Paul Cézanne, and he gained a more solidly based sense of composition. About 1915 he began to achieve a personal, strongly stated, and thoroughly French Expressionist style.

Vlasov, Andrey Andreyevich (b. Sept. 1 [Sept. 14, New Style], 1900, Vladimir province, Russia—d. Aug. 12, 1946), anti-Stalinist military commander who, captured by the Germans early in World War II, became a turncoat and fought with the Germans against the Soviet Union.

The son of a kulak, Vlasov was drafted into the Red Army in 1919 and fought in the Russian Civil War. He joined the Communist Party in 1930 and, in 1938, went to China to serve as a military adviser to Chiang Kai-shek. He returned to Russia in 1939 and, after playing major roles in the defense of Kiev and Moscow against the Germans in 1941, was captured with his army in July 1942.

In 1944 Nazi leaders allowed Vlasov to form the Committee for the Liberation of the Peoples of Russia with the aim of overthrowing the regime of Soviet leader Joseph Stalin. The Russian Liberation Army, which he also headed, was composed of former Russian soldiers captured by the Germans. Near the end of the war, Vlasov's 50,000 troops were allowed by their distrustful German sponsors to go into battle against the advancing Red Army. Most of them soon afterward surrendered to American forces advancing on Czechoslovakia and were forcibly repatriated to Soviet authorities. Vlasov was handed over to the Soviets in May 1945 and was tried and hanged.

Vlissingen, English FLUSHING, *gemeente* (commune), Zeeland *provincie,* southwestern Netherlands. It is situated on the southern coast of Walcheren Island, at the mouth of the western Schelde (Scheldt) estuary. A medieval trading town with emphasis on herring fishing, its importance lay in its position controlling the approach to Antwerp. Fortified by Charles V, it was the first town to rebel against Spanish rule in 1572 and became the headquarters of the insurgents' navy (the Sea Beggars). It was held by England from 1585 to 1616 as a "security town" under an agreement to assist the Dutch. It was turned into a naval base by Napoleon during the French occupation (1795–1814). A period of prosperity after the independence of The Netherlands was followed in the 19th century by a decline from which Vlissingen did not recover until the establishment of a shipbuilding yard in 1875. The town was heavily damaged in 1944 when Walcheren and other islands were flooded by the British army in World War II to clear the way to Antwerp, and it was again damaged by natural floods in 1953. Since rebuilt, it is now an important commercial port, fishing harbour, and seaside resort and also a naval base. Vlissingen's industries include shipbuilding, engineering, oil refining, and the manufacture of machinery.

Historic landmarks include the Church of St. James (1308; rebuilt after a fire in 1911), the Prisoners' Tower (1563), the old exchange (1672), the town hall (1733), and part of an old city gate. The municipal museum has a collection relating to Admiral Michiel Adriaanzoon de Ruyter, a native of Vlissingen. Pop. (1992 est.) 43,913.

Vlorë, also called VLORA, Geg dialect VLONË, Italian VALONA, town that is the second seaport of Albania. It lies at the head of Vlorës Bay, which is protected by the mountainous Karaburun (peninsula) and the island of Sazan (Italian Saseno, ancient Saso). Of ancient origin, it was founded as Aulon, one of three Greek colonies on the Illyrian coast. It was strategically important during Roman times and in the 11th–12th-century wars between Normans and Byzantines. Later it was contested by Venetians, Serbs, and Turks. On Nov. 28, 1912, Ismail Qemal proclaimed there the independence of Albania. Vlorë was occupied by the Italians in 1915–20 and again in 1939. During World War II Sazan was used as a German and Italian submarine base. After the war the town's harbour and submarine facilities were improved by the Soviet Union, which used the bay as a naval base until 1961, when conflict between the two states resulted in a Soviet departure. Vlorë's population includes Muslims, Greek Orthodox, and a few Roman Catholics.

The town is surrounded by hilly olive groves and is situated just inland from its port, which is linked by pipeline to oil fields and the Cërrik refinery. Vlorë has a fishing and canning industry, a distillery, and an olive-oil refinery. Natural bitumen from nearby Selenicë is exported. Pop. (1990 est.) 73,800.

Vlorë proclamation (Nov. 28, 1912), declaration of Albanian independence from Ottoman rule. After the Turkish government adopted a policy of administrative centralization for the Ottoman Empire (1908), Albanian nationalist leaders led a series of revolts (1909–12) demanding the unification of the empire's Albanian districts and political and cultural autonomy within them. While the Albanians, after a successful uprising in 1912, were negotiating with the Turks, however, a coalition of Balkan states declared war on the Ottoman Empire (October 1912).

Because one of the Balkan states' goals was to divide the Albanian districts of the empire among themselves and because their armies swiftly overcame the Turkish forces, the Albanian leaders abandoned their goal of creating an autonomous province within the empire. Instead, on Nov. 28, 1912, while their lands were being occupied by Serbian, Montenegrin, and Greek troops, 83 delegates from all parts of Albania met at Vlorë (Valona), where their leader, Ismail Qemal, proclaimed Albania an independent state.

Although the Balkan allies continued to seize Albanian territory, the major Euro-

pean powers, influenced primarily by Austria-Hungary and Italy, approved the formation of a sovereign Albanian state (December 1912). Confirming their position in the Treaty of London (May 30, 1913), which ended the 1912 Balkan War, the powers next determined Albania's borders with Serbia, Montenegro, and Greece; obtained the withdrawal of foreign troops from Albania; and on July 29, 1913, formally recognized Albania as an independent principality, guaranteed its status, and named as its sovereign Wilhelm zu Wied, a prince from the German Rhineland.

Vltava River, German MOLDAU, river, the longest in the Czech Republic, flowing 270 miles (435 km). Its drainage basin is 10,847 square miles (28,093 square km). The river rises in southwestern Bohemia from two headstreams in the Bohemian Forest, the Teplá Vltava and the Studená Vltava. It flows first southeast, then north across Bohemia, and empties into the Elbe (Czech: Labe) River at Mělník, 18 miles (29 km) north of Prague. Prague and České Budějovice are on the Vltava. At České Budějovice, in the river's middle basin, is an extensive lake region. The middle and lower course of the Vltava is gorgelike, with rapids and incised meanders. Large hydropower dams with associated lakes provide recreational facilities. The Vltava's principal tributaries are the Lužnice and Sázava (east) and the Otava and Berounka (west). The river is celebrated as the second subject in a cycle of six symphonic poems under the general title of *Má vlast* ("My Country") by the Czech composer Bedřich Smetana.

Vo Chi Cong (b. 1912, Quang Nam province, southern Vietnam), strongly anti-French Communist revolutionary who was among the earliest fighters for Vietnam's independence. He held key positions in South Vietnam's National Liberation Front (NLF) and the Provisional Revolutionary Government—both political arms of the Viet Cong guerrillas—during the Vietnam War.

Cong began an activist career in 1930 under Phan Boi Chau and Phan Chau Trinh, early nationalist rebels against the French colonial regime. During World War II he participated in the underground resistance against Japan and the Vichy French, who arrested him and kept him under surveillance in 1942.

It was not until 1961 that he emerged into political significance as a founding member of the NLF. Cong was the chief organizer of the People's Revolutionary Party, South Vietnam's communist party, and became a strong opponent of Saigon's U.S.-backed regime. After the reunification of Vietnam in 1976, he joined the new national government, serving as the minister of fisheries (1976–77) and of agriculture (1977–78) and as a deputy prime minister (1976–82). He also became a full member of the Politburo of the Vietnamese Communist Party in 1976.

Vo Nguyen Giap (b. 1912, An Xa, Vietnam), Vietnamese military and political leader whose perfection of guerrilla as well as conventional strategy and tactics led to the Viet Minh victory over the French (and to the end of French colonialism in Southeast Asia) and later to the North Vietnamese victory over South Vietnam and the United States.

The son of an ardent anticolonialist scholar, Giap as a youth began to work for Vietnamese autonomy. He attended the same high school as Ho Chi Minh, the Communist leader, and while still a student in 1926 he joined the Tan Viet Cach Menh Dang, the Revolutionary Party of Young Vietnam. In 1930, as a supporter of student strikes, he was arrested by the French Sûreté and sentenced to three years in prison, but he was paroled after serving only a few months. He studied at the Lycée Albert-Sarraut in Hanoi, where in 1937 he received a law degree. Giap then became a professor of history at the Lycée Thanh Long in Hanoi, where he converted many of his fellow teachers and students to his political views. In 1938 he married Minh Thai, and together they worked for the Indochinese Communist Party. When in 1939 the party was prohibited, Giap escaped to China, but his wife and sister-in-law were captured by the French police. His sister-in-law was guillotined; his wife received a life sentence and died in prison after three years.

In 1941 Giap formed an alliance with Chu Van Tan, guerrilla leader of the Tho, a minority tribal group of northeastern Vietnam. Giap hoped to build an army that would drive out the French and support the goals of the Viet Minh, Ho Chi Minh's Vietnamese independence movement. With Ho Chi Minh, Giap marched his forces into Hanoi in August 1945, and in September Ho announced the independence of Vietnam, with Giap in command of all police and internal security forces and commander in chief of the armed forces. Giap sanctioned the execution of many non-Communist nationalists, and he censored nationalist newspapers to conform with Communist Party directives. In the French Indochina War, Giap's brilliance as a military strategist and tactician led to his winning the decisive battle at Dien Bien Phu on May 7, 1954, which brought the French colonialist regime to an end.

On the division of the country in July, Giap became deputy prime minister, minister of defense, and commander in chief of the armed forces of North Vietnam. He subsequently led the military forces of the north to eventual victory in the Vietnam War, compelling the Americans to leave the country in 1973 and bringing about the fall of South Vietnam in 1975. From 1976, when the two Vietnams were reunited, to 1980 Giap served as Vietnam's minister of national defense; he also became a deputy prime minister in 1976. He was a full member of the Politburo of the Vietnamese Communist Party until 1982. Giap was the author of *People's War, People's Army* (1961), a manual of guerrilla warfare based on his own experience.

vocal cord, Latin PLICA VOCALIS, either of two folds of mucous membrane that extend across the interior cavity of the larynx and are primarily responsible for voice production. Sound is produced by the vibration of the folds in response to the passage between them of air exhaled from the lungs. The frequency of these vibrations determines the pitch of the voice. The vocal cords are shorter and thinner in women and children, accounting in part for their higher-pitched voices. *See* speech.

The ventricular folds, located just above the vocal cords, are sometimes termed false vocal cords because they are not involved in voice production.

vocal fry, also called MURMUR, or BREATHY VOICE, in phonetics, a speech sound or quality used in some languages, produced by vibrating vocal cords that are less tense than in normal speech, which produces local turbulence in the airstream resulting in a compromise between full voice and whisper. English speakers produce a vocal fry when suggesting ghost wails with an *oo*-sound. *See also* voice; whisper.

vocal-instrumental concerto, musical composition of the early Baroque era (late 16th and early 17th centuries) in which choirs, solo voices, and instruments are contrasted with one another. Although sometimes employing secular texts, the genre is particularly associated with sacred music and is sometimes referred to as the sacred concerto. Its principle of contrast is rooted in late Renaissance developments such as the multiple choirs of Venice and the change in musical aesthetic toward greater emotional expressiveness.

The genre falls into two loose categories—concerti for many voices and for few. The many-voiced type is performed by multiple choirs, accompanied by organ and/or orchestra; it includes such examples as the Vespers (songs at certain hours) of the Italian composer Claudio Monteverdi. In contrast, the few-voiced type was usually set for one or more solo voices and continuo (low melody instrument, such as cello or bassoon, and harmony instrument, such as an organ or harpsichord). Leading composers of the few-voiced type include Monteverdi and Alessandro Grandi. By the end of the 17th century the two types merged, large-scale concerti frequently including vocal solos with continuo accompaniment.

The Italian vocal-instrumental concerto was adopted by German composers for Lutheran religious music. Such works, often based on the melody of a chorale, or German hymn, became the ancestors of the German church cantata. Notable German composers of the vocal-instrumental concerto include Michael Praetorius and Heinrich Schütz.

vocal pouch, in frogs and toads (amphibians of the order Anura), a sac that serves as a resonating chamber. Its opening into the floor of the mouth is partially closed by vocal cords; air forced past the cords into the pouch produces sound by vibrating the cords.

Vocal pouches vary greatly in size and shape among species. They may be single or double. Darwin's frog has a distensible vocal pouch in which the male harbours eggs about to hatch until they have hatched and the young can survive outside.

vocalization, any sound produced through the action of an animal's respiratory system and used in communication. Vocal sound, which is virtually limited to frogs, crocodilians and geckos, birds, and mammals, is sometimes the dominant form of communication. In many birds and nonhuman primates the adult repertoire comprises a number of different calls, used to indicate territoriality, aggression, alarm, fright, contentment, hunger, the presence of food, or the need for companionship. Bird song (*q.v.*), the most intensively studied of animal vocalizations, consists primarily of territorial and mating calls.

vocational education, instruction intended to equip persons for industrial or commercial occupations. It may be obtained either formally in trade schools, technical secondary schools, or in on-the-job training programs or, more informally, by picking up the necessary skills on the job.

Vocational education in schools is a relatively modern development. Until the 19th century such education, except for the professions, was provided only by apprenticeship. This situation was partly due to the low social status associated with such instruction as opposed to a classical curriculum, which was considered "necessary for a gentleman." With the growth of industrialization during the 19th century, however, several European countries, notably Germany, began introducing vocational education in elementary and secondary schools. In Great Britain, however, opposition to vocational education persisted into the 20th century, although a few trade and junior technical schools were established by local authorities before World War II. By the late 19th century public (common) school vocational education in the United States consisted of manual training and practical arts. These programs were gradually expanded until 1917 when federal aid was provided to public schools for trade and industrial, agricultural, and homemaking courses.

After World War II the demand for trained paraprofessionals in the relatively new fields

of computer science, electronics, and medical services led to an increased interest in short-term postsecondary specialized training programs in these areas as an alternative to a traditional college education.

Vöcklabruck, town, *Bundesland* Oberösterreich (federal province of Upper Austria), north central Austria, on the Vöckla River southwest of Wels. The fine town square has two old gate towers and a Baroque facade, and there are two 15th-century churches and the Church of St. Ägidius (1688). Vöcklabruck is a busy industrial town with a large asbestos-cement plant and textile, metal, and paper mills. Pop. (1981) 11,039.

Vocontii, a Celtic tribe of the Gallic province of Narbonensis; its members probably lived in the western foothills of the Alps. Subjugated by the Romans (125–124 BC), they were a *civitas foederata* ("allied state") with two capitals—Vasio (Vaison-la-Romaine) and Lucus Augusti (Luc-en-Diois). Excavations at Vaison have shown that the Roman town was built north of an earlier hill fort; uncovered among the Roman ruins were a theatre, portico, and two groups of houses.

vodka, distilled liquor, clear in colour and without definite aroma or taste, ranging in alcoholic content from about 40 to 55 percent. Because it is highly neutral, with flavouring substances mainly eliminated during processing, it can be made from a mash of the cheapest and most readily available raw materials suitable for fermentation. Potatoes were traditionally employed in Russia and Poland but have largely been supplanted there and in other vodka-producing countries by cereal grains.

Vodka originated in Russia during the 14th century, and the name is a diminutive of the Russian *voda* ("water"). The beverage was mainly popular in Russia, Poland, and the Balkan states until soon after World War II, when consumption began to increase rapidly in the United States and then in Europe. Most producers purchase previously distilled and purified neutral spirits that are extremely high in alcohol content, with almost no flavouring substances remaining. Such spirits are then additionally purified by a filtration process, usually employing charcoal, and are then reduced in strength with distilled water and bottled without aging.

In Russia, where fairly low alcohol content of 40 percent by volume (80 U.S. proof) is preferred, and in Poland, where 45 percent is more common, vodka is usually consumed unmixed and chilled, in small glasses, and accompanied by appetizers. In other countries it is popular for use in mixed drinks because of its neutral character. It may be combined with other beverages without imparting flavour of its own and substituted for other spirits in cocktails not requiring the specific flavour of the original spirit. Popular vodka drinks include the screwdriver, made with orange juice; the bloody Mary, with tomato juice; vodka and tonic, a tall drink; and the vodka martini, with vodka substituted for gin.

Vodkas are sometimes flavoured. *Zubrówka,* yellowish in colour, highly aromatic, and with a somewhat bitter undertone, is produced by steeping several stalks of *Zubrówka,* or buffalo grass, in vodka. Other flavoured vodkas are made with such ingredients as lemon peel, berries, peppercorns, and caraway.

vodyanoy, in Slavic mythology, the water spirit. The *vodyanoy* is essentially an evil and vindictive spirit whose favourite sport is drowning humans. Anyone bathing after sunset, on a holy day, or without having first made the sign of the cross risks being sucked into the water by the *vodyanoy.* He can assume many different forms that enable him to deceive and trap his victims. The *vodyanoy* lives alone in his particular body of water and is known to favour rivers with strong currents and swamps.

Voegelin, Eric (Herman Wilhelm) (b. Jan. 3, 1901, Cologne—d. Jan. 19, 1985, Stanford, Calif., U.S.), German-American political scientist and interdisciplinary scholar known for his studies of modern political thought and for his efforts to create a comprehensive philosophy of man, society, and history.

Voegelin earned a Ph.D. from the University of Vienna in 1922, where he taught law from 1929 to 1938. He escaped to Switzerland when the Nazis annexed Austria, and he subsequently went to the United States, where he was naturalized in 1944. He taught at Harvard University, Bennington College in Vermont, the University of Alabama, and Louisiana State University. From 1958 to 1969 he taught political science at the University of Munich, returning to the United States thereafter as a senior research fellow at the Hoover Institution on War, Revolution, and Peace in Stanford, Calif.

Voegelin is best known for his work on the philosophy of history. He examined not only political institutions but also language symbols and the nature of civilization in current and ancient texts. His work centred on the interpretation of the governing symbols and myths of political society, the understanding of which he viewed as basic to the success of political theory.

Among the principal works of Voegelin are *Der Autoritäre Staat* (1936), *The New Science of Politics* (1952), *Order and History,* 4 vol. (1956–74), *Science, Politics and Gnosticism* (1959), and *From Enlightenment to Revolution* (1975).

Articles are alphabetized word by word, not letter by letter

Voetius, Gisbertus (b. 1589, Heusden, Holland—d. 1676), Dutch Reformed theologian, scholar in Semitic languages, and educator who upheld uncompromising Calvinist views on predestination and condemned as atheistic the rationalist thought of the 17th-century French philosopher René Descartes.

Voetius studied in Leiden and in 1611 became pastor of Blymen, after which he returned to Heusden in 1617. In 1619 he played an influential part in the Synod of Dort, and 1634 he became professor of theology at Utrecht. Three years later he became pastor of the Utrecht congregation. His writings, *Politica Ecclesiastica* (4 vol., 1663–76) and *Diatriba de Theologia* (1668; "Discourse on Theology") strongly censured any concession to Roman Catholic doctrine.

Vogel, Hermann Karl (b. April 3, 1842, Leipzig—d. Aug. 13, 1907, Potsdam, Ger.), German astronomer who discovered spectroscopic binaries—double-star systems that are so close for the individual stars to be discerned by any telescope but, through the analysis of their light, have been found to be two individual stars rapidly revolving around one another.

An assistant at the Leipzig Observatory from 1867, Vogel became director of a private observatory at Bothkamp, Ger., in 1870. His early work centred on the study of planetary spectra (the characteristic wavelengths of the light from the planets) to obtain data on the planetary atmospheres; it was published in his *Spectra der Planeten* (1874; "Spectra of the Planets"). In 1874 he joined the staff of the new Astrophysical Observatory at Potsdam and in 1882 became its director.

In 1887 Vogel began a program of spectroscopic measurement of the radial motions of the stars and introduced the use of photography in stellar spectroscopy. In the course of his work he found that the star Algol is accompanied by a dark companion (about the size of the Sun) that periodically eclipses it, thus accounting for Algol's periodic and regular variations in brightness. Vogel is also noted for his work in stellar classification. First proposed in 1874 and revised in 1895, the Vogel system is based on the previous work of an Italian astronomer, Angelo Secchi.

Vogel, Sir Julius (b. Feb. 24, 1835, London—d. March 12, 1899, East Molesey, Surrey, Eng.), New Zealand statesman, journalist, and businessman known for his bold project to regenerate New Zealand's economy in the 1870s through large-scale public works financed by British loans.

Attracted by gold discoveries in Victoria, Vogel emigrated to Australia in 1852 and became successful in business and journalism. He moved to Otago, N.Z., in 1861 after being badly defeated for public office and soon guided the *Otago Daily Times* to a leading position in the colony. Elected to Parliament in 1863, he led the opposition (1865–68) and became colonial treasurer in 1869 in the ministry of William Fox. This was the beginning of a "continuous ministry" during which Vogel, whatever office he held, was the real holder of power in the government of New Zealand. Where it suited his purpose, Vogel implemented policies that had been planned by others, such as the abolition of provincial governments. He also picked the men who formed ministries and headed the government for more than a decade.

Vogel's financial skills, particularly in negotiating loans from the British government, enabled him to develop his own policies. His development scheme, which he implemented as colonial treasurer (1869–72) and prime minister (1873–75, 1876), entailed the building of transportation and communication facilities and other public works. He was knighted in 1875.

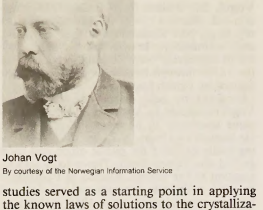
A staunch advocate of the extension of British power in the Pacific, Vogel's agitation helped persuade Britain to annex Fiji in 1874. From 1876 to 1880 he served as agent-general in London and reentered New Zealand politics in 1884 as the real power in the ministry of Sir Robert Stout (1884–87). Vogel was unable to stave off economic depression in New Zealand, however, and he resigned his parliamentary seat in 1889, the year of publication of his novel *Anno Domini 2000: Or Woman's Destiny,* which projected his ideas on empire and finance to the year 2000.

Voghera, town, Pavia province, Lombardia (Lombardy) region, northern Italy. Voghera is located on the Staffora River, just southwest of Pavia. Probably the site of Iria, a Roman colony, it was fortified by the Visconti family, whose castle there dates from 1372. The 17th-century church of S. Lorenzo and the unused Romanesque church of S. Ilario (Chiesa Rossa, or Red Church, from its red-brick construction) are also notable. Voghera is an important agricultural market, with an agricultural training school, and has textile, mechanical, and food industries and a hydroelectric plant. Pop. (1981 prelim.) mun., 42,592.

Vogt, Johan Herman Lie (b. Oct. 14, 1858, Tvedestrand, Nor.—d. Jan. 3, 1932, Trondheim), Norwegian geologist and petrologist who pioneered in the use of physical-chemical methods in the study of the origin of igneous rocks and ores.

Vogt was appointed professor of metallurgy at the University of Christiania in 1886. His first important work, *Studier over slagger* (1884; "Studies on Slags"), began a series of studies on molten slags, in which he examined the crystallization of furnace slags and pointed out the close resemblance in mineral composition and texture between slags and certain

igneous rocks. His principal work on slags, *Die Silikatschmelzlösungen* ("The Molten Silicate Solutions"), appeared in 1903–04. Vogt's



Johan Vogt
By courtesy of the Norwegian Information Service

studies served as a starting point in applying the known laws of solutions to the crystallization of igneous-rock magmas, and his pioneer work did much to stimulate the quantitative research that followed. In 1912 he took the chair of mineralogy at the technical high school at Trondheim, retiring 16 years later.

Vogt, Nils Collett (b. Sept. 24, 1864, Christiania [now Oslo], Nor.—d. Dec. 23, 1937, Oslo), Norwegian novelist and poet who dealt with the conflict between the generations and the struggle for intellectual freedom.

Vogt was a rebel in a conservative family, and his first novel, *Familiens sorg* (1889; "A Grief to His Family"), is about youth in rebellion against a social order dominated by old men. He was greatly in sympathy with the workers' cause and wrote songs for them. He wrote novels, plays, and short stories, but he is remembered mainly for his lyric poetry, published in many volumes, including *Det dyre bred* (1900; "The Precious Bread"), *Septemberbrand* (1907; "September Fire"), and his last poems, *Et liv i digt* (1937; "A Life in Poetry").

Vogtland, physical and cultural region of southwestern Saxony *Land* (state), southeastern Germany, lying between Bavaria *Land* and the Czech Republic. A wooded, hilly plateau drained northward by the upper Weisse Elster River, Vogtland is cradled by the higher ranges of the Ore Mountains to the east, the Fichtel Hills to the south, and the Thüringian Forest and Franconian Forest to the west.

Under the Hohenstaufen dynasty of Holy Roman emperors (1138–1254), the region came to be ruled by an imperial official called a *Vogt*. The *Vogt*'s castle in Plauen, the region's main city, dates from 1250. After Hohenstaufen rule ended, Vogtland fragmented into many petty states. By 1466 the Wettin family controlled most of the region, and Vogtland's political fortunes thereafter followed those of Saxony.

The economy of the comparatively infertile region developed around cottage industries. Textiles and clothing have long been major products. Musical-instrument making has been important in southeastern Vogtland since the 17th century, when Protestant refugees from Roman Catholic Bavaria brought their craft with them. Klingenthal and Markneukirchen specialize in the manufacture of reed and stringed instruments respectively. Vogtland has also become a recreational center, particularly for winter sports. Spas at Bad Elster and Radiumbad Brambach serve vacationers and convalescents.

Vogul (people): *see* Khant and Mansi.

Vohu Manah (Avestan: "Good Mind"), in Zoroastrianism, one of the six *amesha spentas* ("beneficent immortals") created by Ahura Mazdā, the Wise Lord, to assist him in furthering good and destroying evil. According to Zoroastrian doctrine, because the prophet Zoroaster was, in a vision, conducted into the presence of Ahura Mazdā by Vohu Manah, any individual who seeks to know the Wise Lord must approach him through this immortal.

Since Vohu Manah is the closest of the *amesha spentas* to Ahura Mazdā, the second month of the Zoroastrian calendar is dedicated to him. His sacred animal is the cow, symbol of the goodness that nourishes.

voice, in grammar, form of a verb indicating the relation between the participants in a narrated event (subject, object) and the event itself. Common distinctions of voice found in languages are those of active, passive, and middle voice. These distinctions may be made by inflection, as in Latin, or by syntactic variation, as in English. The active-passive opposition can be illustrated by the following sentences:

active:	The hunter killed the bear.
passive:	The bear was killed by the hunter.

The action remains the same, but the focus is different. The subject of an active verb governs the process as an actor, or agent, and the action may take an object as its goal. The passive voice indicates that the subject is being acted upon. The topicalized goal of the action ("the bear") is the grammatical subject of the passive sentence and is acted upon by the agent ("the hunter"), which is the logical, but not the grammatical, subject of the passive sentence. Passive constructions do not always require the agent to be expressed:

passive:	The bear was killed.

Although many transitive verbs in English can take either active or passive voice, there are exceptions. Some transitive verbs do not occur in the passive.

sentence:	This hotel room sleeps six people.
nonsentence:	Six people are slept by this hotel room.

It is believed that proto-Indo-European distinguished between an active and a middle voice, and it is from the latter that the passive voice in later Indo-European languages developed. The middle voice signifies either an action or a state in which the principal interest is the subject of the verb, as is seen in the following examples from Russian:

active:	Ivan bril Pyotra.
	Ivan was shaving Peter.
middle:	Ivan brilsya.
	Ivan was getting shaved (by himself or by someone else).

In the middle voice the subject may or may not be the agent; the focus is on the action affecting him, whereas the passive voice focuses on the recipient of the action.

The category of voice is not found in all languages. Languages that can preserve meaning while changing focus by means of different forms of the verb can be analyzed as having the category of voice.

voice, also called FULL VOICE, in phonetics, the sound that is produced by the vibration of the vocal cords. All vowels are normally voiced, but consonants may be either voiced or voiceless (*i.e.,* uttered without vibration of the vocal cords). The liquid consonant *l* and the nasal *m, n, ng* (as in "sing") are normally voiced in English, and the stops, fricatives, and affricates characteristically possess both voiced and voiceless forms. In English, for example, *b* is a voiced bilabial stop, whereas *p* is a voiceless bilabial stop. Of the other stops, fricatives, and affricates, *v, d, th* (as in "this"), *z, zh* (the sound of the *s* in "pleasure"), *j* (as in "jam"), and *g* are normally all voiced sounds; while *f, t, th* (as in "thin"), *s, sh, ch,* and *k* are all voiceless sounds. *See also* vocal fry; whisper.

voice box (anatomy): *see* larynx.

voice identification, police technique for identifying individuals by the time, frequency, and intensity of their speech-sound waves. A sound spectrograph is employed to record these waves in the form of a graph that may be compared to graphs of other individuals and differentiated. Though voice graphs (or voiceprints) have been used in courtroom proceedings, the accuracy of this technique in identifying individuals is a subject of controversy among speech scientists.

Voice of America (VOA), radio broadcasting network of the U.S. government, a unit of the United States Information Agency (USIA). Its first broadcast, in German, took place on Feb. 24, 1942, and was intended to counter Nazi propaganda among the German people. By the time World War II ended, the VOA was broadcasting 3,200 programs in 40 languages every week. It became part of the USIA when that agency was established in 1953.

The VOA's function is to promote understanding of the United States and to spread American values. During the Cold War it concentrated its message at the communist countries of eastern and central Europe. Its daily broadcasts include news reports, stories and discussions on American political and cultural events, and editorials setting forth U.S. government policy. The VOA produces and broadcasts radio programs in English and foreign languages and operates broadcasting and relay stations to transmit them.

void (mysticism and religion): *see* emptiness.

voir dire, in law, process of questioning by which members of a jury are selected from a large panel, or venire, of prospective jurors. The veniremen are questioned by the judge or, more likely, by the attorneys for the respective parties. The attorneys try to detect bias or preconceived notions of guilt or innocence on the part of the veniremen. They may dismiss a juror for cause and have an unlimited number of challenges of this type. They also have a limited number of peremptory challenges that they can use to dismiss a juror for any reason.

Voit, Carl von (b. Oct. 31, 1831, Amberg, Bavaria [Germany]—d. Jan. 31, 1908, Munich, Ger.), German physiologist whose definitive measurements of gross metabolism in mammals, including humans, helped establish the study of the physiology of metabolism and laid much of the foundation for modern nutritional science.

A pupil of the German chemists Justus von Liebig and Friedrich Wöhler at the University of Munich, where he later served as professor of physiology (1863–1908), Voit became involved in experiments designed to determine the utilization and disposition of proteins, fats, and carbohydrates in animals under varying conditions.

In 1862 he began a collaboration with the German chemist Max von Pettenkofer that led to his most productive investigations. After building a "respiration chamber" capable of supporting human subjects, they proceeded to study animal metabolism during states of activity, rest, and fasting by measuring accurately the ingestion and excretion of foodstuffs, the consumption of oxygen, and the production of carbon dioxide and heat.

Through 11 years of intensive experimentation, they made the first accurate determination of human energy requirements (in terms of caloric intake), demonstrated the validity of the laws of conservation of energy in living animals, and did much to establish the concept that the basis of metabolism lies in

the cells rather than in the blood. Voit also showed that an animal's oxygen requirement is the result, not the cause, of metabolism, that carbon dioxide production is proportional to the rate of muscular activity, and that the body's protein requirement is determined by the organized mass of the tissues, whereas its fat and carbohydrate requirements are determined by the amount of mechanical work performed.

Voiture, Vincent (b. Feb. 24, 1597, Amiens, France—d. May 26, 1648, Paris), French poet, letter writer, and animating spirit of the group that gathered at the salon of the marquise de Rambouillet.

Voiture completed his education in Paris and early made the acquaintance of the aged poet François de Malherbe and of Jean-Louis Guez de Balzac, whose zeal for reforming the French language he shared. Having attached himself to Gaston de France, duc d'Orléans, he followed him into exile in 1632 and was sent to Spain to negotiate on Orléans' behalf. On his return to France in 1634, Voiture was elected to the French Academy.

Voiture excelled at writing occasional pieces of light verse, and his *Lettres* (published 1649) are full of witty and subtle allusions that were enjoyed by his narrow circle. His skillful use of stylistic conceits also appealed to the members of the Rambouillet salon. He was one of the two central figures in the "sonnets controversy," which briefly divided the Parisian literary world between the admirers of Isaac de Benserade's poem "Sonnet sur Job" and the admirers of Voiture's sonnet "L'Amour d'Uranie avec Philis." Voiture's admirers eventually won the argument, but the acrimony that developed, together with the outbreak of the civil wars of the Fronde (1648–53), put an end to the Rambouillet society.

Vojvodina, autonomous *pokrajina* (province) within the republic of Serbia, Serbia and Montenegro. It is the northernmost part of Serbia and Montenegro, bordered by Croatia to the west, Hungary to the north, and Romania to the east. The Vojvodina includes the historic regions of Bačka, between the Danube and Tisa rivers and the Hungarian border; Banat, to the east of Bačka; and Srem (Srijem), to the south. The border with Serbia proper to the south generally follows the Sava River west of Belgrade and is formed by the Danube east of the city. For the most part, the province consists of an extensive plain.

Fine chernozem soils make the Vojvodina the agricultural heart of Serbia and Montenegro, and the region supplies much of the country's wheat and corn (maize). Many cash crops are also grown there—notably sugar beets and oilseeds. Livestock raising and petroleum and natural gas extraction near Vršac and Kikinda in the west are also important, and at Pančevo, in the south, there is a heavy industry complex. The Vojvodina has a well-developed system of roads and railways, as well as an extensive network of canals and navigable waterways. The principal towns are Novi Sad (the administrative centre), Subotica, and Zrenjanin. The population is more than half Serbs, with a large minority of Hungarians and smaller numbers of other ethnic groups.

Slavic farmers first settled in the Vojvodina in the 6th and 7th centuries, and Hungarian (Magyar) nomads arrived there in the 9th and 10th. The Ottoman Turks controlled the region from the early 16th to the late 18th century. During that time, many Serbs emigrated to the Vojvodina from Serbia proper, which was under Ottoman rule, and the Vojvodina became an important centre of Serbian Orthodox culture. With the region's incorporation into the Austrian Habsburg empire later in the 18th century, large numbers of Hungarians, Germans, and Romanians migrated to the area.

The immigrants were given grants of land and awarded privileges that included the right to elect their own leader, or *vojvod;* in return, the immigrants provided military service, defending the empire against the Turks. Portions of Bačka, Banat, and Srem were united with Austria in 1849. In 1867 rule reverted to Hungary. In 1918 the Vojvodina was incorporated into the Kingdom of Serbs, Croats, and Slovenes, which was renamed Yugoslavia in 1929. An area of eastern Srem (the Fruška Gora [hills]) was attached to the Vojvodina in 1931, greatly increasing the Serbian population.

In 1945, after a wartime Axis occupation had split up Yugoslavia, the Vojvodina was reincorporated into the new Yugoslav federation as an autonomous province of the Serbian republic. By 1974 the Vojvodina was a virtual republic in its own right. Many Serbs resented this independence, and Serbia reasserted direct control over it in 1989. It remained a province in the new Yugoslav republic established in 1992; in 2003 Yugoslavia's name was changed to Serbia and Montenegro.

The ethnic makeup of the Vojvodina was altered considerably by the warfare in the Balkan region that followed the breakup of the Yugoslav federation. An increasingly hostile atmosphere of Serbian nationalism prompted many ethnic minorities within the province to leave for neighbouring countries, reducing in particular the Vojvodina's Hungarian community. They were replaced by ethnic Serbs who came as refugees from Croatia, Bosnia and Herzegovina, and Kosovo. In 1999 the Vojvodina became the target of many attacks during NATO's massive aerial bombing of Yugoslavia, because the province is the location of many of the country's petroleum storage and refining facilities. Bridges over the Sava and Danube were specially targeted. The bombing destroyed much of the province's infrastructure and communications. Area 8,304 square miles (21,506 square km). Pop. (2002) 2,031,992. (J.B.A.)

voladores, juego de los (Spanish: "game of the fliers"), ritual dance of Mexico, possibly originating among the pre-Columbian Totonac and Huastec Indians of the region now occupied by Veracruz and Puebla states,



Juego de los voladores performed by Totonac Indians at Tajín, Mex.
By courtesy of the Mexican Ministry of Tourism

where it is still danced. Although the costumes and music show Spanish influence, the dance itself survives almost exactly in its original form. Four or six men (the *voladores,* or "flyers") dance on a platform atop a pole 60 to 90 feet (18 to 27 m) high; at the end of the dance, they circle downward around the pole as the ropes that fasten them to it unwind.

Volapük, artificial language constructed in 1880 by Johann Martin Schleyer, a German cleric, and intended for use as an international second language. Although its vocabulary is based on English and the Romance languages, the word roots in Volapük have been modified to such a degree that they are virtually unrecognizable; for example, *lol* from English "rose," *nim* from "animal," and *Melop* from "America." It is difficult to learn because of the unfamiliar appearance of the words and because it has a grammar nearly as complex as that of Latin. There are four cases for nouns, six pronouns with plural forms, and six persons and six tenses for the verb, as well as indicative, passive, infinitive, aorist, conditional-conjunctive, imperative, and participial forms, each with full or nearly full conjugation. Although the complexity of Volapük grammar made it difficult, regularity of spelling and grammar eased this somewhat, and in the 1880s, until Esperanto appeared as a competitor, hundreds of thousands of enthusiasts studied Volapük and published books and periodicals in the language.

volcanic dome, also called LAVA DOME, any steep-sided mound that is formed when lava reaching the Earth's surface is so viscous that it cannot flow away readily and accumulates around the vent. Sometimes domes are produced by repeated outpourings of short flows from a summit vent, and, occasionally, extremely viscous lava is pushed up from the vent like a short protrusion of toothpaste from a slightly squeezed tube. More commonly, however, the initial small extruded mass is gradually expanded by new lava being forced up into its interior. Fractures forming in the solidified shell of the expanding dome may allow small flows to escape onto its flanks or around its base, but, for the most part, the growth is simply a slow swelling. As the dome grows, the expanding crust breaks up, and pieces of it roll down to form a heap of angular rock fragments (breccia) around its base. Continued crumbling of the shell of the dome may result in a heap of debris that nearly buries the solid portion of the dome.

Volcanic domes may develop in the summit craters of volcanoes or completely away from any crater. They may attain heights of several hundred metres and measure thousands of metres across. One of the largest known volcanic domes is that constituting the upper part of Lassen Peak in northern California. The Lassen dome rises more than 600 m (2,000 feet) and has a diameter of approximately 3.2 km (2 miles). The Chaos Crags, located just north of Lassen Peak, constitute a row of spectacular domes.

volcanic glass, any glassy rock formed from lava or magma that has a chemical composition close to that of granite (quartz plus alkali feldspar). Such molten material may reach very low temperatures without crystallizing, but its viscosity may become very high. Because high viscosity inhibits crystallization, a sudden cooling and loss of volatiles, as when lava extrudes from a volcanic vent, tends to chill the material to a glass rather than to crystallize it.

Volcanic glass is unstable and tends to change spontaneously (devitrify) from the glassy to the crystalline state in periods of time that are relatively short by geologic standards; the material takes on a stony appearance due to the presence of minutely crystalline aggregates. Geologically ancient glasses are therefore very rare, and most glassy rocks are of Tertiary age or younger (less than 66.4 million years old). There is good reason to believe that glassy rocks were abundant in ancient geologic time, but nearly all of these have since devitrified. Devitrification commonly begins along

cracks in the glass or around large crystals and may spread outward until eventually the entire mass has been converted to fine crystals of quartz, tridymite, and alkali feldspar.

Characteristic of many natural glasses is a streaked or swirly structure that consists of bands or trains of crystals and crystalline bodies. This structure is believed to have been formed by the flowage of viscous lava. Some flow structures consist of alternating bands of different-coloured material; in others, layers of bubble-free glass alternate with highly vesicular glass. *See also* obsidian; tachylyte.

volcanism, also spelled VULCANISM, any of various processes and phenomena associated with the surficial discharge of molten rock or hot water and steam, including volcanoes, geysers, and fumaroles. Although volcanism is best known on the Earth, there is evidence that it has been important in the development of other planets such as Mercury, Venus, and Mars, as well as certain satellites.

A brief treatment of volcanism follows. For full treatment, *see* MACROPAEDIA: Volcanism.

On the Earth, volcanism occurs in several distinct geological settings. Most of these, however, are associated with the boundaries of the enormous, rigid plates that make up the lithosphere—the crust and upper mantle. *See also* plate tectonics.

The majority of active terrestrial volcanoes (roughly 80 percent) and related phenomena occur where two lithospheric plates converge and one overrides the other, forcing it down into the mantle to be reabsorbed. Long curved chains of islands known as island arcs form at such subduction zones. Volcanoes of the explosive type make up many of the islands of a single arc or the inner row of islands of a double arc. All such islands, which border the Pacific Basin, are built up from the sea floor, usually by the extrusion of basaltic and andesitic magmas.

A second major site of active volcanism is along the axis of the mid-ocean ridge system, where the plates move apart on both sides of the ridge, and magma wells up from the mantle, creating new ocean floor along the trailing edges of both plates. Virtually all of this volcanic activity occurs under water. In a few places the mid-ocean ridges stand sufficiently high from the deep ocean floor that they break the surface, and sub-aerial volcanism occurs. Iceland is the best-known example. The magmas that are erupted along the mid-ocean ridges are basaltic in composition.

A relatively small number of volcanoes occur within plates far from their margins. Some, as exemplified by the volcanic islands of Hawaii that lie in the interior of the Pacific Plate, are thought to occur because of plate movement over a "hot spot" from which magmas can penetrate to the surface. These magmas characteristically generate a chain of progressively older volcanoes, which mark the direction of past motion of the plate over a particular hot spot. The highly active volcanoes of the East African Rift Valley also occur within a plate (the African plate) but appear to result from a different mechanism—possibly an extremely slow form of plate spreading.

volcano, plural VOLCANOES, or VOLCANOS, any vent in the crust of the Earth or other planet or satellite (*e.g.,* Jupiter's Io), from which molten rock, pyroclastic debris, and steam issue.

A brief treatment of volcanoes follows. For full treatment, *see* MACROPAEDIA: Volcanism.

Volcanoes are commonly divided into two broad types: fissure and central. Each type is associated with a different mode of eruption and surface structure.

Fissure volcanoes are much more common than those of the central type. They occur along fractures in the crust and may extend for many kilometres. Lava, usually of basaltic composition, is ejected relatively quietly and continuously from the fissures and forms enormous plains or plateaus of volcanic rock. Submarine fissure eruptions are common along the crests of mid-ocean ridges and are pivotal in seafloor spreading (*see* seafloor spreading hypothesis). When molten rock is extruded under water, pillow lava—piles of sack-shaped rock masses measuring up to several metres in diameter—are often formed.

Central volcanoes have a single vertical lava pipe and tend to develop a conical profile. The volcanic cone is generally built up of a succession of lavas, ignimbrites, and welded tuffs (porous rock formed by the cementation of solidified volcanic ash and dust particles). Lava flows from the throat of a central volcano following the easiest path downhill, its flow pattern strongly influenced by the topography.

The shape of any given volcanic landform depends on a variety of local circumstances and on the relative abundances of lavas, tuffs, and ignimbrites. This in turn depends on the composition of the magma arriving at the surface. The lower the viscosity, the more readily the lava flows away from the throat or fissure. There is, as a consequence, relatively little tendency to build up a steep-sided cone. The more viscous the magma, however, the greater the tendency to chill and solidify close to the source and to form a cone. In many cases, highly viscous lava also may clog the throat of the volcano, causing a pressure buildup that can only be relieved by violent explosions and nuées ardentes. Such eruptions, exemplified by those of Mount St. Helens in southwestern Washington state during the early 1980s and Vesuvius in AD 79, may completely remove the top of a volcanic cone and occasionally part of the interior of the cone as well. The resultant roughly circular hollow is called a caldera. Further eruption may lead to the formation of a lava lake within the cone, and if the lava cools and solidifies, the inward drainage of rainwater may produce a water lake on the surface of the lava lake. A caldera may also form without an explosion by the collapse of the top of the cone into an underlying accumulation of magma. Kilauea on southeastern Hawaii Island is an excellent example of a large volcanic cone with a well-developed caldera produced by collapse.

volcano, mud: *see* mud volcano.

Volcano Islands, Japanese KAZAN-RETTŌ, archipelago, Tokyo *to* (metropolis), Japan. The islands lie in the western Pacific between the Bonin Islands (north) and the Mariana Islands (south). The three small volcanic islands are, in north–south sequence, Kita-Iō (San Alexander) Island, Iō (Iwo Jima) Island, and Minami-Iō (San Augustino) Island. Unclaimed until the arrival of Japanese fishermen and sulfur miners in 1887, the islands were claimed formally by Japan in 1891.

Iwo Jima (*q.v.*) is the largest island, with a large stretch of level land that was converted into a military airfield during World War II. It lies about 760 miles (1,220 km) south of Tokyo. The island was the scene of a bloody battle between Japanese and U.S. forces in 1945. Under the peace treaty with Japan, that nation retained residual sovereignty over the archipelago, but the United States administered the islands from 1951 to 1968, when they were returned to Japan.

volcanology, also spelled VULCANOLOGY, scientific discipline concerned with all aspects of volcanic phenomena.

A brief treatment of volcanology follows. For full treatment, *see* MACROPAEDIA: Earth Sciences, The.

Volcanology deals with the formation, distribution, and classification of volcanoes, as well as with their structure and the kinds of materials ejected during an eruption (*e.g.,* lava, dust, ash, and gas). It also involves research on the relationships between volcanic eruptions and other large-scale geological processes, such as mountain building and earthquakes. One of the chief objectives of this research is determining the nature and causes of volcanic eruptions for the purpose of predicting their occurrence. Another practical concern of volcanology is securing data that may aid in locating commercially valuable deposits of ores, particularly those of certain metallic sulfides.

Interest in volcanic phenomena extends back to ancient times. The eruption of Vesuvius in AD 79 was recorded in considerable detail by Pliny the Younger. Studies of volcanoes, however, were not conducted systematically until the early 19th century. Since that time volcanology has become an important branch of physical geology. Specialists in the field, using the principles and methods of geophysics and geochemistry and the tools of seismology, have obtained much knowledge of processes occurring deep within the Earth's interior.

Volchov River (northwest Russia): *see* Volkhov River.

Volcker, Paul A(dolph) (b. Sept. 5, 1927, Cape May, N.J., U.S.), American economist and banker who, as chairman of the board of governors of the Federal Reserve System (1979–87), played a key role in stabilizing the American economy during the 1980s.

Volcker graduated from Princeton University in 1949 and received an M.A. from Harvard University in 1951. He worked as an economist for the Federal Reserve Bank of New York (1953–57) and for the Chase Manhattan Bank (1957–61), was a deputy undersecretary in the Department of the Treasury (1963–65), and was a vice-president of Chase Manhattan Bank (1965–68). As undersecretary for monetary affairs in the Treasury Department from 1969 to 1974, Volcker was the chief architect of the United States' abandonment of the gold standard and the devaluations of the U.S. dollar in 1971 and 1973.

Volcker served as president of the Federal Reserve Bank of New York from 1975 to 1979, and in the latter year President Jimmy Carter appointed him to head the Federal Reserve System at a time when inflation in the United States had reached nearly 13 percent. Volcker was determined to end chronic high inflation, and under his leadership the Federal Reserve slowed the growth of the money supply and allowed interest rates to rise. These policies caused the most severe recession (1982–83) in the United States since the Great Depression, but they brought inflation firmly under control. Volcker was reappointed to a second four-year term in 1983 but declined reappointment to a third term in 1987. He taught economics at Princeton University and served as CEO of investment banking firm James D. Wolfensohn Inc. from 1988 to 1996. In 2000 he was named chairman of the trustees of the International Accounting Standards Committee Foundation, a group that promotes responsible global accounting standards.

vole, any of numerous mouselike rodents belonging to the family Cricetidae (order Rodentia), but especially the members of the genus *Microtus.* Voles are typically rather short tailed and have blunt snouts, small eyes and ears, and short limbs. They are generally plant eaters, sometimes pests that damage crops or trees, and important prey animals for many flesh-eating birds and mammals.

There are about 45 species of voles in the genus *Microtus.* Commonly called meadow voles, field voles, or meadow mice, these are stocky rodents found in North and Central America and in northern Eurasia. Some inhabit wooded or desert areas, but most are found in fields and meadows. Meadow voles are 10 to 26 centimetres (about 4 to 10 inches)

Major volcanoes of the world

	elevation		first recorded eruption	comments
	feet	m		
Africa				
Kilimanjaro, *Tanzania*	19,341	5,895	...	Includes three dormant volcanoes (Kibo, Mawensi, and Shira) that have not erupted in historic times.
Cameroon, *Cameroon*	13,451	4,100	1650	A 1982 eruption caused more than 300 nearby residents to evacuate their homes.
Teide (Tenerife), *Canary Islands*	12,198	3,718	...	In 1705 an eruption buried the town of Garachico and filled in its harbour.
Nyiragongo, *Zaire*	11,400	3,475	1884	Eruptions occurred on an almost continuous basis from 1928 to 1977.
Nyamulagira, *Zaire*	10,023	3,055	1882	The largest lava flow from a 1982 eruption destroyed an 8-mile- (13-kilometre-) long section of forest.
Fogo, *Cape Verde Island*	9,281	2,829	1500	
Karthala, *Comoros*	7,745	2,361	1828	
Fournaise, *Reunion Islands*	5,981	1,823	1640	The first eruption in 1640 reportedly lasted for almost 10 years.
Erta-Ale, *Ethiopia*	1,650	503	1873	This volcano erupted almost continuously from 1967 to 1980.
America, North				
Citlaltépetl, *Mexico*	18,406	5,610	...	
Popocatépetl, *Mexico*	17,930	5,465	1347	
Rainier, *Washington, U.S.*	14,410	4,392	1825	
Shasta, *California, U.S.*	14,160	4,317	...	
Colima, *Mexico*	13,911	4,240	1576	
Tajumulco, *Guatemala*	13,845	4,220	1821	
Acatenango, *Guatemala*	13,041	3,976	1924	
Fuego, *Guatemala*	12,342	3,763	1524	
Hood, *Oregon, U.S.*	11,235	3,424	1800	
Spurr, *Alaska, U.S.*	11,067	3,374	1953	The 1953 eruption sent ash more than 12 miles (19 km) into the atmosphere.
Baker, *Washington, U.S.*	10,775	3,285	1820	
Lassen, *California, U.S.*	10,457	3,187	1650	One of the few active volcanoes in the contiguous United States.
Redoubt, *Alaska, U.S.*	10,194	3,108	1778	
Iliamna, *Alaska, U.S.*	10,016	3,053	1768	
Shishaldin, *Alaska, U.S.*	9,371	2,857	1775	
Paricutin, *Mexico*	9,210	2,807	1943	The 1943 eruption continued until 1952. Its cone increased in elevation by more than 1,400 feet (427 m), and in 1949, 1,000 people were killed in the eruption.
Pavlof, *Alaska, U.S.*	8,902	2,714	1790	A 1981 eruption sent vapour and ash some 3 miles (5 km) into the atmosphere.
Poas, *Costa Rica*	8,869	2,704	1834	
Pacaya, *Guatemala*	8,371	2,552	1565	The active cone of the volcano grew more than 900 feet (274 m) in elevation during the early 1980s.
St. Helens, *Washington, U.S.*	8,360	2,549	1500	A 1980 eruption left some 66 people dead or missing and destroyed more than 100 square miles (259 square km) of forests.
Veniaminof, *Alaska, U.S.*	8,223	2,507	*c.*1750	A new cinder cone formed with the summit's crater in 1984.
El Chichón, *Mexico*	7,300	2,225	...	A 1982 eruption destroyed most villages within 5 miles (8 km), more than 100 people were killed, and the volcanic dust produced by the eruption extended 20 miles (32 km) into the atmosphere and encircled the Earth.
San Miguel, *El Salvador*	7,150	2,180	1586	
Chiginagak, *Alaska, U.S.*	6,973	2,126	1852	
Katmai, *Alaska, U.S.*	6,714	2,047	1912	The 1912 eruption deposited ash almost 50 feet (15 m) thick near the volcano and about 1 foot (30 cm) thick at Kodiak Island, some 100 miles (160 km) away.
Makushin, *Alaska, U.S.*	6,674	2,035	1768	
Izalco, *El Salvador*	6,445	1,965	1770	
San Cristobal, *Nicaragua*	5,724	1,745	1522	
Great Sitkin, *Alaska, U.S.*	5,697	1,737	1760	
Arenal, *Costa Rica*	5,356	1,633	1968	Lava extrusions have been almost continuous since 1968.
Concepcion, *Nicaragua*	5,281	1,610	1750	
Pelée, *Martinique*	4,582	1,397	1792	An eruption in 1902 killed 26,000 people.
Momotombo, *Nicaragua*	4,198	1,280	1550	A geothermal plant at Momotombo was opened in 1983.
Kiska, *Alaska, U.S.*	4,001	1,220	1907	
Telica, *Nicaragua*	3,477	1,060	1527	A 1982 eruption reached almost 3 miles (5 km) into the atmosphere and deposited ash some 30 miles (48 km) away.
America, South				
Guallatiri, *Chile*	19,876	6,060	1825	
Cotopaxi, *Ecuador*	19,347	5,897	1532	The world's highest continuously active volcano.
El Misti, *Peru*	19,101	5,823	1542	A dormant volcano that held a religious significance in Inca culture.
Tupungatito, *Chile*	18,499	5,640	1829	
Lascar, *Chile*	18,342	5,592	1848	
Ruiz, *Colombia*	17,716	5,400	1595	In 1985 mudflows triggered by explosions killed more than 22,000 people.
Sangay, *Ecuador*	17,154	5,230	1628	
Tolima, *Colombia*	17,105	5,215	1822	
Tungurahua, *Ecuador*	16,512	5,033	1534	
Purace, *Colombia*	15,744	4,800	1827	An eruption in 1949 killed 1,000 people.
Guagua Pichincha, *Ecuador*	15,724	4,794	1533	
Lautaro, *Chile*	11,115	3,380	1878	
Llaima, *Chile*	10,250	3,125	1640	
Villarrica, *Chile*	9,318	2,840	1558	
Hudson, *Chile*	8,580	2,615	1971	
Antarctica				
Erebus, *Ross Island*	12,280	3,743	1841	This volcano erupted almost every year during the 1970s.
Darnley, *Sandwich Islands*	3,608	1,100	1823	
Deception Island	1,890	576	1800	

Major volcanoes of the world (continued)

	elevation		first recorded eruption	comments
	feet	m		
Asia-Oceania-Pacific				
Klyuchevskaya, *Kamchatka, Russia*	15,584	4,750	1697	Highest of the 22 active volcanoes on the Kamchatka Peninsula.
Mauna Kea, *Hawaii*	13,796	4,205	. . .	Usually snowcapped dormant volcano. Its 32,000-foot (9,750-metre) height from the sea floor makes it the world's highest island peak from base to tip.
Mauna Loa, *Hawaii*	13,678	4,169	1750	Volcano that is part of the largest single mountain mass in the world. A 1984 eruption created a cloud that extended about 7 miles (11 km) high, and the lava flow covered more than 18 square miles (47 square km).
Kerinci, *Sumatra, Indonesia*	12,467	3,800	1838	
Fuji, *Honshu, Japan*	12,388	3,776	781	Highest mountain peak of Japan whose symmetrical snowcapped cone is a favourite Japanese artistic theme.
Rinjani, *Lombok, Indonesia*	12,224	3,726	1847	
Tolbachik, *Kamchatka, Russia*	12,080	3,682	1740	
Semeru, *Java, Indonesia*	12,060	3,678	1818	
Ichinskaya, *Kamchatka, Russia*	11,880	3,621	. . .	Lava dome has had no recorded eruptions.
Kronotskaya, *Kamchatka, Russia*	11,575	3,528	1922	
Koryakskaya, *Kamchatka, Russia*	11,339	3,456	1895	
Slamet, *Java, Indonesia*	11,247	3,428	1772	More than 30 eruptions have been recorded since the 18th century.
Raung, *Java, Indonesia*	10,932	3,332	1586	Approximately 3,000 people were killed in the eruptions of both 1638 and 1730.
Shiveluch, *Kamchatka, Russia*	10,771	3,283	1793	
Dempo, *Sumatra, Indonesia*	10,364	3,159	1817	
Sundoro, *Java, Indonesia*	10,338	3,151	1806	
Cremay, *Java, Indonesia*	10,098	3,078	1698	
Ontake, *Honshu, Japan*	10,049	3,063	1979	
Papandayan, *Java, Indonesia*	9,802	2,987	1772	
Gede, *Java, Indonesia*	9,705	2,958	1747	It has had more than 20 recorded eruptions.
Zhupanovsky, *Kamchatka, Russia*	9,705	2,958	1776	
Apo, *Mindanao, Philippines*	9,692	2,954	. . .	
Merapi, *Java, Indonesia*	9,551	2,911	1006	More than 55 eruptions have been recorded since 1006.
Bezymianny, *Kamchatka, Russia*	9,514	2,900	1955	Bezymianny volcano produced a cataclysmic eruption in 1956. Ash deposits reached a depth of 23 inches (50 cm) some 6 miles (10 km) from the eruption and still measured 11 inches (28 cm) in depth at a distance of 18 miles (29 km). Mudflows extended for as far as 50 miles (80 km).
Marapi, *Sumatra, Indonesia*	9,485	2,891	1770	Marapi has had more than 50 reported eruptions.
Tambora, *Sumbawa, Indonesia*	9,350	2,850	1812	A tidal wave following an eruption in 1815 killed 56,000 people.
Ruapehu, *North Island, New Zealand*	9,177	2,797	1861	
Peuetsagu, *Sumatre, Indonesia*	9,121	2,780	1918	
Avachinskaya, *Kamchatka, Russia*	9,026	2,751	1737	
Balbi, *Bougainville, Papua New Guinea*	8,999	2,743	. . .	Balbi has not had any eruptions in recent history.
Mayon, *Luzon, Philippines*	7,943	2,421	1616	
Alaid, *Kuril Islands, Russia*	7,662	2,335	1790	
Ulawun, *New Britain, Papua New Guinea*	7,532	2,296	1700	
Lamington, *New Guinea, Papua New Guinea*	5,940	1,780	1951	The eruption of 1951 killed 3,000 people.
Kelud, *Java, Indonesia*	5,679	1,731	1000	Eruptions in 1586 and 1919 killed 10,000 and 5,000 people, respectively.
Pinatubo, *Luzon, Philippines*	4,800	1,460	1380	The eruption of 1991 may have produced more ash and smoke than any other volcanic eruption of the 20th century.
Lopevi, *Vanuatu*	4,755	1,364	1864	
Unzen, *Kyushu, Japan*	4,462	1,360	860	A 1792 eruption killed more than 10,000 people.
Awu, *Pulau Sangihe, Indonesia*	4,331	1,320	1640	Eruptions in 1711 and 1856 killed 3,200 and 2,800 people, respectivsly.
Kilauea, *Hawaii*	4,077	1,243	1750	Beginning in 1983, Kilauea produced a river of flowing lava that reached the sea 30 miles (48 km) away.
Krakatoa, *Krakatau, Indonesia*	2,667	813	1680	The 1883 eruption of Krakatoa was one of the most catastrophic in history. A series of tremendous explosions occurred, the largest being heard at a distance of 2,900 miles (4,670 km). Most of the 36,000 people killed on Java and Sumatra were drowned by a tidal wave.
Suwanose-jima, *Ryukyu Islands, Japan*	2,621	799	1813	
Taal, *Luzon, Philippines*	1,312	400	1572	Eruptions of 1906 and 1911 killed 1,500 and 1,300 people, respectively, and a tidal wave associated with the 1965 eruption sank many boats on Taal Lake surrounding the volcano.
Europe and the Atlantic				
Etna, *Italy*	10,899	3,323	. . .	It has had some 200 recorded eruptions. An eruption in 1536 killed about 1,000 people, and in 1669 an eruption left 20,000 people dead.
Beerenberg, *Norway*	7,470	2,277	1558	
Tristan da Cunha, *South Atlantic*	6,760	2,060	1700	
Kverkfjöll, *Iceland*	6,298	1,920	1477	
Askja, *Iceland*	5,149	1,570	1875	
Hekla, *Iceland*	4,890	1,491	1104	
Katla, *Iceland*	4,470	1,363	1177	
Vesuvius, *Italy*	4,198	1,280	. . .	The eruption in AD 79 destroyed the cities of Pompeii and Stabiae under ashes and lapilli and Herculaneum under a mudflow.
Stromboli, *Italy*	3,038	926	. . .	A volcano on the island of the same name located north of Sicily, and whose volcanic activity has given rise to the term "Strombolian eruption."
Krafla, *Iceland*	2,683	818	1300	Volcanic eruptions occurred almost continuously from 1975 until the early 1980s.
Thera, *Greece*	1,824	556	. . .	A volcanic eruption about 1500 BC destroyed all life on the island of Thera.
Vulcano, *Italy*	640	195	. . .	A volcano observed by Aristotle, who used the Greek word *tephra*, or ash, to describe the material being erupted.
Surtsey, *Iceland*	568	173	1963	



Vole (*Microtus pennsylvanicus*)
Judith Myers

long including the 2- to 10-centimetre tail. They usually have long, shaggy fur and are generally grayish brown above, paler below. They live in burrows and establish distinctive, narrow runways in the grass. The female can produce a litter of as many as eight or nine young about every two months. Meadow vole populations, like those of certain other voles, tend to rise and fall cyclically, so that the animals may be extremely numerous one year, less abundant another.

There are several other genera of voles, including *Clethrionomys* (red-backed voles), *Arvicola* (water voles), and *Pitymys* (pine voles). Some authorities consider *Arvicola* and *Pitymys* as part of the genus *Microtus*.

Red-backed voles, or red-backed mice, constitute a number of species found in the colder regions of North America and Eurasia. These voles climb well and are generally forest dwellers. They are 7 to 11 cm long without the short tail and resemble meadow voles but are usually gray with reddish brown backs. They live in burrows and, like meadow voles, are subject to periodic fluctuations in population.

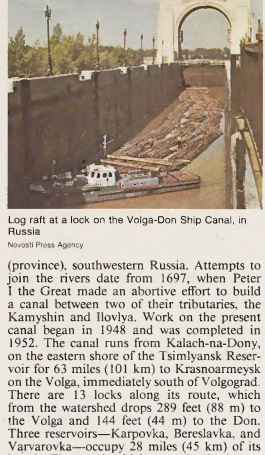
The water voles, or water rats, are exclusively Old World forms found in Europe and Asia. They live along streams, ditches, and lakes or in gardens, fields, and marshes. The more terrestrial of the two species, *A. terrestris*, is sometimes found a considerable distance from water. Water voles dig burrows and often excavate in the banks of waterways, locating the entrance beneath the water surface. They have thick, brown fur and attain a maximum length, exclusive of the tail, of about 22 cm.

Pine voles, or pine mice, constitute about 10 species of burrowing North American and Eurasian voles that, despite their name, are found in a variety of habitats, such as swamps, fields, cultivated land, and open hardwood forests. They are 8 to 12 cm long without the 2- to 4-centimetre tail, and they have velvety, reddish brown or grayish brown fur. The species *P. pinetorum* of the United States sometimes damages orchard trees by eating the bark.

Volendam, town, Edam-Volendam *gemeente* (commune), Noordholland *provincie*, northwestern Netherlands, on Lake IJssel. Its harbour was sealed off as part of an inland lake, preparatory to the drainage of Markerwaard Polder (*see* IJsselmeer Polders), and the town's once-flourishing fishing industry has subsequently declined. Tourism is now the principal economic factor. Visitors and artists are attracted by the quaint buildings, some lake dwellings on piles seaward of the dike, and the picturesque traditional costumes of Volendam's fishermen. Neighbouring Marken Island has a similar appeal. Pop. (1992 est.) including Edam, 24,968.

Volga-Baltic Waterway, officially V.I. LENIN VOLGA-BALTIC WATERWAY, Russian VOLGO-BALTIYSKY VODNY PUT IMENI V.I. LENINA, system of rivers and a canal in western Russia linking the Volga River with the Baltic Sea. The system was completed in 1964, replacing the antiquated Mariinsk Canal system using the same route, which was constructed originally in the 18th century and later several times enlarged and improved. The waterway starts at Rybinsk, on the Volga River and the Rybinsk Reservoir, and goes northward by way of the Sheksna River, which has been converted to a reservoir by a dam and power station above Cherepovets, to Lake Beloye. Crossing the lake, now within the Sheksna Reservoir, the waterway follows the Kovzha River, which is linked by a canal section over the watershed to the Vytegra River; the latter has been canalized by the construction of six locks and two hydroelectric stations and reservoirs. The Vytegra River flows into Lake Onega, and from there the waterway continues westward through the canalized Svir River. It follows the Svir to Lake Ladoga and the Novoladozhsky Canal, and then to the Neva River, which empties into the Gulf of Finland of the Baltic Sea at St. Petersburg. The length of the waterway from Lake Onega to Cherepovets is 229 miles (368 km). The system has seven modern automatically controlled locks and can take craft up to 11.5 feet (3.5 m) draft and 5,000 tons capacity, in contrast to the old Mariinsk system, with 40 locks and a limit of 600-ton barges. The Volga-Baltic Waterway connects with the White Sea–Baltic Canal at Lake Onega.

Volga-Don Ship Canal, Russian VOLGO-DONSKOY SUDOKHODNY KANAL, canal linking the lower Volga River with the Don River at their closest point, in Volgograd *oblast*



Log raft at a lock on the Volga-Don Ship Canal, in Russia
Novosti Press Agency

(province), southwestern Russia. Attempts to join the rivers date from 1697, when Peter I the Great made an abortive effort to build a canal between two of their tributaries, the Kamyshin and Ilovlya. Work on the present canal began in 1948 and was completed in 1952. The canal runs from Kalach-na-Dony, on the eastern shore of the Tsimlyansk Reservoir for 63 miles (101 km) to Krasnoarmeysk on the Volga, immediately south of Volgograd. There are 13 locks along its route, which from the watershed drops 289 feet (88 m) to the Volga and 144 feet (44 m) to the Don. Three reservoirs—Karpovka, Bereslavka, and Varvarovka—occupy 28 miles (45 km) of its length. The canal, which can take the largest rivercraft and smaller seagoing ships, opens up the Upper Volga, Kama River, and Urals regions to oceanic commerce via the Don River (and the Sea of Azov and the Black Sea). Timber moving west and coal moving east are the principal cargoes on the canal.

Volga River, Russian VOLGA, ancient (Greek) RA, or (Tatar) ITIL, or ETIL, river of Europe, the continent's longest and the principal waterway of western Russia. The Volga rises in the Valdai Hills northwest of Moscow and flows 2,193 miles (3,530 km) generally southeastward to empty into the Caspian Sea.

A brief treatment of the Volga River follows. For full treatment, *see* MACROPAEDIA: Europe.

The river basin, occupying 533,000 square miles (1,380,000 square km), contains much of Russia's population, and its immense economic importance and strongly marked character give it a high rank among world rivers. It is a symbol of Russia, long a central element in song and story and national memory.

The Volga is usually said to consist of three parts: the upper Volga, from its source to the confluence of the Oka River; the middle Volga, from the confluence of the Oka to that of the Kama River; and the lower Volga, from the confluence of the Kama to the mouth of the Volga itself. Rising at an elevation of 748 feet (228 m) in the Valdai Hills, the Volga turns northeastward past the cities of Rzhev and Tver and through the Rybinsk Reservoir. From the reservoir the river flows southwestward through a narrow valley, between the Uglich Highlands to the south and the Danilov Upland and the Galich-Chukhlom Lowland to the north, continuing its course along the Unzha and Balakhna plains to Nizhny Novgorod. On its east-southeastward course from the confluence of the Oka to the city of Kazan, the middle portion of the Volga doubles in volume before turning southward into the Samara Reservoir, where the Kama (its major tributary) joins it from the left. In its lower reaches, the Volga flows southwestward along the Volga Hills in the direction of Volgograd. From Volgograd the Volga River, flowing through the Caspian Depression, enters the Caspian Sea at Astrakhan.

The Volga is fed mainly by snow (60 percent of the annual flow), followed by groundwaters (30 percent) and rain (10 percent). The Volga is navigable over most of its length and combines with its tributaries to carry both freight and passenger traffic. The river has played an important part in the life of the Russian people, and in Russian folklore it is characteristically named "Mother Volga" ("Volga Mat," or "Volga Matushka").

Volga-Ural Petroleum and Gas Province, Russian VOLGO-URALSKAYA NEFTEGAZONOSNAYA OBLAST, also called SECOND BAKU, Russian VTOROYE BAKU, principal petroleum-producing region of Russia. Situated in the southern part of European Russia, it stretches from the west flank of the Ural Mountains to west of the Volga River. The largest fields are in Bashkortostan and Tatarstan and near Samara (Syzran fields), Perm, and Orenburg. Buguruslan has large natural-gas fields. Exploitation of the fields began in 1929. The name Second Baku was an allusion to the old oil fields around Baku in Azerbaijan. There are also many large oil refineries in the Volga-Ural region. A pipeline system, more than 3,000 miles (5,000 km) long, was built in 1960–64. A second parallel system having a greater diameter was constructed in the mid-1970s. It supplies the region's oil to Russian industrial centres and also connects to Poland, eastern Germany, Slovakia, Czech Republic, and Hungary.

Volgian stage, major and uppermost division of Jurassic rocks (*i.e.*, those formed from about 152 to 144 million years ago) in continental and Arctic regions of Russia. Elsewhere, the Purbeckian stage is generally recognized as the uppermost Jurassic stratigraphic unit. Two primary divisions of the Volgian, Upper and Lower, have been recognized on the basis of well-developed ammonite faunas. Volgian faunas appear to be restricted in geographic distribution.

Volgograd, formerly (until 1961) STALINGRAD, *oblast* (province), southwestern Russia, lying athwart the lower Volga and Don

rivers. The Volga is flanked on the west by the Volga Upland, which is continued south of Volgograd as the Yergeni Upland. West of the Khoper and Don are additional low uplands. Between the uplands and also east of the Volga are level plains. Most of the *oblast* lies in a dry steppe zone of grass and some sage on fertile soils, but almost all has been plowed, causing severe soil erosion and gullying, especially on the uplands. Saline soils are common, particularly in the Trans-Volga and the south.

Once an area inhabited by successive nomadic peoples (Bulgars, Khazars, and Tatars), the region was settled by Russians from the mid-16th century. Much of the far northern part of the *oblast* along the Volga River was once part of the Volga-German A.S.S.R. until it was dissolved in 1941 and the Germans deported to other areas of the Soviet Union. The bulk of the population today lives along the rivers and in the northern lowland. Industry is concentrated largely in Volgograd, the administrative center; the other cities are concerned chiefly with processing agricultural products. Petroleum is extracted in the north around Zhirnovsk and natural gas near Kotovo and Frolovo. Agriculture is of great importance, but it suffers severely from droughts and soil erosion; irrigation is increasing steadily in many areas. The main crops are wheat, millet, corn (maize), sunflowers, and mustard. Along the Volga Upland, market gardening and dairying are well developed. In the south and in the Trans-Volga, cattle and sheep raising is important. Area 43,980 square miles (113,900 square km). Pop. (1991 est.) 2,632,500.

Volgograd, formerly (until 1925) TSARITSYN and (1925–61) STALINGRAD, city and administrative centre of Volgograd *oblast* (province), southwestern Russia, on the Volga River. It was founded as the fortress of Tsaritsyn in 1589 to protect newly acquired Russian territory along the Volga. During the Russian Civil War (1918–20), Joseph Stalin organized the defense of the city in a major battle against the White Russian armies, and the city was later renamed in his honour. One of the decisive



"Motherland Calls," statue at Mamayev Memorial in Volgograd, Russia, commemorating Soviet soldiers in the Battle of Stalingrad
Alexander M. Chabe

battles of World War II took place there, from August 1942 to February 1943. The German armies at the limit of their advance attempted to capture Stalingrad; after bitter fighting during which the city was reduced to rubble, the German salient was cut off, and an army group of 350,000 men was annihilated. (*See* Stalingrad, Battle of.)

The city was totally rebuilt after the war, and new apartment buildings and factories extend for more than 40 miles (65 km) along the river. Steel and aluminum, engineering products, timber goods, building materials, and foodstuffs head a long list of manufactures, joined in the 1960s by chemicals associated with an oil refinery built in 1957. Other postwar developments include the Volga-Don Ship Canal, opened in 1952, and a hydroelectric station immediately north of the city. There are medical, civil engineering, teacher-training, mechanical, and municipal-economics institutes. The University of Volgograd was opened in 1980. Pop. (1991 est.) 1,007,300.

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Volhynia, also spelled VOLYNIA, Ukrainian and Russian VOLYN, Polish WOŁYŃ, area of northwestern Ukraine that was a principality



Volhynia *c.* 1250
Adapted from R. Treharne and H. Fullard (eds.), *Muir's Historical Atlas: Ancient, Medieval and Modern*, 9th ed. (1965); George Philip & Son Ltd., London

(10th–14th century) and then an autonomous component of the Grand Duchy of Lithuania and was ruled largely by its own aristocracy (after the late 14th century). The region became prominent during the 12th century, when many emigrants from the declining Kiev principality settled in Volhynia and its even more westerly neighbour Galicia.

In 1199 Prince Roman Mstislavich of Volhynia (d. 1205) united the two territories into a powerful principality, which dominated Kiev. He successfully battled the Poles, Lithuanians, Hungarians, and Polovtsy (or Cumans) and was sought as an ally by Byzantium. Roman's son Daniel (reigned 1221–64) reunited Volhynia with Galicia in 1238 (the union had lapsed after Roman's death), built cities (*e.g.*, Lviv), encouraged a flourishing east-west trade through his lands, and fostered the development of fine arts. In 1260, however, Volhynia and Galicia were devastated by a Mongol invasion and forced to recognize the Mongol khan as their overlord.

In the course of the 14th century Volhynia was absorbed by the Lithuanian state and Galicia by Poland. After the Polish-Lithuanian union of 1569, Volhynia was ceded to Poland. It remained a Polish territory until the second partition of Poland (1793) transferred most of it to Russia. After World War I it was divided between Russia and Poland; and after World War II the entire region became part of the Ukrainian S.S.R.

Volkhov River, also spelled VOLCHOV, Russian REKA VOLKHOV, river, northwestern Russia. It is the major outlet for Lake Ilmen, whence it flows past Novgorod and directly north-northeast into Lake Ladoga across a level, swampy basin. The river is 139 miles (224 km) long and drains a basin of 31,000 square miles (80,200 square km). It is frozen from mid-November to mid-April. At the town of Volkhov the first hydroelectric station in the Soviet Union was built in 1926. The Volkhov, in early times part of the important Baltic Sea–Black Sea trade route, is navigable only by small craft.

Völkischer Beobachter (German: "People's Observer"), daily newspaper published by the Nazi Party in Germany from the 1920s until the fall of the Third Reich in 1945. The paper was originally founded in 1887 as a four-page Munich weekly, the *Münchner Beobachter.* It had become a daily anti-Semitic gossip sheet with a circulation of about 7,000 when it was bought by Adolph Hitler in 1923 to serve as the propaganda organ of his Nazi Party. In 1941 its circulation had passed 1.1 million.

Publication of the *Völkischer Beobachter* was suspended three times in the early 1920s by the pre-Hitler German government because of anti-Semitic articles and attacks on government policies and officials. After the third suspension it resumed publication as a weekly in 1925 and became a daily again a month later. Hitler had made Alfred Rosenberg its editor, and the latter continued the anti-Semitic thrust of the paper while making it a forum for Hitler and propaganda minister Joseph Goebbels. The *Völkischer Beobachter* launched Berlin and South German editions in 1930, and in 1933 the paper opened a new editorial and printing headquarters in Berlin. A Vienna edition began to appear following Germany's annexation of Austria in 1938. Foreign correspondents and diplomats from the rest of the world followed it for indications of Nazi policy shifts and propaganda objectives, making allowances for its usual exaggeration and hyperbole.

Volkmann's contracture, disorder of the wrist and hand in which the hand and fingers become fixed in a characteristic bent position. The disorder may be caused by the pressure of bandages, a tourniquet, or splints after a fracture; or by a severe injury in the region of the elbow. If it is recognized early and the cause is removed promptly, recovery is possible. Otherwise the muscles degenerate and are replaced with fibrous connective tissue.

Volkov, Vladislav Nikolayevich (b. Nov. 23, 1935, Moscow, Russia, U.S.S.R.—d. June 29, 1971, in space), Soviet cosmonaut, participant in the Soyuz 7 and 11 missions of 1969 and 1971, the second of which resulted in the death of three cosmonauts.

Son of an aviation design engineer, Volkov was educated at the Moscow Aviation Institute. On the Soyuz 7 mission, Volkov, acting as flight engineer, was accompanied by Anatoly V. Filipchenko; the two tested welding techniques in space and multiple launching. Volkov was again flight engineer on the Soyuz 11 mission commanded by Georgy T. Dobrovolsky and accompanied by Viktor I. Patsayev.

The three cosmonauts remained in space a record 24 days and created the first manned orbital scientific station by docking their Soyuz 11 spacecraft with the unmanned Salyut 1 station launched two months earlier. The three were found dead in their space capsule after it made a perfect landing in Kazakhstan; decompression, resulting from a leak in their capsule when a hatch was improperly closed, was given as the cause of death. While in the space

station, the cosmonauts had performed meteorological and plant-growing experiments.

Volkova, Vera (b. 1904, St. Petersburg, Russia—d. May 5, 1975, Copenhagen, Den.), Soviet ballet teacher who greatly influenced Western dance training.

Volkova studied at the Imperial Ballet Academy and later at Volynsky's Russian Choreographic School in Petrograd (now St. Petersburg) under Agrippina Vaganova. Volkova became an expert of the Vaganova school of technique and moved to Shanghai to dance and teach with the George Goncharov Company (1929).

In 1936 Volkova moved to London, where she was asked to instruct at the Sadler's Wells Ballet School (1943–50). She later became the artistic adviser to the Royal Danish Ballet, as well as one of its school's foremost teachers.

Volksraad, English PEOPLE'S COUNCIL, advisory body created by the Dutch in the East Indies (now Indonesia) in 1917 and opened in May 1918. It served as a forum for the expression of grievances but lacked the power to pursue genuine reform.

Initially, the majority of the membership was appointed and predominantly European, to the anger of Indonesian nationalists. In 1925 the Volksraad was made a semilegislative body; although decisions were still made by the Dutch government, the governor-general was expected to consult the Volksraad on major issues. In 1929 Indonesian membership was increased to 30 and Dutch reduced to 25. The number of persons qualified to vote directly for representatives in the Volksraad, however, especially Indonesians, remained small. The body was dissolved when Japanese troops occupied Indonesia in 1942.

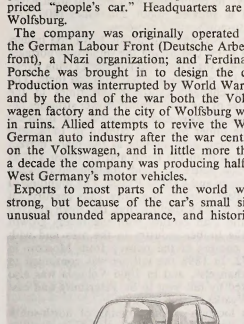
Volkswagen AG, major German automobile manufacturer, founded by the German government in 1937 to mass-produce a low-priced "people's car." Headquarters are in Wolfsburg.

The company was originally operated by the German Labour Front (Deutsche Arbeitsfront), a Nazi organization; and Ferdinand Porsche was brought in to design the car. Production was interrupted by World War II, and by the end of the war both the Volkswagen factory and the city of Wolfsburg were in ruins. Allied attempts to revive the West German auto industry after the war centred on the Volkswagen, and in little more than a decade the company was producing half of West Germany's motor vehicles.

Exports to most parts of the world were strong, but because of the car's small size, unusual rounded appearance, and historical connections with Nazi Germany, sales in the United States were originally slow. This changed in 1959, when an American advertising agency, Doyle Dane Bernbach, began a landmark advertising campaign, dubbing the car the Beetle because of its shape and pointing to its size as an advantage to the consumer. This campaign was very successful, and for some years following, the Beetle was the leading automobile import sold in the United States.

The Volkswagen hardly changed from its original design, however, and by 1974, with increasing competition from other compact foreign cars, Volkswagen came near bankruptcy. This spurred the company to develop newer, sportier car models, among them the Rabbit and its successor, the Golf.

Although the company had been founded by the German government, in 1960 the state essentially denationalized it by selling 60 percent of its stock to the public. Volkswagen acquired the Auto Union company in 1965. Volkswagen and its affiliates operate plants throughout most of the world. In addition to cars, the company produces vans and minibuses, automotive parts, and industrial engines. It owns several other auto companies, including Audi in Germany and SEAT (Sociedad Espanola de Automoviles de Turismo) in Spain, and it also makes and markets cars with Fiat of Italy and Škoda of the Czech Republic.



A Doyle Dane Bernbach advertisement for the Volkswagen Beetle, from the early 1960s
Volkswagen AG, photograph, DDB Needham Worldwide

Vollard, Ambroise (b. 1865, Saint-Denis, Réunion—d. July 21, 1939, Versailles, France), French art dealer and publisher who in the late 19th and early 20th centuries championed the then avant-garde works of such artists as Paul Cézanne, Henri Matisse, and Pablo Picasso.

Vollard abandoned the study of law to work as a clerk for an art dealer. He opened his own gallery in Paris in 1893 and defied public taste two years later with the first one-man exhibition of the work of Cézanne. A second Cézanne exhibition in 1898 was followed by the first one-man shows of the work of Picasso (1901) and Matisse (1904), while such artists as Maurice de Vlaminck, Georges Rouault, and Pierre Bonnard also received Vollard's support and the benefits of his salesmanship. Vollard shrewdly acquired masterpieces by these almost unknown artists at bargain prices.

Vollard's interest also turned to art publishing about 1905, and he sponsored the publication of many literary works superbly illustrated by Edgar Degas, Picasso, and other painters, as well as editions of original prints and other graphic works by them. Several avant-garde artists, including Cézanne and Picasso, reciprocated Vollard's early appreciation of their work by painting or drawing his portrait. Vollard's autobiography is *Souvenirs d'un marchand de tableaux* (1937; *Recollections of a Picture Dealer*).

volleyball, game played by two teams, usually of six players on a side, in which the players use their hands to bat a light, 9–10 ounce (260–280 gram) inflated ball about 26 inches (65 cm) in circumference back and forth over a high net, trying to make the ball touch the court within the opponents' playing area before it can be returned. The opponents attempt to prevent this by one player batting the ball up and toward a teammate before it touches the court surface, the teammate then volleying it back across the net or batting it to a third teammate who volleys it across the net. A team is allowed only three touches of the ball before it must be returned over the net.

History. Designed as an indoor sport for businessmen who found the new game of basketball too vigorous, volleyball was invented in 1895 by William G. Morgan, physical director of the Young Men's Christian Association (YMCA) in Holyoke, Mass. He called it "mintonette," until a professor from Springfield College (Springfield, Mass.), noting the volleying nature of play, proposed the name of "volleyball." The first rules were written by Morgan and printed in the first edition of the *Official Handbook of the Athletic League of the Young Men's Christian Associations of North America* (1897). The game soon proved to have wide appeal for both sexes in schools, playgrounds, the armed forces, and other organizations in the United States, and it was subsequently introduced to other countries.

In 1916 rules were issued jointly by the YMCA and the National Collegiate Athletic Association (NCAA). The first national U.S. tournament was conducted by the National YMCA Physical Education Committee in New York City in 1922. The United States Volleyball Association (USVBA) was formed in 1928 and recognized as the rules-making, governing body in the United States. From 1928 the USVBA—now known as USA Volleyball (USAV)—conducted annual national men's and senior men's (age 35 and older) volleyball championships except during 1944 and 1945 at the end of World War II. Its women's division was started in 1949, and senior women's (age 30 and older) was added in 1977. Other U.S. national events are conducted by member groups of the USAV such as the YMCA and the NCAA.

Volleyball was introduced to Europe by U.S. troops in World War I, and national organizations were formed. The International Volleyball Federation (Fédération Internationale de Volley Ball; FIVB) was organized in 1947 in Paris with the USVBA as one of the 13 charter members. FIVB membership grew to more than 180 member countries by the late 20th century.

International volleyball competition had been initiated in 1913 in the first Far East Games, in Manila. During the early 1900s and continuing until after World War II, volleyball in Asia was played on a larger court, with a lower net, and nine players on a team. Participants played fixed positions instead of rotating clockwise after gaining service; they returned to their positions after their time to serve.

The FIVB-sponsored world volleyball championships (for men only in 1949; for both men and women in 1952 and succeeding years) led to acceptance of standardized playing rules and officiating. Volleyball became an Olympic sport for both men and women in 1964 at the Summer Games in Tokyo.

By the mid-1980s Soviet teams had won more world and Olympic titles, both men's and women's, than any other nation. Their success was attributed to widespread grassroots interest and well-organized play and instruction at all levels of skill. The popularity of the game in the Soviet Union was proved by 40,000 spectators attending single matches at the 1952 World Championships in Moscow.

A highly publicized Japanese women's team, Olympic champions in 1964, reflected the interest of private industry in sport. Young women working in the same company gave their entire free time and energy to conditioning, team practice, and competition under expert and demanding coaching. They were encouraged by the Japanese Volleyball Association. This women's team made its mark in international competition, winning the world championship in 1962, 1966, and 1967, in addition to the 1964 Olympics. At the 1984 Olympic Summer Games in Los Angeles, the United States won its first Olympic volleyball medals when its women's team captured the silver medal and its men's team won the gold medal.

A four-year cycle of international volleyball events, recommended by the FIVB, began in 1969 with World Cup championships, to be

held in the year following the Olympic Games; the second year is the World Championships; in the third come the regional events (*e.g.,* European championships, Asian Games, African Games, Pan-American Games, etc.); and in the fourth year come the Olympic Games. For world champions, *see* Sporting Record: *Volleyball. See also* Olympic Games.

Beach volleyball—usually played, as its name implies, on a sand court with two players per team—was introduced in California in 1930. The first official beach volleyball tournament was held in 1948 at Will Rogers State Beach, Santa Monica, Calif., and the first FIVB-sanctioned world championship was held in 1986 at Rio de Janeiro. Beach volleyball was added to the roster of Olympic Summer Games in 1996.

The game. Volleyball requires a minimum of equipment and space and can be played indoors or outdoors. The game is played on a smooth-surfaced court 30 feet (9 m) wide by 60 feet (18 m) long, divided by a centre line into two equal areas, one of which is selected by or assigned to each of the two competing teams. Players may not step completely beyond the centre line while the ball is in play. A line 10 feet (3 m) from and parallel to the centre line of each half of the court indicates the point in front of which a back court player may not drive the ball over the net from a position above the top of the net. (This offensive action, called a spike, or kill, is usually performed most effectively and with greatest power near the net by the forward line of players.) A tightly stretched net is placed across the court exactly above the middle of the centre line; official net heights (measured from the top edge of the net to the playing surface—in the middle of the court) are 8 feet (2.4 m) for men and 7 feet 4.25 inches (2.2 m) for women. Further adjustments in net height can be made for young people and others who need a lower net. A vertical tape marker is attached to the net directly above each side boundary line of the court, and, to help game officials judge whether served or volleyed balls are in or out of bounds, a flexible antenna extends 3 feet (1 m) above the net along the outer edge of each vertical tape marker. A ball must pass over the net entirely between these antennae. A service area is marked outside and behind the right one-third of each court end line. The service must be made from within or behind this area. A space at least 6 feet (2 m) wide around the entire court is needed to permit freedom of action, eliminate hazards from obstructions, and allow space for net support posts and the officials' stands. A clear area above the court at least 26 feet (8 m) high is required to permit the ball to be served or received and played without interference.

Informally, any number can play volleyball. In competition each team consists of six players, three of whom take the forward positions in a row close to and facing the net, the other three playing the back court. Play is started when the right back (the person on the right of the second row) of the serving team steps outside his end line into the serving area and bats the ball with a hand, fist, or arm over the net into the opponents' half of the court. The opponents receive the ball and return it across the net in a series of not more than three contacts with the ball. This must be done without any player catching or holding the ball while it is in play and without any player touching the net or entering the opponents' court area. The ball must not touch the floor, and a player may not touch the ball twice in succession or with any part of the body below the hips. A player continues to serve until his team makes an error, commits a foul, or completes the game. When the service changes (side out), the receiving team becomes the serving team and its players rotate clockwise one position, the right forward shifting to the right back position and then serving from the service area. Only the serving team scores, points being awarded for errors and fouls committed by the receiving team, such as hitting the ball out of bounds, failing to return the ball, contacting the ball four times before returning it, etc. No point is awarded when side out is declared. Only one point at a time is scored for a successful play.

A game is won by the team that first scores 15 points, provided the winning team is ahead by two or more points.

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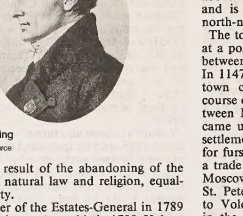
Volney, Constantin-François de Chasseboeuf, Count (comte) **de** (b. Feb. 3, 1757, Craon, France—d. April 25, 1820, Paris), historian and philosopher, whose work *Les Ruines* . . . epitomized the rationalist historical and political thought of the 18th century.

As a student in Paris, Volney frequented the salon of Madame Helvétius, widow of the philosopher Claude Helvétius, and knew the Baron d'Holbach and Benjamin Franklin. Following an early interest in history and ancient languages, Volney traveled in Egypt and Syria, after which he wrote *Voyage en Syrie et en Egypte* . . . , 2 vol. (1787; *Travels Through Syria and Egypt* . . .). In 1791 his most influential work appeared, *Les Ruines, ou méditations sur les révolutions des empires* (*The Ruins: or a Survey of the Revolutions of Empires*). Seeking the origins of civil society and the causes for its dissolution, he saw revolution as a result of the abandoning of the principles of natural law and religion, equality, and liberty.



Volney, engraving
Giraudon—Art Resource

As a member of the Estates-General in 1789 and the Constituent Assembly in 1790, Volney urged the establishment of the National Guard and the division of France into communes and departments. In 1792 he bought an estate in Corsica, hoping to improve agriculture by the example of intense cultivation. While visiting Paris in 1793 he was, as a Girondist, imprisoned during the Reign of Terror. After his release he served as professor of history at the École Normale ("Normal School") at Paris (1794), and he also visited the United States from 1795 to 1798. Although he was a senator under Napoleon and was created *comte d'empire* (1808), he opposed the empire. Louis XVIII created him a peer in 1814.

Volodymyr-Volynskyy, Russian VLADIMIR-VOLYNSKY, also spelled VLADIMIR-VOLYNSKIJ, city, Volyn *oblast* (province), northwestern Ukraine. The city is situated on the Bug River where it is crossed by the Kovel-Lviv railway. It was founded by Vladimir I, grand prince of Kiev, in the 10th century and became the capital of one of the chief princedoms of Kievan Rus. Among the city's architectural monuments is the Cathedral of the Assumption, built in 1160. The town passed to Poland in 1347, back to Russia in 1795, and to Poland again in 1919; in 1939 the area was annexed by the Soviet Union, which formalized the annexation in 1945. Its industries process agricultural products. Pop. (1991 est.) 40,300.

Vologda, *oblast* (province), northwestern Russia. The *oblast* consists of alternating broad river basins and morainic hills. The western third is drained by tributaries of the upper Volga River, while the eastern part belongs to the Northern Dvina River basin, draining into it by the Sukhona River. In the extreme northwest a small area drains directly into Lake Onega, the southern shore of which is in the *oblast*. The entire *oblast* lies in the zone of boreal taiga, or swampy coniferous forest, which is dominated by spruce, pine, and birch, with some fir and larch in the east. In the south, deciduous species such as lime are found. The lowlands have extensive swamps, mostly peat bogs but also including reed and marsh grass. Broad floodplain meadows flank the rivers. The economy of both urban and rural areas alike is concerned with the timber industry: timber rafting along the rivers, sawmilling along the railways, and pulp making, papermaking, and timber processing in the towns. A considerable portion of the timber that is cut is rafted on the Dvina north to Arkhangelsk or southward on the Volga. Pulp and paper are made in the settlement of Sokol near Vologda city. Other industry includes large-scale ferrous metallurgy at Cherepovets and engineering at Vologda, the *oblast* administrative centre. Much peat is cut for fuel. Agriculture, undertaken mainly in the south, is dominated by dairying and the cultivation of flax, fodder crops, rye, wheat, and oats. Area 56,300 square miles (145,700 square km). Pop. (1993 est.) 1,362,400.

Vologda, city and administrative centre of Vologda *oblast* (province), northwestern Russia. The city lies along the Vologda River above its confluence with the Sukhona River and is situated about 250 miles (400 km) north-northeast of Moscow.

The town was founded by Novgorod traders at a point controlling the important portages between the Volga and Northern Dvina rivers. In 1147 a monastery was founded there. The town changed hands several times in the course of the 14th-century power struggles between Moscow and Novgorod, but it finally came under Moscow's control in 1478. The settlement grew rapidly as the main market for furs from the north and northeast and as a trade centre for goods transported between Moscow and Central Russia. The founding of St. Petersburg in the early 18th century led to Vologda's decline, but the town revived in the 19th century with the steady growth of the timber industry in the area and with the coming of the railway from Moscow in 1872. In 1898 the railway was continued to Arkhangelsk, and in 1906 Vologda was also linked by rail west to St. Petersburg and east to Vyatka (now Kirov).

Its location at the crossing of north-south and east-west railways, as well as its position at the head of navigation on the Dvina River system, has made modern Vologda a major junction and transshipment centre. The town is an important focus of the timber industry and has furniture factories and paper and pulp mills. Vologda also has locomotive repair yards, a plant producing timber-working equipment, and various light industries producing linen, lace, and other consumer goods. Pop. (1993 est.) 289,100.

Vologeses, also spelled VOLOGASES, or VOLOGAESES, name of Parthian kings, grouped below chronologically and indicated by the symbol •.

• **Vologeses I** (d. *c.* AD 80), king of Parthia (reigned *c.* AD 51–80), the son of the previous king, Vonones II, by a Greek concubine.

Vologeses gave the kingdom of Media At-

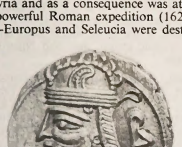
ropatene to his brother Pacorus and occupied Armenia for another brother, Tiridates. Parthian control of Armenia, however, led to a long war with the Romans (AD 54–63). A peace was finally concluded by which Tiridates was acknowledged as a Roman client king in Armenia. The power of Vologeses was further weakened by an attack by the nomadic Dahae and Sakas, a rebellion of the Hyrcanians, an invasion by Alani tribesmen in Media and Armenia, and the usurpation of his son Vardanes II. Vologeses' reign was also marked by a decided reaction against Hellenism; he built Vologesias near Ctesiphon with the intention of drawing to the new town the inhabitants and trade of the Greek city Seleucia on the Tigris.

• Vologeses III (or II) (d. AD 147?), one of the rival claimants to the throne of the Parthian king Pacorus II.

He first presented himself as the ruler of Parthia in 105/106 and seems to have been able to persist in his claim throughout the reign of Osroes (*c.* 109/110–*c.* 128/129). On the death of Osroes, Vologeses was able to overcome another rival, Mithradates IV, and to secure the greater part of the Parthian realm, which he ruled until his death.

• Vologeses IV (or III) (d. AD 192), king of Parthia (reigned 148–192).

In the early part of his reign he was able to restore the internal unity of the Parthian empire; in 161, however, he invaded Cappadocia and Syria and as a consequence was attacked by a powerful Roman expedition (162–165). Doura-Europus and Seleucia were destroyed,



Vologeses IV, coin, late 2nd century; in the British Museum

By courtesy of the trustees of the British Museum, photograph, J.R. Freeman & Co. Ltd

and the Parthian royal palace at Ctesiphon, in Babylonia, was burned; the Romans even advanced into Media. Continued sporadic fighting in Babylonia and Armenia led to further reductions of Parthian influence, and in the peace treaty northern Mesopotamia was ceded to the Romans. Vologeses was succeeded by his son Vologeses V (or IV).

• Vologeses V (or IV) (fl. 2nd and 3rd centuries), king of Parthia who reigned 191–208/209.

He first appeared in 191 as a rebel against his father Vologeses III, whom he succeeded in 192. In 193 he stirred up a rebellion in the Roman client kingdoms of Osroene and Adiabene, but in 195 the Romans under Septimius Severus recovered the districts. After the Roman army departed, Vologeses again swept through Mesopotamia and restored his suzerainty over Adiabene. Subsequently Septimius Severus launched another campaign (197/198–202), advancing into Mesopotamia, occupying Nisibis, and plundering Ctesiphon. He failed, however, in his attempts to conquer the frontier fortress of Hatra. Little more is known of Vologeses' reign; he was succeeded by his son Vologeses VI (or V) in 209.

Vologeses VI (or V) (fl. early 3rd century), king of Parthia (reigned 209–*c.* 212).

The son of the Parthian king Vologeses V (or IV), he succeeded his father in 209. Vologeses VI ruled for only about four years before his brother Artabanus V rebelled against him and became master of the greater part of the Parthian empire. But Vologeses VI did manage to maintain himself in parts of Babylonia; his dated coins extend in time to AD 228–229.

Vólos, port, the third largest of Greece (after Piraeus and Thessaloníki). It lies at the head of the Gulf of Pagasitikós (Vólos) on the east coast of Thessaly. Vólos is the capital of the *nomós* (department) of Magnisía and of the *eparkhía* ("eparchy") of Vólos, as well as seat of the Orthodox bishop of Demetrias.

Since 1956 excavations have been carried out on two Mycenaean palaces in the old town, Áno Vólos. Áno Vólos was the site of ancient Iolcos, inhabited since the beginning of the Bronze Age (*c.* 2500 BC) and capital of Mycenaean Thessaly. The Neolithic towns of Sesklo and Dimini also stood near present-day Vólos, and just south of it are the ruins of Pagasae, a prominent port from Mycenaean to late Classical times. In 293 BC Pagasae was eclipsed by the newly founded Macedonian town of Demetrias to the north of it.

A bishopric in the Byzantine Empire, Demetrias in 902 survived destruction by Saracen pirates. Vólos grew dramatically after 1881 when it was ceded, along with Thessaly, by Turkey to Greece.

The modern industrial district of Vólos is built around the gulf. The old town, a suburb with houses built up to 2,500 feet (750 m) above sea level, rises on the spurs of Mount Pelion. The port developed industrially after the establishment of a direct ferry service to Tartūs, Syria, circumventing the long overland trip through Turkey. From the port are shipped the various products of the Thessalian plain, including cereals, wine, cotton, chromite, cement, yarns, fresh fruit, tobacco, olives, and olive oil. Vólos has an important archaeological museum. Pop. (1981) 71,378.

Volsci, ancient Italic people prominent in the history of Roman expansion during the 5th century BC. They belonged to the Osco-Sabellian group of tribes and lived (*c.* 600 BC) in the valley of the upper Liris River. Later events, however, drove them first westward and then south to the fertile land of southern Latium.

Knowledge of the Volsci depends largely upon Roman accounts of their mutual wars. To increase their pressure against Rome and the Latins, the Volsci allied themselves with the Aequi. Rome and the Latins in turn joined in alliance with the Hernici, who lived between the Aequi and the Volsci. For about 200 years campaigns dragged on intermittently between these opponents. The Volsci are said to have made peace with Rome in 396 but profited by Rome's weakness after the Gauls sacked the city in 390 to renew their warfare. In the course of these struggles the Romans established several colonies in the 5th and 4th centuries to stem the advance of the Volsci. In 340 the Volsci joined the Latin revolt but were defeated (338), and they had finally submitted to Rome by 304. Thereafter they became Romanized so quickly and completely that it is difficult to ascertain their original culture. Their language is known from an inscription (early 3rd century) from Velitrae.

Volscian language, an Italic language or dialect, closely related to Umbrian and Oscan and more distantly related to Latin and Faliscan. Spoken in central Italy by the Volsci people, neighbours of the Oscan-speaking Samnites, Volscian was replaced by Latin in the 3rd century BC as the Volsci became Romanized after their submission to Rome (304 BC). Modern knowledge of the language is mostly derived from a single inscription from Velitrae (modern Velletri), Italy, dating from the early 3rd century BC; although information about Volscian is slight, it appears to be quite similar to the Umbrian language.

Volsinii, Etruscan VELZNA, ancient Etruscan town on the site of present-day Bolsena (Viterbo province, Italy). At an unidentified neighbouring site was a temple to Voltumna, which was the headquarters of the 12-city Etruscan League and the site of the annual assemblies of the Etruscans.

Excavations at Bolsena have uncovered huge double walls surrounding the group of small hills over which the city was built. A system of lateral walls within these enabled its defenders to cut off portions of the city and retreat behind further positions. On the highest of the enclosed hills, the acropolis was situated; on the surrounding plateau of Mercatello was the main residential area.

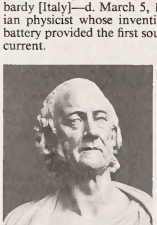
The Volsinienses attacked Roman lands in 392 BC, but little is known of their relations with Romans until Lucius Postumius Megellus defeated them in 294. In 265 the Romans were called in to check civil strife in the city, and their influence probably dates from that time. They appear to have persuaded the citizens of Volsinii to transfer to another site within their territory, probably Orvieto. Roman citizenship was granted to Volsinii in about 90 BC, and under Rome it grew proverbially wealthy.

Volsk, city, Saratov *oblast* (province), western Russia. The city lies along the Volga River opposite its confluence with the Bolshoy (Great) Irgiz. Originating as the small settlement of Malykovka, it was made a town in 1780, first called Volgsk, later Volsk. Since the October Revolution (1917), Volsk has become one of the largest centres in Russia for cement production. Pop. (1991 est.) 65,500.

Volstead Act (1919), U.S. law enacted to provide enforcement for the Eighteenth Amendment, prohibiting the manufacture and sale of alcoholic beverages. *See* prohibition.

volt, unit of electrical potential, potential difference and electromotive force in the metre–kilogram–second system (SI); it is equal to the difference in potential between two points in a conductor carrying one ampere current when the power dissipated between the points is one watt. An equivalent is the potential difference across a resistance of one ohm when one ampere is flowing through it. The volt is named in honour of the 18th–19th-century Italian physicist Alessandro Volta. These units are defined in accordance with Ohm's law, that resistance equals the ratio of potential to current, and the respective units of ohm, volt, and ampere are used universally for expressing electrical quantities. *See also* electric potential; electromotive force.

Volta, Alessandro Giuseppe Antonio Anastasio (b. Feb. 18, 1745, Como, Lombardy [Italy]—d. March 5, 1827, Como), Italian physicist whose invention of the electric battery provided the first source of continuous current.



Volta, detail of a bronze bust

Alinari—Art Resource

In 1775 Volta's interest in electricity led him to invent the electrophorus, a device used to generate static electricity. He became professor of physics at the Royal School of Como in 1774 and discovered and isolated methane gas in 1778. One year later he was appointed to the chair of physics at the University of Pavia.

In 1780 Volta's friend Luigi Galvani discovered that contact of two different metals with the muscle of a frog resulted in the generation of an electric current. Volta began experimenting in 1794 with metals alone and found that animal tissue was not needed to produce a current. This finding provoked much controversy between the animal-electricity adherents and the metallic-electricity advocates, but, with his demonstration of the first electric battery in 1800, victory was assured for Volta. In 1801 in Paris, he gave a demonstration of his battery's generation of electric current before Napoleon, who made Volta a count and senator of the kingdom of Lombardy. The emperor of Austria made him director of the philosophical faculty at the University of Padua in 1815. The volt, a unit of the electromotive force that drives current, was named in his honour in 1881.

volta, la (Italian: "the turn," or "turning"), also spelled LAVOLTA, LAVATOE, and LEVALTO, 16th-century leaping and turning dance for couples, originating in Italy and popular at French and German court balls until about 1750. Performed with a notoriously intimate embrace, it became respectable, but never completely dignified, after Queen Elizabeth I of England danced it with the earl of Leicester.

The dance, to music in $\frac{3}{4}$ time, was composed of a series of complex hops, steps, leaps, and turns. In order to assist his partner with her high jumps, the man held her close with his left hand above her right hip, his left thigh against her right thigh, and his right hand firm against the stiff busk below her bosom. She in turn held her partner's back or shoulder with her right hand and kept her dress from flying with her left hand. The volta survives as a folk dance in Provence, France.

Volta, Lake, artificial lake in Ghana. The lake is formed by the Akosombo Dam (*q.v.*), which, begun in 1961 and completed in 1965, dammed the Volta River just south of Ajena and created a lake extending upstream from the Akosombo Dam to Yapei, beyond the former confluence of the Black Volta and White Volta rivers.

With a storage capacity of 124,000,000 acre-feet (153,000,000,000 cubic m) of water, Lake Volta is one of the largest man-made lakes in the world. It is about 250 miles (400 km) long and covers 3,283 square miles (8,502 square km), or 3.6 percent of Ghana's area. The lake's creation involved the inundation of 15,000 homes and of 740 villages and the resettlement of 78,000 people. The lake is navigable and provides a cheap route linking Ghana's northern savanna with the coast. It also is a major fishing ground and provides irrigation water for farmland in the dry Accra Plains lying immediately below the damsite. The generating capacity of the dam's hydroelectric power plant is 912 megawatts of electricity; this power is used by the aluminum smelter located at the port of Tema on the Gulf of Guinea and supplies most of Ghana's other electricity needs as well.

Volta Redonda, city, western Rio de Janeiro *estado* ("state"), Brazil. It lies along the Paraíba do Sul River, at 1,500 feet (460 m) above sea level. The city is known for its steel manufacturing.

Volta Redonda was founded in 1941 on a site chosen for its access to power, water, and basic raw materials and for its location between Rio de Janeiro city and São Paulo, whose manufacturing industries together use the majority of the iron and steel produced in Brazil. In 1942–46 the government-controlled National Steel



Volta Redonda and its steel complex, Brazil
Eric Carle—Shostal

Company constructed the Gilherme Guinle Steel Plant at Volta Redonda; for many years this was the largest steel complex in South America.

Volta Redonda is a model city, with varied types of single-family dwellings; an advanced employee-welfare program; and schools, hospitals, and generous recreational facilities. It is served by a highway and two railroads. Pop. (1991 prelim.) 219,988.

Volta River, chief river system of Ghana, formed from the confluence of the Black Volta and White Volta (*q.v.*) headstreams. The Volta flows generally southward through Ghana, discharging into the Gulf of Guinea. Its major tributaries are the Afram and the Oti (Pandjari). The river system has a length of 1,000 miles (1,600 km), a drainage basin of 153,800 square miles (398,000 square km), and an average annual discharge of 42,700 cubic feet (1,210 cubic metres) per second.

Both of the river's two main upper branches, the Black and White Voltas, rise in the open plateaus of Burkina Faso (formerly Upper Volta) and unite in north-central Ghana some 300 miles (480 km) north of the sea. (These two branches are respectively called the Mouhoun and the Nakambe rivers in Burkina Faso.) The Volta's lower course was well-known to Europeans since the time of the 15th-century explorations of the Portuguese, who gave it its name, meaning "turn," because of its twisting course.

The northern four-fifths of the Volta River's valley is now covered by Lake Volta, which is one of the world's largest artificial lakes. Lake Volta was formed after the Akosombo Dam (*q.v.*) was completed in 1965; the dam was built at the gorge where the Volta River cut through the Akwapim-Togo Ranges on its way to the sea. Below the damsite, the Volta River turns sharply eastward across the Accra Plains before entering the Atlantic Ocean at Ada. *See also* Volta, Lake.

voltage regulator, any electrical or electronic device that maintains the voltage of a power source within acceptable limits. The voltage regulator is needed to keep voltages within the prescribed range that can be tolerated by the electrical equipment using that voltage. Such a device is widely used in motor vehicles of all types to match the output voltage of the generator to the electrical load and to the charging requirements of the battery. Voltage regulators also are used in electronic equipment in which excessive variations in voltage would be detrimental.

In motor vehicles, voltage regulators rapidly switch from one to another of three circuit states by means of a spring-loaded, double-pole switch. At low speeds, some current from the generator is used to boost the generator's magnetic field, thereby increasing voltage output. At higher speeds, resistance is inserted into the generator-field circuit so that its voltage and current are moderated. At still higher speeds, the circuit is switched off, lowering the magnetic field. The regulator switching rate is usually 50 to 200 times per second.

Electronic voltage regulators utilize solid-state semiconductor devices to smooth out variations in the flow of current. In most cases, they operate as variable resistances; that is, resistance decreases when the electrical load is heavy and increases when the load is lighter.

Voltage regulators perform the same function in large-scale power-distribution systems as they do in motor vehicles and other machines; they minimize variations in voltage in order to protect the equipment using the electricity. In power-distribution systems the regulators are either in the substations or on the feeder lines themselves. Two types of regulators are used: step regulators, in which switches regulate the current supply, and induction regulators, in which an induction motor supplies a secondary, continually adjusted voltage to even out current variations in the feeder line.

Voltaic languages, also called GUR, a branch of the Niger-Congo family of languages that is spoken in northern Togo and the adjoining part of Benin (formerly Dahomey), as well as in northern Ghana, northeastern Côte d'Ivoire (Ivory Coast), much of Burkina Faso (formerly Upper Volta), and part of Mali between the Niger River and the Burkina Faso–Mali border. Mossi (or Mosi), spoken in Burkina Faso, is the most widely used language of the Voltaic group. *See also* Niger-Congo languages.

Voltaire, pseudonym of FRANÇOIS-MARIE AROUET (b. Nov. 21, 1694, Paris, France—d. May 30, 1778, Paris), one of the greatest 18th-century European authors, remembered as a crusader against tyranny and bigotry and noted for his wit, satire, and vigorous critical capacity.

A treatment of Voltaire follows. For full treatment, *see* MACROPAEDIA: Voltaire.

Born of middle-class parents and educated by the Jesuits at the college of Louis-le-Grand in Paris, Voltaire studied law for a time but abandoned it to become a writer. He made his name with classical tragedies and continued to write for the theatre all his life. Voltaire's epic poem *La Henriade* was well-received, but his lampoons of the Regency and his liberal religious opinions caused offense. He was imprisoned in the Bastille for nearly a year (1717), and in 1726 he was driven into exile in England, where his philosophical interests deepened.

Following his return to France, in 1728 or 1729, Voltaire continued to write plays, and his histories—*Charles XII* (1731) and *Le Siècle de Louis XIV* (1751)—marked new departures for him and for historiography. After publication in 1734 of the *Lettres philosophiques*, in which he spoke out against established religious and political systems, Voltaire fled from Paris and settled at Cirey in Champagne with Madame du Châtelet, who became his patroness and mistress. At Cirey, Voltaire turned to scientific research. He also began to work systematically on the study of religions and culture.

In 1750, Voltaire accepted an invitation from Frederick II of Prussia to go to Berlin. In 1754 he purchased a house in Geneva and, four years later, settled at Ferney in France, near the Swiss border. He returned to Paris shortly before his death in 1778. In addition to his many works on philosophical and moral problems, Voltaire wrote several *contes* ("tales"), including *Micromégas* (1752), *Zadig* (1747), and *Candide* (1758), a satire on philosophical optimism that became his best-known work. He kept up an immense

correspondence and took an interest in any cases of injustice—especially resulting from religious prejudice—that came to his notice.

voltammetry: *see* polarography.

Volterra, town and episcopal see, Pisa *provincia,* Tuscana (Tuscany) *regione,* central Italy, northwest of Siena. As the ancient Velathri it was one of the 12 cities of the Etruscan confederation. It supported Rome during the Second Punic War in 205 BC, acquired Roman citizenship after the civil wars between Gaius Marius and Sulla (81–80 BC), and took the name Volaterrae. It became a free commune in the 12th century and fell under the domination of the Medici family of Florence in 1361.

Now noted primarily as an Etruscan and medieval art centre, Volterra has the remains of Etruscan walls enlarged in the 4th and 3rd centuries BC, two Etruscan-Roman gateways, and circular tombs from the 6th century BC with vaults of concentric rings supported by a central pillar. The Guarnacci Etruscan Museum contains a notable collection of Etruscan art, including more than 600 cinerary urns, and Volterra also has an art gallery and a museum of sacred art. Other important monuments include the Priori Palace (1208–57), the oldest communal palace in Tuscany; the fortress (1343; enlarged 1472); the 10th-century cathedral (restored and enlarged 13th and 16th centuries); the Baptistery (1283); and the 13th-century Pretorio Palace. Volterra was the birthplace of the Mannerist painter Daniele da Volterra.

Volterra's traditional industries are the extraction and artistic manufacture of alabaster and the preparation and drying of salt. Pop. (1987 est.) mun., 13,365.

Volterra, Daniele da, original name DANIELE RICCIARELLI (b. 1509, Volterra, Republic of Florence [Italy]—d. April 4, 1566, Rome), Italian Mannerist painter and sculptor, noted for his finely drawn, highly idealized figures done in the style of Michelangelo.

He studied with the Sienese painter Sodoma, and in about 1538 he moved to Rome, where he became a pupil and a close friend of Michelangelo. The latter's influence is already apparent in the exaggerrated musculature and strong linear rhythms of the figures in Volterra's fresco freize (1541) in the Massimi Palace depicting the story of Fabius Maximus. In that same year Volterra painted his most famous work, the "Descent from the Cross" in the Church of Trinità de' Monti, Rome. The dynamically posed, monumental figures in this powerful and agitated composition make it one of the most important works done by the younger generation of Mannerist painters in Rome. Volterra's other major paintings include "Massacre of the Innocents" (Uffizi, Florence) and "David Killing Goliath" (Louvre, Paris).

In 1559 Pope Paul IV assigned Volterra the task of painting in draperies to cover the nudity of the figures in Michelangelo's "Last Judgment" in the Sistine Chapel. For his performance of this task Volterra earned the nickname Il Braghetone ("The Breeches Maker"), as well as an undeserved posthumous reputation as a prude. Volterra's last work was a bronze portrait bust of Michelangelo based on the latter's death mask. The bust is the finest surviving representation of that great artist.

Consult the INDEX *first*

Volterra, Vito (b. May 3, 1860, Ancona, Papal States [Italy]—d. Oct. 11, 1940, Rome), Italian mathematician who strongly influenced the modern development of calculus.

Volterra's later work in analysis and mathematical physics was influenced by Enrico Betti while the former attended the University of Pisa (1878–82). Volterra was appointed professor of rational mechanics at Pisa in 1883, the year he began devising a general theory of functionals (functions that depend on a continuous set of values of another function). This concept led to the development of new fields of analysis, including important applications to the solution of integral and integro-differential equations. The important idea of harmonic integrals derives essentially from his functional calculus. He also applied his analytical methods with good results to optics, electromagnetism, and elasticity and the theory of distortions.

In 1892 Volterra became professor of mechanics at the University of Turin and eight years later accepted the chair of mathematical physics at the University of Rome. In 1905 he became a senator of the Kingdom of Italy. Although he was more than 55 years old, he joined the Italian Air Force during World War I and helped develop dirigibles as weapons of war. The first to propose using helium in the place of hydrogen in airships, he helped organize helium manufacture in Italy.

After the war Volterra devoted his attention to mathematical biology. Unknown to him, much of his work duplicated that of previous researchers. His abstract mathematical models of biological associations (living systems of different species in a common environment) found many analogies to physical science.

For refusing to take the required oath of loyalty to the Fascist government of Benito Mussolini, Volterra was forced to leave the University of Rome in 1931. The following year he was required to resign from all Italian scientific academies. Thereafter, he lived mainly outside Italy. Among his most important books is *Theory of Functionals and of Integral and Integro-Differential Equations* (1930).

Volterrano, Il: *see* Franceschini, Baldassare.

voltmeter, instrument that measures voltages of either direct or alternating electric current on a scale usually graduated in volts, millivolts (0.001 volt), or kilovolts (1,000 volts). The typical commercial or laboratory standard voltmeter in use today is likely to employ an electromechanical mechanism in which current flowing through turns of wire is translated into a reading of voltage. Other types of voltmeters include the electrostatic voltmeter, which uses electrostatic forces and, thus, is the only voltmeter to measure voltage directly rather than by the effect of current. The potentiometer operates by comparing the voltage to be measured with known voltage; it is used to measure very low voltages. The electronic voltmeter, which has largely replaced the vacuum-tube voltmeter, uses amplification or rectification (or both) to measure either alternating- or direct-current voltages. The current needed to actuate the meter movement is not taken from the circuit being measured; hence, this type of instrument does not introduce errors of circuit loading.

The instruments just described provide readings in analogue form, by moving a pointer that indicates voltage on a scale. Digital voltmeters give readings as numerical displays. They also provide outputs that can be transmitted over distance, can activate printers or typewriters, and can feed into computers. Digital voltmeters generally have a higher order of accuracy than analogue instruments.

An instrument that also measures ohms and amperes (in milliamperes) is known as a volt-ohm-milliammeter, or sometimes as a multimeter.

Volturno River, Italian FIUME VOLTURNO, Latin VOLTURNUS, river, south-central Italy. It rises in the Abruzzese Apennines near Alfedena and flows southeast as far as its junction with the Calore River near Caiazzo. It then turns southwest, past Capua, to enter the Tyrrhenian Sea at Castel Volturno, northwest of Naples. The river is 109 miles (175 km) long and has a drainage basin of 2,100 square miles (5,450 square km). In the 1950s a dam was built a short distance upstream from Capua, regulating the Volturno's discharge and creating a reliable supply of irrigation water.

Since the Volturno flows at right angles to the main roads connecting Rome and Naples, it has had considerable military importance. During the wars for Italian unity, the Italian nationalist leader Giuseppe Garibaldi defeated a Neapolitan army there in 1860. During World War II, German forces in southern Italy used the Volturno as their line of defense after the fall of Naples, until the U.S. 5th Army crossed the river on Oct. 13, 1943. The upper Volturno River valley fell into Allied hands with the capture of Isernia by the British on Nov. 8, 1943.

Voltzia, a genus of fossil cone-bearing plants dating to the Early Triassic epoch (beginning 245 million years ago). It belongs to the family Voltziaceae, order Coniferales (sometimes Voltziales). The genus showed interesting modifications of the seed-cone complex of earlier forms. The pollen-bearing cone was an axis with spirally arranged pollen cases. The seed-bearing cone had three ovules on five flattened and fused scales, a trend of fusion and simplification that continued in later coniferous genera.

Volubilis, North African archaeological site, located near Fès in the Jebel Zerhoun Plain of Morocco. Under the Mauretanian king Juba II in the 1st century BC and the 1st century AD, Volubilis became a flourishing centre of late Hellenistic culture. Annexed to Rome about AD 44, it was made a municipium (a community that exercised partial rights of Roman citizenship), and it became the chief inland city of the Roman province of Mauretania Tingitana. Known to the Arabs as Oulili, Walila, or Walili, it became the capital of Idris I (founder of the Idrisid dynasty) after 788.

Roman ruins on the site are extensive; among the most noteworthy are a forum, a 2nd-century AD basilica, and the Arch of Caracalla (AD 217).

volumetric analysis, any method of quantitative chemical analysis in which the amount of a substance is determined by measuring the volume that it occupies or, in broader usage, the volume of a second substance that combines with the first in known proportions, more correctly called titrimetric analysis (*see* titration).

The first method is exemplified in a procedure devised by a French chemist, Jean-Baptiste-André Dumas, for determining the proportion of nitrogen combined with other elements in organic compounds. A weighed sample of the compound is burned in a furnace under conditions that ensure the conversion of all the nitrogen to elemental nitrogen gas, N_2. The nitrogen is carried from the furnace in a stream of carbon dioxide that is passed into a strong alkali solution, which absorbs the carbon dioxide and allows the nitrogen to accumulate in a graduated tube. The mass of the nitrogen can be calculated from the volume it occupies under known conditions of temperature and pressure, and therefore the proportion of nitrogen in the sample can be determined.

A volumetric method is also applied in the analysis of nitrates, which can be converted into nitric oxide, NO, a gas. Production or consumption of carbon dioxide during biological processes often is measured volumetrically. The composition of fuel gases and

combustion products can be determined by measuring the changes in volume that occur when the sample is treated successively with reagents that specifically absorb such components as carbon dioxide, carbon monoxide, oxygen, and others.

voluntarism, any metaphysical or psychological system that assigns to the will (Latin: *voluntas*) a more predominant role than that attributed to the intellect. Christian philosophers have sometimes described as voluntarist: the non-Aristotelian thought of St. Augustine because of its emphasis on the will to love God; the post-Thomistic thought of John Duns Scotus, a late medieval scholastic, who insisted on the absolute freedom of the will and its supremacy over all other faculties; and the position of the French writer Blaise Pascal, who in religion substituted "reasons of the heart" for rational propositions. Immanuel Kant's categorical imperative as an unconditional moral law for the will's choice of action represented an ethical voluntarism. A metaphysical voluntarism was propounded in the 19th century by the German philosopher Arthur Schopenhauer, who took will to be the single, irrational, unconscious force behind all of reality and all ideas of reality. An existentialist voluntarism was present in Friedrich Nietzsche's doctrine of the overriding "will to power" whereby man would eventually re-create himself as "superman." And a Pragmatic voluntarism is evident in William James's reference of knowledge and truth to purpose and to practical ends.

voluntary muscle: *see* striated muscle.

Volunteer Island (Kiribati): *see* Starbuck Island.

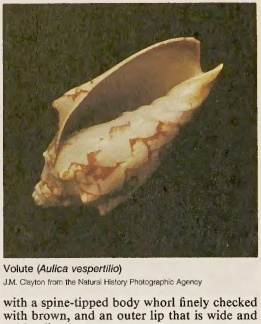
Volunteer Island (Pacific Ocean): *see* Jarvis Island.

Volunteers of America, religious social-welfare organization in the United States that offers spiritual and material aid to those in need. It was founded in New York City in 1896 by Ballington and Maud Booth as a result of a schism in the Salvation Army and is organized along quasi-military lines. The Grand Field Council, made up of all officers of the rank of lieutenant major or higher, is the chief governing body. It elects the commander in chief and other administrative officers.

Through more than 800 service centres the organization offers a broad variety of welfare services, including day nurseries, homes and clubs for the aged, summer camps for children and adults, maternity homes for unwed mothers, aid to convicts and former convicts and their families, salvage and rehabilitation programs for the physically and mentally handicapped, residences for girls, emergency shelters for women and children, and family centres. Its spiritual services include mission churches and Sunday schools, in which a conservative interpretation of the Christian faith is presented.

Local administration is performed by a resident officer aided by an advisory board of local citizens. Funds are provided by direct public contribution and through the local federated fund. Headquarters are in New York City.

volute, any marine snail of the family Volutidae (subclass Prosobranchia of the class Gastropoda). Most species have large, colourful shells, typically with an elongated aperture in the first whorl of the shell and a number of deep folds on the inner lip. Volutes are most common in warm, shallow waters but occur also in polar seas. Prized by collectors is the imperial volute (*Aulica imperialis*) of the Philippines; it is 25 cm (10 inches) long,



Volute (*Aulica vespertilio*)
J.M. Clayton from the Natural History Photographic Agency

with a spine-tipped body whorl finely checked with brown, and an outer lip that is wide and golden-lined.

Volvo Aktiebolaget, major Swedish manufacturer of automobiles and related products. Headquarters are in Göteborg.

Volvo was created in 1926 as a wholly owned subsidiary of AB Svenska Kullagerfabriken and became an independent corporation in 1935. Its original business was the assembly of cars and trucks, but by acquiring its suppliers, as well as by internal expansion, Volvo grew from assembly into a major manufacturer. It acquired engine builder AB Skovde Gjuteri oth Mekaniska Verkstad in 1931, transmission and axle manufacturer Kopings Mekaniska Verkstads AB in 1942, and car-body manufacturer Olofstrom AB in 1969.

Volvo's auto-manufacturing subsidiaries produce primarily medium-sized passenger cars with an emphasis on comfort and conservative design. Over the years the company has earned a reputation for its attentiveness to quality control and safety features.

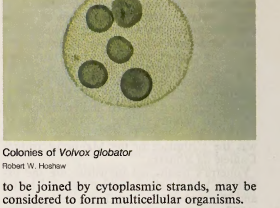
The company began making trucks in 1928, becoming one of Europe's leading manufacturers of heavy-duty trucks, and it started manufacturing buses in 1931. The company also produces marine, industrial, aircraft, and rocket engines; earth-moving, agricultural, and forestry equipment; and recreational and camping products. Other Volvo subsidiaries engage in oil prospecting and trading.

volvocid, any rounded, plantlike protozoan of the phytoflagellate order Volvocida. Common in fresh water, volvocids often colour ponds and ditches green. Some are classified by botanists as green algae (Chlorophyta). Typical forms have a central nucleus and usually two to four flagella protruding from an opening in the anterior end of the closely fitting cellulose (or mineral and cellulose) theca—*i.e.,* test, or shell. Chromatophores contain green pigments. Some species (*e.g., Haematococcus pluvialis* and *Chlamydomonas nivalis*) that cause red snow—*i.e.,* give snow a reddish hue—have an additional red pigment, hematochrome. Size may be less than 25 micrometres (0.001 inch) in solitary forms, such as *Chlamydomonas* (*q.v.*), or 1 mm (0.039 inch) in colonies, such as *Volvox* (*q.v.*). Volvocids may be photosynthetic, may obtain nutrients by absorption, or may combine both methods. In asexual reproduction (by longitudinal division) newly formed organisms remain in the parent membrane for a while. Sexual reproduction also occurs. Colonies vary from loosely associated flat disks of similar organisms (*Gonium*) to the complex arrangement of *Volvox*.

Volvox, a freshwater, chlorophyll-containing organism that lives in colonies; it is assigned by zoologists to the flagellate protozoan order Volvocida and by botanists to the green algae (Chlorophyta). The oval, hollow colonies, one cell in depth and about the size of a pinhead, contain from 500 to 60,000 cells imbedded in a gelatinous wall.

Asexual colonies have biflagellated somatic cells and reproductive cells (gonidia) that produce small daughter colonies within the parent. Developing ova or spermatozoa replace gonidia in sexual colonies. Fertilization of eggs results in zygotes, which encyst and are released from the parent colony after its death. Thick-walled zygotes formed late in the summer serve as winter resting stages.

Volvox possesses differentiation between somatic and reproductive cells, a phenomenon considered highly significant in tracing the evolution of higher animals from Protozoa. Certain species, in which somatic cells appear



Colonies of *Volvox globator*
Robert W. Hoshaw

to be joined by cytoplasmic strands, may be considered to form multicellular organisms.

volvulus, twisting of a portion of the digestive tract on its mesentery (the fold of membrane that attaches the intestine to the posterior abdominal wall), resulting in intestinal obstruction, severe pain, distension of the involved segment, and interference with circulation to the affected area. Volvulus may be congenital or acquired; the areas most frequently affected are the sigmoid colon, the ileocecal region, and the stomach. Treatment of severe volvulus is usually surgical; removal of part of the organ may be necessary to prevent recurrence.

Volyn, *oblast* (province), northwestern Ukraine. The larger northern part of the *oblast* consists of the flat, swampy lowland of the Pripet Marshes; reed and grass marshes are very extensive; drier areas are generally forested. In the south are the rolling hills of the Volyn-Podilsk Upland, a rugged area much dissected by river valleys and gullies. The natural forest-steppe vegetation of the upland has largely disappeared under the plow. Agriculture dominates the economy, and more than half of the population is rural. The uplands produce sugar beets and grain, especially rye, wheat, and corn (maize). In the north, livestock raising is more important. The communities are all small and engaged chiefly in processing farm produce. The administrative centre is Lutsk (*q.v.*). There is a small coalfield in the southwest. The *oblast* was formerly part of the old region of Volhynia (*q.v.*). Area 7,800 square miles (20,200 square km). Pop. (1991 est.) 1,072,700.

Volyn-Podilsk Upland, also spelled VOLYNPODOLSK, plateau extending between the Dniester and upper Bug river valleys in the west and the Dnieper River in the east in western Ukraine. In the north, where it is bordered by an escarpment, the plateau reaches to a line between the cities of Zhytomyr, Kremenets, and Lviv, while in the south it is terminated by the Zaporizhzhya-Balta line, beyond which lie the Black Sea lowlands. The northwestern part near Lviv is highest, reaching 1,545 feet (471 m). The plateau is composed of loess and horizontal rocks, with outcrops, in the river

valley and especially in the east, of crystalline rocks. The eastern area between the Southern (Pivdennyy) Buh and the Dnieper rivers is sometimes called the Dnieper Upland.

Volynia (Ukrainian region): *see* Volhynia.

Volzhsky, also spelled VOLZHSKY, city, Volgograd *oblast* (province), southwestern Russia, on the Volga River. Volzhsky was founded in 1951 to house persons working on the large hydroelectric station on the Volga. On completion of the project in 1961, industry was brought in and the population increased rapidly. There is a major chemical industry using petrochemical products from Volgograd and natural gas. Other industries produce ball bearings, steel pipes, and grinding wheels. Pop. (1999 est.) 289,500.

Vom, town, Plateau state, central Nigeria, situated on the Jos Plateau near the source of the Kaduna River, 18 miles (29 km) southwest of Jos town. It is the site of the National Veterinary Research Institute (1924) and of western Africa's first veterinary school (1942). Vom also has a government dairy; milk is supplied by Fulani herdsmen who graze their cattle on the tsetse-free plateau.

The volcanic soils around Vom are heavily farmed for sorghum, millet, *acha* (hungry rice), and potatoes and other vegetables. Tin and columbite mining is important east of the town, and the minerals are sent to Jos for smelting and via rail to Port Harcourt, 360 miles (580 km) south-southwest, for export.

vomeronasal organ (anatomy): *see* Jacobson's organ.

vomiting, also called EMESIS, the forcible ejection of the stomach contents from the mouth. Like nausea, vomiting may have a wide range of causes, including motion sickness, the use of certain drugs (recreational, illegal, and prescription), intestinal obstruction, disease or disorder of the inner ear, injury to the head, and appendicitis. It may even occur without nausea, such as after extreme physical exertion.

Vomiting is believed to be controlled by two distinct brain centres—the vomiting centre and the chemoreceptor trigger zone—both located in the medulla oblongata. The vomiting centre initiates and controls the act of emesis, which involves a series of contractions of the smooth muscles lining the digestive tract. These contractions begin at the small intestine and move successively through the stomach and the esophagus until the contents of the stomach are forced out the mouth. The vomiting centre responds directly to stimuli from various parts of the body that may be stressed or diseased. The chemoreceptor trigger zone, by contrast, is stimulated by many toxins and drugs. Activation of this brain region stimulates in turn the vomiting centre, which initiates emesis in an effort to rid the body of the toxin. In severe cases vomiting may result in dehydration, malnutrition, or rupturing of the esophageal wall.

von (in proper names): *see under* substantive word (*e.g.,* Hindenburg, Paul von), except as below.

von Gierke's disease, also called GLYCOGENOSIS TYPE I, most common of a group of hereditary glycogen-storage diseases. It is inherited as an autosomal-recessive trait. In von Gierke's disease, the body's metabolism of glycogen is blocked by the absence of the enzyme glucose-6-phosphatase, which regulates the release of the simple sugar glucose from glycogen stored in the liver. This results in an abnormal accumulation of glycogen in the liver, causing the liver to enlarge and producing symptoms of hypoglycemia (low blood sugar) and hyperuricemia (gout). The disorder, which occurs in only about 1 in 200,000 persons, first appears in childhood and carries a high mortality rate in the early years. Children with the disease usually have poor muscular development, stunted growth, osteoporosis, and an abnormal bleeding tendency. Afflicted individuals who survive into adulthood suffer primarily from hyperuricemia and hepatoma (malignant tumour of the liver).

von Hügel, Friedrich, BARON (Freiherr) VON HÜGEL (b. May 5, 1852, Florence [Italy]—d. Jan. 27, 1925, London, Eng.), Roman Catholic philosopher and author who was the forerunner of the realist revival in philosophy and the theological study of religious feeling.

Of Austrian descent, von Hügel inherited his father's baronial title in 1870 but lived most of his life (1876–1925) in England, where he married a sister of the 13th Earl of Pembroke and, at the outbreak of World War I, assumed British citizenship (1914). He customarily styled himself Baron von Hügel.

Von Hügel combined a deep faith in the Roman Catholic church with tolerant views that won him friends among thinkers of many denominations. When the Modernist crisis broke out in the early 20th century, his close contacts with such Modernist leaders as Alfred F. Loisy and George Tyrrell led him to be classed with those who undermined the church. In fact, von Hügel fully accepted the papacy but thought the methods of church government suffered from overcentralization, which he hoped to counteract by the healthy interplay of energy between head and members. His correspondence and writings make clear his disapproval of revolt and his rejection of the Modernist theory of belief.

As a religious scholar, von Hügel sought to interpret the relationships between theological dogma and history, Christ and humanity, free will and church control, and Roman Catholicism and contemporary scientific reasoning. In support of Roman Catholicism and the importance of mystical experience, he wrote *The Mystical Element of Religion as Studied in Saint Catherine of Genoa and Her Friends* (1908).

von Neumann, John, original name JOHANN VON NEUMANN (b. Dec. 3, 1903, Budapest, Hung.—d. Feb. 8, 1957, Washington, D.C., U.S.), German-American mathematician who made important contributions in quantum physics, logic, meteorology, and computer science. His theory of games had a significant influence upon economics.

Von Neumann studied chemistry at the University of Berlin and, at Technische Hochschule in Zürich, received the diploma in chemical engineering in 1926. The same year, he received the Ph.D. in mathematics from the University of Budapest, with a dissertation about set theory. His axiomatization has left a permanent mark on the subject; and his definition of ordinal numbers, published when he was 20, has been universally adopted.



Von Neumann
Alan W. Richards

Von Neumann was privatdocent (lecturer) at Berlin in 1926–29 and at the University of Hamburg in 1929–30. During this time he worked mainly on quantum physics and operator theory. Largely because of his work, quantum physics and operator theory can be viewed as two aspects of the same subject.

In 1930 von Neumann was visiting lecturer at Princeton University; he was appointed professor in 1931. In 1932 he gave a precise formulation and proof of the "ergodic hypothesis" of statistical mathematics. His book on quantum mechanics, *The Mathematical Foundations of Quantum Mechanics,* published in 1932, remains a standard treatment of the subject. In 1933 he became a professor at the newly founded Institute for Advanced Study, Princeton, keeping that position for the rest of his life. Meanwhile, he turned his attention to the challenge made in 1900 by a German mathematician, David Hilbert (*q.v.*), who proposed 23 basic theoretical problems for 20th-century mathematical research. Von Neumann solved a special case of Hilbert's fifth problem, the case of compact groups.

In the second half of the 1930s the main part of von Neumann's publications, written partly in collaboration with F.J. Murray, was on "rings of operators" (now called Neumann algebras). Of all his work, these concepts will quite probably be remembered the longest. Currently it is one of the most powerful tools in the study of quantum physics. An important outgrowth of rings of operators is "continuous geometry." Von Neumann saw that what really determines the character of the dimensional structure of a space is the group of rotations that the structure allows. The groups of rotations associated with rings of operators make possible the description of space with continuously varying dimensions.

About 20 of von Neumann's 150 papers are in physics; the rest are distributed more or less evenly among pure mathematics (mainly set theory, logic, topological group, measure theory, ergodic theory, operator theory, and continuous geometry) and applied mathematics (statistics, numerical analysis, shock waves, flow problems, hydrodynamics, aerodynamics, ballistics, problems of detonation, meteorology, and two nonclassical aspects of applied mathematics, games and computers). His publications show a break from pure to applied research around 1940.

During World War II, he was much in demand as a consultant to the armed forces and to civilian agencies. His two main contributions were his espousal of the implosion method for bringing nuclear fuel to explosion and his participation in the development of the hydrogen bomb.

The mathematical cornerstone of von Neumann's theory of games is the "minimax theorem," which he stated in 1928; its elaboration and applications are in the book he wrote jointly with Oskar Morgenstern in 1944, *Theory of Games and Economic Behavior.* The minimax theorem says that for a large class of two-person games, there is no point in playing. Either player may consider, for each possible strategy of play, the maximum loss that he can expect to sustain with that strategy and then choose as his "optimal" strategy the one that minimizes the maximum loss. If a player follows this reasoning, then he can be statistically sure of not losing more than that value called the minimax value. Since (this is the assertion of the theorem) that minimax value is the negative of the one, similarly defined, that his opponent can guarantee for himself, the long-run outcome is completely determined by the rules.

In computer theory, von Neumann did much of the pioneering work in logical design, in the problem of obtaining reliable answers from a machine with unreliable components, the function of "memory," machine imitation of "randomness," and the problem of constructing automata that can reproduce their own kind. One of the most striking ideas, to the study of which he proposed to apply computer techniques, was to dye the polar ice caps so as to decrease the amount of energy they would reflect—the result could warm the Earth enough to make the climate of Iceland approximate that of Hawaii.

The "axiomatic method" is sometimes mentioned as the secret of von Neumann's success. In his hands it was not pedantry but perception; he got to the root of the matter by concentrating on the basic properties (axioms) from which all else follows. His insights were illuminating and his statements precise.

von Recklinghausen's disease of bone: *see* parathyroid adenoma.

von Recklinghausen's syndrome I: *see* neurofibromatosis.

von Willebrand's disease, also called PSEUDOHEMOPHILIA B, VASCULAR HEMOPHILIA, or ANGIOHEMOPHILIA, inherited hemorrhagic disorder characterized by a prolonged bleeding time and a deficiency of antihemophilic factor (factor VIII), which is an important blood clotting agent. This disorder is due to deficiencies in von Willebrand factor (vWF), a molecule that facilitates platelet adhesion and is a plasma carrier for factor VIII.

Von Willebrand's disease (vWD) types 1 and 2 are milder forms and are inherited as autosomal dominant traits; type III, the most severe form, is recessive and requires that the trait be inherited from both parents. Symptoms usually include abnormal bruising, bleeding from mucosal surfaces such as the gums and the gastrointestinal tract, and prolonged bleeding from any break in the skin or during surgery. The level of vWF and the severity of the disease vary over time, often as a result of hormonal or immune responses elevating the level of vWF.

Inherited forms of vWD respond to cryoprecipitate, a plasma rich in vWF. Acquired forms of vWD, in which antibodies are formed against the vWF, have occasionally developed after multiple transfusions and in autoimmune or lymphoproliferative disorders, and treatment focuses on the underlying disorder because treatment with cryoprecipitate is ineffective. *See also* thrombocytopathy.

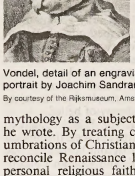
Vonck, Jean-François (b. Nov. 29, 1743, Baardegem, Austrian Netherlands [now Belgium]—d. Dec. 1, 1792, Lille, Fr.), Belgian lawyer who led the democratic faction, the Vonckists, in the Belgian revolt against Austrian rule in 1789.

Vonck worked as a lawyer in Brussels and in 1781 began to organize against the far-reaching administrative and religious reforms of Emperor Joseph II. He and his followers favoured a fully representative form of government, whereas the other Belgian revolutionary vanguard group, the Statists, led by Henri van der Noot (*q.v.*), sought a return to rule by the nobility and clergy. Vonck formed a secret society, Pro Aris et Focis (For Altar and Hearth), which gained widespread support, and then organized a volunteer army based at Liège and commanded by a former Austrian officer, Jean-André van der Meersch.

When the army joined van der Noot at Breda in 1789, after an Austrian invasion, the insurgents won a victory at Turnhout and gained control of the Austrian Netherlands. Vonck and van der Noot returned to Brussels in December 1789 to form a new government, the United Belgian States. Van der Noot then exploited clerical opposition to Vonck's democratic views to force him into exile in March 1790. After the Austrians regained power in the Austrian Netherlands in December 1790, Vonck organized a Belgian legion to assist in the expected French liberation, which took place in November 1792. He died the following month.

Vondel, Joost van den (b. Nov. 17, 1587, Cologne—d. Feb. 5, 1679, Amsterdam), Dutch poet and dramatist who produced some of the greatest works of Dutch literature.

Van den Vondel's Mennonite parents had fled from Antwerp to Cologne and ended up in Amsterdam. The young van den Vondel was largely self-educated. He taught himself French, and he also studied Latin and eventually translated works by Virgil and Seneca. He early showed a preference for using Christian



Vondel, detail of an engraving after a portrait by Joachim Sandrart, 1635
By courtesy of the Rijksmuseum, Amsterdam

mythology as a subject matter for the plays he wrote. By treating classical themes as adumbrations of Christian truths, he was able to reconcile Renaissance learning with his own personal religious faith. *Het Pascha* (1612; "The Passover"), a dramatization of the Exodus of the Jews from Egypt, was his most important early work, in which the power and splendour of his verse is already apparent. This play was an allegory for the Calvinists who had fled from Spanish tyranny in the southern Netherlands.

The execution of Holland's lord advocate, Johan van Oldenbarnevelt, in 1619, provoked Vondel to write a flood of spirited lampoons and satirical poems against the Dutch church and government. His play *Palamedes* (1625), which dramatized the political trial in a classical setting, incurred his prosecution by the government. Around this time he also translated the great jurist Hugo Grotius' drama *Sophompaneas* into Dutch. Grotius influenced van den Vondel to turn from the emulation of ancient Latin to that of ancient Greek drama.Van den Vondel's *Gijsbrecht van Aemstel* (1637), written during this transitional period, provided a hero for the capital of the new Dutch Republic who was modeled on Virgil's Aeneas. In 1639 van den Vondel completed his first translation of a Greek tragedy, Sophocles' *Electra.* His original play *Gebroeders,* an Old Testament tragedy of the same year, is the first of his plays on the Greek model; they include *Jeptha* (1659) and his greatest achievements, the trilogy comprising *Lucifer* (1654), *Adam in ballingschap* (1664; *Adam in Exile,* 1952), and *Noah* (1667). *Lucifer,* which is generally regarded as van den Vondel's masterpiece, treats the same theme as had John Milton: the inexplicable revolt of the angels against God. Meanwhile, van den Vondel's religious liberalism had gradually led him from Calvinism to Remonstrant views and eventually, at the age of 54, to the Roman Catholic Church, in which he found the peace of mind he sought in a universal faith.

Van den Vondel was more than 60 years old before he reached his literary maturity. He had shown himself to be a master of the lyric, the ode and sonnet, the epic, the long religious poem, and the essay, but his dramatic tragedies, with their powerful and lyrical language and the grandeur of their conception, remain his most important literary achievement.

Vonnegut, Kurt, Jr. (b. Nov. 11, 1922, Indianapolis, Ind., U.S.), American novelist noted for his pessimistic and satirical novels that use fantasy and science fiction to highlight the horrors and ironies of 20th-century civilization.

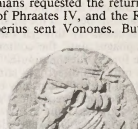
Vonnegut studied at Cornell University before serving in the U.S. Air Force in World War II. Captured by the Germans, he was one of the survivors of the fire bombing of Dresden, Ger., in February 1945. After the war he studied anthropology at the University of Chicago. In the late 1940s he worked as a reporter and as a public relations writer.

Vonnegut's first novel, *Player Piano* (1952), visualizes a completely mechanized and automated society whose dehumanizing effects are unsuccessfully resisted by the scientists and workers in a New York factory town. *The Sirens of Titan* (1959) is a quasi-science-fiction novel in which the entire history of the human race is considered an accident attendant on an alien planet's search for a spare part for a spaceship. In *Cat's Cradle* (1963), some Caribbean islanders adopt a new religion consisting of harmless trivialities in response to an unforeseen scientific discovery that eventually destroys all life on Earth. *Slaughterhouse Five, or The Children's Crusade* (1969) is Vonnegut's attempt to re-create his Dresden experience in fictional form; the book uses that bombing raid as a symbol of the cruelty and destructiveness of war down through the centuries.

Vonnegut also wrote several plays, including *Happy Birthday, Wanda June* (1970); several works of nonfiction; and several collections of short stories, chief among which was *Welcome to the Monkey House* (1968). His other novels include *Mother Night* (1961), *God Bless You, Mr. Rosewater* (1965), *Breakfast of Champions* (1973), *Slapstick* (1976), *Jailbird* (1979), *Deadeye Dick* (1983), and *Galápagos* (1985).

Vonones I (d. AD 19, Antioch, Syria), king of Parthia (reigned AD 7/8–11).

Vonones was the eldest son of Phraates IV (*q.v.*) and was in Rome as a hostage when the Parthian king Orodes III died in about AD 7. The Parthians requested the return of one of the sons of Phraates IV, and the Roman emperor Tiberius sent Vonones. But Vonones'



Vonones I, coin, 1st century AD
By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

foreign manners and dependence on Rome alienated the Parthians. Artabanus III, king of Media Atropatene, revolted and entered the Parthian capital at Ctesiphon in Mesopotamia about AD 12. Vonones fled to Armenia, where he secured the Armenian throne, but because of pressure from Artabanus he was forced to abdicate about AD 15. Vonones then went to Antioch in Syria, where the Roman governor kept him in custody until he was killed in an attempt to escape.

voodoo, also spelled VOUDOU, French VAUDOU, national religious folk cult of Haiti. Voodoo is a mixture of Roman Catholic ritual elements, which date from the period of

French colonization, and African theological and magical elements, which were brought to Haiti by slaves formerly belonging to the Yoruba, Fon, Kongo, and other peoples of Africa. The term *voodoo* is derived from the word *vodun,* which denotes a god, or spirit, in the language of the Fon people of Benin (formerly Dahomey).

Although voodooists profess belief in a rather distant supreme God, the effective divinities are a large number of spirits called the *loa,* which can be variously identified as local or African gods, deified ancestors, or Catholic saints. The *loa* are believed to demand ritual service, which thereby attaches them to individuals or families. In voodoo ritual services, a number of devotees congregate at a temple, usually a humble meeting place, where a priest or priestess leads them in ceremonies involving song, drumming, dance, prayer, food preparation, and the ritual sacrifice of animals. The voodoo priest, or *houngan,* and the priestess, or *mambo,* also act as counselors, healers, and expert protectors against sorcery or witchcraft.

The *loa* are thought by voodoo devotees to act as helpers, protectors, and guides to people. The *loa* communicate with an individual during the cult services by possessing him during a trance state in which the devotee may eat and drink, perform stylized dances, give supernaturally inspired advice to people, perform medical cures, or display special physical feats; these acts exhibit the incarnate presence of the *loa* within the entranced devotee. Many urban Haitians believe in two sharply contrasting sets of *loas,* a set of wise and benevolent ones called Rada *loas,* and a harsher, more malevolent group of spirits called Petro *loas.* Petro spirits are called up by more agitated or violent rituals than Rada spirits are evoked by.

A peculiar, and much sensationalized, aspect of voodoo is the zombi. A zombi is regarded by voodooists as being either a dead person's disembodied soul that is used for magical purposes, or an actual corpse that has been raised from the grave by magical means and is then used to perform agricultural labour in the fields as a sort of will-less automaton. In actual practice, certain voodoo priests do appear to create "zombis" by administering a particular poison to the skin of a victim, who then enters a state of profound physical paralysis for a number of hours.

For decades the Roman Catholic church in Haiti denounced voodoo and even advocated the persecution of its devotees, but because voodoo has remained the chief religion of least 80 percent of the people in Haiti, the Catholic church by the late 20th century seemed resigned to coexisting with the cult.

Voortrekker (Afrikaans: "Pioneer," or "Leading Migrant"), any of the Afrikaners who left the British Cape Colony in southern Africa to make the Great Trek (*q.v.*) into the interior from 1835 to the early 1840s.

Voragine, Jacobus de: *see* Jacobus de Voragine.

Vorarlberg, *Bundesland* (federal state), far western Austria. It is bounded on the north by Bavaria (Germany) and Lake Constance (Bodensee), on the west by Switzerland (across the Rhine River) and Liechtenstein, on the south by Switzerland, and on the east (over the Arlberg Pass) by Tirol. With an area of 1,004 square miles (2,601 square km), the state is drained by the Ill River and the Bregenzer River; the terrain is level south of Lake Constance and in the Rhine and Ill valleys, hilly in the forested Bregenzer Forest (*see* Bregenzerwald; northeast), and mountainous in the Silvretta Alps (south), whose highest peak is Mount Buin (10,866 feet [3,312 m]).

The region was part of the Roman province of Raetia from 15 BC until the 5th century. Invaded by the Alemanni (a Germanic people), it had become part of the Frankish kingdom by 593 and was later divided into countships. The Walser people moved there from the area of the modern Swiss canton of Valais and contributed to the Germanizing of the region in the 14th and 15th centuries. The Habsburgs, who had acquired most of the area by 1523, administered it with Tirol. Vorarlberg remained linked with Tirol until it became an independent *Bundesland* of Austria in 1918. Of Alemannic descent and speaking a dialect akin to Swiss-German, the people of Vorarlberg voted to join Switzerland in 1919, but neither the Swiss government nor the Allies were in favour of this.

Vorarlberg ranks second only to Vienna in industrialization, with more than half of its labour force engaged in industry and crafts. Its textile and clothing industries, as well as its output of hydroelectric power in the Ill and Bregenzer river valleys, constitute considerable percentages of Austria's national production for export. Watch and clock making and metal, chemical, and pharmaceutical industries also contribute to the economy. Industry is concentrated primarily in the Rhine and, to a lesser extent, the Ill river valleys. The principal towns are Bregenz (the capital), Dornbirn, Feldkirch, Bludenz (*qq.v.*), and Lustenau. Agriculture is dominated by grassland farming and cattle raising, particularly in the upper Ill Valley and the Bregenzer Forest area. Dairy farming is also extensive. Potatoes, corn (maize), wheat, and fruit are grown in the Rhine Valley, which also has some vineyards. Forestry is declining, but Vorarlberg's Alpine tourist trade is of increasing economic importance. The state's road and rail communications with foreign countries are far more extensive than those with Tirol and the rest of Austria. Pop. (1988 est.) 316,294.

Vordingborg, city, Storstrøm *amtskommune* (county commune), southern Sjælland (Zealand), Denmark, on Masne Sound. Founded in the 12th century around its castle, which was built by Valdemar I as a defense against the Wends, the town of Vordingborg became a favourite meeting place of the Danehof (national assembly), at one of whose meetings the oldest national statute was published (1241). The city was chartered in 1415. In the 14th century Valdemar IV built the curious "Goose Tower," crowned with a golden (now copper) goose weathercock, in the grounds of his castle, which is now a botanic garden. Vordingborg's industries include meat-packing and brick and cement manufacturing. The city has a mental home and a hospital for tubercular children. There are several colleges in the area. The 18th-century manor farm of Rosenfeldt is nearby. From Vordingborg a 2-mile (3.2-kilometre) bridge—the longest in Denmark—connects with the island of Falster. Pop. (1986 est.) city, 8,780; (1990 est.) mun., 20,041.

Vorkuta, city, Komi republic, northwestern Russia, on the Vorkuta River. Coal mining began in the area in 1932, but the industry and city did not grow significantly until World War II. Initially the coal exploitation used penal labour. The area subsequently became the site of some of Stalin's forced-labour camps for political prisoners, most of whom perished there from the harsh climate. Pop. (1991 est.) 117,400.

Voronezh, also spelled VORONEŽ, *oblast* (province), western Russia. The *oblast* has an area of 20,250 square miles (52,400 square km) and lies in the basin of the middle Don River, which bisects it north–south. The northeastern part of the *oblast* consists of the level Oka–Don Plain; west of the Don the land rises to the Central Russian Upland, which is greatly dissected by valleys and erosion gullies. The *oblast* lies in the forest-steppe zone, with a natural vegetation of alternating patches of oak forest and grass steppe. The greater part of the natural plant cover has disappeared owing to cultivation, since the soils are exceptionally rich. The surviving oak forest is protected in nature reserves. Plowing has caused intensive soil erosion in the *oblast,* and countermeasures are relatively limited. Nevertheless, the *oblast* is highly developed agriculturally, dominated by the cultivation of wheat, corn (maize), and other grains; it is one of the few areas of Russia that provides adequate climatic conditions for corn. Sunflowers and sugar beets are the chief industrial crops. Vegetables, especially potatoes, are important around Voronezh, the *oblast* headquarters, and orchards abound. Dairy and beef cattle, pigs, and sheep are kept in large numbers. Except in Voronezh city, most industry is small in scale, processing farm produce. There are some low-grade iron-ore deposits. Pop. (1991 est.) 2,474,400.

Voronezh, also spelled VORONEŽ, city and administrative centre of Voronezh *oblast* (province), western Russia. It lies along the right bank of the Voronezh River above its confluence with the Don. The city was founded in 1586 as a fortress, later forming part of the Belgorod defensive line. Peter I the Great built his naval flotilla there for use in his campaigns against the Turkish fortress of Azov. With the intensive agricultural development of the forest-steppe, Voronezh became a major centre for the grain trade and flour milling.

Modern Voronezh has a wide range of engineering, chemical, and food-processing industries. Power comes from a thermal electric plant and from the Novovoronezh nuclear power station. The city has a university (evacuated there from Tartu, Estonia, in 1918) and agricultural, medical, veterinary, forestry, and teacher-training institutes. The centre of the city, with most of the administrative, cultural, and educational institutions, is laid out on a gridiron pattern that is broken only near the river by ravines in the steep bank. Industrial areas lie west of the city centre or on the low, sandy left bank. Pop. (1991 est.) 900,000.

Vorontsov, Mikhail Illarionovich (b. July 23 [July 12, Old Style], 1714—d. Feb. 26 [Feb. 15], 1767, St. Petersburg, Russia), Russian statesman who played a major role, particularly in foreign affairs, during the reign (1741–62) of Empress Elizabeth.

A member of a family that became prominent in Russian court circles in the 18th century, he was appointed a page in the court of Yelizaveta Petrovna (the daughter of the late emperor Peter I the Great) when he was 14. In 1742 (1741, Old Style) he helped her overthrow Emperor Ivan VI and become Empress Elizabeth. Subsequently he became vice chancellor (1744); and, after the chancellor Aleksey P. Bestuzhev-Ryumin, his rival, was removed from his post because he was thought to favour Russia's enemy, England, during the Seven Years' War, Vorontsov, who was pro-French, became his replacement (1758).

Nevertheless, when Peter III succeeded Elizabeth and abandoned her alliances with France and Austria, Vorontsov made no effort to dissuade the new emperor and even continued to support him when he was deposed by his wife, Catherine II (1762). Vorontsov was consequently placed under house arrest; only after Peter died did he swear allegiance to Catherine and resume his office as chancellor, which he held until he retired in 1763.

Other members of the Vorontsov family who attained noteworthy positions include Mikhail's brother Roman Illarionovich Vorontsov

(1707–83), who was a favourite at Elizabeth's court; Roman's daughters Yelizaveta, who became the mistress of Peter III; and Princess Yekaterina Romanovna Dashkova (*q.v.*; 1743/44–1810), who was a close associate of Catherine II. In addition, Roman's son Aleksandr (1741–1805) became a noted diplomat and statesman, serving as Russia's minister to Great Britain and to the Dutch Netherlands, as president of the department of trade (1773–92), and as chancellor (1802–04). His brother Semyon (1744–1832) also served as Russia's minister to Great Britain (1784–1806), and, although his determined pro-English attitudes brought occasional disgrace upon him, he was offered the post of chancellor, which he refused.

To make the best use of the Britannica, consult the INDEX *first*

Vorontsov, Mikhail Semyonovich, Prince (b. May 19 [May 30, New Style], 1782—d. Nov. 6 [Nov. 18], 1856, Odessa, Ukraine, Russian Empire), Russian military and government official who was an outstanding imperial administrator.

The son of the diplomat Semyon R. Vorontsov, he was born into a family that had become highly influential in Russian political affairs in the 18th century. He entered the Russian army in 1801 and participated in Russia's campaign against Napoleonic France (1806–15). He was a lieutenant general by 1813, and he commanded Russia's occupation forces in France in 1815–18. In 1823 he was appointed governor-general of a sparsely populated frontier area that included the Crimea, Bessarabia, and the town of Odessa. During his long tenure in this post (1823–54), Vorontsov built up an honest and efficient administration, and he also discouraged serfdom from spreading into his territories with the influx of Russian settlers. He greatly facilitated the growth of trade and industry in the region, besides establishing schools and other cultural institutions.

In 1844 Vorontsov was appointed commander in chief and governor of the Caucasus, and he succeeded in solidifying Russia's tenuous hold over that territory. By 1848 he had also brought two-thirds of Dagestan (a region in the eastern Caucasus) under Russian control. Vorontsov favoured the introduction of moderate reforms in Russia, including the emancipation of the serfs. He retired in 1853 and was made a field marshal in 1856.

Vorontsova, Yekaterina Romanovna: *see* Dashkova, . Yekaterina Romanovna Vorontsova, Knyaginya.

Voroshilov, Kliment Yefremovich (b. Feb. 4 [Jan. 23, Old Style], 1881, Verkhneye, Russia—d. Dec. 2, 1969, Moscow), military and political leader of the Soviet Union who served as head of state after the death of his close friend and collaborator Joseph Stalin.

A Bolshevik activist from 1903, Voroshilov participated in the civil war that followed the Bolshevik takeover in Russia (October 1917). He distinguished himself as an able commander and, while defending Tsaritsyn (now Volgograd) during the summer of 1919, became closely associated with Stalin, who was then the political commissar in that region. In 1925 Stalin made him people's commissar for defense. In 1926 he also became a member of the Politburo of the party's Central Committee and in 1935 was named a marshal of the Soviet Union.

Held responsible for the initial Soviet defeats in World War II, Voroshilov was removed from his post as defense commissar. He was nevertheless appointed to the committee for state defense (June 1941), which assumed all the powers of government after the Germans invaded the Soviet Union, and was also made commander of the northwest armies (July 10, 1941), which were charged with the defense of Leningrad. Despite his determined efforts and displays of heroism, Voroshilov failed to prevent the Germans from blockading Leningrad. Although stripped of his command in September 1941, he continued to serve in responsible positions throughout the war. In 1945–47, acting as Stalin's representative, he supervised the establishment of the communist regime in Hungary.

After the war, Voroshilov, as an expert on military affairs, continued to sit on the Politburo, but his role and responsibility gradually diminished, and it is probable that by 1953 he had fallen into Stalin's disfavour. Stalin died, however, in March 1953, and Voroshilov, who then became chairman of the Presidium of the Supreme Soviet (*i.e.*, head of the Soviet state), maintained his influence in government affairs until 1957, when he joined other members of the party's Presidium (formerly the Politburo) in an unsuccessful attempt to remove the new leader, Nikita Khrushchev, from power. Despite his role in this "anti-party group," which was not publicly revealed until October 1961, Voroshilov was allowed to retain his high government and party posts until he retired in 1960.

Voroshilovgrad (Ukraine): *see* Luhansk.

Voroshilovsk (Ukraine): *see* Kommunarsk.

Vörösmarty, Mihály (b. Dec. 1, 1800, Nyék, Hung.—d. Nov. 19, 1855, Pest), poet and dramatist who helped make the literature of Hungary truly Hungarian during the era (1825–49) of social reforms. By ridding Hungarian literature of overwhelming classical and German influence, he made it national not only in language but in spirit.



Vörösmarty, detail of a steel engraving by C.A. Schwerdgeburth, after a drawing by Miklós Barabás

By courtesy of the Hungarian National Museum, Budapest

Born into an impoverished noble family, Vörösmarty soon had to provide for himself. From the age of 15 as a schoolboy, and later while studying law, he supported himself by private tutoring. In 1825 he published an epic poem, *Zalán futása* ("The Flight of Zalán"), describing the conquest of Hungary by Árpád. The epic has great artistic merit, but its resounding success was partly caused by the general patriotic upsurge of the period, which clamoured for a work describing the glorious past of the Hungarian nation.

In 1828 Vörösmarty became the full-time editor of a well-known magazine, the *Tudományos Gyűjtemény,* and he was the first Hungarian man of letters to make a living—a modest one—from literature. In 1830 he became the first member of the newly founded Hungarian Academy and produced a truly great work, *Csongor és Tünde,* a symbolic fairy-tale play that is reminiscent of William Shakespeare's *A Midsummer Night's Dream.* He married late, in 1843, and his wife, Laura Csajághy, inspired some beautiful poems, among which "A merengőhöz" (1843; "To a Day-Dreamer") is outstanding. Having achieved fame, reasonable material comfort, and a happy marriage, Vörösmarty was in a position to look forward to a contented old age when the War of Independence (1848–49) shattered his life. An ardent partisan of Lajos Kossuth, he embraced the national cause and became a member of Parliament. During the repression that followed, Vörösmarty had to go into hiding and lived with his three children in great misery. His personal misfortune and the tribulation of his country affected his mind, and, though he was still able to produce some splendid poems, such as "Vén cigány" (1854; "The Old Gypsy"), he was unable to continue his former activity.

Vorschule (German: "preparatory school"), a type of private elementary school that developed in Prussia and other north German states in the mid-19th century to prepare upper-class children for secondary schools. Theoretically, any Prussian boy who had completed the *Volksschule* (a free, universal, and compulsory primary school) could go to secondary school. But the primary and secondary curricula had little in common that many who had completed the *Volksschule* could not master the secondary curriculum. The *Vorschule* gave students the background necessary to succeed in secondary school. Some were privately owned; others were operated by local governments. All charged fees; thus sons of poorer parents rarely attended. The usual course was three years. In 1919 Germany adopted the Weimar Constitution, which required each state to have primary schools that prepared all children for secondary school. With the implementation of this requirement, the *Vorschule* ceased to exist.

Vorskla River, Battle of the (Aug. 12, 1399), major victory of the Golden Horde (the westernmost division of the Mongol empire, which had suzerainty over the Russian lands) over the Lithuanian ruler Vytautas, which ended his attempt to extend his control over all southern Russia.

As a result of internal conflicts within the Golden Horde, the khan Tokhtamysh was deposed and replaced by Temür Kutlugh as khan and Edigü as emir. In order to restore his authority, Tokhtamysh requested aid from Vytautas, who was eager to extend his domain, which reached the Dnepr (Dnieper) River in the east, into the lands of the Golden Horde. Vytautas gathered an army of his Russian-Lithuanian forces, Tokhtamysh's Mongols, and auxiliary troops from Poland and the Teutonic Knights of Prussia. His army met those of Temür Kutlugh and Edigü, who had advanced from the steppe toward the Dnepr, at the Vorskla, a tributary of the lower Dnepr. Although Vytautas' force, which was well organized and armed with cannon, fared well in a battle of several hours against the main body of the Mongol army, commanded by Edigü, it was unable to withstand a rear attack from Temür Kutlugh's reserve units. Tokhtamysh's troops fled, many Russian-Lithuanian princes were killed, and Vytautas barely escaped alive. The victorious army then pillaged the lands around Kiev and in Podolia and reoccupied the lower Bug River basin, which Lithuania had taken in 1363 to gain access to the Black Sea. The disastrous outcome of the battle persuaded Vytautas to abandon his plan to establish suzerainty over the Golden Horde; he thenceforth concentrated primarily on Lithuania's relations with Poland, the Teutonic Knights, and northern Russia. Temür Kutlugh died of wounds received in the battle, and Tokhtamysh was killed as a fugitive soon after. The Golden Horde continued as an independent state under Edigü, who, however, never was khan.

Vorst (Belgium): *see* Forest.

Vorster, John, original name BALTHAZAR JOHANNES VORSTER (b. Dec. 13, 1915, Jamestown, Cape Province, Union of South Africa—d. Sept. 10, 1983, Cape Town), right-wing Nationalist politician, prime minister of the Republic of South Africa (1966–78), who was elected president in 1978 but was forced



Vorster
Archiv für Kunst und Geschichte, Berlin

to resign the following year because of a political scandal.

The 13th child of a wealthy Afrikaner sheep farmer, he studied at the University of Stellenbosch, where he gained attention as a Nationalist student leader. In 1938 Vorster left the university to act as registrar to the judge-president at the Cape, and the next year he practiced law at Port Elizabeth. During World War II Vorster helped to found the anti-British Ossewa Brandwag (Ox-Wagon Guard) and became a "general" in its extremist wing. Expressing his contempt for the democracies and respect for Germany, Vorster was arrested for undermining the war effort in 1942. He was released after 14 months and allowed to resume his legal practice.

Vorster tried to enter politics after the war but was at first rejected by the National Party. He was narrowly defeated in the 1948 parliamentary election. By 1953, however, he was accepted by the party and was a successful candidate from the Nigel constituency in the Transvaal. As a leading member of the National Party's right wing, Vorster helped to bring to power Hendrik Frensch Verwoerd, who became prime minister in 1958. Vorster, in turn, was appointed deputy minister of education, arts and science, and social welfare in October. He soon gained a reputation for rigid enforcement of apartheid policies. When Verwoerd decided that a firmer hand was needed after the serious interracial disturbances at Sharpeville (March 1960), Vorster was made minister of justice, police, and prisons. With expanded legal authority, Vorster vigorously suppressed and harassed opponents of his government's racial policies.

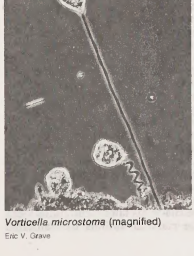
One week after Verwoerd was assassinated (September 1966), a National Party caucus chose Vorster as his successor. He had rivals for the office, but none could match the support he received from the combined forces of the party's strong right wing, the Nederduitse Gereformeerde Kerk (Dutch Reformed Church), and the influential Broederbond, a secret Afrikaner society. Despite his vow to uphold apartheid, his program was, in practice, more liberal than his predecessor's. He did much to remove hated symbols of the separatist policy and some of the grosser practices of racial discrimination. He was quick to understand the change of power in southern Africa after the collapse of the Portuguese colonial empire in 1974 and offered cooperation with neighbouring black African leaders in trying to achieve a peaceful settlement of the continuing crises in Rhodesia and Namibia (South West Africa). This advantage was lost, however, when he sent South African forces into Angola in an unsuccessful effort to oppose Soviet and Cuban support for the Popular Movement for the Liberation of Angola (MPLA). He worked with the U.S. secretary of state Henry Kissinger to persuade Ian Smith of Rhodesia to share power with black leaders, while remaining adamantly opposed to any such future for South Africa.

In September 1978 Vorster resigned his post for reasons of health and on October 10 became his nation's president, a largely ceremonial position. In November the so-called Muldergate scandal (involving misappropriation of huge sums of government money and abuse of the parliamentary system), which had been simmering for months, came to a boil. Continuing revelations in the scandal shook the country and the National Party. On June 4, 1979, after an investigating commission reported that Vorster had known all about the misuse of funds and had helped to conceal the abuse, he resigned the presidency.

voršud, among the Finno-Ugric Udmurt (Votyak) people, a family spirit, literally "luck protector"; the term also designates a birch-bark container kept in the family shrine, or *kuala* (*q.v.*), as a receptacle for offerings and possibly an image of the protector. The *voršud* was believed to watch over the welfare and prosperity of the family members worshipping at the *kuala.* The *voršud* case was kept on a shelf on the back wall of the *kuala* resting on a bed of twigs, which were renewed for ceremonies. The original *voršud* case was handed down from father to eldest son, but lesser *voršud* could also be made as the family expanded. The new *voršud* had to be made in the old *kuala,* left there for a while, and then transferred with some ashes from the hearth to dedicate the new shrine that was to contain it (*see* mudor šuan).

The *tõnni-vakk* of the Estonians (also a Finno-Ugric people) was a similar object of worship. The *vakkas,* or "cases," were kept by families and in some cases collectively by a village. They contained offerings to St. Antony, to whom sacrifices of sheep and oxen were made on January 17. The *tõnni-vakk* could be made only by a shaman and cared for only by the master of the household. During sacrificial ceremonies the *vakk* was carried around the farmstead to bestow its blessings upon it.

Vorticella, genus of the ciliate protozoan order Peritrichida, a bell-shaped or cylindrical organism with a conspicuous ring of cilia (hairlike processes) on the oral end and a contractile unbranched stalk on the aboral end; cilia usually are not found between the oral and aboral ends. Vorticellas eat bacteria and small protozoans and live in fresh or salt water attached to aquatic plants, surface scum, submerged objects, or aquatic animals.



Vorticella microstoma (magnified)
Eric V. Grave

Although vorticellas are often found in clusters, each stalk is fastened independently. The stalk consists of an external sheath that contains a fluid and a spirally arranged contractile thread. When the vorticella is contracted the stalk thread is shortened, and the sheath is coiled like a corkscrew.

Vorticellas reproduce by longitudinal fission. One of the two daughter cells retains the original stalk; the other grows a temporary wreath of cilia at the aboral end and migrates. Propelled by these cilia, the migrant eventually grows a stalk, attaches to a substrate, and loses its temporary cilia. In conjugation one small special migrant (microconjugant) finds an attached vorticella (macroconjugant) and the two conjugants amalgamate completely, forming one organism in a sexlike union that eventually leads to fission.

Vortigern, also spelled WYRTGEORN (fl. 425–450), king of the Britons at the time of the arrival of the Saxons under Hengist and Horsa in the 5th century. Though the subject of many legends, he may probably be safely regarded as an actual historical figure. Vortigern made use of Hengist and Horsa to protect his kingdom against the Picts and Scots and rewarded them for their services with a grant of land. Later Britons made war on the newcomers, now established in Kent, and four battles were fought, in the last of which, according to the *Historia Brittonum,* the king's son Vortemir, their leading opponent, was slain. The *Historia Brittonum* also records the massacre of the British nobles after the death of Vortemir and Vortigern's subsequent grant of Essex and Sussex to the invaders.

vortograph, the first kind of completely abstract photograph. Vortographs are composed



Vortograph portrait of Ezra Pound by Alvin Langdon Coburn
George Eastman House Collection

of kaleidoscopic repetitions of forms achieved by photographing objects through a triangular arrangement of three mirrors. Alvin Langdon Coburn, a member of the Photo-Secession Group and pioneer in nonobjective photography, invented vortography in 1917 and remained the principal advocate and practitioner of the technique.

The name is a reference to the Vorticist group of British writers and painters. The fractured planes and complex space characteristic of vortography reflect the Vorticists' as well as Coburn's own interest in Cubism.

Võrtsjärv, also spelled VÕRTS-JÄRV, or VIRTS-JÄRV, Russian OZERO VYRTS-YARV, lake (*järv*) in south-central Estonia, with an area of about 110 square miles (280 square km). Võrtsjärv forms part of the 124-mile (200-kilometre) course of the Ema River (German Embach, Lithuanian Emajõgi), which enters the lake

from the south and drains it north and east into Peipsi Lake on the Estonia–Russia border. The Võrtsjärv is navigable, as is the lower course of the Ema. The lake and river together divide the hilly Haanja region of southeastern Estonia from the flat remainder of the republic. The lake and its swampy, level basin are believed to be remnants of a much larger, ice-dammed prehistoric lake whose original drainage was toward the west. A Zoological and Botanical Institute was established on the lake in 1961.

Vosges, massif extending west of the Rhine River Valley in the Haut-Rhin, Bas-Rhin, and Vosges *départements* of eastern France. Of ancient rocks, the dome-shaped mountains rise to their greatest heights north of Belfort Gap and then spread westward for more than 40 mi (64 km) toward the Moselle Valley and northward for more than 70 mi (114 km) parallel to the Rhine. They form chains of granite in the south and of red sandstone in the north, which fall abruptly to the Rhine Valley; but to the west the forested slopes descend more gently. In the south the high Vosges summits, known as *ballons,* exceed 4,000 ft (1,200 m), culminating in the Ballon de Guebwiller, 4,672 ft (1,424 m). In the southwest, a region favoured by holidaymakers, the heights slope down to pleasant valleys and to lakes, such as Gérardmer and Longemer. In the northern Vosges, in the region southwest of Strasbourg, the heights reach 3,307 ft (1,008 m) at Le Donon mountain, dropping to less than 2,000 ft beyond the Col (pass) de Saverne. The higher mountains are covered with snow for nine months of the year and are both a tourist attraction and a winter sports area. In the shelter of the highest summits, to the southeast, are the vineyards of Alsace.

Vosges, *département,* Lorraine region, eastern France, created chiefly from the southern part of the historic Lorraine province, with additional portions of Franche-Comté in the south and of Champagne in the west. With an area of 2,267 sq mi (5,871 sq km), it extends east–west from the crests of the Vosges highlands across the hilly Lorraine plateau—about 1,000–1,500 ft (300–450 m) above sea level—to high forest lands east and west of the Meuse River.

The *département* lies mainly in the drainage basins of the north-flowing Meuse and Moselle rivers; but the south-flowing Saône River rises in the southeast, where the land reaches heights of more than 1,800 ft. The climate is snowy and severe in winter, but summers are warm. The *département* is one of the most wooded in France (pine, beech, and oak).

Cereals are grown, and cattle are raised. Among the fruits produced, cherries and mirabelle plums are specialities. Textiles are the chief industry. The Vosges mountains are a region of tourism, and there are several spas, including Contrexéville and Plombières. On the west bank of the Meuse, Domrémy-la-Pucelle, birthplace of St Joan of Arc, is a place of pilgrimage. The *département* has three *arrondissements:* Épinal, the capital; Neufchâteau; and Saint-Dié. Vosges is in the educational division of Nancy. Pop. (1990) 386,258.

Voskhod, any of a second series of manned Soviet spacecraft. Following the triumph of the Vostok (*q.v.*) launchings that had put the first human in space, the Soviets developed the first spacecraft capable of carrying more than one crew member. On Oct. 12, 1964, Voskhod 1 carried three cosmonauts into Earth orbit.

Voskhod 1 represented a major advance over the earlier Vostok series of manned orbiters. It was 1,500 pounds (680 kilograms) heavier and featured many technical improvements. It was the first spacecraft to employ an ion-propulsion system and was considered so reliable that no space suits were worn in flight.

Reentry procedures were also modified for the Voskhod flight. The pilots of the Vostok series had to parachute from their spacecraft, but the Voskhod cosmonauts remained in their ship, making a hard-surface landing that involved the use of drogues (special parachutes) and retro-rockets. Voskhod 1 also was the first space mission to yield significant biomedical data. One of the cosmonauts, Boris Yegorov, was a physiologist, and was assigned to monitor the physical condition of his fellow crew members. He measured their blood pressure, took blood samples, recorded brain waves, and tested muscle coordination.

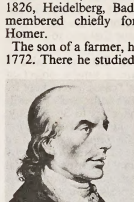
Voskhod 2, launched on March 18, 1965, continued the early pattern of Soviet space firsts. The two-man crew performed the first space walk. On the day of the launch cosmonaut Aleksei A. Leonov exited the Voskhod spacecraft through an airlock and practiced manoeuvring in space for 10 minutes. Voskhod 2 spent 27 hours in orbit before returning to the Earth.

Voskresensk, city, Moscow *oblast* (province), western Russia, on the Moskva River southeast of the city of Moscow. It is a significant industrial centre, with a large complex producing concentrated fertilizers; it also produces building materials. Pop. (1991 est.) 81,400.

Vosna River (Bosnia and Hercegovina): *see* Bosna River.

Voss, Johann Heinrich (b. Feb. 20, 1751, Sommersdorf, Mecklenburg—d. March 29, 1826, Heidelberg, Baden), German poet remembered chiefly for his translations of Homer.

The son of a farmer, he went to Göttingen in 1772. There he studied theology (briefly) and



Voss, lithograph
By courtesy of the Kurpfalzische Museum, Heidelberg

philology and became one of the leading spirits of the Göttinger Hain, a group of young poets. From 1778 to 1802 Voss was headmaster of schools, first at Otterndorf, Hanover, where he began to translate the *Odyssey,* then at Eutin; but he found the work uncongenial and became a private scholar in Jena. In 1805 he went to Heidelberg as professor of classical philology, devoting himself to his translations. An ardent rationalist, he waged an embittered struggle against the younger Romantics and became increasingly lonely before his death.

Voss published his collected poems in 1802. As a lyricist he wrote mainly songs, odes, elegies, and pastoral idylls in the style of the ancients and of the German Neoclassical poet Friedrich Klopstock. Voss's idyll *Luise* (1795), which portrays with naturalistic ease the life of a country pastor's family, inspired Goethe to write *Hermann und Dorothea.*

Voss's fame, however, rests on his translations. The *Odyssey* (1781) and *Iliad* (1793), particularly, achieved permanent importance. Voss was regarded by Goethe and other German poets as an authority on classical metres, but his pedantic regard for the niceties of form and language made his later translations seem strained. The classical authors he translated included Virgil (1789 ff.), Ovid (1798), and Horace (1806). He also translated *The Thousand and One Nights* (1781–85) and, with his sons Heinrich and Abraham, Shakespeare's plays (1818–29).

Vossius, Gerardus Johannes (Latin), Dutch GERHARD JOHANN VOSS (b. 1577, near Heidelberg—d. March 19, 1649, Amsterdam), Dutch Humanist theologian, one of the foremost scholars of the Dutch Republic's "Golden Age."

Vossius studied at Leiden, where he made a lasting friendship with the jurist and scholar Hugo Grotius. In 1615 he became regent of the theological college of the States-General at Leiden and soon joined the controversy over Arminianism, a liberal reaction to the Calvinist doctrine of predestination. His mediating role was suspected by the Calvinists, and he resigned his chair in 1619.

So great, however, was Vossius' reputation as a scholar that in 1622 he was appointed professor of rhetoric and chronology (later also Greek) at the University of Leiden. He twice refused invitations to Cambridge but accepted a nonresident prebendary at Canterbury offered him by Charles I and Archbishop William Laud. He was installed there in 1629 and received a doctorate of civil law from Oxford. In 1633 Vossius left Leiden to become professor of history at the newly founded Athenaeum at Amsterdam.

Vossius' scholarship was universal, though his reputation during his lifetime was chiefly in the field of classics and educational works, including several volumes of church history and doctrine. Particularly interesting for the light it throws on contemporary problems is his varied and extensive correspondence with men prominent in all fields, especially English men of letters, among them Lancelot Andrewes and Christopher Wren. Vossius' collected works were published at Amsterdam in six volumes (1695–1701).

Of Vossius' eight children, four became distinguished scholars. Isaak Voss (1618–89) was tutor of Greek and librarian to Christina of Sweden before, in 1673, becoming resident canon of Windsor. Like his father, he was an eminent classical and ecclesiastical historian.

Vostochno-Kazakhstan, also spelled VOSTOČNO-KAZACHSTAN, English EAST KAZAKHSTAN, *oblast* (province), extreme eastern Kazakhstan, in the Altai Mountains on the frontier with China, with an area of 37,550 sq mi (97,300 sq km). Its capital is Ust-Kamenogorsk.

It is drained by the upper Irtysh River, and Lake Zaysan lies in the south. The climate is continental and dry. One of the main centres of nonferrous metallurgy in Kazakhstan, the *oblast* has rich deposits of zinc, lead, and copper, as well as gold, silver, and other metals, which have been exploited since the late 18th century. The principal mines are at Leninogorsk, Zyryanovsk, and Belousovka. A major copper-mining centre was under development at Nikolayevka in the late 1970s. Cheap power is provided by the Ust-Kamenogorsk and Bukhtarma hydroelectric stations on the Irtysh.

Engineering products include drilling and flotation machinery, automated instruments, and capacitors. Agriculture mainly involves stock raising, but wheat and sunflowers are also grown. Other activities are fishing, forestry, fur trapping, and beekeeping. About 70 percent of the population is Russian and 23 percent Kazakh. Pop. (1991 est.) 949,000.

Vostochno-Sibirskoye more (Arctic Ocean): *see* East Siberian Sea.

Vostochno-Yevropeyskaya Ravnina (Russia): *see* Russian Plain.

Vostok, any of a series of manned Soviet spacecraft, the initial flight of which carried

the first human being into space. Launched on April 12, 1961, Vostok 1, carrying cosmonaut Yury A. Gagarin, made a single orbit of the Earth before reentry. The Vostok series included six launchings over a two-year period (1961–63). While the first flight lasted only 1 hour and 48 minutes, the second, Vostok 2 (Aug. 6, 1961), remained in space more than 25 hours, making 17 orbits around the Earth. The remaining Vostok missions were launched in pairs. Vostok 3 and Vostok 4 were both launched on Aug. 11, 1962, and orbited in sight of each other. Vostok 3 set a new time record in space of 94 hours and traveled more than 1,600,000 miles (2,560,000 km) in Earth orbit.

The final two missions in the Vostok series included the participation of the first woman cosmonaut. Vostok 5 lifted off on June 14, 1963, followed two days later by Vostok 6 carrying Valentina V. Tereshkova. These Vostok flights were notable in that the two spacecraft traveled so close together (at times only 3 miles [4.8 km] apart), setting the stage for future space dockings between orbiting vehicles.

Vostok Island, also spelled VOSTOCK, formerly STAVER ISLAND, coral atoll in the Southern Line Islands, part of Kiribati, southwestern Pacific Ocean. It lies 400 miles (640 km) northwest of Tahiti. A low formation, with a land area of only 0.1 square mile (0.3 square km), it has no anchorage in its lagoon. Vostok was sighted in 1820 by the Russian Antarctic explorer Fabian Gottlieb von Bellingshausen and was named for his ship. It was claimed by the United States under the Guano Act of 1856, and its guano deposits were exploited from 1873 to 1943. With the other Southern Line Islands, Vostok became a part of the Gilbert and Ellice Islands Colony in 1972 and a part of independent Kiribati in 1979. The island is uninhabited.

vote, in politics and government, a formal expression of opinion or will that indicates approval or disapproval of a proposal, motion, or candidate for office. *See* election.

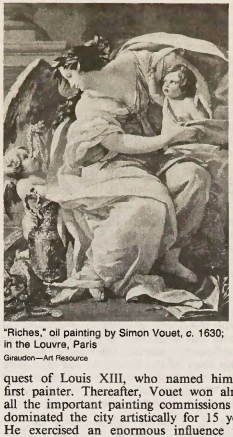
Votic language, member of the Finno-Ugric group of the Uralic language family, very nearly extinct. The few remaining Votic speakers live in the border area between Estonia and Russia (a region in which pressures to speak Russian or Estonian are not so great as they are in places of easier access). *See also* Finno-Ugric languages.

Votkinsk, city, Udmurtiya, western Russia. It lies along the Votka River just above the latter's confluence with the Kama. Votkinsk was founded in 1759 and became a city in 1935. It is famous chiefly as the birthplace of the composer Peter Ilich Tchaikovsky, whose home is preserved as a museum. Principal economic activities include machine building, peat brick production, and lumber processing. Pop. (1991 est.) 104,500.

Vouet, Simon (b. Jan. 9, 1590, Paris, Fr.—d. June 30, 1649, Paris), painter who introduced an Italianate Baroque style of painting into France.

Vouet formed his style in Italy, where he lived from 1612 to 1627. The use of dramatic contrasts of light and shade seen in such early works as his "Two Lovers" indicates that he began in Rome as a follower of Caravaggio. Works done after 1620, however, such as "St. Bruno" (1620) and "Cupid and Psyche" (1637), display more idealized figures, betraying the influence of Guido Reni, Guercino, and Domenichino, who painted in the classical Baroque style of the school of Bologna. Vouet's "Time Vanquished" (1627) breaks with the tenebrism of Caravaggio, using the more evenly diffused white light that characterizes his later style.

He returned to Paris in 1627 at the re-



"Riches," oil painting by Simon Vouet, *c.* 1630; in the Louvre, Paris
Giraudon—Art Resource

quest of Louis XIII, who named him his first painter. Thereafter, Vouet won almost all the important painting commissions and dominated the city artistically for 15 years. He exercised an enormous influence with such works as "Riches" (*c.* 1630), which was probably part of the decorative program of the château of Saint-Germain-en-Laye. Engravings and surviving panels show that he had studied Italian illusionistic ceiling decoration; *e.g.*, his work in the Château de Chilly is derived from Guercino's "Aurora," and that in the Hôtel Séguier (completed *c.* 1640) is derived from Veronese. His other principal undertakings were in the Hôtel de Bullion and in the palace of the Cardinal de Richelieu at Rueil.

Vouet's religious paintings of the early 1630s, such as the "St. Charles Borromeo" (*c.* 1640), show a developed but restrained Baroque style. The "Madonna" (*c.* 1640) and the "Diana" (1637) illustrate his best-known style, characterized by soft, smooth, and idealized modeling, sensuousness of forms, use of bright colours, and a facile technique.

Vouri River (Cameroon): *see* Wouri River.

vow, sacred voluntary promise to dedicate oneself or members of one's family or community to a special obligation that goes beyond usual social or religious requirements.

In the ancient Middle East, individuals often made vows to a deity to perform certain acts or to live in a certain way in return for a divine favour. Hannah, the mother of the Old Testament judge Samuel, for example, vowed that if Yahweh, the God of Israel, would grant her a son she would devote him to the service of the Lord. She did bear a son, and she kept her vow. Persons dedicated to the service of Yahweh might be released from their vows, however, by paying a certain amount of money.

Ancient Roman religion encouraged vows to a deity in the name of the state, thereby putting the vow-giver in debt to the gods until the vows were fulfilled. During wars, vows were made to Mars, the god of war, to sacrifice a large number of animals in exchange for support in battle.

Among the Vikings, vows to the gods, often considered a type of prayer, were viewed as sacrosanct, and those who broke vows were cast out of their community.

Vows are very common in Hinduism, Buddhism, and Jainism, not only among ordained religious persons but also among lay devotees. Hindu followers of the bhakti (devotion) movements often vow to render special service to their gods; individual Hindus also often vow special fastings or offerings to priests and gods on special days. Buddhist monks, who follow the rules of the sangha (community of believers), vow to practice 10 precepts, which include nonviolence, chastity, and honesty. Buddhist laymen and laywomen also take on some of the vows of monks and nuns at some time or times during their lives. Mahāyāna (Greater Vehicle) Buddhists sometimes adopt the vow of the bodhisattva (one destined to be enlightened), which is very strict and involves certain stipulated preliminary actions or abilities, as well as the personal power to generate the thought of enlightenment. Jaina monks follow the five vows, or *vratas* of Mahāvīra, the 6th-century BC reformer of their religion—renunciation of killing, lying, taking what is not given, sexual pleasures, and all attachments.

Among the followers of Judaism, Christianity, and Islām, vows are taken by laypersons as well as by members of religious orders. In Judaism, vows (Hebrew *nedarim*) may be positive or negative. A positive *neder* is a voluntary pledge to consecrate something to God or to do something in God's honour that is not required by law. A negative *neder* (Hebrew *issar*) is a voluntary pledge to abstain from or deprive oneself of a legitimate pleasure. In general, however, the taking of a vow in Judaism was not encouraged by the Talmudic rabbis, unless it was to be used as a last resort. Roman Catholic religious orders in general take three vows—poverty, chastity, and obedience—and in some cases an added vow of stability, *i.e.*, to remain in a monastery. In Protestantism, vows are made during certain rites (*e.g.*, confirmation, ordination, and marriage ceremonies). Muslim saints revered for their curative or spiritual powers are sometimes appealed to by the faithful, who offer vows of various sorts in return for specific help.

vowel, in human speech, sound in which the flow of air from the lungs passes through the mouth, which functions as a resonance chamber, with minimal obstruction and without audible friction; *e.g.*, the *i* in "fit," and the *a* in "pack." Although usually produced with vibrating vocal cords, vowels may be pronounced without such vibration, resulting in a voiceless, or whispered, sound. From the viewpoint of articulatory phonetics, vowels are classified according to the position of the tongue and lips and, sometimes, according to whether or not the air is released through the nose.

A high vowel (such as *i* in "machine" and *u* in "rule") is pronounced with the tongue arched toward the roof of the mouth. A low vowel (such as *a* in "father" or "had") is produced with the tongue relatively flat and low in the mouth and with the mouth open a little wider than for high vowels. Midvowels (such as *e* in "bed" and *o* in "pole") have a tongue position between the extremes of high and low.

High, middle, and low vowels are also classified according to a front-to-back dimension. A front vowel is pronounced with the highest part of the tongue pushed forward in the mouth and somewhat arched. The *a* in "had," the *e* in "bed," and the *i* in "fit" are front vowels. A back vowel—*e.g.*, the *u* in "rule" and the *o* in "pole"—is produced with the back part of the tongue raised toward the soft palate (velum).

The shape and position of the lips yields a third articulatory dimension by which vowels are classified. The lips may be rounded or spread, in what is called labialization.

Additional articulatory features describing vowel articulation are "wide" and "narrow,"

"tense" (*fortis*) and "lax" (*lenis*). Wide and narrow refer to the tongue-root position. To form a narrow vowel, the tongue root is retracted toward the pharyngeal wall, and the pharynx is narrowed. To form a wide vowel, the tongue root is advanced so that the pharynx is expanded. Tense and lax are less clearly defined terms. Tense vowels are articulated with greater muscular effort, slightly higher tongue positions, and longer durations than lax vowels.

All vowels can be divided into two main categories: diphthongs and monophthongs. Diphthongs are gliding vowels in the articulation of which there is a continuous transition from one position to another. Diphthongs are to be contrasted in this respect with so-called pure vowels, or monophthongs—*i.e.*, unchanging, or steady-state, vowels. Though they are single speech sounds, diphthongs are usually represented, in a phonetic transcription of speech, by means of a pair of characters indicating the initial and final configurations of the vocal tract. Many of the vowel sounds in most dialects of English are diphthongs—*e.g.*, the vowels of "out" and "ice," respectively.

Semivowels are sounds produced in the same manner as vowels but are used and perceived as consonants. Examples include the *y* in "yawn" and the *w* in "walk."

voyage, continuous (maritime law): *see* continuous voyage.

Voyager, in aeronautics, American experimental aircraft that in 1986 became the first airplane to fly around the world without stops or refueling. Piloted by Dick Rutan and Jeana Yeager, the craft took off on December 14 from Edwards Air Force Base, 60 miles (100 km) northeast of Los Angeles, and landed at that same base 9 days later after completing a course of 25,012 miles (40,251 km) around the world. The *Voyager* easily surpassed the previous record for unbroken, straight-line flight of 12,532 miles (20,167 km) that had been set in 1962. The *Voyager* made its round-the-world journey cruising at an average speed of about 116 miles per hour (186 km per hour).

Designed by Burt Rutan, the *Voyager* had its main wing (spanning 111 feet [33.8 m]) at the plane's rear and had a horizontal stabilizer wing at the plane's nose. The craft's extremely light but strong body was made of layered pieces of carbon-fibre tape and epoxy-saturated paper that were glued together using epoxy resin. At the start of the journey, the fuselage, wings, and other frame elements were entirely filled with a quantity of fuel that weighed four times as much as the airplane's 1,860-pound (840-kilogram) weight; all but a few gallons of fuel was used up during the flight.

Voyager, in space exploration, either of a pair of unmanned U.S. interplanetary probes launched to observe and to transmit to Earth information about the outer planetary system.

Voyager 1, launched on Sept. 5, 1977, flew by Jupiter in March 1979 and reached Saturn in November 1980. It then took up a trajectory to lead it out of the solar system.

Voyager 2, launched on Aug. 20, 1977, traveled more slowly than its partner. It sped by Jupiter on July 9, 1979, passed Saturn on Aug. 25, 1981, and flew past Uranus on Jan. 24, 1986. It encountered Neptune on Aug. 24, 1989.

Data and photographs transmitted by the Voyager probes revealed previously unknown details about each of the giant planets and their moons. For example, closeup images from the spacecraft uncovered a variety of cloud forms around Jupiter and volcanic activity on Io, one of its so-called Galilean satellites. Saturn was found to have a system of several thousand "ringlets" in addition to its known rings, and Uranus proved to have 10 additional moons and a substantial magnetic field. The flyby of Neptune led to the discovery of three rings and six hitherto unknown satellites around the planet as well as a magnetic field strong enough to trap energetic protons and electrons of the solar wind in a zone similar to the Earth's Van Allen radiation belts.

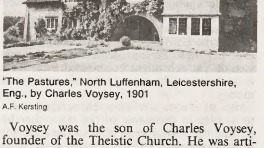
The Voyager spacecraft will continue their journeys into deep space and travel beyond the outer edge of the solar system. Voyager 2 is expected to remain operable until about the year 2020, periodically transmitting data on the heliopause—the farthest reach of the Sun's magnetosphere.

Voyageurs National Park, national park in northern Minnesota, U.S. It lies along the Canadian border, east of International Falls. Established in 1975, it was named for the mostly French-Canadian frontiersmen who were involved in fur trading in the area in the late 18th and early 19th centuries. The park occupies an area of 217,892 acres (88,178 hectares) and consists of a network of streams and lakes—the largest of which are Rainy (part), Namakan, and Kabetogama—in the heart of the North Woods. The park contains stands of fir, spruce, pine, aspen, and birch. Wildlife includes beaver and many varieties of native birds and waterfowl.

Voyer de Paulmy, René-Louis de: *see* Argenson, René-Louis de Voyer de Paulmy, marquis d'.

voyeurism, human sexual behaviour involving achievement of sexual arousal through viewing the sexual activities of others or through watching others disrobe. To some extent voyeurism is widespread; various types of sexual display are a normal part of sexual attraction and mating behaviour in most animals, including humans, but voyeurism is considered a deviant behaviour when observation ceases to be merely one factor in sexual attraction and becomes the sole or primary source of gratification. The risk of being caught is an additional element in the excitement of the voyeur.

Voysey, Charles Francis Annesley (b. May 28, 1857, Hessle, Yorkshire, Eng.—d. Feb. 12, 1941, Winchester, Hampshire), British architect and designer whose work was influential in Europe between 1890 and 1910 and was a source of Art Nouveau inspiration.



"The Pastures," North Luffenham, Leicestershire, Eng., by Charles Voysey, 1901
A.F. Kersting

Voysey was the son of Charles Voysey, founder of the Theistic Church. He was articled to J.P. Seddon in 1874, became assistant to George Devey, the eminent country-house designer, in 1880, and set up his own practice in London in about 1882. Voysey was soon successful as a designer of wallpaper and textiles that reflected the influence of Arthur Mackmurdo and William Morris. In 1888 the publication of his plans for small houses in *The British Architect* led to a series of building commissions.

Voysey's reputation grew rapidly, and by 1895 his work was widely publicized in British and European journals. Rejecting all classical architectural teaching, Voysey became a disciple of Augustus Pugin and John Ruskin. He applied their theories to the design of simple, well-built houses. His nature-related, cottage-style buildings were characteristically long and low with white roughcast walls, dominating roofs, and massive chimneys. Voysey's designs were widely copied, but he designed no major buildings after 1914. He wrote *Reason as the Basis of Art* (1906) and *Individuality* (1915).

Voznesensky, Andrey Andreyevich (b. May 12, 1933, Moscow, Russian S.F.S.R.), Soviet poet who was one of the most prominent of the generation of writers that emerged after the Stalinist era.

Voznesensky spent his early childhood in the city of Vladimir. In 1941 he moved with his mother and sister to Kurgan, in the Ural Mountains, while his father assisted



Voznesensky
AP/Wide World

in the evacuation of factories from besieged Leningrad. The profound effects of the war on his developing psyche later found vivid expression in his poetry.

After the war the family returned to Moscow, and Voznesensky pursued his education. While still a student, he sent some of his own verses to the renowned author Boris Pasternak, who encouraged him and became his model and tutor for the next three years.

Voznesensky's first published poems, which appeared in 1958, are experimental works marked by changing metres and rhythms, a distinctive use of assonance and sound associations, and a passionate but intellectually subtle moral fervour. His important early works include *Mastera* (1959; "The Masters"), *Mozaika* (1960; "Mosaic"), and *Parabola* (1960).

During the late 1950s and early '60s, Soviet poets staged a creative renaissance. Poetry readings became so popular that they sometimes were held in sports arenas in order to accommodate thousands of listeners. Along with his contemporary Yevgeny Yevtushenko, the charismatic Voznesensky became a star attraction at these events. The readings came to a sudden halt in 1963, however, when Soviet artists and writers working in "excessively experimental" styles were subjected to an official campaign of condemnation. Along with his fellow poets outside the approved socialist-realism school, Voznesensky suffered seven months of official criticism; he was returned to partial favour only after writing an ironic recantation in the government newspaper *Pravda*. Charges of obscurity, experimentation, and "ideological immaturity" continued to be periodically leveled against Voznesensky and his peers throughout the 1960s and '70s. Despite his occasional outspoken criticisms of the Soviet government, Voznesensky's characteristic poems remained apolitical celebrations of art, freedom, and the unrestrained human spirit.

In what is perhaps his best-known poem, "Goya" (1960), the author uses a series of powerful metaphors to express the horrors of war. "Akhillesogo serdtse" ("My Achilles Heart") and "Avtoportret" ("Self-Portrait") tell of his suffering and anger during the 1963 crack-

down. His later works include the volumes *40 Lyric Digressions from the Poem "Triangular Pear"* (1962), *Antimiry* (1964; "Anti-worlds"), *Vypusti ptitsu!* (1974; "Let the Bird Free!"), and *Soblazn* (1978; "Temptation"). Voznesensky's poetic production during the 1970s and '80s resulted in little that was new or distinctive.

Vrancea, *județ* (county), east-central Romania, occupying an area of 1,878 square miles (4,863 square km). The Eastern Carpathian and sub-Carpathian mountains rise above settlement areas in the county's valleys and lowlands. The southward-draining Siret River constitutes most of the county's eastern border. The Zăbala, Rimna, and Trotuș rivers also flow southeastward into the Siret. The county is a major wine-producing area with centres located in Focșani (*q.v.*; the county capital), Odobești, Cotești, Panciu, and Ivești. Livestock raising and cereal growing are other agricultural activities. Chemical factories operate in Mărășești, and building materials are produced in Doaga, while Focșani and Gugești are timber-production centres. Highway and railway connections extend through Focșani. Pop. (1984 est.) 385,647.

Vrangel, Ferdinand Petrovich (Russian explorer): *see* Wrangel, Ferdinand Petrovich.

vrata, in Jainism, a religious vow. *See* Jaina vrata.

Vratsa, also spelled VRATCA, or VRACA, town, northwestern Bulgaria. It is situated in the northern foothills of the western Balkan Mountains at the point where the Leva River emerges from its picturesque Vratsata gorge. The town was moved to its present position in the early 15th century after the Turks had destroyed a previously standing Bulgarian fortress. Under the Turks, Vratsa was a prosperous trading centre on routes traversing Europe. After Bulgaria's liberation in 1878, Vratsa's trade and craft industries declined, but the town remained an administrative centre and garrison town.

Major industrial expansion occurred in Vratsa after World War II: there is now a giant chemical complex powered by natural gas, as well as textile, furniture, ceramics, and metal industries. A large cement works is located at nearby Beli Izvor. Vratsa is a rail junction and has a modern, well-planned aspect. The district museum has many exhibits, including relics of a local Thracian settlement. A few miles west of Vratsa is the Ledenika Cave, a tourist attraction. (1986 est.) 75,526.

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vrātya, wandering ascetic, member of either an ethnic group or a sect, located principally in the Magadha (South Bihār) region of ancient India. The *vrātyas* lived outside the fold of the dominant Aryan society and practiced their own forms of austerity and esoteric rites. Much speculation regarding the *vrātyas* has left unsettled the question of whether they were forerunners of the main Aryan invaders from Iran or were non-Aryan in origin. Some scholars conjecture that the *vrātya* might have been a source of non-Aryan beliefs and practices introduced into the Vedic religion.

Vries, Adriaen de (b. 1545/46, The Hague—d. Dec. 15, 1626, Prague), the most important Dutch Mannerist sculptor.

De Vries left his homeland, where there was little interest in sculpture at the time, and he never returned. In Florence he studied under Giambologna, the leading Italian Mannerist sculptor of his day. De Vries lived for a time in Rome and later worked for Charles Emmanuel, duke of Savoy, and as court sculptor (from 1601) under the emperor Rudolf II in Prague.

De Vries's most significant work is the "Hercules Fountain" (1596–1602), a monumental Italianate work created in Augsburg for the city festival of 1600. His "Psyche with Pandora's Box" is a characteristic example of his style—shimmering satin finish, spiraling complexity, and a soaring grace.

Vries, Hugo (Marie) de (b. Feb. 16, 1848, Haarlem, Neth.—d. May 21, 1935, near Amsterdam), Dutch botanist and geneticist who introduced the experimental study of organic evolution. His rediscovery in 1900 (simultaneously with the botanists Carl Correns and Erich Tschermak von Seysenegg) of Gregor Mendel's principles of heredity and his theory of biological mutation, though considerably different from a modern understanding of the phenomenon, resolved ambiguous concepts concerning the nature of variation of species that, until then, had precluded the universal acceptance and active investigation of Charles Darwin's system of organic evolution.

Educated at the universities of Leiden, Heidelberg, and Würzburg, de Vries became a professor at the University of Amsterdam in 1878, serving there until 1918. In 1886 de Vries noticed wild varieties of the evening primrose (*Oenothera lamarckiana*) that differed markedly from the cultivated species. This suggested to de Vries that evolution might be studied by a new, experimental method rather than by the old method of observation and inference. He discovered in his cultivation of the evening primrose new forms or varieties appearing randomly among the host of ordinary specimens. He gave the name mutations to these phenomena, which he showed to arise suddenly, as distinct from Darwin's variation of species through natural selection. De Vries believed these varieties to be an example of an evolution that could be studied experimentally and conceived of evolution as a series of abrupt changes radical enough to bring new species into existence in a single leap.

De Vries' research into the nature of mutations, summarized in his *Die Mutationstheorie* (1901–03; *The Mutation Theory*), led him to begin a program of plant breeding in 1892, and eight years later he drew up the same laws of heredity that Mendel had. While surveying literature on the subject, de Vries discovered the Austrian monk's paper of 1866 on the breeding of garden peas, and he was careful to attribute the original discovery of the laws of heredity to Mendel in his subsequent publications.

De Vries also contributed to knowledge of the role played in plant physiology by osmosis, and in 1877 he demonstrated a relation between osmotic pressure and the molecular weight of substances in plant cells. Among de Vries' other works are *Intracellular Pangenesis* (1889) and *Plant Breeding* (1907).

Vriesea, genus of epiphytes (plants that are supported by another plant and have aerial roots exposed to the humid atmosphere) of the pineapple family (Bromeliaceae), containing nearly 200 South American species. Many species are grown indoors as decorative plants.

The stiff, sword-shaped, fleshy green leaves grow in a rosette and often are mottled or banded with brown. The pink, yellow, green, or white flowers have three petals and three sepals. They grow from the centre of the rosette, often in a flat spike.

Vrije Volk, Het (Dutch: "The Free People"), Socialist evening daily newspaper published in 30 regional editions in Rotterdam and outlying locations, one of the largest and most influential dailies in The Netherlands. It was established in 1900 as *Het Volk* ("The People"), the official organ of the Socialist Democratic Labour Party. During the German occupation of The Netherlands in World War II, it was suppressed by the Nazis, but it resumed publication in 1945 as *Het Vrije Volk.* It remained the voice of the Labour Party, retaining a strong political orientation. It and the Communist *De Waarheid* ("The Truth") are the only daily newspapers in The Netherlands with permanent party affiliations. The paper does not publish a Sunday edition. Its circulation in the late 20th century was about 160,000.

Vrjji, Pāli VAJJI, confederacy of the Licchavis and neighbouring peoples in Bihār, India, that existed from the 6th century BC to the 4th century AD. Its capital was at Vaiśālī (in modern Besarh). It was governed as an aristocratic republic. Gautama Buddha is said to have modeled the organizational structure of the Buddhist monastic order, sangha, on the government of the Vrjji. In the 4th century BC the marriage of Candragupta to a Licchavi princess helped establish the Mauryan dynasty.

VT fuze (military): *see* proximity fuze.

VTOL airplane, abbreviation of VERTICAL TAKEOFF AND LANDING AIRPLANE, any of several unconventional aircraft with rotating wing systems, such as the helicopter and autogiro. They may also have rotatable jet systems capable of vertical lift-off and landing in areas that only slightly exceed the overall dimensions of the aircraft.

The first operational VTOL jet aircraft was the British Royal Air Force *Harrier;* its jet engines are mounted horizontally, with their blast deflected downward to effect vertical thrust for takeoff. It achieved high subsonic speeds in level flight.

Vuillard, (Jean-)Édouard (b. Nov. 11, 1868, Cuiseaux, Fr.—d. June 21, 1940, La Baule), French painter, printmaker, and decorator,



"Under the Trees," tempera on canvas panel from "Jardin de Paris," by Édouard Vuillard, *c.* 1894; in the Cleveland Museum of Art, Cleveland

By courtesy of the Cleveland Museum of Art, Cleveland, gift of Henna Fund

who,,with Pierre Bonnard, developed the Intimist style of painting (*see* Intimism).

Vuillard met Bonnard, Paul Sérusier, and Félix Vallotton while studying at the École des Beaux-Arts in Paris, and, along with his old friends Maurice Denis and Ker-Xavier Roussel, they formed an association called the Nabis (*q.v.*) that drew its inspiration from the Synthetist works of Gauguin's Pont-Aven period. Vuillard's "Jardin de Paris," a series of decorative panels, is characteristic of his mature work as a Nabi. In those nine panels (1894; examples in the Cleveland Museum of Art; Musée National d'Art Moderne, Paris; Museum of Fine Arts of Houston, Texas; and Musée des Beaux-Arts, Brussels), Vuillard used pale light and discreet areas of neutral colours as flat surface pattern to create a mood of restful calm. In contrast to his earlier work, all modelling was avoided. Instead, unaltered colour filled the contours of the forms depicted, producing a two-dimensional, tapestry-like effect.

In 1899 the Nabis exhibited together for the last time. That year Vuillard painted works that show the influence of the techniques of Impressionism and his admiration for the subtle interior compositions of Manet and Degas. He also executed two series of masterful lithographs that reveal his great debt to Japanese woodcuts, then in vogue in Europe.

Vuillard never married. He lived with his widowed mother until her death, and the majority of his works deal with domestic scenes set in his mother's bourgeois home. As early as 1892, his production of small paintings of daily home life, such as "Woman Sweeping" (*c.* 1892; Phillips Collection, Washington, D.C.), led him to be called an Intimist.

Vuillard received numerous commissions to do decorative works. These included the decorations (1913) in the foyer of the Théâtre des Champs-Élysées, and murals in the Palais de Chaillot (1937) and in the League of Nations, Geneva (1939). In addition, he did designs for the Théâtre de l'Oeuvre and the Ballets Russes.

After the turn of the century, he painted several works in his Intimist manner. The majority of his late works, however, lack the charm and directness of his early work.

Vulcan, in Roman religion, god of fire, particularly in its destructive aspects as volcanoes or conflagrations. Poetically, he is given all the attributes of the Greek Hephaestus (*q.v.*). His worship was very ancient, and at Rome he had his own priest (*flamen*). His chief festival, the Volcanalia, was held on August 23 and was marked by a rite of unknown significance: the heads of Roman families threw small fish into the fire. Vulcan was invoked to avert fires, as his epithets Quietus and Mulciber (Fire Allayer) suggest. Because he was a deity of destructive fire, his temples were properly located outside the city.

Vulcan automatic cannon, 20-millimetre (0.8-inch) weapon capable of firing at a rate of up to 7,200 rounds per minute. Such extremely rapid fire is thought necessary in combat between supersonic aircraft, for a target may only be in the gunsight for a second or less at one time.

To attain the requisite speed, six barrels are electrically fired and rotated in succession, an arrangement basically like that of the 19th-century Gatling gun. The Vulcan is widely used in aircraft and various tactical surface weapon systems.

vulcanism: *see* volcanism.

vulcanization, chemical process by which the physical properties of natural or synthetic rubber are improved; finished rubber has higher tensile strength and resistance to swelling and abrasion, and is elastic over a greater range of temperatures. In its simplest form, vulcanization is brought about by heating rubber with sulfur.

The process was discovered in 1839 by the U.S. inventor Charles Goodyear, who also noted the important function of certain additional substances in the process. Such a material, called an accelerator (*q.v.*), causes vulcanization to proceed more rapidly or at lower temperatures. The reactions between rubber and sulfur are not fully understood, but in the product, the sulfur is not simply dissolved or dispersed in the rubber; it is chemically combined, mostly in the form of cross-links, or bridges, between the long-chain molecules.

In modern practice, temperatures of about 140°–180° C are employed, and in addition to sulfur and accelerators, carbon black or zinc oxide is usually added, not merely as an extender, but to improve further the qualities of the rubber. Anti-oxidants are also commonly included to retard deterioration caused by oxygen and ozone. Certain synthetic rubbers are not vulcanized by sulfur but give satisfactory products upon similar treatment with metal oxides or organic peroxides.

Vulcano Island, Italian ISOLA VULCANO, Greek HIERA, Latin VULCANA, southernmost of the Eolie Islands, in the Tyrrhenian Sea (of the Mediterranean), off northeastern Sicily. It is administered as part of Messina province, Sicily, Italy. Vulcano has an area of 8 sq mi (21 sq km). Although the last major eruptions were in 1888–90, fumaroles of sulfurous vapour testify to continuous volcanic activity, and its Gran Cratere is still active. *See also* Eolie Islands.

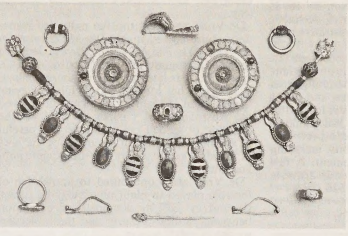
vulcanology: *see* volcanology.

Vulci, Etruscan VELCH, important town of the ancient Etruscans, the ruins of which are about 10 miles from the sea between the villages of Canino and Montalto di Castro, in Viterbo province, Italy. The site, excavated in 1956, has extensive cemeteries and a large network of streets and walls. Vulci grew out of a number of Villanovan villages and flourished chiefly in the 6th–4th century BC, largely as a result of trade, the extraction of minerals from nearby Monte Amiata, and the manufacture of bronze jugs and tripods, etc. Vulci was the centre of a large city-state, but after the 6th century it had to relinquish parts of this territory to the Romans.

The frescoes of one of its tombs, called the "François Tomb" after its discoverer, are unique in that they show early scenes from Etruscan history. These paintings, which date from the 4th–3rd century, were detached and taken to the Museo Torlonia in Rome. From other tombs came remarkable stone sculptures and imported Greek vases.

Much of the pottery from Vulci is in the Louvre, Paris, in Munich, and in the British Museum. Among the objects are painted ostrich eggs and Assyrian and Phoenician artifacts.

There are a few Roman remains on the city site and a fine Roman bridge resting upon Etruscan columns.



Etruscan jewelry found at Vulci, Italy
By courtesy of The Metropolitan Museum of Art, New York City, Dick Fund, 1940

Vulgar Latin, spoken form of non-Classical Latin from which originated the Romance group of languages. Vulgar Latin was primarily the speech of the middle classes in Rome and the Roman provinces; it is derived from Classical Latin but varied across Roman-occupied areas according to the extent of education of the population, communication with Rome, and the original languages of the local populations. As the Roman Empire disintegrated and the Christian Church became the chief unifying force in southern and western Europe, communication and education declined and regional variation in pronunciation and grammar increased until gradually, after about 600, local forms of Vulgar Latin were no longer mutually intelligible and were thereafter to be considered separate Romance languages. As the ancestor of the Romance languages, Vulgar Latin is also sometimes called Proto-Romance, although Proto-Romance most often refers to hypothetical reconstructions of the language ancestral to the modern Romance languages rather than to the Vulgar Latin that is known from documents.

Written materials in Latin almost always make use of Classical Latin forms; hence, written documentation of Vulgar Latin is uncommon. Modern knowledge of the language is based on statements of Roman grammarians concerning "improper" usages, and on a certain number of inscriptions and early manuscripts, "lapses" in the writings of educated authors, some lists of "incorrect" forms and glossaries of Classical forms, and occasional texts written by or for persons of little education. Beyond this, early texts in the Romance languages (beginning in the 9th century) often throw light on earlier usages. All of these sources, used with some caution, have made it possible to piece together the structure and vocabulary of Vulgar Latin with some exactness.

Among the most useful texts in or containing Vulgar Latin are the *Peregrinatio Etheriae* ("Pilgrimage of Etheria"), apparently written in the 4th century by an uneducated Spanish nun, and the *Appendix Probi* ("Appendix of Probus"), a list of correct and incorrect word forms dating perhaps from as early as the 3rd century. *See also* Latin language.

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Vulgate (from the Latin *editio vulgata:* "common version"), Latin Bible used by the Roman Catholic Church, primarily translated by St. Jerome. In 382 Pope Damasus commissioned Jerome, the leading biblical scholar of his day, to produce an acceptable Latin

version of the Bible from the various translations then being used. His revised Latin translation of the Gospels appeared about 383. Using the Septuagint Greek version of the Old Testament, he produced new Latin translations of the Psalms (the so-called Gallican Psalter), the Book of Job, and some other books. Later, he decided that the Septuagint was unsatisfactory and began translating the entire Old Testament from the original Hebrew versions, a process that he completed about 405.

Jerome's translation was not immediately accepted, but from the mid-6th century a complete Bible with all the separate books bound in a single cover was commonly used. It usually contained Jerome's Old Testament translation from the Hebrew, except for the Psalms; his Gallican Psalter; his translation of the books of Tobias (Tobit) and Judith (apocryphal in the Jewish and Protestant canons); and his revision of the Gospels. The remainder of the New Testament was taken from older Latin versions, which may have been slightly revised by Jerome. Certain other books found in the Septuagint—the Apocrypha for Protestants and Jews; the deuterocanonical books for Roman Catholics—were included from older versions.

Various editors and correctors produced revised texts of the Vulgate over the years. The University of Paris produced an important edition in the 13th century. Its primary purpose was to provide an agreed standard for theological teaching and debate. The earliest printed Vulgate Bibles were all based on this Paris edition.

In 1546 the Council of Trent decreed that the Vulgate was the exclusive Latin authority for the Bible, but it required also that it be printed with the fewest possible faults. The so-called Clementine Vulgate, issued by Pope Clement VIII in 1592, became the authoritative biblical text of the Roman Catholic Church. From it the Confraternity Version was translated in 1941.

Various critical editions have been produced in modern times; in 1965 a commission was established by the second Vatican Council to revise the Vulgate.

vulture, any of numerous large, carrion-eating birds of the order Falconiformes. Although often similar in appearance, the vultures of the New and Old World form separate taxonomic groups, the former comprising a distinct family (Cathartidae), the latter a subfamily (Aegypiinae) of the hawk and eagle family Accipitridae (order Falconiformes). The 20 species have bare heads and large crops. Their feet are big but weak and flat-nailed, adapted to walking and to holding a carcass. In some the beak is exceptionally strong and heavy, for tearing hides and meat.



King vulture (*Sarcoramphus papa*)
Kenneth W. Fink—Root Resources

Eyesight is well developed, as is the sense of smell in the turkey vulture.

Vultures are widely distributed in temperate and tropical regions but absent from Australia and most oceanic islands. Most vultures have broad food habits, consuming carrion, garbage, and excrement, but rarely live animals. A few occasionally take helpless live prey (as lambs and tortoises). Vultures may remain aloft for hours, soaring gracefully on long, broad wings. When one bird finds a dead or dying animal, others fly in from miles away. Feeding vultures maintain a strict social order, by species, based on body size and



Hooded vultures (*Necrosyrtes monachus*)
Alain Gille—UNESCO

strength of beak. They all give way, however, to mammalian competitors (as jackals and hyenas).

Vultures inhabit many kinds of terrain, often roosting and nesting in groups on cliffs, in tall trees, or on the ground. They lay one or two (rarely three) eggs and incubate them for seven or eight weeks. The young mature more slowly than other falconiform birds do.

Accipitrine, or Old World, vultures have eagle-like feet suitable for grasping. Cathartid, or New World, vultures have no voice, because they lack a syrinx; they have a perforated nasal septum; their feet are weak, with the hind toe slightly elevated and front toes slightly webbed at the base. The family Cathartidae includes, in addition to those listed below, two vultures called condors (*see* condor).

New World vultures. The black vulture (*Coragyps atratus*), a New World vulture sometimes called black buzzard or carrion crow, is resident in the tropics and subtropics in the Americas, often wandering far into temperate regions. It is a chunky black bird about 60 cm (24 inches) long with a very short tail, short wings, bare black head, and feathered hindneck.

The king vulture (*Sarcoramphus papa*), a New World form, is the most colourful vulture: the head and neck are red, yellow, and bluish; the eyes are white with red eye-rings; the body is buff above and white below; and the ruff is gray. Wingspread is about 1.7 m (5.6 feet); the body is about 70 cm (28 inches) long. King vultures range from southern Mexico to Argentina, where they soar in flocks over the rain forests.

Old World vultures. The cinereous vulture, sometimes also called black vulture (*Aegypius monachus*), one of the biggest and heaviest of living birds of flight, is about 100 cm (39 inches) long and 12.5 kg (27.5 pounds) in weight, with a wingspread of about 2.7 m (9 feet). This Old World vulture is all black with very broad wings and a short, slightly wedge-shaped tail. It ranges through southern Europe, Asia Minor, and the central steppes and highest mountains of Asia, nesting in tall trees.

The Egyptian vulture (*Neophron percnopterus*), also called Pharaoh's chicken, is a small Old World vulture, about 60 cm (24 inches) long, white with black flight feathers, a bare face, and a cascading mane of feathers. Its range is northern and eastern Africa, southern Europe, and the Middle East to Afghanistan and India.

The griffon vulture (*Gyps fulvus*) is an Old World vulture of northwestern Africa, the Spanish highlands, southern Russia, and the Balkans. Gray above and reddish brown with white streaking below, it grows to about 100 cm (39 inches) long.

The lappet-faced vulture (*Torgos tracheliotus*), sometimes called eared, or Nubian, vulture, is a huge Old World vulture of arid Africa. By reason of its size (to about 100 cm [39 inches] long with a 2.7-metre [8.9-foot] wingspread), it dominates all other vultures when feeding. It is black and brown above and has a wedge-shaped tail; there is much white down on the underparts. Large lappets hang from the sides of its bare head. Its face is pink or reddish.

The palm-nut vulture (*Gyphohierax angolensis*) is an Old World vulture of western and central Africa. It is about 50 cm (20 inches) long and has a bare orange face and yellow beak. The palm-nut vulture is unusual in being primarily a vegetarian, although it sometimes takes crustaceans and dead fish.

The Pondicherry vulture (*Sarcogyps calvus*), often called Indian (black) vulture, is an Old World vulture ranging from Pakistan to Malaysia. It is about 75 cm (30 inches) long and has a wingspread of about 2.7 m (8.9 feet). It is black with white down on the breast and has a huge black beak and large lappets on the sides of the neck.

The white-headed vulture (*Trigonoceps occipitalis*), an Old World vulture, is about 80 cm (31 inches) long; wingspread is about 1.8 m (5.9 feet). Black with white secondary wing feathers and belly, high black ruff, and massive red beak, the bird has a uniquely triangular head, pale yellowish and bare except for a cap of white down. For bearded vulture, *see* lammergeier.

vulva, plural VULVAE, the external female genitalia that surround the opening to the vagina; collectively these consist of the labia majora, the labia minora, clitoris, vestibule of the vagina, bulb of the vestibule, and the glands of Bartholin. All of these organs are located in front of the anus and below the mons pubis (the pad of fatty tissue at the forward junction of the pelvic bones).

The labia majora are two thick folds of skin running from the mons pubis to the anus. The outer sides of the labia are covered with pigmented skin, sebaceous (oil-secreting) glands, and after puberty, coarse hair. The inner sides are smooth and hairless, with some sweat glands. Beneath the skin layer, there is mostly fatty tissue with some ligaments, smooth muscle fibres, nerves, and blood and lymphatic vessels. The labia majora correspond to the scrotum in the male.

Directly beneath the mons pubis and between the labia majora is a small structure of erectile tissue known as the clitoris. It is capable of some enlargement caused by increased blood pressure during sexual excitement and is considered homologous (comparable in structure) to the male penis, only on a much smaller scale. Unlike the penis, the clitoris does not contain the urethra for excretion of urine; it does have a rounded elevation of tissue at the tip known as the glans clitoridis. Surrounding the glans clitoridis on two sides are the beginning folds of the labia minora.

These folds are known as the prepuce (or foreskin) of the clitoris. Like the glans penis, the glans clitoridis contains nerve endings and is highly sensitive to tactile stimulation.

The labia minora, two smaller folds of skin between the labia majora, surround the vestibule of the vagina; they have neither fat nor hairs. The skin is smooth, moist, and pink and has sebaceous and sweat glands.

The vestibule of the vagina begins below the clitoris and contains the openings of the urethra, the vagina, and the ducts of the two glands of Bartholins. The urethral opening is a small slit located closest to the clitoris; through this opening urine is excreted. Below the urethral opening is the larger, vaginal orifice. The two Bartholin ducts open on each side of the vaginal orifice; these glands secrete mucus (a thick protein compound) and frequently are sites of infection. Each gland is about 1 cm (0.4 inch) in diameter; after the 30th year, they gradually diminish in size. In virgins the vaginal orifice is covered by a membranous fold of skin known as the hymen; after sexual intercourse only fragments of the hymen remain along the margins of the opening. Running along the sides of the vestibule are two elongated bodies of erectile tissue known as the bulb of the vestibule. Many mucous glands are also present in the vestibular region. Both the labia minora and labia majora tend to cover the vestibule.

vulvitis, inflammation and infection of the vulva—the external genitalia of the female. The external organs of the vulva include the labia majora and minora (folds of skin), the clitoris, and the vestibular glands. The basic symptoms of vulvitis are superficial red, swollen, and moisture-laden lesions on the skin of the vulva. Itching sensations are a particularly prominent and consistent symptom. The areas of affected vulvar skin may turn white, crack, or develop fluid-filled blisters that break open, ooze, and crust over.

The skin of the vulva is subject to all the irritations, infections, and other conditions that affect skin elsewhere on the body. Moreover, the skin of the vulva is unusually susceptible to irritation because it is moist and warm. Besides sometimes providing a breeding ground for bacteria, these conditions can render the vulva susceptible to allergic or inflammatory reactions from direct contact with underwear or commercial hygiene products. The vulva can become the site of infections by bacteria, fungi, or viruses, and vulvitis may also accompany similar infections of the vagina (vaginitis). Depletion of estrogen, as occurs in postmenopausal women, can lead to drying and thinning of the vulvar tissues, rendering them more susceptible to irritation and infection. The vulva can be contaminated by urine, feces, vaginal discharges, and menstrual flow.

Among the most common causes of vulvitis are inflammations arising from vulvar skin's allergic reaction to soaps, vaginal sprays and deodorants, sanitary napkins, panty hose, synthetic underwear, or the detergents used to wash underwear. Allergic reactions usually take a few days to manifest themselves and produce such symptoms as itching, mild redness, and swelling.

Vulvitis may also be caused by fungi, bacteria, or herpes or other viral infections. Fungal diseases of the vulva are common; usually the agent of infection is *Candida albicans,* a yeastlike fungus. Women with diabetes are especially susceptible to these infections, as are women who eat large amounts of carbohydrates (starches). *Gardnerella vaginalis* is the most common bacterial cause of vulvitis. *Mycoplasma, Escherichia coli,* and staphylococci and streptococci may also cause infections. Tight, nonporous, nonabsorbent underwear in combination with poor hygiene may foster the growth of bacterial or fungal infections on the vulvar skin.

A cortisone cream is sometimes used to relieve the itching of vulvitis until a specific therapy can be decided upon. The particular causative agent of the condition must be isolated if treatment is to be effective. Wearing loose, absorbent underwear that allows the circulation of air is often the only necessary treatment for contact vulvitis. The substitution of cotton for synthetic garments may also help to alleviate the problem. Vulvitis arising from fungal and bacterial infections is usually treated by the topical application of creams that kill the causative microorganisms. *Candida* vulvitis is treated with clotrimazole, nystatin, or miconazole creams; *Gardnerella* and other bacterial infections are treated with metronidazole; and *Chlamydia* infections are treated with the antibiotics doxycycline or erythromycin.

Vung Tau, French CAP SAINT-JACQUES, port, southern Vietnam. It is situated near the tip of an 11-mile- (18-kilometre-) long projection into the South China Sea, which trends southwest and partially encloses Ganh Rai Bay. The bay receives the Saigon River on the northeastern Mekong delta. The port of Vung Tau has a pilot station, fuel depot, and sea harbour to serve vessels using the port of Ho Chi Minh City (formerly Saigon), 45 miles (72 km) up the Soirap River. It also has a government training centre for rural workers. The port was traditionally a seaside resort, with several hotels. On one of the granite hills overlooking the port is a well-known shrine to Buddha. Pop. (1989) 124,634.

Vuri River (Cameroon): *see* Wouri River.

Vyādhapura (Sanskrit: "City of the Hunters"), capital city of the ancient Hindu kingdom of Funan, which flourished from the 1st to the 6th century AD in an area that comprises modern Cambodia and Vietnam. Vyādhapura, and Funan as a whole, was the major centre for the diffusion of Indian civilization and culture throughout the Southeast Asian mainland.

Its site is 120 miles (190 km) from the mouth of the Mekong River, near a landform called Ba Hill in southern Cambodia. By the 3rd century, Vyādhapura had developed into a city surrounded by brick walls for defensive purposes, with houses and palaces constructed of brick and plaster. It was connected to the Gulf of Thailand and inland cities by canals utilizing the natural channels and the delta. The canals were large enough to accommodate seagoing vessels. Irrigation systems provided water for the agriculture needed to sustain an expanding population.

The city of Vyādhapura remained a major cultural centre of Indochina until the collapse of Funan; long afterward, the memory of its greatness continued to be a source of pride to the rulers of the later Khmer empire, who attempted to trace their descent from the rulers of Funan.

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vyāla, also called ŚARDŪLA, popular motif in Indian art, consisting of a composite leonine creature with the head of a tiger, elephant, bird, or other animal, frequently shown in combat with human beings or pouncing upon an elephant. Essentially a solar symbol, it represents, like the eagle seizing the serpent, the triumph of the spirit over matter.

Occurring in a relatively naturalistic form in the earliest monuments, notably the great stupa at Sānchi (*c.* 50 BC) and in the Kushan sculpture of Mathura (1st–3rd century AD), the *vyāla* assumed a definite stylized form about the 5th century. From the 8th century



Vyāla pouncing on an elephant, made of khondalite, from the Sun Temple at Konārak, Orissa, 13th century
P. Chandra

onward, it was constantly employed in architectural decoration, being repeated, for example, on the walls of temples.

Vyāsa (Sanskrit: "Arranger," or "Compiler"), also called KṚṢṆA DVAIPĀYANA, or VEDAVYĀSA (fl. 1500 BC?), legendary Indian sage who is traditionally credited with composing or compiling the *Mahābhārata,* a collection of legendary and didactic poetry worked around a central heroic narrative.

According to legend, Vyāsa was the son of the ascetic Parāśara and the Dāsa princess Satyavatī and grew up in forests living with hermits who taught him the Vedas. Thereafter he lived in the forests near the banks of the river Sarasvatī, becoming a teacher and a priest, fathering a son and disciple, Śuka, and gathering a large group of disciples. Late in life, living in caves in the Himalayas, he is said to have divided the Vedas, composed Purāṇas, and, in a period of two and one-half years, composed his great poetic work, the *Mahābhārata,* supposedly dictating it to his scribe, Gaṇeśa, the elephant god.

Vyatka (city, Russia): *see* Kirov.

Vyborg, formerly (1919–40) VIIPURI, city, Leningrad *oblast* (province), northwestern Russia. The city stands at the head of Vyborg Bay of the Gulf of Finland, 70 miles (113 km) northwest of St. Petersburg (formerly Leningrad). First settled in the 12th century, Vyborg was built as a fortress in 1293 by the Swedes after they had captured Karelia. In 1710 the fortress was captured by Peter I the Great, and Vyborg thenceforth remained under Russian rule. From 1918 to 1940 the city was part of Finland and held the name Viipuri, but it was ceded back to the Soviet Union in 1940 after the Russo-Finnish War. The city was occupied by Finnish and German forces from 1941 to 1944, after which it was permanently ceded to the Soviet Union. The city sustained severe damage during World War II but was subsequently rebuilt.

Vyborg is an important fishing port and also has ship-repair yards. Its other industries include sawmilling, furniture making, and the manufacture of farm machinery and electrical equipment. Vyborg has cool summers and mild winters, and its beach resorts and health sanatoriums are popular attractions. Pop. (1991 est.) 81,100.

Vychegda River, also spelled VYČEGDA, tributary of the Northern Dvina River, Komi republic and Arkhangelsk *oblast* (province), northwestern Russia. The river's length is 702 miles (1,130 km), and the area of its basin is 47,400 square miles (122,800 square km). The

Vychegda rises on the slopes of the Timan Ridge and joins the Northern Dvina at Kotlas. Its course frequently is marked by marshes, lakes, cutoffs, and sandbanks, but it is navigable for 596 miles (960 km) to Voldino. It freezes in early November and thaws in late April.

Východočeský, *kraj* (region), north-central Czech Republic. It is bordered by Středočeský and Severočeský *kraje* to the west, Poland to the north, Severomoravský *kraj* to the east, and Jihomoravský and Jihočeský *kraje* to the south. The Krkonoše ("Giant") Mountains range across the north; in them rises the Labe (Elbe) River, which flows first south, then west, and which, with its tributaries, forms the central plains of Východočeský *kraj*. The plains slope gently upward to the Českomoravská Vrchovina in the south and the Svitavská Pahorkatina and Orlické (Orlice) Mountains to the east.

The principal crops grown in the *kraj*'s plains include corn (maize) for animal feed, sugar beets, wheat, barley, potatoes, oats, rye, flax, and vegetables. Apples, plums, cherries, and pears are grown in the western parts of the region. Livestock includes hogs, cattle, and poultry. Dairying accounts for about one-third of the region's cattle. Forests of spruce, oak, fir, and pine occupy about one-third of Východočeský *kraj*, and several lumbering and paper-milling operations are located in the region. A large bituminous coalfield is mined in the Broumovské Highlands. Nickel, lead, and zinc are mined in the southwest, and manganese and fluorite are mined and building stones are quarried in the *kraj*.

Hradec Králové, Východočeský *kraj*'s capital, and Pardubice are the main industrial cities; both have metalworking, electronics, chemical, synthetic rubber, woodworking, textile, and food-processing plants. Hradec Králové also has glassworks, and Pardubice has an oil refinery and petrochemicals plant.

The Krkonoše Mountains are one of the Czech Republic's most visited regions for winter sports, hiking, fishing, and camping. The tourist centre for the area is Špindlerův Mlýn, which has hotels and summer and winter sports facilities. The noted Janské Lázně thermal mineral spa and Pec pod Sněžkou spa are located in this area. Other regions attracting tourists are the Vale of Ratiboř, a nature reserve in the Úpa River valley; the Teplice and Adršpach Rocks, a series of sandstone labyrinthine formations; and the Orlické Mountains, northeast of Hradec Králové, which feature virgin pine forest and camping and hiking facilities. Hradec Králové, the history of which dates to the 10th century AD, was a residence for the queens of Bohemia and in the 14th century rivaled Prague in importance; it is the cultural centre of the *kraj*. Other towns of cultural importance are Pardubice, Vamberk, Hořice, and Harrachov. Area 4,340 square miles (11,240 square km). Pop. (1991 prelim.) 1,232,646.

Vycpálek, Ladislav (b. Feb. 23, 1882, Prague, Bohemia, Austria-Hungary [now Czech Republic]—d. Jan. 9, 1969, Prague), one of the leaders of the musical revival in Czechoslovakia after World War I. He took a Ph.D. in philology from Charles University in Prague in 1906 and later studied composition. From 1907 until 1942 he was associated with the national library in Prague. His outstanding works, showing a gift for polyphonic writing, are three cantatas: *Kantáta o posledních věcech člověka* (1920–22; *Cantata of the Last Things of Man*), on words from Moravian folk songs; *Blahoslavený člověk ten* (1933; *Blessed Is This Man*), on words from the biblical book of Psalms and dedicated to Tomáš Masaryk, the first president of Czechoslovakia; and *České requiem* (1940; *Czech Requiem*), also on a biblical text.

Vyrts-Yarv, Ozero (Estonia): *see* Võrtsjärv.

Vyshinsky, Andrey Yanuaryevich, Vyshinsky also spelled VISHINSKY (b. Dec. 10 [Nov. 28, Old Style], 1883, Odessa, Russia—d. Nov. 22, 1954, New York, N.Y., U.S.), Soviet statesman, diplomat, and lawyer who was the chief prosecutor during the Great Purge trials in Moscow in the 1930s.

Vyshinsky, a member of the Menshevik branch of the Russian Social-Democratic



Andrey Vyshinsky
© Hulton-Deutsch Collection/Corbis

Workers' Party since 1903, became a lawyer in 1913 and joined the Communist Party in 1920. While teaching at Moscow State University and practicing law as a prosecutor, he acquired a reputation as a legal theoretician. In 1928 he was appointed to the collegium of the Commissariat of Education and also was prosecutor at several noted trials of alleged saboteurs and counterrevolutionaries. After becoming prosecutor of the Russian Soviet Federated Socialist Republic (1931), he was promoted to deputy prosecutor (1933) and prosecutor of the Soviet Union (1935).

Vyshinsky became widely known in 1933 during the Metro-Vickers trial, in which several British engineers were charged with trying to wreck Soviet hydroelectric constructions. During the Great Purge trials (1934–38), in which he prosecuted many prominent former Soviet leaders for treason, he gained worldwide notoriety as an aggressive and vengeful courtroom lawyer.

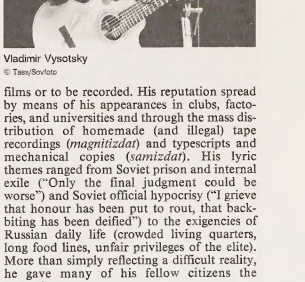
Becoming a member of the party's Central Committee, as well as deputy commissar of foreign affairs, by 1940, Vyshinsky supervised the incorporation of Latvia into the Soviet Union in 1940 and later arranged for a communist regime to assume control of Romania (1945). In March 1949 he became foreign minister and, representing the Soviet Union at the United Nations, frequently launched bitter verbal attacks on the United States, which was soon engaged in the Korean War. After Joseph Stalin's death in 1953, Vyshinsky was demoted to first deputy foreign minister but remained at the United Nations as the permanent Soviet representative.

Vyshny Volochyok, also spelled VYSHNIY VOLOCHEK, or VIŠNIJ VOLOČOK, city, Tver *oblast* (province), western Russia. The city's importance began in the 18th century as a result of its position on the highway between Moscow and St. Petersburg. It soon became important for its textiles and hosiery, and today it also has industries in the woodworking, paper, and food-processing fields. There is a textile college and a medical school. The city is often known as the "Russian Venice" because of its numerous canals. Pop. (2002) 56,400.

Vysotsky, Vladimir, in full VLADIMIR SEMYONOVICH VYSOTSKY (b. Jan. 25, 1938, Moscow, Russia, U.S.S.R.—d. July 24, 1980, Moscow), Russian actor, poet, songwriter, and performer who was considered "the voice of the heart of a nation." His wide-ranging and forthright poems were considered subversive by the Soviet authorities and were barred from publication, but they were the cultural lifeblood for many Russians. Vysotsky was an immensely popular figure who continued to be revered, read, and listened to long after his death.

Vysotsky's parents were divorced soon after his birth, and he lived mostly with his mother (a technical translator), first in Buzuluk and then (from 1945) in Moscow. He attended the Institute of Civil Engineering for a year (1955–56) but quit to join the Nemirovich-Danchenko Studio School of the Moscow Art Theatre. He graduated in 1960 and became a professional actor, first at the Moscow Pushkin Dramatic Theatre and then at the Theatre of Miniatures (*i.e.*, "Playlets"). From 1964 he was a member of the Moscow Theatre of Drama and Comedy on the Taganka, where he starred notably as Hamlet. He also was featured in several films and on television.

His great popularity as an actor was perhaps even exceeded by his popularity as a poet and songwriter; he wrote several hundred songs and poems, as well as incidental music for plays and films. Soviet officialdom permitted few of his songs to be sung on television or in



Vladimir Vysotsky
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films or to be recorded. His reputation spread by means of his appearances in clubs, factories, and universities and through the mass distribution of homemade (and illegal) tape recordings (*magnitizdat*) and typescripts and mechanical copies (*samizdat*). His lyric themes ranged from Soviet prison and internal exile ("Only the final judgment could be worse") and Soviet official hypocrisy ("I grieve that honour has been put to rout, that backbiting has been deified") to the exigencies of Russian daily life (crowded living quarters, long food lines, unfair privileges of the elite). More than simply reflecting a difficult reality, he gave many of his fellow citizens the strength to go on.

He died at age 42 of a heart attack brought on, it was said, by his hard-drinking lifestyle. In the late 1980s the Soviet government began allowing the publication of his poetry and song lyrics.

Vytautas THE GREAT, Lithuanian VYTAUTUS DIDYSIS, Polish WITOLD WIELKI (b. 1350, Lithuania—d. Oct. 27, 1430, Trakai, Lith.), Lithuanian national leader who consolidated his country's possessions, helped to build up a national consciousness, and broke the power of the Teutonic Knights. He exercised great power over Poland.

Vytautas was the son of Kęstutis, who for years had waged a struggle with his brother Algirdas for control of Lithuania. The conflict between the two branches of the family continued into the next generation, as Vytautas vied with Algirdas' son Jogaila. Both Vytautas and his father were captured by Jogaila in 1382 and Kęstutis was murdered while a prisoner. Vytautas, however, escaped and two years later was able to make peace with Jogaila, who returned to Vytautas the family lands seized earlier. In an effort to consolidate his position and widen his power, Jogaila married the 12-year-old Polish queen Jadwiga and was crowned king of Poland in Kraków on Feb. 15, 1386, as Władysław II Jagiełło.

Vytautas then waged an intermittent struggle for power with Jogaila and on occasion sought further assistance from the Teutonic Order. Vytautas' popularity grew until his cousin was forced to adopt a conciliatory position. Jogaila offered to make Vytautas his vice regent over all of Lithuania. The offer was accepted, and in August 1392 a formal compact was signed. As time was to show, Vytautas by this act became supreme ruler of Lithuania in fact if not in law.

Vytautas began his rule by subduing and banishing rebellious and ineffective nobles and trying to conquer the Mongols in the east. His forces, however, were defeated by the Mongols in the Battle of the Vorskla River in present-day Russia on Aug. 12, 1399 (*see* Vorskla River, Battle of the).

In this same period, union between Poland and Lithuania was proclaimed in a treaty concluded at Vilnius in January 1401. Under the terms of the treaty, the Lithuanian boyars promised that in the event of Vytautas' death they would recognize Jogaila as grand prince of Lithuania, and the Polish nobility agreed that if Jogaila died they would not elect a new king without consulting Vytautas.

Vytautas and Jogaila then turned their attention westward, and there followed a series of wars with the Teutonic Order, which recognized Švitrigaila (Swidrygiełło), a brother of Jogaila, as grand prince of Lithuania. Vytautas was able to drive Svidrigaila out of the country, but the Teutonic Order was able to retain control of a portion of Lithuania. Early in 1409 Vytautas concluded a treaty with Jogaila for a combined attack on the Order, and on June 24, 1410, the Polish-Lithuanian forces crossed the Prussian frontier. In the Battle of Grunwald (Tannenberg) on July 15, 1410, the Teutonic Knights suffered a blow from which they never recovered. German supremacy in the Baltic area was broken and Poland-Lithuania began to be regarded in the West as a great power.

In 1429 Vytautas revived his claim to the Lithuanian crown, and Jogaila reluctantly consented to his cousin's coronation as king, but before the ceremony could take place Vytautas died.

W particle, one of two electrically charged subatomic particles that are thought to transmit the weak nuclear force—that is, the force that governs radioactive decay in certain kinds of atomic nuclei. These particles are also referred to as intermediate vector bosons, or weakons.

The existence of intermediate vector bosons and their properties were predicted in the late 1960s by the physicists Sheldon Glashow, Steven Weinberg, and Abdus Salam. Their theoretical efforts, now called the electroweak theory, explain that the electromagnetic force and the weak force, long considered separate entities, are actually manifestations of the same basic interaction. Just as the electromagnetic force is transmitted by means of carrier particles known as photons, the weak force is exchanged via three types of intermediate vector bosons. In addition to carrying the weak force, two of these bosons bear either a positive or negative electrical charge and are designated W^+ and W^-, respectively. The third type, called Z^0, is electrically neutral. Unlike photons, each such intermediate vector boson has a large mass, and this characteristic is responsible for the extremely short range of the nuclear weak force (*i.e.,* its influence is confined to a distance on the order of only about 10^{-16} cm). As established by quantum mechanics, the range of any given force tends to be inversely proportional to the mass of the particle transmitting it.

In low-energy processes such as beta decay, the heavy W particles can be exchanged only because quantum mechanics allows fluctuations in mass-energy over sufficiently short time scales (*see* uncertainty principle). Such W particles can never be observed directly. However, detectable W particles can be produced in collisions between subatomic particles provided that the energy is high enough. A W particle of this kind then typically decays into a charged lepton (*e.g.,* electron, muon, or tau) and an associated neutrino.

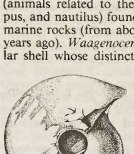
In 1983 a group of investigators at the European Laboratory for Particle Physics (CERN) in Geneva, Switz., detected characteristics closely approximating those predicted for the formation and decay of W and Z particles. Their findings constituted the first direct evidence of weak bosons and as such provided strong support for the electroweak theory. The CERN scientists reported having observed numerous clear-cut instances of weak bosons in proton-antiproton collision experiments that were carried out on a 540-billion-electron-volt (GeV) colliding-beam storage ring. All of the observed W particles had a mass of about 81 GeV, or approximately 80 times the mass of the proton, as had been predicted by the electroweak model. The electrically neutral Z particles detected, with a rest mass of 93 GeV, were also consistent with prediction.

Wa, also called LAWA, VA, HKAWA, KAWA, or KALA, hill-dwelling peoples of eastern Myanmar (Burma), where they are generally called Lawa, and southwestern Yunnan province of China, where they are generally called Va, or Wa. They speak an Austro-Asiatic language related to Mon-Khmer. The pagan, or "wild," Wa are concentrated in the isolated northern and central Wa states of Myanmar; they are known as headhunters who believe that the skulls of the dead are an assurance of good crops and good health. The so-called tame Wa have acculturated to neighbouring groups, sometimes intermarrying with them, and are mainly Buddhists.

Wa-fang-tien, formerly FU-HSIEN, Pinyin WAFANGDIAN, or FU XIAN, city in Liaoning *sheng* (province), China. The city is situated in the centre of the Liaotung Peninsula and is an important market centre for the agriculture and fruit industry of the area, which specializes in growing apples, pears, and grapes. It has developed industries producing various industrial chemicals as well as fertilizers and insecticides. It also has a small engineering industry and processes oils and fats. It is connected by railway with Chin-chou and Shenyang (Mukden). Pop. (mid-1980s est.) 50,000–100,000.

Waadt (Switzerland): *see* Vaud.

Waagenoceras, genus of extinct cephalopods (animals related to the modern squid, octopus, and nautilus) found as fossils in Permian marine rocks (from about 286 to 245 million years ago). *Waagenoceras* has a small, globular shell whose distinctive pattern of sutures

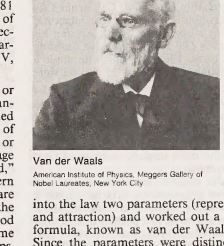


Waagenoceras
Reprinted from H. Shimer and R. Shrock, *Index Fossils of North America*, by permission of the M.I.T. Press, Cambridge, Mass., Copyright 1944 by the Massachusetts Institute of Technology, Copyright renewed 1972 by the Massachusetts Institute of Technology

between shell chambers is complexly convoluted, aiding in identification. Some species of *Waagenoceras* serve as excellent guide, or index, fossils for different spans of Permian time.

Waals, Johannes Diederik van der (b. Nov. 23, 1837, Leiden, Neth.—d. March 9, 1923, Amsterdam), Dutch physicist, winner of the 1910 Nobel Prize for Physics for his research on the gaseous and liquid states of matter. His work made the study of temperatures near absolute zero possible.

Van der Waals first attracted notice in 1873 with his treatise "On the Continuity of the Liquid and Gaseous State," for which he was awarded a doctor's degree. In pursuing his research, he knew that the ideal-gas law could be derived from the kinetic theory of gases if it could be assumed that gas molecules have zero volume and that there are no attractive forces between them. Taking into account that neither assumption is true, in 1881 he introduced



Van der Waals
American Institute of Physics, Meggers Gallery of Nobel Laureates, New York City

into the law two parameters (representing size and attraction) and worked out a more exact formula, known as van der Waals equation. Since the parameters were distinct for each gas, he continued his work and arrived at an equation (the law of corresponding states) that is the same for all substances.

It was this work that brought him the Nobel Prize and also led Sir James Dewar of England and Heike Kamerlingh Onnes of The Netherlands to the determination of the necessary data for the liquefaction of hydrogen and helium.

A self-taught scientist who took advantage of the opportunities offered by the University of Leiden, van der Waals was appointed professor of physics at the University of Amsterdam in 1877, a post he retained until 1907. The van der Waals forces, weak attractive forces between atoms or molecules, were named in his honour.

Wabana, town, southeastern Newfoundland, Canada, just northwest of St. John's, on Bell Island in Conception Bay. Located in the centre of one of the world's richest deposits of red hematite iron ore, the town grew after the beginning of mining operations in 1895 and had a population of more than 8,000 in 1961. But because of marketing problems and the high phosphorus content of the ore, mining operations ceased entirely in 1966, resulting in economic depression and widespread emigration. Regular ferry service links the town with Portugal Cove on the Avalon Peninsula. Inc. 1950. Pop. (1991) 3,608.

Wabanaki (North American Indian confederacy): *see* Abnaki.

Wabar Craters, group of meteorite craters discovered in 1932 in the Rub' al-Khali desert of Saudi Arabia. The largest crater is 330 feet (100 m) in diameter, 40 feet (12 m) deep, partially filled with sand, and thought to be an explosion crater (formed from an explosion on impact). A crater located 0.6 mile (1 km) northwest is about half the size of the main crater and is thought to be two partially superimposed craters. Two others in the area are completely filled with sand. Fused silica glass and tiny globules of nickel-iron have been found near the main crater.

Consult the INDEX *first*

Wabash, city, seat (1835) of Wabash county, northeastern Indiana, U.S., on the Wabash River, 45 miles (72 km) west-southwest of Fort Wayne. It was settled in 1835 on land ceded to the U.S. government by the Potawatomi Indian chief Pierish in the Treaty of Paradise Springs signed on a local hilltop in 1826. Completion of the Wabash and Erie Canal in the 1850s stimulated the community's growth. Wabash was one of the world's first electrically lighted cities (1880). It is now an agricultural trade centre with light industry, including the manufacture of rubber and paper products. The Wabash County Historical Museum in the County Courthouse has Indian and American Civil War relics. Nearby are the Honeywell (rose) Gardens and the state recreational areas of Salamonie and Mississinewa reservoirs. Inc. 1854. Pop. (1991 est.) 12,271.

Wabash River, largest southward-flowing tributary of the Ohio River, rising in Grand Lake, western Ohio. It flows generally westward across Indiana past the cities of Huntington, Wabash, Logansport, and Lafayette, then southward to Terre Haute. Just south of that city it forms a 200-mile (320-kilometre) boundary between Indiana and Illinois and then enters the Ohio in the southwestern corner of Indiana after a total course of 529 miles (851 km). The Wabash drains an area of about 33,150 square miles (85,860 square km). Its chief tributaries are the White and Tippecanoe rivers, both entering from the north. Other tributaries, all flowing from the north, are the Little Wabash, Embarrass, and Vermilion. At Mount Carmel, Ill. (75 miles [120 km] above the mouth of the river), the average flow is 30,400 cubic feet (860 cubic m) per second.

During the 18th century the French used the Wabash as a transportation link between Louisiana and Quebec. After the War of 1812, the Wabash basin was rapidly developed by settlers, and the river continued as an impor-

tant artery of trade, for both flatboats and river steamers. River navigation, apart from barge traffic on its lower course, almost completely disappeared after the coming of the railroads in the 1850s.

The name Wabash is derived from a Miami Indian word meaning "shining white" or "water over white stones."

Waccho (d. *c.* 539), king of the Lombards in the period preceding the invasion of Italy, when they occupied territory roughly coinciding with Austria north of the Danube River.

Waccho assassinated his uncle Tato and usurped the throne about 510, ruling for 30 years. Tato's son and grandson took refuge with the king of a neighbouring people, the Gepidae, making several fruitless attempts to recover rule over the Lombards. Shortly after 536 Waccho made a treaty with the Byzantine emperor Justinian I against the Gepidae. In 539 the Ostrogoth king of Italy, Witigis, hard-pressed by Justinian's general Belisarius, sent ambassadors to Waccho, offering him money in exchange for military aid. Waccho refused, preferring to remain on good terms with Constantinople. Married successively to daughters of the kings of the Thuringians, of the Gepidae, and of the Heruli, Waccho was succeeded by a young son who died during the regency of the Lombard chief Audoin; this regent's son Alboin became the king who destroyed the Gepidae and invaded Italy.

Wace (b. *c.* 1100, Jersey, Channel Islands—d. after 1174), Anglo-Norman author of two verse chronicles, the *Roman de Brut* (1155) and the *Roman de Rou* (1160–74), named respectively after the reputed founders of the Britons and Normans.

The *Rou* was commissioned by Henry II of England, who sometime before 1169 secured for Wace a canonry at Bayeux in northwestern France. The *Brut* may have been dedicated to Henry's queen, Eleanor of Aquitaine. Written in octosyllabic verse, it is a romanticized account of Geoffrey of Monmouth's *Historia regum Britanniae*, tracing the history of Britain from its founding by the legendary Brutus the Trojan. Its many fanciful additions (including the story of King Arthur's Round Table) helped increase the popularity of the Arthurian legends. The *Rou*, written in octosyllabic couplets and monorhyme stanzas of alexandrines, is a history of the Norman dukes from the time of Rollo the Viking (after 911) to that of Robert II Curthose (1106). In 1174, however, Henry II transferred his patronage to one Beneeit, who was writing a rival version, and Wace's work remained unfinished.

Wace's artistry in the *Brut* exerted a stylistic influence on later verse romances (notably on a version of the Tristan story by Thomas, the Anglo-Norman writer), whereas the English poem *Brut* (*c.* 1200) by Layamon was the most notable of many direct imitations. Three devotional works by Wace also survive.

Wach, Joachim (b. Jan. 25, 1898, Chemnitz, Ger.—d. Aug. 27, 1955, Orselina, Switz.), Protestant theologian and one of the foremost scholars in the modern study of religion.

As a professor of the history of religion at the University of Leipzig (1929–35) and the University of Chicago (1945–55), Wach contributed significantly to the field of study that became known as the sociology of religion. He is credited with introducing into American scholarship the phenomenological method of analyzing religious beliefs and practices. He established the discipline known as the comparative study of religion (*Religionswissenschaft*) at the University of Chicago and is considered the founder of the so-called Chicago School, from which emerged such influencial scholars as Mircea Eliade.

Wach conceived *Religionswissenschaft* as a comparative, phenomenological, and psychological approach to religion, including the theoretical (or mental; *i.e.,* religious ideas), the practical (or behavioral), and the institutional (social) aspects of religion. Because of his concern with the study of religious experience, he was also interested in the sociology of religion, attempting to indicate how religious values shaped the institutions that expressed them. Among Wach's writings in English are *Sociology of Religion* (1944), *Types of Religious Experience—Christian and Non-Christian* (1951), and *The Comparative Study of Religions* (1958).

Wachirayan Warot (Siamese prince-patriarch): *see* Vajirañāṇavarorasa.

Wachsmann, Konrad (b. May 16, 1901, Frankfurt an der Oder, Ger.—d. Nov. 25, 1980, Los Angeles, Calif., U.S.), German-born American architect notable for his contributions to the mass production of building components.

Originally apprenticed as a cabinetmaker, Wachsmann studied at the arts-and-crafts schools of Berlin and Dresden and at the Berlin Academy of Arts (under the Expressionist architect Hans Poelzig). During the late 1920s he was chief architect for a manufacturer of timber buildings. He designed a summer house for Albert Einstein, one of his lifelong friends. After receiving the Prix de Rome from the German Academy in Rome in 1932, he spent several years in Italy, where he built blocks of apartments using reinforced concrete. An admirer of his structural ideas at this time was the French architect Le Corbusier.

Wachsmann immigrated to the United States in 1941 and went into partnership with the architect Walter Gropius until 1948, an association that resulted in the formation of the General Panel Corporation, which produced prefabricated building components. In 1950 he was appointed professor at the Institute of Design of Illinois Institute of Technology, Chicago, and director of the department of advanced building research. With associates there, he designed a system for constructing large aircraft hangars (1950–53) with prefabricated parts. This project was undertaken for the U.S. Air Force, which needed service hangars for its B-52 aircraft. In 1964 he joined the University of Southern California as director of the Building Research Division and chairman of the graduate school of the department of architecture. His most notable later work was probably City Hall, California City (1966). Wachsmann lectured to architectural students from all over the world. Among his written works is *The Turning Point of Building* (1959; Eng. trans. 1961), in which he made a point of insisting that technology and art were inseparable.

Wackenroder, Wilhelm Heinrich (b. July 13, 1773, Berlin, Prussia [Germany]—d. Feb. 13, 1798, Berlin), writer and critic who was the originator, with his friend Ludwig Tieck, of some of the most important ideas of German Romanticism.

Wackenroder was the son of a senior civil servant whose expectations that he pursue a successful worldly career were incompatible with the boy's natural sympathies and caused him severe conflict throughout his short lifetime. At school the shy and melancholy Wackenroder, happy only when listening to music, formed a friendship with the more vital and creative Tieck. This friendship was to be of great importance for the work of both men.

After studying with Tieck at the universities of Erlangen (1793) and Göttingen (1793–94), Wackenroder returned to Berlin in 1794. There he was forced into the Prussian civil service by his father, but his preoccupations remained literary. He translated light English novels and wrote anecdotal accounts of the lives of Albrecht Dürer, Leonardo da Vinci, Michelangelo, and Raphael. He also wrote a "biography" of Joseph Berglinger, an imaginary musician and a spokesman for Wackenroder's views on art. In these stories he developed an enthusiastic emotional aesthetic, according to which the perfect work of art is created by a divine miracle and is a moral, aesthetic, and religious unity to be grasped only by the heart, not by the intellect. In 1797, on Tieck's advice, these writings were published under a title chosen by the publishers, *Herzensergiessungen eines kunstliebenden Klosterbruders* ("Outpourings of an Art-Loving Monk"). In 1799 Tieck published the continuation of *Herzensergiessungen* (with the addition of some of his own essays) as *Phantasien über die Kunst* ("Fantasies on Art"). Wackenroder died of typhoid at the age of 24.

Wackernagel, Jacob (b. Dec. 11, 1853, Basel, Switz.—d. May 22, 1938, Basel), Swiss historical and comparative linguist known primarily for his monumental work on Sanskrit.

Influenced by his father, Wilhelm Wackernagel, a professor of Germanic studies at the University of Basel, he became interested in comparative linguistics and Sanskrit while studying at the University of Göttingen. In 1876 Wackernagel became *Privatdozent* (unsalaried lecturer) in classical languages at the University of Basel, and in 1881 he became professor of Greek language and literature. After having made a number of significant contributions to the historical and comparative study of Greek, he began work on his *Altindische Grammatik* (1896–1905, 1930; "Old Indic Grammar"), the comprehensive work for which he is chiefly known. He accepted a position at the University of Göttingen in 1902, remaining there until 1915, when he returned to the University of Basel. Many of his lectures were published in *Vorlesungen über Syntax mit besonderer Berücksichtigung von Griechisch, Lateinisch, und Deutsch* (1920, 1924; "Lectures on Syntax, with Special Consideration of Greek, Latin, and German").

Wacław (Polish personal name): *see under* Wenceslas.

Waco, city, seat (1850) of McLennan county, north-central Texas, U.S. Waco lies along the Brazos River, 97 miles (156 km) south of Dallas. It was founded in 1849 on the site of a Waco (Hueco) Indian village near a Texas Ranger fort (1837) in a farming and plantation area.

After the American Civil War it became a river-bridge crossing on cattle trails; later its economy was based almost exclusively on cotton, and the coming of the railroad (1881) stimulated economic growth. World War II brought two large Air Force installations (now closed) and the beginning of industrialization. Waco still depends partly on crops and livestock, but manufacturing (including clothing, machinery, tire, and glass) and service industries (including tourism) have broadened its economic base.

The city is the seat of Baylor University (Southern Baptist; 1845), McLennan Community College (1965), and the James Connally Campus of Texas State Technical College (1965), located on a deactivated air base.

A violent tornado devastated Waco on May 11, 1953, killing 114 persons. On April 19, 1993, after a 51-day standoff with federal agents, more than 70 members of the Branch Davidian religious cult perished in a fire at their compound near Waco. Lake Waco, formed in 1923 by damming the Bosque River, is a recreational spot just west of the city. Inc. 1856. Pop. (1994 est.) city, 105,892; (1995 est.) Waco MSA, 200,111.

wad, also called BOG MANGANESE, black and earthy substance that consists mainly of hydrated manganese oxides; it is an important

ore of manganese. It varies considerably in chemical composition and contains different impurities, often in large amounts. Wad is very soft, readily soils the fingers, and may be considered to be a mixture chiefly of pyrolusite and psilomelane. It results from the decomposition of other manganese minerals and is often deposited in marshes or by springs; it bears the same relationship to manganese oxides that limonite and gummite do to iron and uranium oxides.

Wad Madanī, city, east-central Sudan. Wad Madanī lies on the west bank of the Blue Nile, 85 miles (136 km) southeast of Khartoum, at an elevation of 1,348 feet (411 m). It owes its recent growth to the irrigated lands of the Jazirah (Gezira) irrigation scheme and is the commercial centre of the al-Jazirah cotton-growing area. Peanuts (groundnuts) and wheat are also grown in the area. The University of al-Jazirah (founded 1975), the Agricultural Research Corporation, and al-Jazirah Research Corporation Library are located at Wad Madanī. It has good railway and road connections with Khartoum, Kūstī, and al-Qadārif and a ferry service on the Blue Nile. A domestic airport is also there. It was a small Egyptian administrative post in the 19th century, and most of its inhabitants (mainly Arabic-speaking) are affiliated to northern Sudanese peoples. Pop. (1983) 141,065.

Wadai, historical African kingdom east of Lake Chad and west of Darfur, in what is now the Ouaddaï (*q.v.*) region of eastern Chad. It was founded in the 16th century, and a Muslim dynasty was established there about 1630. Long subordinate to Darfur, it became independent by the 1790s and began a period of rapid expansion, chiefly at the expense of the Bornu kingdom to the west. Its prosperity resulted from its position at the junction of two major trade routes: the east-west route linking the upper Nile River and Darfur with Bornu and Kano, and the trans-Saharan route from Abéché (Wadai's main town) northward to Banghāzī on the Mediterranean. In the 19th century, caravans abandoned other trails across the desert in favour of the Abéché-Banghāzī route because it was safer, thanks to the regional stability achieved by a series of strong Wadai kings, or *kolaks* (al-Sharif, 1835–58; Ali, 1858–74; and Yusuf, 1874–98). French occupation between 1906 and 1914 put an end to the trans-Saharan trade.

Wadd (Arabian god): *see* Ilumquh.

Waddenzee, shallow inlet of the North Sea between the West Frisian Islands and the northern Netherlands mainland. The inlet extends from Noordholland to the northeast, where the islands gradually curve toward the mainland and the channel narrows to a few miles. Until the completion of the IJsselmeer dam (Afsluitdijk), Waddenzee formed the northern part of the former Zuiderzee. A saltwater tidal delta, the Waddenzee consists of sand flats, mostly uncovered at low tide, intersected by deep channels. It connects with the North Sea through inlets between the West Frisian Islands, with depths to 150 feet (50 m). There is some fishing, and it is a refuge for waterfowl. The chief ports are Den Helder and Harlingen.

Waddington, C.H., in full CONRAD HAL WADDINGTON (b. Nov. 8, 1905, Evesham, Worcestershire, Eng.—d. Sept. 26, 1975, Edinburgh, Scot.), British embryologist, geneticist, and philosopher of science.

Waddington graduated in geology from the University of Cambridge (1926), and it was only after studying paleontology that he turned to biology. Before World War II he taught zoology and embryology at Strangeways Research Laboratory, Cambridge. From 1947 until his death he was professor of animal genetics at the University of Edinburgh.

Waddington performed his first notable work in biology on the development of the embryos of birds and mammals. He showed in 1933 that chemical messengers from certain tissues induce other tissues to develop. These studies of embryonic development led him to investigate the regulatory effects of genes on tissue and organ development. Waddington then attempted, in *Organisers and Genes* (1940), to relate Mendelian genetics to the new findings of experimental embryology.

During World War II, Waddington engaged in operations research for the military. After the war he established for the British Agricultural Research Council the Unit of Animal Genetics, a research organization that studied the genetics and scientific breeding of livestock. He afterward served as chief geneticist for this endeavour.

Waddington published many books on embryology, genetics, and the philosophy of science; his *Principles of Embryology* (1956) is considered a standard textbook, while *The Ethical Animal* (1960) and *Biology for the Modern World* (1962) are leading works of popularized science.

Waddington, William Henry (b. Dec. 11, 1826, Saint-Rémy-sur-Avre, France—d. Jan. 12, 1894, Paris), French scholar, diplomat, and politician. His appointment as French premier by the moderate Republicans, largely because of his cautious and colourless personality, marked the beginning of a trend in the Third Republic toward the exclusion from power of outstanding men.

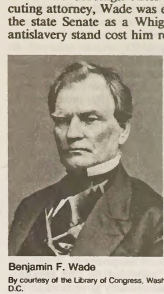
The son of an English manufacturer living in France since 1780, Waddington began his education in France but completed it in England at Rugby and at Trinity College, Cambridge. He traveled in the eastern Mediterranean, published a number of studies on Middle Eastern and Roman antiquities, and was elected to the Académie des Inscriptions et Belles-Lettres in 1865. In the same year and again in 1869, he ran unsuccessfully as a candidate for the Chamber of Deputies. He was elected, however, as an independent in 1871; he was elected senator in 1876. Waddington was minister of education for a few days in May 1873 and again from March 1876 to May 1877. Becoming minister of foreign affairs in December 1877, he distinguished himself as the French representative at the Congress of Berlin (1878).

When elections in January 1879 strengthened the power of the moderate Republicans, the more conservative Marshal Patrice MacMahon was compelled to resign the presidency, and Jules Grévy, who succeeded to the post, chose Waddington as premier (February 1879), partly because he feared that by elevating the brilliant Léon Gambetta, at the time the leading figure among the Republicans, his own prestige would be eclipsed. Waddington did not, in fact, attempt to impose his leadership on the government. Rather, he retained his post as minister of foreign affairs and devoted his energies to active diplomacy over the status of Egypt and the Balkans. However, a member of his cabinet, Jules Ferry, who would later become premier, introduced measures to drastically reduce the influence of the Roman Catholic church in education. This provoked a controversy so bitter that Waddington was forced to resign (December 1879). As ambassador to Great Britain (1883–93) he handled the negotiations over Egypt in 1884. He lost his seat in the Senate in 1893.

Wade, Arthur Sarsfield: *see* Rohmer, Sax.

Wade, Benjamin F., in full BENJAMIN FRANKLIN WADE (b. Oct. 27, 1800, Springfield, Mass., U.S.—d. March 2, 1878, Jefferson, Ohio), U.S. senator during the Civil War whose radical views brought him into conflict with presidents Abraham Lincoln and Andrew Johnson.

In 1821 Wade's family moved to Andover, Ohio. He studied law, was admitted to the bar, and formed a successful partnership in 1831 with the outspoken antislavery advocate Joshua R. Giddings. After a term as prosecuting attorney, Wade was elected in 1837 to the state Senate as a Whig. His determined antislavery stand cost him reelection in 1839,



Benjamin F. Wade
By courtesy of the Library of Congress, Washington, D.C.

but he won another term in 1841. In 1847 he was elected by the legislature as president judge of the third judicial district. His businesslike, forceful methods won him popular attention, and the Whig-controlled legislature in 1851 elected him to the U.S. Senate. He was reelected to the Senate as a Republican in 1857 and 1863.

In the Senate during the 1850s Wade was an uncompromising foe of the extension of slavery and vigorously opposed the passage of the Kansas-Nebraska Act (1854), which opened the door to the spread of slavery in the West. During the Civil War he took his stand with the Radical Republicans, a congressional group that favoured vigorous prosecution of the war, emancipation of the slaves, and severe punishment for the South. As chairman of the Joint Congressional Committee on the Conduct of the War, Wade played a prominent but controversial role in investigating all aspects of the Union military effort. In 1864, as cosponsor of the Wade-Davis Bill, which declared that reconstruction of the Southern state governments was a legislative rather than an executive concern, he came into direct conflict with President Lincoln.

When Andrew Johnson became president after Lincoln's assassination, Wade at first cooperated with him. But when Johnson made it clear that he favoured a lenient plan of reconstruction, Wade became his caustic critic. Elected president pro tempore of the Senate on March 2, 1867, Wade would have succeeded to the presidency had Johnson been removed by the Senate in the impeachment trial of May 1868. Certain of success, Wade actually began to select his cabinet, and Johnson's acquittal bitterly disappointed him. When the Democratic majority in the Ohio legislature denied him a fourth senatorial term, Wade retired to his Ohio law practice in 1869.

Wade, Sir Thomas Francis (b. Aug. 25, 1818, London, Eng.—d. July 31, 1895, Cambridge, Cambridgeshire), British diplomatist and Sinologist who developed the famous Wade-Giles system of romanizing the Chinese language.

The elder son of an English army officer, Wade graduated from Trinity College, Cambridge (1837), and entered the army. Sent to China in 1842, he began an earnest study of Chinese and eventually became an official interpreter, being one of the few officers who knew the Chinese language. After a visit to England in 1845, he became part of the

diplomatic corps in China, serving in various posts over the years in Nanking, Hong Kong, Peking, and elsewhere and engaging in such important negotiations as those for the Treaty of Tientsin (1857), ending the second Opium War, and those for the Chefoo Convention (1876), opening new treaty ports. He was knighted in 1875.

After retiring in 1883, Wade returned to Cambridge and in 1888 was elected the university's first professor of Chinese. He had already written extensively on Chinese studies, his *Peking Syllabary* (1859) providing the basis of the Wade-Giles system of Chinese romanization, which was long the most popular form of romanization in the West as well as in China (even after the official introduction of Pinyin in 1958 and its adoption in 1979). On his death Wade left a large library of Chinese books to the university.

Wade-Davis Bill (1864), unsuccessful attempt by Radical Republicans and others in the U.S. Congress to set Reconstruction policy before the end of the Civil War. The bill, sponsored by senators Benjamin F. Wade and Henry W. Davis, provided for the appointment of provisional military governors in the seceded states. When a majority of a state's white citizens swore allegiance to the Union, a constitutional convention could be called. Each state's constitution was to be required to abolish slavery, repudiate secession, and disqualify Confederate officials from voting or holding office. In order to qualify for the franchise, a person would be required to take an oath that he had never voluntarily given aid to the Confederacy. President Abraham Lincoln's pocket veto of the bill presaged the struggle that was to take place after the war between President Andrew Johnson and the Radical Republicans in Congress.

Wade-Giles romanization, system of romanizing the modern Chinese written language, originally devised to simplify Chinese language characters for the Western world. Initiated by Sir Thomas Francis Wade (*q.v.*), the system was modified by the Cambridge professor Herbert Allen Giles in his *Chinese-English Dictionary* (1912). With Giles's syllabic changes, Wade-Giles became the preferred Chinese transliteration system among both academics and nonspecialists in English-speaking countries and was interpreted into Danish, Finnish, German, Italian, Norwegian, Spanish, Swedish, and Turkish. The Chinese themselves experimented with several systems to transcribe local expressions for non-Chinese publications, but these were all replaced officially in 1979 by the clearer Hanyu pinyin wenzi (*see* Pinyin romanization).

Although valued for its contribution to Chinese language reform, Wade-Giles romanization is thought to be confusing compared with more recent systems. Based on pronunciation from nonstandardized speech sounds, the Wade-Giles system contains like symbols representing different sounds (*e.g.,* Pinyin *j, q, zh,* and *ch* are rendered in Wade-Giles as *ch* and *ch'*), and different symbols expressing the same sound (*ts* and *tz* for Pinyin *z*). Tone changes are indicated by numbers written above the line (tu^2), aspirations and phoneme separations are marked by apostrophes (*t'a'*), and middle-vowel variations are distinguished by additional accents (*êrh*). Printers often eliminate diacritical marks, sometimes confusing the meaning. The system documents 407 monosyllables and polysyllables. Westerners studying Chinese based on the Wade-Giles system find the syllabic subdivisions into monosyllables a distortion of word flow that is only confounded by the numerous intact accents. To standardize pronunciation in the United States, the *Kuo-yo tz'u-tien* dictionary and *chu-yin fu-hao,* a system of Chinese phonetic symbols, are used in addition to Wade-Giles.

For a table of conversions from Wade-Giles to Pinyin and vice versa, *see* Pinyin romanization.

Wadgaon, Convention of (Jan. 13, 1779), compact concluded after the First Marāthā War in India (1775–82), marking the end of British efforts to intervene in Marāthā affairs by making Raghunath Rāo peshwa (the nominal leader of the Marāthā Confederacy) or at least regent for his infant great-nephew.

The compact was concluded after a British expedition, commanded by Colonel William Cockburn and controlled by Colonel John Carnac, was surrounded by Marāthā forces at Wadgaon, 23 miles (37 km) from Pune (Poona), and forced to come to terms. The terms included the return of all British annexations of Marāthā territory since 1773, including Salsette Island; the halting of a British force marching from Bengal; and a share of the revenues from the district of Broach for the Marāthā chief Sindhia. The terms were disavowed by the British authorities at Bengal, and the First Marāthā War dragged on until 1782, ending with the British abandonment of Raghunath and retention of Salsette.

Wadhwān (India): *see* Surendranagar.

wadi: *see* arroyo.

Wādī al-Jadīd, al- (English: "New Valley"), desert *muḥāfaẓah* (governorate), Egypt. It includes the entire southwestern quadrant of the country, from the Nile River valley (east) to the frontiers with The Sudan (south) and Libya (west). Its total area covers approximately two-fifths of Egypt. Until 1958 the *muḥāfaẓah* was known as aṣ-Ṣaḥrā' al-Janūbiyah, meaning "southern desert." For national planning purposes, the term al-Wādī al-Jadīd includes five widely scattered clusters of oases based on artesian wells. These are Sīwah (Siwa) Oasis, al-Baḥrīyah (Bahariya) Oasis, al-Farāfirah (Farafra) Oasis, ad-Dākhilah (Dakhla) Oases, and al-Khārijah (Kharga) Oases. Siwah actually is located in Marṣa Maṭrūḥ governate, al-Baḥrīyah in al-Jīzah, and al-Farāfirah in Asyūṭ. Excluding isolated Siwah, the four eastern oases, together with al-Fayyūm in the north, form a great desert arc; all are linked by a combined paved highway and desert track commencing at Cairo and terminating at al-Khārijah, where it joins a road following a historic caravan route leading north to Asyūṭ. Al-Khārijah is also connected by rail to Naj' Ḥammādī on the upper Nile west of Qinā, and another railway links al-Baḥrīyah, where a rich iron-ore deposit is mined, to the steel plant at Ḥulwān.

The area is an almost rainless plateau of the eastern Sahara embracing the east-central sector of the Libyan Desert. It is composed mainly of Nubian sandstone, which has weathered to undulating plains, in places extensively covered with sand. Al-Wādī al-Jadīd is highest in the extreme southwest, where Mount Bābayn rises to 3,622 feet (1,104 m). From there the plateau falls gently away to the north, to the areas of Siwah and the Qattara Depression, which is partly below sea level. In the east and north, limestone escarpments diversify the landscape. In the depressions, shallow wells tap the aquifers of the underlying Nubian sandstone. Deep-well drilling extended the cultivable land of the habitable oases considerably, but later this was found to have lowered the water table. Plans have been discussed to again raise the water table by flooding an uninhabited depression west of Aswān with water from Lake Nasser.

Of the oases actually within al-Wādī al-Jadīd *muḥāfaẓah,* al-Khārijah lies within a depression 112 feet (34 m) above sea level. The largest of the oases, it has considerable land under cultivation. Garden crops, dates, wheat, and berseem (clover, for livestock feed) are grown. Sheep and camels are raised by the oasis dwellers and by desert tribal groups. At al-Khārijah coal has been found, and a large phosphate deposit at Abū Ṭarṭūr between ad-Dākhilah and al-Khārijah oases is mined and the product shipped by rail from al-Khārijah to Naj' Ḥammādī. A tile- and shale-quarrying industry opened in the late 1970s at al-Khārijah, and brick manufacturing was started. Ad-Dākhilah oasis is much smaller, and date growing has been the traditional occupation. In the 1970s an agricultural experimental program tested new varieties of cotton and other crops, with the goal of developing varieties that could tolerate desert conditions.

At ad-Dākhilah tombs of the Old Kingdom (*c.* 2686–2160 BC) were discovered in the 1970s by an Egyptian archaeological expedition headed by Ahmed Fakhry. Al-Khārijah has more extensive ruins. Throughout pharaonic history the oases served as places of exile or refuge for those in disfavour with the government. In Roman and Byzantine times the oases had widespread cultivation, and they became flourishing Christian settlements. Later, however, raids by desert tribal groups reduced their prosperity. The oasis dwellers were originally Libyan Berber-speaking peoples, mixed with immigrants from the south and with exiled Egyptians. In the Muslim period Arabs intermingled with them, and now they are Arabic speakers. The nomadic desert dwellers are from the Awlād 'Alī tribal group. Area 145,369 square miles (376,505 square km). Pop. (1996 prelim.) 141,737.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Wādī Ḥalfā, town, extreme northern Sudan. It lies on the east bank of the Nile River 6 miles (10 km) below the Second Cataract, just south of the Egyptian border. Located within ancient Nubia, the town and its environs are rich in antiquities; the ruins of Buhen—an Egyptian colony of the Middle Kingdom period that existed until Roman times—lie across the river. A terminus of both railway and steamship lines, Wādī Ḥalfā is an agricultural and commercial centre serving both Egypt and The Sudan. In the 1970s it was the focus of archaeological activities to save Egyptian monuments from inundation by Lake Nasser (the reservoir formed above the Aswān High Dam), a fate that part of the town shared. Its populace was relocated at New Halfā to the southeast near Kassalā town.

Wadjet, also called WADJIT (Egyptian goddess): *see* Buto.

Wafd, in full AL-WAFD AL-MIṢRĪ (Arabic: "Egyptian Delegation"), nationalist political party that was instrumental in gaining Egyptian independence from Britain. Organized by Sa'd Zaghlūl on Nov. 13, 1918, as a permanent delegation of the Egyptian people, it demanded a voice in London and at the peace conferences following World War I. In March 1919 the British temporarily exiled its leaders Sa'd Zaghlūl, Ismā'īl Ṣidqī, and Ḥāmid al-Bāsil. With the creation of an "independent" Egypt by Great Britain on Feb. 28, 1922, the Wafd organized itself as a political party in September 1923; it called for internal autonomy, constitutional government, civil rights, and Egyptian control of both the Sudan and the Suez Canal. It won 90 percent of the seats in the first Chamber in the elections of 1924, and a Wafdist government was installed. After Egypt gained complete independence in 1936, Wafd governments were in constant conflict with the king.

About 1937 the Wafd organized the League of Wafdist Youth (Rabitat ash-Shubbān al-

Wafdiyyin) in order to train future members. The league became a source for the Wafd's paramilitary organization, the Blueshirts, which had its fascist counterpart in the Greenshirts. Until the dissolution of all political parties by the Revolution Command Council in 1953, the party controlled four daily and four weekly newspapers.

The Wafd party was reconstituted in February 1978 in accordance with President Anwar el-Sādāt's legalization of a multiparty system, but in June of that year the party dissolved itself and its remaining members in the People's Assembly became independents.

wafer ash: *see* hop tree.

waffle, crisp raised cake baked in a waffle iron, a hinged metal griddle with a honeycombed or fancifully engraved surface that allows a thin layer of batter to cook evenly and crisply. Baking powder is the typical leavening in American waffles, and yeast waffles are eaten in Belgium and France. In the United States and Canada waffles are a popular breakfast food, topped with butter and maple syrup or fruit preserves. Waffles also can serve as a base for savoury mixtures such as seafood or poultry in sauce. In Belgium waffles are a popular snack food. They are mentioned in French poems from as early as the 12th century, when they were sold as street food at fairs and religious festivals.

Wagadugu (Burkina Faso): *see* Ouagadougou.

Waganda (people): *see* Ganda.

wage-price control: setting of government guidelines for limiting increases in wages and prices. It is a principal tool in incomes policy (*q.v.*).

wage theory, portion of economic theory that attempts to explain the determination of the payment of labour.

A brief treatment of wage theory follows. For full treatment, *see* MACROPAEDIA: Economic Theory.

The subsistence theory of wages, advanced by David Ricardo and other classical economists, was based on the population theory of Thomas Malthus. It held that the market price of labour would always tend toward the minimum required for subsistence. If the supply of labour increased, wages would fall, eventually causing a decrease in the labour supply. If the wage rose above the subsistence level, population would increase until the larger labour force would again force wages down.

The wage-fund theory held that wages depended on the relative amounts of capital available for the payment of workers and the size of the labour force. Wages increase only with an increase in capital or a decrease in the number of workers. Although the size of the wage fund could change over time, at any given moment it was fixed. Thus, legislation to raise wages would be unsuccessful, since there was only a fixed fund to draw on.

Karl Marx, an advocate of the labour theory of value, believed that wages were held at the subsistence level by the existence of a large number of unemployed.

The residual-claimant theory of wages, originated by the American economist Francis A. Walker, held that wages were the remainder of total industrial revenue after rent, interest, and profit (which were independently determined) were deducted.

In the bargaining theory of wages, there is no single economic principle or force governing wages. Instead, wages and other working conditions are determined by workers, employers, and unions, who determine these conditions by negotiation.

The marginal productivity theory of wages, formulated in the late 19th century, holds that employers will hire workers of a particular type until the addition to total output made by the last, or marginal, worker to be hired equals the cost of hiring one more worker. The wage rate will equal the value of the marginal product of the last-hired worker.

Supporters of this theory maintain that the test of an economic theory should be its predictive power. They hold that the marginal-productivity theory is a guide to long-run trends in wage determination and applies more generally than the bargaining theory of wages.

wager of law (early English law): *see* compurgation.

Wages and Hours Act: *see* Fair Labor Standards Act.

Wagga Wagga, city, southeastern New South Wales, Australia, situated on the Murrumbidgee River. A service centre for the fertile Riverina district (chiefly wheat and sheep), it is also the site of an agricultural college and research institute, a college of advanced education, a soil-conservation research station, and a Royal Australian Air Force base. Secondary industries include a rubber-goods factory, timber and flour mills, dairy-products factories, iron foundries, and engineering works. An eisteddfod (Welsh: "festival of arts") and agricultural show are annual events. Settled in the 1830s, Wagga Wagga was proclaimed a town in 1849, a borough in 1870, and a city in 1946. Its name is an Aboriginal word meaning "many crows" in reference to the birds that frequent the area. The Sturt Highway runs through Wagga Wagga, and there is rail and air service to Sydney, 235 miles (380 km) northeast. Pop. (1991) 40,875.

Wagner, Carl (b. May 25, 1901, Leipzig, Ger.—d. Dec. 10, 1977, Göttingen, W.Ger.), German physical chemist and metallurgist who helped advance the understanding of the chemistry of solid-state materials, especially the effects of imperfections at the atomic level on the properties of compounds such as oxides and sulfides, and of metals and alloys.

Wagner was educated at the universities of Munich and Leipzig and taught and carried out research in a number of German universities. He was a member of the faculty of metallurgy at the Massachusetts Institute of Technology, Cambridge, from 1949 to 1958, and from 1958 to 1968 he was director of the Max Planck Institute of Chemistry in Göttingen. His early work on defect structures in solids was important to the development of semiconductor materials.

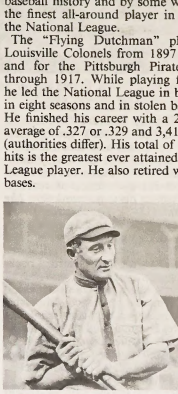
Wagner, Cosima, *née* LISZT, also called (1857–68) COSIMA VON BÜLOW (b. Dec. 25, 1837, Bellagio, Lombardy, Austrian Empire [now in Italy]—d. April 1, 1930, Bayreuth, Ger.), wife of the composer Richard Wagner and director of the Bayreuth Festivals from his death in 1883 to 1908.

Cosima was the illegitimate daughter of the composer-pianist Franz Liszt and the countess Marie d'Agoult, who also bore Liszt two other children. Liszt later legitimatized their births; he also provided generously for their education and, in the case of his daughters, their dowries. With her sister, Blandine, Cosima was educated in Paris by the governess of her father's mistress, Princess Wittgenstein, and then at the house of the mother of Hans von Bülow in Berlin. In 1857 she married Hans von Bülow, one of the outstanding conductors of his time and a favourite pupil of Liszt; but, though she encouraged him in his work and remained devoted to him throughout her life, their marriage proved unsatisfactory. She bore him two daughters; the two daughters subsequently born to Cosima—Isolde (1865) and Eva (1867)—were Richard Wagner's children. In 1868, Cosima with her four daughters left von Bülow and went to live with Wagner in Triebschen; they were finally married in 1870. In that year, too, Wagner composed the *Siegfried Idylle* to commemorate the birth of their son, Siegfried (1869–1930).

With the passing of Wagner (1883), she took upon herself the management of the Bayreuth Festivals, of which she was art director until 1908, when her son took over. To this self-imposed task she applied her characteristic energies and her continued devotion to Wagner's works. She was the moving force behind the festival plays in both commercial and social matters, influencing the selection of repertory, artists, and style of presentation. She died in Bayreuth in total blindness.

Wagner, Honus, byname of JOHN PETER WAGNER (b. Feb. 24, 1874, Mansfield [now Carnegie], Pa., U.S.—d. Dec. 6, 1955, Carnegie), American professional baseball player, one of the first five men elected to the Baseball Hall of Fame (1936). He was generally considered the greatest shortstop in baseball history and by some was regarded as the finest all-around player in the history of the National League.

The "Flying Dutchman" played for the Louisville Colonels from 1897 through 1899 and for the Pittsburgh Pirates from 1900 through 1917. While playing for Pittsburgh, he led the National League in batting average in eight seasons and in stolen bases five years. He finished his career with a 21-year batting average of .327 or .329 and 3,415 or 3,430 hits (authorities differ). His total of 252 three-base hits is the greatest ever attained by a National League player. He also retired with 722 stolen bases.



Honus Wagner
Culver Pictures

A right-handed batter and thrower, Wagner had a heavy physique (about 6 feet, 200 pounds) and unusually long arms. He was, however, very fast as a base runner and as a defensive player. He managed the Pirates briefly in 1917 and, a popular figure in Pittsburgh, coached the team from 1933 to 1951.

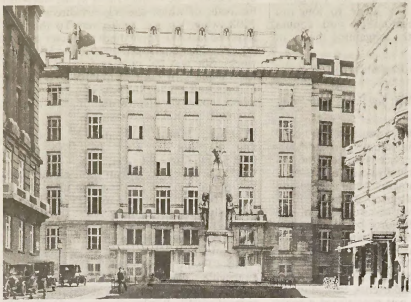
Wagner, Otto (b. July 13, 1841, Penzing, near Vienna—d. April 11, 1918, Vienna), Austrian architect and teacher, generally held to be a founder and leader of the modern movement in European architecture.

Wagner's early work was in the already-established Neo-Renaissance style. In 1893 his general plan (never executed) for Vienna won a major competition, and in 1894 he was appointed academy professor.

As a teacher, Wagner soon broke with tradition by insisting on function, material, and structure as the bases of architectural design. Among his notable works in the Art Nouveau style are a number of stations for the elevated and underground City Railway of Vienna (1894–97) and the Postal Savings Bank (1904–06). The latter, which had little decoration, is recognized as a milestone in the history of modern architecture, particularly for the curving glass roof of its central hall.

Though much attacked at first, Wagner became widely influential. His lectures were

published in 1895 as *Moderne Architektur.* An English translation appeared in *The Brickbuilder* in 1901.



Post Office Savings Bank, Vienna, by Otto Wagner, 1904–06
By courtesy of the Österreichisches Nationalbibliothek, Vienna

Wagner, (Wilhelm) Richard (b. May 22, 1813, Leipzig—d. Feb. 13, 1883, Venice), German dramatic composer and theorist whose operas and music had a revolutionary influence on the course of Western music, either by extension of his discoveries or reaction against them. Among his major works are *The Flying Dutchman* (1843), *Tannhäuser* (1845), *Lohengrin* (1850), *Tristan und Isolde* (1865), and his great tetralogy, *The Ring of the Nibelung* (1869–76).

Early life. The artistic and theatrical background of Wagner's early years (several elder sisters became opera singers or actresses) was a main formative influence. Impulsive and self-willed, he was a negligent scholar at the Kreuzschule, Dresden, and the Nicholaischule, Leipzig. He frequented concerts, however, taught himself the piano and composition, and read the plays of Shakespeare, Goethe, and Schiller.

Wagner, attracted by the glamour of student life, enrolled at Leipzig University, but as an adjunct with inferior privileges, since he had not completed his preparatory schooling. Although he lived wildly, he applied himself earnestly to composition. Because of his impatience with all academic techniques, he spent a mere six months acquiring a ground-



Richard Wagner, drawing by Franz Lenbach, c. 1870
By courtesy of Richard Wagner-Gedenkstatte, Bayreuth, W.Ger.

work with Theodor Weinlig, cantor of the Thomasschule; but his real schooling was a close personal study of the scores of the masters, notably the quartets and symphonies of Beethoven. His own *Symphony in C Major* was performed at the Leipzig Gewandhaus concerts in 1833. On leaving the university that year, he spent the summer as operatic coach at Würzburg, where he composed his first opera, *Die Feen* (*The Fairies*), based on a fantastic tale by Carlo Gozzi. He failed to get the opera produced at Leipzig and became conductor to a provincial theatrical troupe from Magdeburg, having fallen in love with one of the actresses of the troupe, Wilhelmine (Minna) Planer, whom he married in 1836. The single performance of his second opera, *Das Liebesverbot* (*The Ban on Love*), after Shakespeare's *Measure for Measure*, was a disaster.

In 1839, fleeing from his creditors, he decided to put into operation his long-cherished plan to win renown in Paris, but his three years in Paris were calamitous. Despite a recommendation from the influential gallicized German composer Giacomo Meyerbeer, Wagner could not break into the closed circle at the Opéra. Living with a colony of poor German artists, he staved off starvation by means of musical journalism and hackwork. Nevertheless, in 1840 he completed *Rienzi* (after Bulwer-Lytton's novel), and in 1841 he composed his first representative opera, *Der fliegende Holländer* (*The Flying Dutchman*), based on the legend about a ship's captain condemned to sail forever.

In 1842, aged 29, he gladly returned to Dresden, where *Rienzi* was triumphantly performed on October 20. The next year *The Flying Dutchman* (produced at Dresden, Jan. 2, 1843) was less successful, since the audience expected a work in the French–Italian tradition similar to *Rienzi*, and was puzzled by the innovative way the new opera integrated the music with the dramatic content. But Wagner was appointed conductor of the court opera, a post that he held until 1849. On Oct. 19, 1845, *Tannhäuser* (based, like all his future works, on Germanic legends) was coolly received but soon proved a steady attraction; after this, each new work achieved public popularity despite persistent hostility from many critics.

The refusal of the court opera authorities in Dresden to stage his next opera, *Lohengrin*, was not based on artistic reasons; rather, they were alienated by Wagner's projected administrative and artistic reforms. His proposals would have taken control of the opera away from the court and created a national theatre whose productions would be chosen by a union of dramatists and composers. Preoccupied with ideas of social regeneration, he then became embroiled in the German revolution of 1848–49. Wagner wrote a number of articles advocating revolution and took an active part in the Dresden uprising of 1849. When the uprising failed, a warrant was issued for his arrest and he fled from Germany, unable to attend the first performance of *Lohengrin* at Weimar, given by his friend Franz Liszt on Aug. 28, 1850.

Exile. For the next 15 years Wagner was not to present any further new works. Until 1858 he lived in Zürich, composing, writing treatises, and conducting (he directed the London Philharmonic concerts in 1855). Having already studied the Siegfried legend and the Norse myths as a possible basis for an opera, and having written an operatic "poem," *Siegfrieds Tod* (*Siegfried's Death*), in which he conceived of Siegfried as the new type of man who would emerge after the successful revolution he hoped for, he now wrote a number of prose volumes on revolution, social and artistic. From 1849 to 1852 he produced his basic prose works: *Die Kunst und die Revolution* (*Art and Revolution*), *Das Kunstwerk der Zukunft* (*The Art Work of the Future*), *Eine Mitteilung an meine Freunde* (*A Communication to My Friends*), and *Oper und Drama* (*Opera and Drama*). The latter outlined a new, revolutionary type of musical stage work—the vast work, in fact, on which he was engaged. By 1852 he had added to the poem of *Siegfrieds Tod* three others to precede it, the whole being called *Der Ring des Nibelungen* (*The Ring of the Nibelung*) and providing the basis for a tetralogy of musical dramas: *Das Rheingold* (*The Rhinegold*); *Die Walküre* (*The Valkyrie*); *Der junge Siegfried* (*Young Siegfried*), later called simply *Siegfried;* and *Siegfried's Tod* (*Siegfried's Death*), later called *Götterdämmerung* (*The Twilight of the Gods*).

The Ring reveals Wagner's mature style and method, to which he had found his way at last during the period when his thought was devoted to social questions. Looking forward to the imminent creation of a socialist state, he prophesied the disappearance of opera as artificial entertainment for an elite and the emergence of a new kind of musical stage work for the people, expressing the self-realization of free humanity. This new work was later to be called "music drama," though Wagner never used this term, preferring "drama."

Wagner's new art form would be a poetic drama that should find full expression as a musical drama when it was set to a continuous vocal-symphonic texture. This texture would be woven from basic thematic ideas, which Wagner called "motives," but which have come to be known by the term invented by one of his disciples—"leading motives" (German *Leitmotive,* singular *Leitmotiv*). These would arise naturally as expressive vocal phrases sung by characters and would be developed by the orchestra as "reminiscences" to express the dramatic and psychological development.

This conception found full embodiment in *The Ring,* except that the leading motives did not always arise as vocal utterances but were often introduced by the orchestra to portray characters, emotions, or events in the drama. With his use of this method, Wagner rose immediately to his amazing full stature: his style became unified and deepened immeasurably, and he was able to fill his works from end to end with intensely characteristic music. Except for moments in *The Rhinegold,* his old weaknesses, formal and stylistic, vanished altogether, and with them disappeared the last vestiges of the old "opera." By 1857 his style had been enriched by the stimulus of Liszt's tone poems and their new harmonic subtleties, and he had composed *The Rhinegold, The Valkyrie,* and two acts of *Siegfried.* But he now suspended work on *The Ring:* the impossibility of mounting this colossus within the foreseeable future was enforcing a stalemate on his career and led him to project

a "normal" work capable of immediate production. Also, his optimistic social philosophy had yielded to a metaphysical, world-renouncing pessimism, nurtured by his discovery of the philosophy of Arthur Schopenhauer. The outcome was *Tristan und Isolde* (1857–59), of which the crystallizing agent was his hopeless love for Mathilde Wesendonk (the wife of a rich patron), which led to separation from his wife, Minna.

Because of the Wesendonk affair, life in Zürich had become too embarrassing, and Wagner completed *Tristan* in Venice and Lucerne, Switz. The work revealed a new subtlety in his use of leading motives, which in *The Rhinegold* and *The Valkyrie* he had used mainly to explain the action of the drama. The impact of Schopenhauer's theory of the supremacy of music among the arts led him to tilt the expressive balance of musical drama more toward music: the leading motives ceased to remain neatly identifiable with their dramatic sources but worked with greater psychological complexity, in the manner of free association.

Return from exile. In 1859 Wagner went to Paris, where, the following year, productions of a revised version of *Tannhäuser* were fiascoes. But in 1861 an amnesty allowed him to return to Germany; from there he went to Vienna, where he heard *Lohengrin* for the first time. He remained in Vienna for about a year, then travelled widely as a conductor and awaited a projected production of *Tristan.* When this work was not produced because the artists were bewildered by its revolutionary stylistic innovations, Wagner began a second "normal" work, the comedy-opera *Die Meistersinger von Nürnberg* (The Mastersingers of Nürnberg), for which he incorporated into his new conception of music drama certain of the old "operatic" elements. By 1864, however, his expenditure on a grand scale and inveterate habits of borrowing and living on others had brought him to financial disaster: he had to flee from Vienna to avoid imprisonment for debt. He arrived in Stuttgart without a penny, a man of 51 without a future, almost at the end of his tether.

Something like a miracle saved him. He had always made loyal friends, owing to his fascinating personality, his manifest genius, and his artistic integrity, and now a new friend of the highest influence came to his rescue. In 1864 Louis II, a youth of 18, ascended the throne of Bavaria; he was a fanatical admirer of Wagner's art and, having read the poem of *The Ring* (published the year before with a plea for financial support), invited Wagner to complete the work in Munich.

The King set him up in a villa, and during the next six years there were successful Munich productions of all of Wagner's representative works to date, including the first performances of *Tristan* (1865), *The Mastersingers* (1868), *The Rhinegold* (1869), and *The Valkyrie* (1870)—the first two directed by the great Wagner conductor Hans von Bülow. Initially a new theatre at Munich was projected for this purpose, with a music school attached, but this came to nothing because of the opposition aroused by Wagner's way of living. Not only did he constantly run into debt, despite his princely salary, but he also attempted to interfere in the government of the kingdom; in addition, he became the lover of von Bülow's wife, Cosima, the daughter of Liszt. She bore him three children—Isolde, Eva, and Siegfried—before her divorce in 1870 and her marriage to Wagner in the same year. For all these reasons, Wagner thought it advisable to leave Munich as early as 1865, but he never forfeited the friendship of the King, who set him up at Triebschen on the Lake of Lucerne.

Last years in Bayreuth. In 1869 Wagner had resumed work on *The Ring* which he now brought to its world-renouncing conclusion. It had been agreed with the King that the tetralogy should be first performed in its entirety at Munich, but Wagner broke the agreement, convinced that a new type of theatre must be built for the purpose. Having discovered a suitable site at the Bavarian town of Bayreuth, he toured Germany, conducting concerts to raise funds and encouraging the formation of societies to support the plan, and in 1872 the foundation stone was laid. In 1874 Wagner moved into a house at Bayreuth that he called Wahnfried ("Peace from Illusion"). The whole vast project was eventually realized, in spite of enormous artistic, administrative, and financial difficulties. The King, who had provided Wahnfried for Wagner, contributed a substantial sum, and mortgages were raised that were later paid off by royalties. *The Ring* received its triumphant first complete performance in the new Festspielhaus at Bayreuth on Aug. 13, 14, 16, and 17, 1876.

Wagner spent the rest of his life at Wahnfried, making a visit to London in 1877 to give a successful series of concerts and then making several to Italy. During these years he composed his last work, the sacred festival drama *Parsifal,* begun in 1877 and produced at Bayreuth in 1882; he also dictated to his wife his autobiography, *Mein Leben* (*My Life*), begun in 1865. He died of heart failure, at the height of his fame, and was buried in the grounds of Wahnfried in the tomb he had himself prepared. Since then, except for interruptions caused by World Wars I and II, the Festspielhaus has staged yearly festivals of Wagner's works.

Achievement and influence. Wagner's single-handed creation of his own type of musical drama was a fantastic accomplishment, considering the scale and scope of his art. His method was to condense the confused mass of material at his disposal—the innumerable conflicting versions of the legend chosen as a basis—into a taut dramatic scheme. In this scheme, as in his model, the *Oresteia* of Aeschylus, the stage events are few but crucial, the main part of the action being devoted to the working out of the characters' motivations.

In setting the poem he used his mastery of construction on the largest scale, which he had learned from studying Beethoven, to keep the broad outlines clear while he consistently developed the leading motives to mirror every shifting nuance of the psychological situation. Criticism of these motives as arbitrary, factual labels shows a misunderstanding of Wagner. He called them "carriers of the feeling," and, owing to their essentially emotional character, their pliability, and Wagner's resource in alternating, transforming, and combining them, they function as subtle expressions of the changing feelings behind the dramatic symbols.

The result of these methods was a new art form, of which the distinguishing feature was a profound and complex symbolism working on three indivisible planes —dramatic, verbal, and musical. The vital significance of this symbolism has been increasingly realized. The common theme of all his mature works, except *The Mastersingers,* is the romantic concept of "redemption through love"; but this element, used rather naively in the three early operas, became, in the later musical dramas, a mere catalyst for much deeper complexes of ideas. In *The Ring* there are at least five interwoven strands of overt meaning concerned with German nationalism, international Socialism, the philosophy of Schopenhauer, Buddhism, and Christianity. On another level, there is a prophetic treatment of some of the themes of psychoanalysis: power complex arising from sexual inhibition; incest; mother fixation; and Oedipus complex.

Tristan stands in a line of symbolism extending from the themes of "night" and "death" explored by such German Romantic poets as Novalis (1772–1801), through the Schopenhauerian indictment of life as an evil illusion and the renunciation of the will to live, to the modern psychological discovery of a close connection between erotic desire and the death wish. *The Mastersingers* stands apart as a work in which certain familiar themes are treated on a purely conscious plane with mellow wisdom and humour: the impulsiveness of youth and the resignation of age, the ecstasy of youthful love, the value of music itself as an art. In Wagner's last work, *Parsifal,* the symbolism returns on a deeper level than before. He has been much criticized for this strongly personal treatment of a religious subject, which mingles the concepts of sacred and profane love; but in the light of later explorations in the field of psychology his insight into the relationship between religious and sexual experience seems merely an advance of its time. The themes of innocence and purity, sexual indulgence and suffering, remorse and sexual renunciation are treated in *Parsifal* with a subtle intensity and depth of compassion that probe deeply into the unconscious and make the opera in some ways the most visionary of all Wagner's works.

Wagner's influence, as a musical dramatist and as a composer, was a powerful one. Although few operatic composers have been able to follow him in providing their own librettos, all have profited from his reform in the matter of giving dramatic depth, continuity, and cohesion to their works.

In the purely musical field, Wagner's influence was even more far-reaching. He developed such a wide expressive range that he was able to make each of his works inhabit a unique emotional world of its own, and, in doing so, he raised the melodic and harmonic style of German music to what many regard as its highest emotional and sensuous intensity. Much of the subsequent history of music stems from him, either by extension of his discoveries or reaction against them.

(D.V.Co./Ed.)

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Where the same name may denote a person, place, or thing, the articles will be found in that order

Wagner, Robert F(erdinand) (b. June 8, 1877, Nastätten, Hesse-Nassau, Ger.—d. May

4, 1953, New York, N.Y., U.S.), U.S. senator and leading architect of the modern welfare state.

Wagner arrived in the United States at the age of eight and settled with his parents in a New York tenement neighborhood. After graduating from the City College of New York in 1898, he went on to obtain a law degree from New York Law School in 1900. Later that year he was admitted to the bar and opened a practice.

But Wagner quickly abandoned law for Democratic Party politics. Starting as a ward heeler for Tammany Hall, he moved up the ranks until in 1904 he won a seat in the state legislature. Four years later he was elected to the state senate. It was in the New York Senate—especially as an outgrowth of his investigation into industrial working conditions in New York City—that Wagner first won renown as a leader in formulating social legislation.

From 1919 to 1926 Wagner served as a justice of the New York Supreme Court. In 1926 he ran successfully for the U.S. Senate, a position to which he would be reelected three times. During his first term Wagner introduced legislation to assist labour and the unemployed, but his initiatives were rebuffed.

Not until the advent of the New Deal did Wagner's legislative proposals become law. He helped draft the National Industrial Recovery Act (1933), the Federal Emergency Relief Administration bill (1933), and the law establishing the Civilian Conservation Corps (1933). An ally of President Franklin Roosevelt, Wagner firmly believed in the government's duty to take an active role in promoting the public good.

In 1935 Wagner sponsored two major pieces of New Deal legislation: the Social Security Act (enacted 1936) and the National Labor Relations Act (better known as the Wagner Act). The latter bill established the National Labor Relations Board, guaranteed workers the right to bargain collectively without jeopardizing their jobs, and outlawed a number of unfair labour practices. In 1937 the Wagner-Steagall Act created the United States Housing Authority, an agency to provide loans for low-cost public housing.

As the New Deal lost momentum, Wagner persisted. He presented national health care and anti-lynching legislation, but both measures failed to gain passage. More successful were his drives to expand housing and social security programs, and in 1945 a weakened version of his full-employment bill became law. Wagner resigned from the Senate for health reasons in 1949. He lived out his last years at his home in New York City, devoting much of his time to supporting the creation of the new nation of Israel. His son, Robert F. Wagner, Jr. (1910–91), served as mayor of New York City from 1954 to 1965.

Wagner Act, officially **NATIONAL LABOR RELATIONS ACT** (1935), the single most important piece of labour legislation enacted in the United States in the 20th century. It was enacted to eliminate employers' interference with the autonomous organization of workers into unions.

Sponsored by Senator Robert F. Wagner, a Democrat from New York, the Wagner Act established the federal government as the regulator and ultimate arbiter of labour relations. It set up a permanent, three-member National Labor Relations Board (*q.v.*; NLRB) with the power to protect the right of most workers (with the notable exception of agricultural and domestic labourers) to organize unions of their own choosing and to encourage collective bargaining. The act prohibited employers from engaging in such unfair labour practices as setting up a company union and firing or otherwise discriminating against workers who organized or joined unions. Under the Wagner Act, the NLRB was given the power to order elections whereby workers could choose which union they wanted to represent them. The act prohibited employers from refusing to bargain with any such union that had been certified by the NLRB as being the choice of a majority of employees.

Wagner-Jauregg, Julius, original name **JULIUS WAGNER, RITTER (Knight) VON JAUREGG** (b. March 7, 1857, Wels, Austria—d. Sept. 27, 1940, Vienna), Austrian psychiatrist and neurologist, whose treatment of syphilitic meningoencephalitis, or general paresis, by the artificial induction of malaria constituted the first example of shock therapy. The method brought a previously incurable fatal disease under medical control and earned him the Nobel Prize for Physiology or Medicine in 1927.

While a member of the psychiatric staff (1883–89) at the University of Vienna, Wagner-Jauregg noted that persons suffering from certain nervous disorders showed a marked improvement after contracting febrile (characterized by fever) infections, and he suggested (1887) that such infections be deliberately induced as a method of treatment for the insane, especially recommending malaria because it could be controlled with quinine. As professor of psychiatry and neurology at the University of Graz, Austria (1889–93), he attempted to induce fevers in mental patients through the administration of tuberculin (an extract of the tubercle bacillus), but the program met with only limited success. In 1917, occupying a similar post at the University of Vienna, where he also directed the university hospital for nervous and mental diseases (1893–1928), Wagner-Jauregg was able to produce malaria in paresis victims, with dramatically successful results.



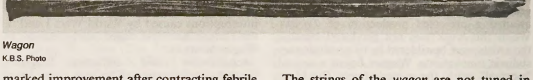
Wagner-Jauregg
Harlingue—H. Roger-Viollet

Although malaria treatment of the disease was later supplanted largely by administration of antibiotics, his work led to the development of fever therapy and shock therapy for a number of mental disorders. He was also known as an authority on cretinism and other thyroid disorders.

wagon, four-wheeled vehicle designed to be drawn by draft animals and known to have been used as early as the 1st century BC, incorporating such earlier innovations as the spoked wheel and metal wheel rim. Early examples also had such features as pivoted front axles and linchpins to secure the wheels. In its essential form, therefore, the wagon has been in common use for about 2,000 years.

During the 9th century several additional improvements in harness and suspension led to a marked preference for wagons over carts as a means of passenger and long-distance transportation. Wagons were heavier than carts in construction, with a boxlike body that was useful for hauling freight and agricultural produce and a smoother ride due to the inherent stability of being supported on four wheels rather than two. Wagons were produced in many sizes and types, and those used for the carrying of passengers were equipped with springs between the box and the running gear. The coach variation was a later innovation, becoming a distinct form in the 16th century. One type of wagon, the Conestoga, became famous as a freight wagon during the 18th century, and its descendant, the prairie schooner, was the most common vehicle used by settlers in the opening of the American West.

wagon, also called **YAMATO KOTO,** musical instrument, a Japanese six-stringed board zither with movable bridges. It is closely connected with courtly, Shintō, and vocal music.



Wagon
K.B.S. Photo

The strings of the *wagon* are not tuned in ascending order but form a pentatonic scale in the following manner (from the bottom string): e', g', b', d'', a', d''. This unusual tuning relates to the instrument's primary performance practice, which consists of four arpeggio-like, stereotyped patterns (*san, ji, oru,* and *tsumu*), rather than melodies. Some claim the instrument to be indigenous to Japan, on the basis of 3rd-century Japanese artifacts, whereas others believe that it was imported from Korea.

wagon train, caravan of wagons organized by settlers in the United States for emigration to the West during the late 18th and most of the 19th centuries. Composed of up to 100 Conestoga wagons (*q.v.*; sometimes called prairie schooners), wagon trains soon became the prevailing mode of long-distance overland transportation for both people and goods. Wagon-train transportation moved westward with the advancing frontier. The 19th century saw the development of such famous roads as the Santa Fe Trail, the Oregon Trail, the Smoky Hill Trail, and the Southern Overland Mail route. It was, however, in transit westward over the Oregon-California Trail that the wagon trains attained their most highly organized and institutionalized character. Meeting in early spring at a rendezvous town, perhaps near the Missouri River, the groups would form companies, elect officers, employ guides, and collect essential supplies while awaiting favourable weather, usually in May. Those riding in the wagons were directed and protected by a few on horseback. Once organized and on their way, wagon-train companies tended to follow a fairly fixed daily routine, from 4 AM rising, to 7 AM leaving, 4 PM encampment, cooking and tending to chores while the animals grazed, and simple recreation before early retirement. The companies had to be prepared for such challenges as crossing rivers and mountains and meeting hostile Indians.

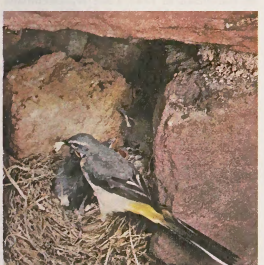
Wagon-train migrations are more widely known and written about than wagon freighting, which also played an essential role in an expanding America. Teamsters, best known as bullwhackers or muleskinners, conducted commercial operations on a more or less fixed two-way schedule until replaced by the railroad and the truck.

wagonette, horse-drawn carriage designed to carry a large number of passengers who sat on long bench-style seats facing each other. The driver's seat was separate and mounted from the front, while passengers boarded the vehicle from a door in the rear. The first wagonette was built in England about 1843 and became a popular vehicle, partially because of the implied endorsement of Prince Albert, the husband of Queen Victoria. It was eventually made in a great variety of styles and sizes for public and private use, and it remained popular well into the 20th century.

Wagram, Battle of (July 5–6, 1809), victory for Napoleon, which forced Austria to sign an armistice and led eventually to the Treaty of Schönbrunn in October, ending Austria's 1809 war against the French control of Germany. The battle was fought on the Marchfeld (a plain northeast of Vienna) between 154,000 French and other troops under Napoleon and 158,000 Austrians under Archduke Charles. After a defeat at Aspern-Essling in May, Napoleon needed a victory to prevent a new anti-French coalition from forming. Charles deployed his army along a 14-mile (23-kilometre) front (with the village of Wagram in the centre) to await the French attack. Napoleon decided to attack before Charles could be reinforced by the 30,000 troops of his brother, Archduke John. On the evening of July 5, after having crossed the Danube River, he hastily attacked the thinly stretched Austrian positions but was beaten back.

On the morning of July 6 Charles attacked in the south to cut the French off from the Danube and envelop their southern flank. Napoleon's main attack was in the north, at the Austrian line along Russbach Brook. By reinforcing his southern flank, Napoleon repelled the Austrian attack there; at the same time, the French attack in the north succeeded. Napoleon then launched the final assault against the Austrian centre and split it. By the time Archduke John appeared in the late afternoon, Charles's army was already in retreat. John was easily driven off. The battle took a terrible toll, mostly from the heaviest concentration of artillery fire yet employed in any war; Austria suffered more than 40,000 casualties and France about 34,000. Four days later Charles asked for an armistice.

wagtail, any of the 7 to 10 species of the bird genus *Motacilla,* of the family Motacillidae, together with the forest wagtail (*Dendronanthus indicus*) of Asia. Wagtails are strongly patterned birds of beaches, meadows, and streamsides; they usually nest on the ground but roost in trees. The birds are so named because they incessantly wag their long tails up and down. The forest wagtail wags its entire body from side to side. Males of the white wagtail (*Motacilla alba*), common across Eurasia, are variably white and gray or white and black. The variety in Britain is called pied wagtail. The only species reaching the New World is the yellow wagtail (*M. flava,* sometimes *Budytes flavus*), which breeds in Alaska and migrates to Asia.



Gray wagtail (*Motacilla cinerea*)
H. Reinhard—Bruce Coleman Inc.

Wāh, also called WĀH CANTONMENT, town, Punjab province, northern Pakistan. It is connected by road with Peshāwar and Rāwalpindi and is a growing industrial centre. Wāh's industries include one of the largest cement factories in the Indian subcontinent, ordnance and tractor plants, and agricultural implements and spare-parts manufacturing. Amenities include a garden said to have been built by the Mughal emperor Akbar in the 16th century. Pop. (1981) 122,335.

Waha (people): *see* Ha.

Wahankh Intef: *see* Intef II.

Wāḥāt al-Khārijah, Al-, also spelled KHARGA, OF EL-KHARGA, oasis in the Libyan (Western) Desert, part of Al-Wādī al-Jadīd ("New Valley") *muḥāfaẓah* (governorate), in south-central Egypt. It is situated about 110 miles (180 km) west-southwest of Naj' Ḥammādī, to which it is linked by railroad. The name Wāḥāt al-Khārijah means "outer oasis." The oasis consists of two fertile zones, extending about 100 miles (160 km) north-south and from 12 to 50 miles (19 to 80 km) east-west, with an area of more than 1,400 square miles (3,650 square km). The smaller southern section contains the village of Bāris. The northern part is the largest of Egyptian oases. At the centre of its approximately 10-square-mile (26-square-kilometre) area lies Al-Khārijah, the chief town, with narrow, winding streets, in places cut through solid rock.

Al-Khārijah has been occupied since the Old Stone Age. The ancient Egyptians, who called the oasis Kenem, or Hibis, often used it as a place of exile. The Achaemenian king Darius I (d. 486 BC) built there a temple dedicated to Amon that was excavated in 1908–11. The largely ruined Roman town in the oasis is situated between the temple of Nadura, built by Antoninus Pius (d. AD 161), and a Christian necropolis.

In modern times the oasis's permanent population has been mainly of Berber and Bedouin origin. Some settlers from the Nile River valley have been established there as a result of a deep-well-drilling program in the 1960s, which has had mixed results. Efforts have been made to create an adequate irrigation system, and dates, wheat, olives, clover, and fruits and vegetables are grown. Pop. (1986 prelim.) Al-Khārijah town, 38,544.

Wahaya (people): *see* Haya.

Wahhāb, Muḥammad ibn 'Abd al- (b. 1703, 'Uyaynah, Arabia [now in Saudi Arabia]—d. 1792, Ad-Dir'iyah), theologian and founder of the Wahhābī movement, which attempted a return to the "true" principles of Islām.

Having completed his formal education in the holy city of Medina, in Arabia, 'Abd al-Wahhāb lived abroad for many years. He taught for four years in Basra, Iraq, and in Baghdad he married an affluent woman whose property he inherited when she died. In 1736, in Iran, he began to teach against what he considered to be the extreme ideas of various exponents of Sūfī doctrines. On returning to his native city, he wrote the *Kitāb at-tawḥīd* ("Book of Unity"), which is the main text for Wahhābī doctrines. His followers call themselves al-Muwaḥḥidūn, or "Unitarians"; the term Wahhābī is generally used by non-Muslims and opponents.

'Abd al-Wahhāb's teachings have been characterized as puritanical and traditional, representing the early era of the Islāmic religion. He made a clear stand against all innovations (*bid'ah*) in Islāmic faith because he believed them to be reprehensible, insisting that the original grandeur of Islām could be regained if the Islāmic community would return to the principles enunciated by the Prophet Muḥammad. Wahhābī doctrines, therefore, do not allow for an intermediary between the faithful and Allah and condemn any such practice as polytheism. The decoration of mosques, the cult of saints, and even the smoking of tobacco were condemned.

When the preaching of these doctrines led to controversy, 'Abd al-Wahhāb was expelled from 'Uyaynah in 1744. He then settled in Ad-Dir'iyah, capital of Ibn Sa'ūd, a ruler of the Najd (now in Saudi Arabia).

The spread of Wahhābism originated from the alliance that was formed between 'Abd al-Wahhāb and Ibn Sa'ūd, who, by initiating a campaign of conquest that was continued by his heirs, made Wahhābism the dominant force in Arabia since 1800.

Wahhābī, also spelled WAHĀBĪ, any member of the Muslim puritan movement founded by Muḥammad ibn 'Abd al-Wahhāb in the 18th century in Najd, central Arabia, and adopted in 1744 by the Sa'ūdī family.

The political fortunes of the Wahhābī were immediately allied to those of the Sa'ūdī dynasty. By the end of the 18th century, they had brought all of Najd under their control, attacked Karbalā', Iraq, a holy city of the Shī'ite branch of Islām, and occupied Mecca and Medina in western Arabia. The Ottoman sultan brought an end to the first Wahhābī empire in 1818, but the sect revived under the leadership of the Sa'ūdī Faysal I. The empire was then somewhat restored until once again destroyed at the end of the 19th century by the Rashīdīs of northern Arabia. The activities of Ibn Sa'ūd in the 20th century eventually led to the creation of the Kingdom of Saudi Arabia in 1932 and assured the Wahhābī religious and political dominance on the Arabian Peninsula.

Members of the Wahhābī call themselves al-Muwaḥḥidūn, "Unitarians," a name derived from their emphasis on the absolute oneness of God (tawhid). They deny all acts implying polytheism, such as visiting tombs and venerating saints, and advocate a return to the original teachings of Islām as incorporated in the Qur'ān and Ḥadīth (traditions of Muḥammad), with condemnation of all innovations (*bid'ah*). Wahhābī theology and jurisprudence, based, respectively, on the teachings of Ibn Taymīyah and on the legal school of Aḥmad ibn Ḥanbal, stress literal belief in the Qur'ān and Ḥadīth and the establishment of a Muslim state based only on Islāmic law.

Wahiawa, city, Honolulu county, west-central Oahu Island, Hawaii, U.S. It is situated on the 1,000-foot- (300-metre-) high Leilehua Plateau between the two forks of the Kaukonahua Stream. Wahiawa (meaning "place of noise") is a commercial centre for nearby plantation communities and military installations (Schofield Barracks and Wheeler Air Force Base). It is the site of company housing developments for plantation workers and is also the area's truck depot for pineapple shipments to Honolulu. Pop. (1990) 17,386.

Wahībah Dunes, Al (Oman): *see* Al Wahībah Dunes.

Wahidin Sudirohusodo, Mas Ngabehi (b. Jan. 7, 1852, Melati, Java [now in Indonesia]—d. May 26, 1916, Yogyakarta, Java [now in Indonesia]), founder of Budi Utomo ("High Endeavour"), the first Indonesian organization modeled after Western institutions.

Budi Utomo owed its existence to the efforts of Wahidin, a retired physician, to obtain

support for a scholarship fund for Indonesian students. His objectives proved attractive to students at STOVIA (School Tot Opleiding Van Indische Artsen; *i.e.*, "School for the Training of Native Doctors"). On May 20, 1908, some of these joined Dr. Wahidin in founding Budi Utomo with the intention of building a General Javanese Union.

By 1910 the membership had grown to nearly 10,000—mainly students and civil servants. Their expressed objectives went far beyond Wahidin's interest in improving educational opportunities for Indonesians; they called for the encouragement of agriculture and trade and the dissemination of humanistic thought. However much its members emphasized Javanese culture, Budi Utomo was built on acceptance of the Western social system and the wish for Javanese advancement and for the expression of Javanese thought within that system. The leadership was held by conservatives who resisted political activity by the group, but they were increasingly opposed by younger and more aggressive members. The effectiveness of Budi Utomo was finally undercut by the appeal of those who favoured direct action against the West and by more radical and expressly political organizations. Membership in Budi Utomo fell off sharply after 1910, but the organization was important as a model for later nationalist groups.

wahoo (*Acanthocybium solanderi*), swift-moving, powerful, predacious food and game fish of the family Scombridae (order Perciformes) found worldwide, especially in the tropics. The wahoo is a slim, streamlined fish with sharp-toothed, beaklike jaws and a tapered body ending in a slender tail base and a crescent-shaped tail. Gray-blue above and paler below, it is marked with a series of vertical bars and,



Wahoo (*Acanthocybium solanderi*)
Painted especially for *Encyclopaedia Britannica* by Tom Dolan, under the supervision of Loren P. Woods, Chicago Natural History Museum

like the related tunas, has a row of small finlets behind the dorsal and anal fins. At its largest, the wahoo attains a length of 1.8 m (6 feet) and weight of 55 kg (120 pounds) or more.

Wahunsonacock (American Indian chief): *see* Powhatan.

Wahutu (people): *see* Hutu.

Waialeale, Mount, peak, central Kauai Island, Hawaii, U.S. Waialeale ("Rippling Water"), with a height of 5,148 feet (1,569 m), is a dissected (eroded) dome that is part of a central mountain mass which includes Kawaikini (5,243 feet [1,598 m]), the island's highest peak, immediately south. Waialeale is located at the southeastern edge of an extinct caldera that is now a plateau called Alakai Swamp. Shrouded in clouds, Waialeale is one of the world's wettest spots. Over a period of 32 years the average annual rainfall was 460 inches (11,685 mm), the highest in the world. In 1982, 666 inches (16,916 mm) of rain were recorded on the peak, establishing an official record. Only a few miles away, however, the rainfall drops dramatically to only 10 inches (250 mm) a year.

Deep faulting and water erosion have carved canyons in the mountain's flanks. Three valleys radiate northward: Wainiha, Lumahai, and Hanalei. To the west of Mount Waialeale is Waimea Canyon, Hawaii's "Little Grand Canyon." The focus of a state park, this canyon is 25 miles (40 km) long and 1 mile (1.6 km) wide, ranges from more than 0.5 mile in depth, and is often viewed from Puukapele (3,662 feet [1,116 m]), a peak on its western edge. Mount Waialeale's mass supplies numerous waterfalls, sending down rushing streams on all sides to feed the only navigable rivers in the state. The main rivers are the Waimea, Wailua, Makaweli, and Hanapepe.

Waianae Range, mountains paralleling the western coast of Oahu, Hawaii, U.S. The range is the oldest area of volcanic activity on the island. It is 22 miles (35 km) long and 9 miles (14 km) wide and is composed of three lava groups. The original caldera, 3 miles (5 km) wide and 5 miles (8 km) long, was at the head of Lualualei Valley (near Kolekole Pass) but was buried through submergence and erosion.

Composed mainly of basaltic rock, the range is heavily eroded. Its western slopes are steep and precipitous and indented by deep valleys such as the Nanakuli, Lualualei, Waianae, Makaha, and Keaau. Its eastern slopes are more gradual and approach the central Schofield Plateau with small, narrow valleys. The range's northern part ends in steep, coastal cliffs (750–1,000 feet [200–300 m]), while its southern slopes have an even gradient as they near the coastal plain. Mount Kaala (4,020 feet [1,225 m]), the highest point on Oahu, is at the head of Makaha Valley; it has a flat, swamp-filled, semicircular plateau 1 mile (1.5 km) in diameter. Kolekole Pass, 3 miles (5 km) south, is an important link between the west coast and the fertile central plateau.

Waiau River, river in southwestern South Island, New Zealand. It rises in Lake Manapouri and flows south through the Southland district for 135 miles (217 km) to enter Te Waewae Bay of the Tasman Sea. Its drainage basin includes the Mararoa River, extending 20 miles (32 km) farther inland to the Livingstone Mountains, and Lakes Te Anau and Monowai. The town of Tuatapere is the market and lumbering centre for the farms and forests of the valley. Salmon are caught in the river. The Waiau was first explored by William Mantell, an agent of the Canterbury Association Settlement, in 1852.

Waiau River, formerly WAIAU-UA, or DILLON, river in eastern South Island, New Zealand. It rises in the Spenser Mountains and flows south and east for 105 miles (169 km) to enter the Pacific Ocean, 6 miles (10 km) northeast of Cheviot. Its generally hilly drainage basin, 1,270 square miles (3,290 square km) in area, borders the Canterbury Plains to the south. Towns in the river's valley, including Waiau and Parnassus, are market centres for the livestock raised in the area. Tributaries include the Lewis, Doubtful, Hope, Hanmer, and Leader rivers. Several gorges along the river are possible sites for hydroelectric-power stations.

Waigeo Island, Indonesian PULAU WAIGEO, also spelled WAIGEU, largest island of the Raja Ampat group in the Dampier Strait, Irian Jaya *provinsi* ("province"), Indonesia. Waigeo Island lies about 40 miles (64 km) northwest of the Doberai (Vogelkop) Peninsula and across the strait from Irian Jaya. It is 70 miles (110 km) long (east-west) and 30 miles (48 km) wide (north-south). The island, which is almost bisected by a narrow inlet of the Dampier Strait, has a rocky and generally steep coastline. Its central areas are mountainous, rising to 3,300 feet (1,000 m), and are heavily forested with hardwood, with streams plunging down the rock faces. Some parts of the island are covered with head-high grass, casuarina groves, and stands of pine trees. The crimson bird-of-paradise is found there, together with opossums, cuscuses, snakes, tortoises, frilled and giant monitor lizards, plumed herons, and honey eaters. The climate is hot and humid on the coastal fringes and cool inland. There is little agriculture, and the major product is sago. Cattle are raised, and deep-sea fishing is important. Tortoiseshells and fish are exported. The island is sparsely populated by Papuans who speak Austronesian languages. Chief settlements are Saonek on the southern tip of the western half of Waigeo and Wakre on the southern tip of the eastern half of the island. Transport is by boat to the more southerly islands of Batanta, Kofiau, and Salawati and to New Guinea through the port of Sorong on the northwestern tip of Irian Jaya.

Waiheke Island, island, a volcanic formation in southern Hauraki Gulf, off the east coast of North Island, Auckland local government region, New Zealand. It is the fifth largest island of New Zealand, having a total land area of 37 square miles (96 square km). Waiheke has rolling hills rising to a maximum elevation of 759 feet (231 m).

The island, whose Maori name means "cascading waters," was the site of manganese mining in the late 19th century. Now a holiday resort and residential area, it is linked to Auckland (12 miles [19 km] east) by air and launch services across Tamaki Strait. The principal settlements of Onetangi, Oneroa, Ostend, and Surfdale are clustered at the western end of the island. There are also some sheep and cattle stations. Pop. (1986) 4,662.

Waihi, town, Waikato local government region, northern North Island, New Zealand, on the Ohinemuri River (tributary of the Waihou). Situated at the base of the Coromandel Peninsula on the northern end of the Waihi Plains, Waihi, whose name is Maori for "rising waters," was founded three years after gold and silver were discovered just north of the site in 1875. Gold mining continued until the 1950s, and many shafts lie directly under the town. Waihi is linked to Auckland (90 miles [145 km] northwest) by rail and road and serves a highly localized dairy region with a processing plant. Other industries include footwear, home-appliance, joinery, and concrete-products factories; general-engineering works; and sawmills. The resort of Waihi Beach lies 7 miles (11 km) east along the Bay of Plenty. Pop. (1987 est.) 3,680.

Waikaremoana, Lake, lake in eastern North Island, New Zealand. Created by a landslide damming the Waikare Taheke River, the 21-square-mile (54-square-kilometre) lake, measuring 12 miles (19 km) by 6 miles (10 km), drains a 165-square-mile (427-square-kilometre) basin and empties via the same river, which is a tributary of the Wairoa. From its surface elevation of 2,015 feet (614 m), the lake extends to a depth of 840 feet (256 m). It is bounded on the west by the Huiarau Range and on the south by the sheer 2,000-foot (610-kilometre) wall of Panekiri Bluff. First sighted by Europeans in 1844, Lake Waikaremoana, whose name is Maori for "sea of rippling water," now lies within the forested Urewera National Park but still belongs to the indigenous Maori. Once emptied by natural overflow and subsurface drainage, the lake may vary as much as 45 feet (14 m) in depth according to the amount of water being siphoned off to supply downstream hydroelectric stations. The town of Waikaremoana, on the lake's northeastern shore, is a resort centre.

Waikato, local government region, northern North Island, New Zealand. It includes the mountainous Coromandel Peninsula and adjacent Hauraki Plains in the northeast; the fertile Waikato River valley in the northwest; the hills, limestone crags, and canyons of King Country in the southwest; and much of the island's rugged central volcanic plateau and Lake Taupo, the country's largest lake, in the southeast. The region is bordered by the Tasman Sea on the west and by the South Pacific Ocean on the east.

The Coromandel Peninsula, some 70 miles (110 km) long and about 20 miles (30 km) wide, is formed by the Coromandel Range,

which rises to more than 2,900 feet (880 m) above sea level. The mountainous peninsula is bounded by the Firth of Thames and Hauraki Gulf to the west. Its extensive forests were exploited by the British for ship timber in the second half of the 19th century. Sheep and dairy cattle are now raised in the region, which is also a resort area.

The valley of the northwestward-flowing Waikato River lies west of the Coromandel Peninsula. The valley was densely populated by Maori originally and was swampy until drained by Europeans in the 19th century. The Waikato River valley now consists mostly of lush pasturelands that support dairy and beef cattle as well as thoroughbred horses. Hamilton, located in the Waikato River valley about 70 miles (113 km) south of Auckland, is New Zealand's largest inland city and is a noted centre of agricultural research.

King Country, which extends south of the Puniu River (an upper tributary of the Waikato), is a relatively isolated farming and timber-producing area of poor soils, forested hills and mountains, and seascapes along the Tasman Sea. To the southeast, North Island's central plateau rises above the Rangipo Desert to three snow-clad volcanoes: Tongariro, Ngauruhoe, and Ruapehu (the highest; 9,176 feet [2,797 m]), all in Tongariro National Park. Lake Taupo, in the centre of the plateau region, covers an area of 234 square miles (606 square km) and was first seen by Europeans in the 1930s. Both the national park and the lake are major centres of tourism; sheep rearing and timber production are also economically important. Pop. (1991) 338,959.

Waikato River, river, the longest in New Zealand, in central North Island. Rising on the slopes of Mount Ruapehu in Tongariro National Park as the Tongariro River, it flows north through Lake Taupo and, issuing from the lake's northeastern corner, tumbles over Huka Falls and flows northwest to enter the Tasman Sea south of Auckland. The river is 264 miles (425 km) long. It has a gentle gradient and carries a heavy load of ash from the volcanic highlands. The Waikato has formed numerous lakes and lagoons along its lower reaches. Its principal tributaries are the Waipa and Poutu. Major towns in its valley are Taupo, Rotorua, Cambridge, and Hamilton (head of navigation for small steamers). Several power stations built on the river between Taupo and Karapiro are a major source of hydroelectric power. The artificial lakes created by the power stations are popular recreation areas. A thermal-power station at Huntly, using coal mined nearby, began operating in 1980. The river, whose name is Maori for "flowing water," was the scene of several skirmishes between the British and the Waikato tribes in 1863–65.

Waikiki, resort area, Honolulu county, on the southern coast of Oahu Island, Hawaii, U.S. Waikiki (Hawaiian: "Spurting Water"), the southeastern section of Honolulu, is on Mamala Bay between the Ala Wai Canal (north and west) and Diamond Head crater (southeast). Its beach, a tourist's mecca, is one of the best known in the world. Lined with luxury hotels, it is the focus of water-sports facilities and has an aquarium, zoo, garden attractions, and the International Market Place. Waikiki is also the site of Fort DeRussy, a military recreation area. The area was once a favourite resort of island monarchs, with coconut groves, fishponds, and walled taro patches that extended a mile inland.

Wailing Wall (Judaism): *see* Western Wall.

Wailua River, river on Kauai Island, Hawaii, U.S. It flows from the slopes of Mount Waialeale about 10 miles (16 km) inland, to the east-central coast. The Wailua River Reserve, a 587-acre (238-hectare) coastal state park along the river, is rich in Hawaiian tradition. The first migratory Tahitians, including the great chief Puna-nui, arrived in the 12th century and settled near the present coastal towns of Wailua and Kapaa. During the period of island kings, only royalty (*alii*) could visit the area. The name Wailua (Hawaiian: "Two Waters") probably refers also to the North Fork that joins the main stream about 2 miles (3 km) from the coast. The riverbanks are a tangle of luxuriant vegetation, and 4 miles (6 km) upstream, at the end of boat navigation, is the Fern Grotto, a scenic lava cave festooned with ferns and curtained by a small waterfall. Ruined *heiaus* (temples) are in evidence in the area, and one, Holo-holo-ku, has been restored. Sugar and coconut plantations, cattle, and tourism are significant to the local economy.

Wailuku, city, seat of Maui county, northern Maui Island, Hawaii, U.S. It is situated on an isthmus at the mouth of the valley of Iao and the base of the western mountains. With Kahului (east) it forms a contiguous area that is the most densely populated and busiest on the island. Iao Stream flows through the western part of the city. Wailuku (Hawaiian: "Water of Destruction") recalls the Battle of Kepaniwai (1790) that added Maui to the kingdom of Kamehameha the Great. Wailuku's economy depends chiefly on tourism, sugar, textiles, woodworking products, shoes, and hula supplies. Products are shipped from the port of Kahului. Pop. (1990) 10,688.

Waimakariri River, river in east-central South Island, New Zealand. It rises in the Southern Alps and flows 100 miles (160 km) southeast to Pegasus Bay of the Pacific Ocean. 8 miles (13 km) north of Christchurch. Fed by its principal tributaries—the Bealey, Poulter, and Esk—the river drains a basin of about 1,000 square miles (2,600 square km). The delta formed at its mouth constitutes a major portion of Banks Peninsula and part of the Canterbury Plains. In its lower course, the river flows in braided channels, which prevent navigation and limit port activities to Kaiapoi, at its mouth. During the winter, the river's upper reaches may run dry. The valley supports sheep grazing; grain is cultivated south of the river between Aylesbury and West Melton. Waimakariri is a Maori term meaning "cold water."

Waimea, town, Kauai county, on Waimea Bay, southwestern Kauai Island, Hawaii, U.S. It lies at the mouth of the Waimea River. The canyon valleys of the Waimea (Hawaiian: "Reddish Water") River and its tributary, the Makaweli River, were once heavily populated, and the town was an early centre of native government. It was there that Captain James Cook, the English navigator-explorer, made his first landing in the Hawaiian Islands on Jan. 20, 1778. Waimea developed as a provisioning port for whalers and sandalwood traders. A ruined Russian fort, built (1815) in a futile attempt to seize the isle, occupies a coastal bluff above the Waimea River. A rich sugar-plantation region extends 9 miles (15 km) northwest of Waimea through Kekaha to Mana. Barking Sands Military Reservation is on the coast near Mana. Pop. (1990) 1,840.

Wain, John (Barrington) (b. March 14, 1925, Stoke-on-Trent, Staffordshire, Eng.—d. May 24, 1994, Oxford, Oxfordshire), English novelist and poet whose early works caused him, by their radical tone, to be spoken of as one of the "Angry Young Men" of the 1950s. He was also a critic and playwright.

Wain was educated at St. John's College, Oxford, of which he subsequently became a fellow. He was a lecturer in English literature at the University of Reading from 1949 to 1955 and from 1973 to 1978 was professor of poetry at Oxford.

His poetry includes *Mixed Feelings* (1951), *A Word Carved on a Sill* (1956), *Weep Before God* (1961), *Wildtrack* (1965), *Letters to Five Artists* (1969), and *Feng* (1975). *Poems 1949–1979* was published in 1980. His poetry, witty and brittle, has been criticized for its occasionally contrived cleverness.

Hurry On Down (1953) was Wain's first and, to some critics, best novel. (Other contenders would probably be *Strike the Father Dead* [1962] and *A Winter in the Hills* [1970].) It follows the adventures of a university graduate valiantly trying to establish some sort of personal identity in the bewildering and rapidly changing society of postwar Britain. Wain's other novels include *Living in the Present* (1955), *The Contenders* (1958), *The Young Visitors* (1965), *The Smaller Sky* (1967), and *The Pardoner's Tale* (1978). His short stories are collected in *Nuncle and Other Stories* (1960), *Death of the Hind Legs* (1966), and *The Life Guard and Other Stories* (1971). Wain wrote a considerable body of literary criticism, including *Preliminary Essays* (1957), *Essays on Literature and Ideas* (1963), and *The Living World of Shakespeare* (1964; rev. ed., 1979). He wrote a biography of Samuel Johnson (1974, with a revised edition in 1980) and an autobiography, *Sprightly Running* (1962). In 1983 he was made a Companion of the Order of the British Empire.

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Wainganga River, river, tributary of the Godāvari River, western India. It rises in the Mahādeo Hills in south-central Madhya Pradesh state and flows 360 miles (580 km) south to join the Wardha River (a headwater of the Godāvari) northeast of Kāgaznagar in Mahārāshtra state. Along the final 142 miles (229 km) of its course, the river forms the boundary between Mahārāshtra and Andhra Pradesh states and is known as the Prānhita. The Wainganga River valley is forested and relatively sparsely populated, except in the northern industrial area around Nāgpur city in Mahārāshtra state. Most of the population is concentrated along the river, where rice is extensively irrigated. Major river towns include Kāmptee, Bhandāra, and Pauni.

wainscot, interior paneling in general and, more specifically, paneling that covers only the lower portion of an interior wall or partition. It has a decorative or protective function and is usually of wood, although tile and marble have at times been popular. The molding along the upper edge is called a wainscot cap and may serve as a chair rail.

Traditionally, British wainscot was oak—imported from Russia, Germany, or Holland—and wainscot oak remains a term for especially selected, quartersawn oak for paneling. A typical use of wainscot appears in early English Renaissance mansions where oak paneling to a height of 8 or 10 feet (2.5 to 3 m) was installed and hung with paintings or armour. The French equivalent for wainscot is boiserie. The latter term's use is generally reserved, however, for the profusely decorated paneling, often carved in low relief, of the 17th and 18th centuries in France. Boiserie commonly covers the wall up to the ceiling and may also be painted, gilded, or, in some instances, inlaid.

wainscot chair, also called PANEL CHAIR, a joined wooden chair, usually made of oak, hence the name wainscot, which was used to describe a fine grade of oak usually used for paneling. Like many terms used in reference to furniture, it has a general and a particular meaning. The general sense is any heavy wooden chair of fairly simple construction. The more specific reference is to a wooden chair with turned (shaped on a lathe) front

legs, square-sectioned back legs, arm supports, a simple, unupholstered seat, and a slightly raked panel back, usually with some form of incised decoration and sometimes topped



Wainscot chair, English, early 17th century; in the Metropolitan Museum of Art, New York City

By courtesy of the Metropolitan Museum of Art, New York City, the Sylmaris Collection, gift of George Coe Graves, 1923

with a carved cresting. Wainscot chairs were a popular feature of early 17th-century English and colonial households.

Wainwright, town, east-central Alberta, Canada. It lies 129 miles (208 km) southeast of Edmonton. Founded as Dewood in about 1905, it was renamed to honour William Wainwright, a Grand Trunk Pacific Railway vice president, after the arrival of the railroad in 1909. The town is located in a mixed-farming area, but its economic base changed following the discovery of oil and gas in the region in 1929. The area was once known for its buffalo, which were moved to Wainwright Park in 1910 to prevent their extinction. During World War II the animals (which then included moose, elk, and deer) were moved to Elk Island National Park (*q.v.*), and Wainwright Park became a military base. Inc. village, 1908; town, 1910. Pop. (1991) 4,732.

Wainwright, Jonathan M., in full JONATHAN MAYHEW WAINWRIGHT (b. Aug. 23, 1883, Walla Walla, Wash., U.S.—d. Sept. 2, 1953, San Antonio, Texas), U.S. Army general who won distinction as the hero of Bataan and Corregidor in the defense of the Philippines against Japanese attack during World War II.

After he graduated from the U.S. Military Academy at West Point, N.Y., (1906), Wainwright joined the cavalry and saw action in Europe during World War I. In September 1940 he was promoted to major general and sailed for Manila to take command of the Philippine Division. Thus, when World War II broke out in the Far East (December 1941), he was already a seasoned leader of well-trained U.S. and Filipino troops. When General Douglas MacArthur left the Philippines to assume a higher post (March 1942), Wainwright was given command of all U.S. forces remaining in the islands—a situation that was already militarily hopeless. Retreating finally from the peninsula of Bataan to the island fortress of Corregidor in Manila harbour, Wainwright was forced on May 6 to surrender his hungry, battle-scarred forces to the Japanese. From then until August 1945 he and his men were held prisoners of war in Taiwan and in Manchuria. After the Japanese surrender in 1945, he returned home to receive a hero's welcome and the Medal of Honor.

wairakite, hydrated calcium aluminosilicate mineral present in hot-spring deposits, notably those at Wairakei, New Zealand, and Onikobe, Japan. Like analcite, wairakite has been assigned to two mineral families: it is regarded as a feldspathoid because of its chemical properties, molecular structure, and mode of formation but as a zeolite because of its ion-exchange and reversible dehydration behaviour. Wairakite forms colourless, often twinned crystals of monoclinic symmetry; its chemical formula is $CaAl_2Si_4O_{12} \cdot 2H_2O$. Several other zeolite minerals are converted to wairakite in the presence of water at high temperatures and pressures.

Wairau River, river in northern South Island, New Zealand. It rises in the Spenser Mountains and flows for 105 miles (169 km) between the St. Arnaud and Raglan ranges to enter Cloudy Bay of Cook Strait. Wairau Bar (Te Pokohiwi), a long spit of boulders at the river's mouth, encloses more than 15 lagoons, which had been interconnected by artificial channels before the arrival of Europeans.

Together with its principal tributaries—the Rainbow, Branch, and Waihopia rivers—the Wairau drains a basin of 1,630 square miles (4,220 square km). Its lower reaches are susceptible to flooding. The chief settlement of the valley is Blenheim, near the mouth.

In 1843 the Wairau (Maori: "Many [or One Hundred] Waters") was the site of the Wairau Affray, a battle between the New Zealand Company and local Maori chiefs.

wait, an English town watchman or public musician who sounded the hours of the night. In the later Middle Ages the waits were night watchmen, who sounded horns or even played tunes to mark the hours. In the 15th and 16th centuries waits developed into bands of itinerant musicians who paraded the streets at night at Christmas time. From the early 16th century, London and all the chief boroughs had their corporation waits.

In the 18th and early 19th centuries the custom developed of these ordinary street watchmen serenading householders at Christmas time and calling on the day after Christmas Day to receive a gratuity. When, in 1829, their place as guardians of a city's safety was taken over by the police, private individuals kept up the custom, playing and singing suitable Christmas music.

Waitaki River, river in central South Island, New Zealand. Streams issuing from Lakes Ohau, Pukaki, and Tekapo in the Southern Alps form the Waitaki (Maori: "Weeping Waters"), which, draining a 4,565-square-mile (11,823-square-kilometre) basin, flows southeast for 130 miles (209 km) to enter the Pacific



Benmore Dam on the Waitaki River, New Zealand

G.R. Roberts, Nelson, N.Z.

at Glenavy, about 70 miles (113 km) north of Dunedin. The Waitaki River Power Development, which includes several large dams, is one of the largest hydroelectric projects in the nation.

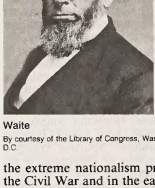
Waitangi, Treaty of (Feb. 6, 1840), historic pact between Great Britain and a number of New Zealand Maori tribes of North Island. It purported to protect Maori rights and was the immediate basis of the British annexation of New Zealand. Negotiated at the settlement of Waitangi on February 5–6 by Britain's designated consul and lieutenant governor William Hobson and many leading Maori chiefs, the treaty's three articles provided for (1) the Maori signatories' acceptance of the British queen's sovereignty in their lands, (2) the crown's protection of Maori possessions, with the exclusive right of the queen to purchase Maori land, and (3) full rights of British subjects for the Maori signatories.

In May 1840 Britain annexed all of New Zealand, the North Island on the basis of the Waitangi treaty and the South Island by the (dubious in this case) right of discovery. The vital land-selling article of the treaty, designed to protect the Maori from large-scale private land purchase that would have cheated them and disrupted their society, remained in effect until 1862.

The arrangement had serious shortcomings in practice. The Maori were dissatisfied because the impoverished colonial government could not afford to buy much land; and the land it did buy was resold to Europeans at a substantial profit. British immigrants were also angered by government land profits and by the scarcity of land. The resulting interracial and intercultural tension led to warfare in 1844–47 and the Maori Wars of the 1860s. The land-selling article of the treaty ceased to be operative with the passage of the Native Land Act of 1862, which provided for private purchase of Maori land.

Since 1960, February 6 is celebrated by New Zealanders as Waitangi Day, an occasion for thanksgiving.

Waite, Morrison Remick (b. Nov. 29, 1816, Lyme, Conn., U.S.—d. March 23, 1888, Washington, D.C.), seventh chief justice of the United States (1874–88), who frequently spoke for the Supreme Court in interpreting the post-Civil War constitutional amendments and in redefining governmental jurisdiction over commerce in view of the great expansion of American business. Reacting against



Waite

By courtesy of the Library of Congress, Washington, D.C.

the extreme nationalism predominant during the Civil War and in the early Reconstruction years, the Waite court did much to rehabilitate the idea of states' rights.

The son of a justice of the Connecticut Supreme Court, Waite practiced law in Toledo, Ohio. In 1871–72 he became nationally prominent as one of the U.S. counsels to the *Alabama* arbitration commission at Geneva, dealing with Great Britain's liability to the United States for permitting Confederate warships to be built and serviced in British ports. The favourable impression he made on President Ulysses S. Grant at that time led to his appointment as chief justice by Grant on Jan. 19, 1874.

Waite's most famous opinion was *Munn* v. *Illinois,* 94 U.S. 113 (1877), one of a group of six Granger cases involving Populist-inspired state legislation to fix maximum rates charge-

able by grain elevators and railroads. Against the assertion that the Granger laws constituted deprivation of private property without due process of law and conflicted with the Fourteenth Amendment (1868), Waite borrowed a phrase from Sir Matthew Hale, lord chief justice of England (1671–76), to hold that, when a business or private property was "affected with a public interest," it was subject to governmental regulation.

In several cases concerning the recently freed and supposedly enfranchised blacks, Waite held that the privileges and immunities of U.S. citizens had not been increased by the Fourteenth Amendment and that neither it nor the Fifteenth Amendment (1870) had given Congress extensive power to safeguard civil rights. In *United States* v. *Cruikshank,* 92 U.S. 542 (1876), he stated that, despite its apparently plain language, the Fifteenth Amendment had not conferred a federal right of suffrage on blacks, because "the right to vote comes from the states." In *Hall* v. *De Cuir,* 95 U.S. 485 (1878), he struck down, as a "direct burden" on interstate commerce, a Louisiana Reconstruction statute requiring full racial integration of passengers by common carriers. In *Reynolds* v. *United States,* 98 U.S. 145 (1878), in upholding the application of antipolygamy laws to Mormons, Waite distinguished between the freedom to hold a religious belief and the freedom to engage in religious practices (polygamy) that had been outlawed by legislative act.

Waite tried to establish a nonpolitical conception of the chief justiceship. In 1876 he might have had the Republican Party's nomination for president, but he rejected it because, in his view, his candidacy would detract from the court's prestige.

Waitemata Harbour, harbour in northern North Island, New Zealand. The focal point of the Auckland region, it opens into Hauraki Gulf (east) through Stanley Bay. Its shore has many lesser embayments, containing Island, Soldiers, and Onetaunga bays in the northwest, Herne Bay in the southeast, and Stanley and Freemans bays in the east. Several tidal rivers, including Henderson and Whau creeks, empty into the western part of the harbour. Tidal mudflats covered by mangroves and salt marshes mark its banks. The Auckland Harbour Bridge spans it in the east, linking Auckland on the south with Takapuna on the north.

Deep navigable channels, slow currents, and minimal tidal range all contribute to good berthing facilities for large ships. The harbour also provides a setting for a one-day regatta that draws thousands of people into Auckland annually.

waiting-line theory (management science): *see* queuing theory.

Waitomo, limestone caves, north-central North Island, New Zealand. They lie about 50 miles (80 km) south of Hamilton. Located on a tributary of the Waipa River, the caves are easily accessible for tourists by road. The underground caves have elaborate stalactites, stalagmites, and incrustations, some of which are named *(e.g.,* Bride's Jewels, Organ, White Terrace, Blanket Chamber). The main attraction is a boat journey along the underground river that takes the visitor to Glow-worm Grotto, lit by countless glowworms.

Waitz, Georg (b. Oct. 9, 1813, Flensburg, Schleswig [now in Germany]—d. May 24, 1886, Berlin, Ger.), German historian who was the founder of a renowned school of medievalists at the University of Göttingen. As the leading disciple of Leopold von Ranke's critical methods, he is regarded as the ablest of the German constitutional historians; many consider him to be superior to his teacher in exactness of scholarship.

Educated at the universities of Kiel and Berlin, Waitz was early influenced by Ranke. He began his researches in medieval German history while still a student, going to Hanover (1836) to assist in the work of publishing the *Monumenta Germaniae Historica.* Appointed to the chair of history at the University of Kiel in 1842, he became involved in politics; a fervent German nationalist, he sat in the provincial diet as a representative of his university (1846) and went to Berlin to represent the provisional government set up by the northern duchies of Schleswig in their revolt against the Danes. Elected by Kiel as a delegate to the national parliament at Frankfurt in 1848, he adhered to his party's policy for the unification of the German states under a German emperor, resigning only when the Prussian king refused the crown.

At Göttingen, where Waitz became a professor in 1849, his lectures and scholarship attracted many students and soon established the worldwide reputation of that university's historical school. His major work, *Deutsche Verfassungsgeschichte,* 8 vol. (1844–78; "German Constitutional History"), is an exhaustively annotated study of medieval German institutions from the earliest times to the middle of the 12th century, remarkable for its thoroughness. In 1875 he became editor of *Monumenta Germaniae Historica.* Other studies by Waitz include the important *Schleswig-Holsteins Geschichte,* 2 vol. (1851–54; "History of Schleswig-Holstein"), as well as numerous treatises on medieval German history.

Waiuku, town, Auckland local government region, northern North Island, New Zealand. It lies along the Waiuku estuary, which is the southern arm of Manukau Harbour. The settlement was founded in 1843 as a port on the route between Auckland and the agricultural area of the Waikato River to the south. Its function as a trading centre ceased with the Waikato War of 1863–64, when it was made a stockade. Waiuku was made a town in 1914. It lies near the terminus of a line branching from the North Island Main Trunk Railway at Paerata (east) and is the distribution and service centre for a dairy- and mixed-farming region 40 miles (65 km) southwest of Auckland. Its industries include stockyards, light engineering works, small boatbuilding, and the production of butter, knitwear, clothing, and joinery goods. New Zealand's first steel mill (1970), located at Glenbrook (5 miles [8 km] northeast), uses iron sands from North Head of the Waikato River. Pop. (1987 est.) 4,360.

Wajda, Andrzej (b. March 6, 1926, Suwałki, Pol.), leading director in the "Polish film school," a group of highly talented individuals whose films brought international recognition to the Polish cinema during the 1950s.



Wajda, 1972
Renata Pajchel Socha

Wajda became interested in the visual arts when working as assistant to a restorer of old church paintings in Radom. He studied painting at the Academy of Fine Arts in Kraków, then film directing at the Leon Schiller State Theatre and Film School at Łódź. His first three films, *Pokolenie* (1954; *A Generation*), *Kanał* (1957; *Canal*), and *Popiół i diament* (1958; *Ashes and Diamonds*), won prizes at international film festivals. They constituted a trilogy that dealt in symbolic imagery with sweeping social and political changes in Poland during the German occupation, the Warsaw uprising of 1944, and the immediate postwar years. The actor Zbigniew Cybulski became famous for his portrayal of the hero, a boy growing into manhood whose idealism survives the humiliation and defeat of the occupation and the deaths of friends and the girl he loves.

Wajda became increasingly concerned with the problems of youth in the contemporary world and with the conflicts inherent in the human situation in later films such as *Lotna* (1959), *Wszystko na sprzedaż* (1968; *Everything for Sale*), *Zeimia obiecana* (1976; *The Promised Land*), *Człowiek z marmary* (1977; *Man of Marble*), *Bez znieczulenia* (1978; *Without Anesthetic,* or *Rough Treatment*), *Panny z Wilka* (1979; *The Young Girls of Wilko*), *Człowiek z zelaza* (1981; *Man of Iron*), and *Danton* (1983).

wak'a (Inca religion): *see* huaca.

waka, Japanese poetry, specifically the court poetry of the 6th to the 14th century, including such forms as the *chōka* and *sedōka,* in contrast to such later forms as *renga, haikai,* and *haiku.* The term *waka* also is used, however, as a synonym for *tanka,* the short poem that is a basic Japanese form.

The *chōka,* "long poem," is of indefinite length, formed of alternating lines of five and seven syllables, ending with an extra seven-syllable line. Although many *chōka* have been lost, the shortest of those extant are 7 lines long, the longest are 149 lines. They may be followed by one or more envoys. The *chōka* of Kakinomoto Hitomaro and Yamanoue Okura (both fl. 8th century) are collected in the *Man'yōshū.*

The *sedōka,* or "head-repeated poem," consists of two tercets of five, seven, and seven syllables each. An uncommon form, it was sometimes used for dialogues. Hitomaro's *sedōka* are noteworthy. *Chōka* and *sedōka* were seldom written after the 8th century.

The *tanka,* or "short poem," the basic form of Japanese poetry, has existed throughout the history of written poetry until the present, outlasting the *chōka* and preceding the *haiku.* It consists of 31 syllables in five lines of 5, 7, 5, 7, and 7 syllables each. The envoys to *chōka* were in *tanka* form. As a separate form, *tanka* also served as the progenitor of *renga* and *haiku.*

Renga, or "linked verse," is a form in which three or more poets supplied alternating verses of five, seven, and five and seven and seven syllables according to an exacting canon. The *Kin'yōshū* (*c.* 1125) was the first imperial anthology to include *renga,* at that time simply *tanka* composed by two poets, one supplying the five, seven, and five beginning and the other the seven and seven ending. These were *tan renga* ("short" *renga*) and generally light in tone. The form developed fully in the 15th century, during the Muromachi (1338–1573) period, when a distinction came to be drawn between *ushin renga* ("serious" *renga*), which followed the conventions of court poetry, and *haikai,* or *mushin renga* ("unconventional," or "frivolous," *renga*), which deliberately broke those conventions in terms of vocabulary and diction. The standard length of a *renga* was 100 verses, although there were variations. Verses were linked by verbal and thematic associations, while the mood of the poem drifted subtly as successive poets took up one another's thoughts. An outstanding example is the melancholy *Minase sangin hyakuin* (1488; *Minase Sangin Hyakuin: A Poem of One Hundred Links Composed by Three Poets at Minase,*

1956), composed by Sōgi (1421–1502), Shōhaku (1443–1527), and Sōchō (1448–1532). Later the initial verse (*hokku*) of a *renga* developed into the independent haiku form.

Japanese poetry has generally consisted of very small basic units, and its historical development has been one of gradual compression down to the three-line haiku, in which an instantaneous fragment of an emotion or perception takes the place of broader exposition. *See also* haiku.

Wakatipu Lake, lake in south-central South Island, New Zealand. The S-shaped lake measures 48 miles (77 km) by 3 miles (5 km) and has an area of 113 square miles (293 square km). It is the second largest of the Southern Lakes, being exceeded only by Te Anau. The lake's name is of Maori derivation and may mean "water springs dug by Rakaihaitu" or, more likely, may refer to a legend of a goblin living below the surface whose breathing was believed to cause the unusual 5-inch (125-millimetre) rise and fall in the lake's water level. The lake occupies a valley that was overdeepened by glaciation and then dammed by a moraine (glacial debris). Thus, while the lake's surface elevation is 1,017 feet (310 m), its floor, with a maximum depth of 1,240 feet (378 m), lies more than 200 feet (61 m) below sea level. Receiving the Dart and Rees rivers at its head and the Greenstone and Von from the west, Wakatipu drains a 1,150-square-mile (2,978-square-kilometre) basin. It empties to the east by the Kawarau, a tributary of the Clutha. Just south of the outlet, the 7,600-foot (2,300-metre) Remarkable mountain range overlooks the lake. Wakatipu is a resort area focused on Queenstown, on the central east shore. A steamship line runs from the rail terminus at Kingston, in the south, to Glenorchy, near the lake's head. A road also connects Glenorchy to Queenstown.

Wakayama, *ken* (prefecture), south-central Honshu, Japan. It occupies the Kii Peninsula, which faces the Kii Strait (west) and the Pacific Ocean (south). Most of its area of 1,824 square miles (4,725 square km) is mountainous and broken by deep river valleys, such as the Toro Gorge on the Kumano River. Despite frequent typhoons in summer, the climate is mild, and the coastal plain and some large valleys are rich agricultural regions. Fishing for tuna, bonito, mackerel, and sardines has been carried on along the coast since early historic times.

Industrialization is confined largely to the northwest, where the city of Wakayama (the prefectural capital) and neighbouring Kainan are part of the Hanshin Industrial Zone. These cities' major products include petrochemicals, textiles, iron, and steel. A thermoelectric plant began operation near Kainan during the early 1970s.

Wakayama prefecture is also a major tourist area, with attractions including the seascape, beaches, hot-spring resorts, and Shinto shrines and Buddhist temples. Nachi-Katsura, in Yoshino-Kumano National Park, is a tourist centre located near hot springs and the Nachi Waterfall. The town of Taiji is considered the birthplace of Japanese whaling and contains a whaling museum. Mount Kōya, in the northern part of the prefecture, is crowned by a Buddhist temple complex, monastery, and extensive cemetery founded in the 9th century AD. A university was founded there in 1949. Pop. (1997 est.) 1,078,000.

Wakayama, city, Wakayama *ken* (prefecture), south-central Honshu, Japan. It is situated at the mouth of the Kino River, on the Kii Peninsula, and lies along the Kii Strait, which leads from the Pacific Ocean into the Inland Sea. It is the capital and largest city of Wakayama prefecture. The settlement's growth began in 1585 with the construction of a castle there by Hideyoshi Toyotomi. Wakayama subsequently became the headquarters of the Kii branch of the ruling Tokugawa family of Japan. The last seven shoguns of Japan, ruling from 1716 to 1867, were members of this branch. Wakayama's traditional industries were the manufacture of furniture and cotton textiles, but steel and petrochemical plants were established there after World War II. The original Wakayama Castle founded by Hideyoshi was destroyed by fire in World War II but was later rebuilt, the grounds around it being made into a public park. The nearby Buddhist temple of Kimiidera is another notable attraction. Pop. (1995) 393,885.

wake, watch or vigil held over the body of a dead person before burial and sometimes accompanied by festivity; also, in England, a vigil kept in commemoration of the dedication of the parish church. The latter type of wake consisted of an all-night service of prayer and meditation in the church. These services, officially termed Vigiliae by the church, appear to have existed from the earliest days of Anglo-Saxon Christianity. Each parish kept the morrow of its vigil as a holiday. Wakes soon degenerated into fairs; people from neighbouring parishes journeyed over to join in the merrymaking, and the revelry and drunkenness became a scandal. The days usually chosen for church dedications being Sundays and saints' days, the abuse seemed all the more scandalous. In 1445 Henry VI attempted to suppress markets and fairs on Sundays and holy days.

Side by side with these church wakes there existed the custom of "holding a wake over" a corpse. The custom, as far as England was concerned, seems to have been older than Christianity and to have been at first essentially Celtic. Doubtless it had a superstitious origin, the fear of evil spirits hurting or even removing the body. The Anglo-Saxons called the custom lich-wake, or like-wake (from Anglo-Saxon *lic*, a corpse). With the introduction of Christianity, the offering of prayer was added to the vigil. As a rule, the corpse, with a plate of salt on its breast, was placed under the table, on which was liquor for the watchers. These private wakes soon tended to become drinking orgies. With the Reformation and the consequent disuse of prayers for the dead, the custom of waking became obsolete in England but survived in Ireland. Many countries and peoples have a custom equivalent to waking, which, however, is distinct from funeral feasts.

Wake Island, formerly HALCYON ISLAND, or HELSION ISLAND, an atoll in the central Pacific Ocean, 2,300 miles (3,700 km) west of Honolulu. An unincorporated territory of the United States, it comprises three low-lying coral islets (Wilkes, Peale, and Wake) that rise to 21 feet (6 m) and occupy a total land area of 2.5 square miles (6.5 square km). Linked by causeways, they lie in a crescent configuration on a reef (4.5 miles [7.2 km] long and 2 miles [3.2 km] wide) surrounding a lagoon. The atoll receives little rainfall, which may explain the absence of inhabitants when it was first sighted (1568) by the Spanish explorer Álvaro de Mendaña. Two water catchments and a distillation plant for seawater have alleviated the problem. Visited by the British mariner William Wake (1796), the atoll was charted by a U.S. expedition under Lieutenant Charles Wilkes (1841). It was formally claimed by the United States in 1899 for the site of a cable station and was placed under naval jurisdiction in 1934. The following year a commercial seaplane base and hotel were built for overnight stops on transpacific flights to Guam and the Philippines.

In 1939 the U.S. Navy began construction of an air and submarine base; this was half completed when Wake was attacked and occupied by Japanese forces in December 1941. Soon after the Japanese surrender and the return of U.S. personnel to the island in 1945, commercial flights were resumed. Since 1974 it has been used by commercial aircraft, mainly for emergency stopovers. In 1975 Vietnamese refugees were housed on Wake Island before transport was arranged to the United States. The atoll, which has a jet airfield, is administered by the U.S. Air Force. The U.S. National Weather Service and National Oceanographic and Atmospheric Administration operate research stations on the islands. Bridges link the islets. The atoll is linked by underwater cables with Honolulu and Guam. Pop. (1995) 302.

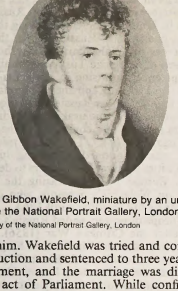
Wake Island, Battle of, battle for a small atoll named Wake Island in the central Pacific in December 1941, waged between U.S. Marine and civilian defenders and Japanese invaders. At that time, Wake Island was the site of a half-completed U.S. air and submarine base. The Japanese first attacked Wake with 36 bombers at noon on Dec. 8, 1941 (Wake time; December 7, Hawaiian time), a few hours after the Pearl Harbor attack. A Japanese naval task force that included cruisers and destroyers appeared on December 11 but was repulsed with considerable loss by the coastal-defense guns and aircraft. Thereafter, however, the Japanese had the atoll under almost continuous air attack, and a U.S. relief force failed to reach the area before the Japanese returned on December 23 with a much more powerful force and in five hours forced the surrender of the island forces under U.S. Navy Commander Winfield Scott Cunningham. Altogether 1,616 Americans were captured, and most of them were evacuated to China and Japan. The Japanese fortified the atoll heavily, but repeated attacks by U.S. aircraft during the remainder of the war devastated it completely. The Japanese garrison surrendered the atoll on Sept. 4, 1945.

Wakefield, city ("district"), in the southeastern portion of the metropolitan area of West Yorkshire, England. With an area of 129 square miles (333 square km), the district extends eastward from the older coal-mining and wool-manufacturing area in the Pennine foothills to the plain beyond the confluence of the Rivers Aire and Calder at Castleford. Coal mining is now concentrated in large collieries working rich, deep seams east of the Wakefield city centre and supplying electricity-generating stations of Fernbridge. Kellingley, near the eastern boundary of the district, is the newest pit (1965). The fertile limestone tract in the eastern part of Wakefield is graced by fine mansions set in parkland, such as Bretton and Woolley halls and Nostell Priory, but is also scarred by mining subsidence and spoil heaps.

The district is named for its main population centre, the historic city of Wakefield. Wakefield was originally the chief locality in a large estate belonging to Edward the Confessor and was still a royal manor in 1086. Shortly afterward it became a baronial holding. By 1308 Wakefield had a wool market, and in about 1470 Flemish cloth weavers began to settle there, stimulating the local woolen industry. By the 16th century, together with Halifax and Leeds, Wakefield had become noted for cloth finishing and dyeing. The town was attacked and taken by the Parliamentarian general Thomas Fairfax in 1643 during the English Civil Wars. Still a textile centre, it specializes in wool and synthetic knitting yarns. Wakefield has dyestuffs and engineering industries. The city has retained the administrative importance that it acquired as the county town of the former West Riding of Yorkshire, but it is subsidiary to Leeds as a commercial centre. Pop. (1991) city, 73,955; (1999 est.) district, 310,915.

Wakefield, Edward Gibbon (b. March 20, 1796, London, Eng.—d. May 16, 1862, Wellington, N.Z.), British colonizer of South Australia and New Zealand and inspirer of the Durham Report (1839) on Canadian colonial policy.

In 1814 Wakefield became secretary to the British minister at Turin, Italy, and in 1816 he married. His wife died in 1820, and in 1826, while on the staff of the British embassy in Paris, he tricked a young heiress into marrying him. Wakefield was tried and convicted of abduction and sentenced to three years' imprisonment, and the marriage was dissolved by an act of Parliament. While confined in Newgate Prison, London, Wakefield saw first-hand the immense problems of the penal system and learned of the forcible removal of convicts to British overseas possessions, where squalid and often brutal conditions prevailed. He concluded that the controlled low-cost settlement of ordinary citizens (not convicts) in the colonies would best solve the problems of poverty and crime caused by the sharp increase in the British population. In his first important book, *A Letter from Sydney* . . . (published in 1829 while he was still in prison), which was thought by many to have come from Australia, he proposed the sale of crown lands there in small units at a "sufficient price" (fixed and modest), rather than the granting of large tracts free. The proceeds would pay for sending emigrants from Great Britain, who were to be equally divided by sex and to represent a cross-section of English society.



Edward Gibbon Wakefield, miniature by an unknown artist, in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

In 1831 regulations embodying the "sufficient price" concept were applied to New South Wales (originally settled by convicts) in Australia and to Cape Colony in southern Africa. Further, Wakefield's anonymous *England and America* . . . , 2 vol. (1833), an elaboration of his theories, influenced the South Australian Act of 1834, which forbade the organization of South Australia as a convict settlement and incorporated the notion of the "sufficient price" for subsidizing immigration. The colony was founded Dec. 28, 1836.

Through Wakefield's influence, the New Zealand Association was formed in 1837; it was amalgamated with two other groups in 1838 as the New Zealand Company. On Sept. 24, 1839, a party headed by his brother William Wakefield arrived in New Zealand to buy land from the native Maori. Legal and moral objections were raised, but the land company's activities doubtless hastened the British annexation of New Zealand and may have forestalled a similar move by France.

Meanwhile, in 1838, Wakefield had spent five months in Canada as unofficial adviser to John George Lambton, 1st Earl of Durham, the governor general and lord high commissioner, whose chief secretary, Charles Buller, was an enthusiast for Wakefield's ideas. Durham's *Report on the Affairs of British North America* (submitted to Parliament on Jan. 31, 1839) advocated the union of Upper Canada (Ontario) and Lower Canada (Quebec) under a single legislature to which, as Wakefield had urged, the colonial Executive Council would be responsible. Wakefield's encouragement and ideas influenced Durham in writing the report. In the new Canadian legislature Wakefield briefly represented Beauharnois, Que., and he planned the Beauharnois Canal on the St. Lawrence River.

Subsequently, Wakefield projected a Church of England settlement, Canterbury, on the South Island of New Zealand. Between 1847 and 1850, the bulk of the "Canterbury Pilgrims" emigrated there, and on Feb. 2, 1853, Wakefield himself reached New Zealand. He became a member of the General Assembly there, but lived in retirement following a breakdown in December 1854.

BIBLIOGRAPHY. Paul Bloomfield, *Edward Gibbon Wakefield: Builder of the British Commonwealth* (1961), recounts his life and career.

Wakefield (of Kendal), William Wavell Wakefield, Baron, also called (1944–63) SIR WAVELL WAKEFIELD (b. March 10, 1898, Beckenham, Kent, Eng.—d. Aug. 12, 1983, Kendal, Cumbria, Eng.), one of England's finest rugby players, known for his quick speed and skillful dribbling as a forward.

"Wakers," as he was affectionately called, was a cofounder (1919) and president (1950–51) of the Rugby Union. He gained the first of 31 caps—an English record for 42 years—in 1920. In the 1922–23 season he was captain of the victorious Cambridge team at the Varsity match and also led the Royal Air Force. As a member of the Conservative Party, he served in the House of Commons from 1935 until 1963, when he was made a baron. (He died without a male heir, and the barony became extinct.) He was also knighted in 1944.

Wakefield plays, a cycle of 32 scriptural plays, or "mystery plays," of the early 15th century, which were performed during the European Middle Ages at Wakefield, a town in the north of England, as part of the summertime religious festival of Corpus Christi. The text of the plays has been preserved in the Towneley Manuscript (so called after a family that once owned it), now in the Huntington Library in California. The plays are sometimes referred to as the Towneley cycle.

At some time, probably in the later 14th century, the plays performed at York were transferred bodily to Wakefield and there established as a Corpus Christi cycle; six of the plays in each are virtually identical, and there are corresponding speeches here and there in others. On the whole, however, each cycle went its own way after the transfer. From a purely literary point of view, the Wakefield plays are considered superior to any other surviving cycle. In particular, the work of a talented reviser, known as the Wakefield Master, is easily recognizable for its brilliant handling of metre, language, and rhyme, and for its wit and satire.

It is not known how long the cycle, which begins with the fall of Lucifer and ends with the Last Judgment, took in performance: the Chester cycle, which is shorter, was given over three days; the York cycle, which is longer, was given in one. Two plays (about Jacob) are peculiar to the Wakefield cycle, which omits many narratives from the New Testament that are found in all the other surviving cycles. The cycle is unusual in that two shepherd's plays are given.

wakerobin (herb): *see* Trillium.

Wākhān (Afghanistan): *see* Vākhān.

Wakkanai, city, northernmost Hokkaido, Japan. It is situated on the Noshappu Peninsula, facing Sōya Bay and the Sōya Peninsula. Most of the city occupies the Sōya plateau, which is a northern extension of the Teshio Range. The Sōya Line (railway) was opened in 1926, and regular steamship service between Wakkanai and the offshore islands of Rishiri and Rebun was begun in 1934. Wakkanai has since developed as a major port for deep-sea fishing. The city is a local administrative centre and contains a marine products industry. The Sōya Peninsula, on the most northern part of Hokkaido, contains several monuments related to the history and life of northern Japan. Pop. (1985) 51,854.



Hyō-setsu-no-mon (Monument to Ice and Snow), Wakkanai, Japan

Shostal—EB Inc.

wakō, any of the groups of marauders who raided the Korean and Chinese coasts between the 13th and 16th centuries. They were often in the pay of various Japanese feudal leaders and were frequently involved in Japan's civil wars during the early part of this period.

In the 14th century Japanese feudal leaders began to send large trading expeditions to China and Korea. When denied trading privileges, the Japanese were quick to resort to violence to ensure their profits. By the 14th century, piracy had reached serious proportions in Korean waters. It gradually declined after 1443, when the Koreans made a treaty with various Japanese feudal leaders, permitting the entry of 50 Japanese trade ships a year, a number that was gradually increased.

Meanwhile, with the decline of central authority in China toward the end of the 13th century, piracy began to increase along the China coast. Using ships large enough to carry 300 men, the pirates would land and sometimes plunder whole villages.

Originally mainly Japanese, in later times the pirates were of mixed origin; by the early 16th century, the majority of them were probably Chinese. Basing themselves on islands off the Chinese coast, the pirates eventually made their main headquarters on the island of Taiwan, where they remained for over a century. By the end of the 17th century, with the growth of a strong central power in Japan under the Tokugawa shogunate (1603–1867) and in China under the Ch'ing dynasty, most of the piracy was eliminated.

Waksman, Selman Abraham (b. July 22, 1888, Priluka, Ukraine—d. Aug. 16, 1973, Hyannis, Mass., U.S.), Ukrainian-born U.S. biochemist considered one of the world's foremost authorities on soil microbiology; after the discovery of penicillin, he played a major role in initiating a calculated, systematic search for antibiotics among microbes. His consequent

discovery of the antibiotic streptomycin, the first specific agent effective in the treatment of tuberculosis, brought him the 1952 Nobel Prize for Medicine or Physiology.



Waksman, 1968

By courtesy of Rutgers News Service, Rutgers University, New Brunswick, N.J.

A naturalized U.S. citizen (1916), Waksman spent most of his career at Rutgers University, New Brunswick, N.J., where he served as professor of soil microbiology (1930–40), professor of microbiology and chairman of the department (1940–58), and director of the Rutgers Institute of Microbiology (1949–58). During his extensive study of the actinomycetes (filamentous, bacteria-like microorganisms found in the soil), he extracted from them antibiotics (a term he coined in 1941) valuable for their killing effect not only on gram-positive bacteria, against which penicillin is effective, but also on gram-negative bacteria, of which the tubercle bacillus (*Mycobacterium tuberculosis*) is one.

In 1940 he and his associates isolated actinomycin from soil bacteria but found it to be extremely toxic when given to test animals. Three years later they extracted the relatively nontoxic streptomycin from the actinomycete *Streptomyces griseus* and found that it exercised repressive influence on tuberculosis. In combination with other chemotherapeutic agents, streptomycin has become a major factor in controlling the disease. Waksman also isolated and developed several other antibiotics, including neomycin, that are used in treating many infectious diseases of humans, domestic animals, and plants.

Among his books are *Principles of Soil Microbiology* (1927), regarded as one of the most exhaustive works on the subject, and *My Life with the Microbes* (1954), an autobiography.

Wal-Mart, in full WAL-MART STORES, INC., U.S. operator of discount stores founded by Sam Walton in Rogers, Ark. (1962). Its headquarters are in Bentonville, Ark.

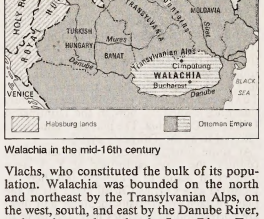
After years of growth in rural areas, the company developed new retail formats, including Sam's Club discount warehouses (1983) and Wal-Mart Supercenters (1988), which sold groceries and a wide range of merchandise. By emphasizing customer attention, cost controls, and efficient distribution networks, Wal-Mart became the largest U.S. retailer in 1990. It entered international markets one year later in Mexico, with expansion continuing in Puerto Rico, Argentina, Brazil, Canada, China, Germany, Korea, the United Kingdom, and Japan. By 1999 Wal-Mart had become the world's largest private employer, and in 2001 it ranked as the largest corporation in the world. Extreme growth did not occur without controversy; Wal-Mart was variously blamed for contributing to urban sprawl, driving local retailers out of business, and perpetuating low wages, among other accusations.

Wala, SAINT (b. *c.* 755—d. August 836, Bobbio [Italy]; feast day August 31), Frankish count, Benedictine abbot, and influential minister at the courts of the Holy Roman emperors Charlemagne and Louis I the Pious. He stood for imperial unity against the traditionalist party, which looked for partition of the emperors' lands.

A cousin of Charlemagne, Wala helped to govern both Saxony and Italy. Although, as a convinced representative of the party standing for the maintenance of imperial unity, he was probably chiefly responsible for the decision of Charlemagne to crown his son, Louis, emperor in 813, he fell out of favour on the new ruler's accession the following year and became a monk at Corbie. From about 821, restored to grace, he was a powerful influence at Louis's court. He became abbot of Corbie in 826. When, in 829, Louis granted lands to his youngest son, Charles (the Bald), Wala and the imperial party opposed the emperor, seeing his action as a threat to the *Ordinatio imperii* of 817, which had decided against partition of the empire on Louis's death. Exiled by Louis for supporting the rebellion against him in 830, Wala later (833) supported Louis's son Lothair against his father; he may even have suggested Lothair's appeal to Pope Gregory IV. Accompanying Lothair to Italy, Wala became abbot of Bobbio in 834.

Walach, Meir: *see* Litvinov, Maksim Maksimovich.

Wallachia, also spelled WALLACHIA, Romanian ŢARA ROMÂNEASCĂ, Turkish EFLAK, principality on the lower Danube River, which in 1859 joined Moldavia to form the state of Romania. Its name is derived from that of the



Walachia in the mid-16th century

Vlachs, who constituted the bulk of its population. Walachia was bounded on the north and northeast by the Transylvanian Alps, on the west, south, and east by the Danube River, and on the northeast by the Seret River. Traditionally it is considered to have been founded in 1290 by Radu Negru ("Radu the Black"), a voivode (military governor) of Făgăraş in southern Transylvania (then part of Hungary), who crossed the Transylvanian Alps and settled at Câmpulung. The new principality was initially dominated by Hungary, whose feudal domination and proselytism the Orthodox Vlachs had fled. Basarab I (reigned *c.* 1330–52) defeated the Hungarian king Charles I in 1330, winning Walachian independence.

The new principality prospered from its rich agricultural development and from the trade passing through it between northern Europe and the Black Sea. It faced dangers from Hungary, which tried to restore its domination, as well as from the Ottoman Turks, who steadily extended their control over the Balkan Peninsula during the 14th century. By 1391 Prince Mircea the Old (reigned 1386–1418) was obliged to pay tribute to the Turks, and in 1417 he acknowledged Turkish suzerainty.

Subsequently, Walachia was allowed to retain its own dynasty, territory, and religion. It was, however, compelled to pay tribute and grant trade concessions to the Ottoman Empire, to supply agricultural goods to the Turks, to subordinate its foreign policy to Turkish policies, and to submit to the sultan's choice of ruler (chosen from within the dynasty).

Numerous princes continued Walachia's resistance to the Turks, *e.g.*, Vlad III the Impaler (reigned 1448, 1456–62, and 1476–77) and Michael the Brave (reigned 1593–1601), who briefly united Walachia with Moldavia and Transylvania. But it increasingly submitted to Turkish domination. After 1716 the Turks ceased to select Walachia's prince from among the native dynasty and instead appointed an influential Phanariote, *i.e.*, a Greek administrator in Ottoman service. Russian influence in Walachia increased during the 18th century, and in 1774 Russia asserted the right to intervene in Walachian affairs, though it continued to recognize Turkish suzerainty.

A 19th-century uprising in Walachia (1821) caused the Turks to end the unpopular Phanariote regime. Under Russian guidance political reforms were undertaken, including the adoption in 1831 of a constitution, the Règlement Organique (*q.v.*). The Turks' trade monopoly was abandoned, providing lucrative opportunities for large landowners to deal with western Europe while increasing the labour burden on Walachia's peasants, who did not receive their full freedom until 1864.

The European powers ended Russia's protectorate after the Crimean War (1856). Walachia's ruling assembly, influenced by growing Romanian nationalism, then voted (1859) to unite with Moldavia under Prince Alexandru Ion Cuza and to form the single state of Romania, which achieved its independence from the Turks in 1878.

Walafrid Strabo (b. *c.* 808, Swabia—d. Aug. 18, 849, Reichenau, Franconia [now in Germany]), Benedictine abbot, theologian, and poet whose Latin writings were the principal exemplar of German Carolingian culture.

Walafrid received a liberal education at the abbey of Reichenau on Lake Constance. After further studies under the celebrated Rabanus Maurus of Fulda Abbey, he was recommended in 829 as tutor to Charles the Bald, son of the Holy Roman emperor Louis I the Pious. Rewarded for his services at court by his appointment as abbot of Reichenau in 838, Walafrid became involved in the power struggle between Louis's sons and, having supported the imperial claims of Lothair I, was banished in 839 by Louis the German. After Lothair's defeat in 842, however, Walafrid was reinstated at Reichenau and served as Louis the German's emissary to Charles the Bald.

Walafrid was esteemed by his contemporaries more for his theological thought and writings than for his poetry, on which modern interest chiefly focuses. His best-known theological work, *Liber de exordiis et incrementis quarundam in observationibus ecclesiasticis rerum* (*c.* 841; "Book on the Origins and Development of Certain Matters in Church Practice"), is valuable for its data on Carolingian religious affairs and administration.

As a young monk at Reichenau about 826, Walafrid set to verse *Visio Wettini* ("The Vision of Wettin"), recording a mystical experience described by his first tutor. With its poetic images of hell, purgatory, and paradise, *Visio Wettini* anticipated Dante's *Divine Comedy.* Later Walafrid wrote his most important poem, *Liber de cultura hortorum* ("Book on the Art of Gardening"), a lyrical piece describing 23 flowers and herbs, their mythological and Christian significances, and their healing properties. His other works include an important panegyric poem, *De imagine Tetrici* ("On the Statue of Theodoric"), and a revision of the *Life of Charlemagne* by the eminent Frankish historian Einhard. Because of its readability and accuracy, this account of Charlemagne is considered one of the outstanding biographies of the Middle Ages.

Wałbrzych, former (1975–98) *województwo* (province), southwestern Poland, now part of Dolnośląskie (*q.v.*) province.

Wałbrzych, German WALDENBURG, city, Dolnośląskie *województwo* (province), southwestern Poland, in the central Sudeten mountains. The second largest town in Lower Silesia (after Wrocław), it is an important rail junction.

The city was first chronicled as the location of a castle built by Bolesław I in 1290. The mining of silver and lead ores in the locality began in the 14th century. Wałbrzych received its town rights in 1400. Since the 15th century it has also been a dressmaking centre, and in 1818 the first mechanized weaving mill in Silesia was built there. In the later part of the 19th century, Wałbrzych began to prosper as an industrial centre through its linen weaving and coke and chemical production, based on nearby coal mines. During World War II the Gross-Rosen Nazi concentration camp was located near the city. Liberated by Soviet troops in 1945, the region was incorporated by Poland. Following the closure of the mines in the early 1990s, the local economy continued to produce textiles and chemicals, together with ceramics, glass, clothing, electronics, and processed foods. The city's museum contains historical exhibits related to coal mining and a porcelain collection. Pop. (2002) 130,268.

Walburga, SAINT, also called WALDBURG, WALPURGIS, VAUBOURG, or GAUBURGE (b. *c.* 710, probably in the kingdom of Wessex, Eng.—d. Feb. 25, 779, Heidenheim, Alemannia [now in Germany]; feast day February 25), abbess and missionary who, with her brothers Willibald of Eichstätt and Winebald of Heidenheim, was important in St. Boniface's organization of the Frankish church.

Walburga was a Benedictine at the monastery of Wimborne, Dorsetshire, when Winebald summoned her to rule the nuns at his double monastery of monks and nuns at Heidenheim, the only one of this type in 8th-century Germany. On his death in 761 she ruled the whole monastery.

Buried at Heidenheim, her body was later moved and interred in the Church of the Holy Cross at Eichstätt. Soon after her death, memory of her seems to have become confused with that of Waldborg, a pre-Christian fertility goddess. On Walpurgis Night—the eve of May 1, the day on which her relics were taken to Eichstätt—witches are believed to rendezvous in the Harz mountains.

Walcott, Derek, in full DEREK ALTON WALCOTT (b. Jan. 23, 1930, Castries, Saint Lucia), West Indian poet and playwright noted for works that explore the Caribbean cultural experience. He received the Nobel Prize for Literature in 1992.

Walcott was of mixed black, Dutch, and English descent. He was educated at St. Mary's College, St. Lucia, and at the University of the West Indies in Jamaica. He began writing poetry at an early age, taught at schools in St. Lucia and Grenada, and contributed articles and reviews to periodicals in Trinidad and Jamaica. Productions of his plays began in St. Lucia in 1950, and he studied theatre in New York City in 1958–59. He lived thereafter in Trinidad and the United States.

Walcott is best known for his poetry, beginning with *In a Green Night: Poems 1948–1960* (1962). This book is typical of his early poetry in its celebration of the Caribbean landscape's natural beauty. The verse in *Selected Poems* (1964), *The Castaway* (1965), and *The Gulf* (1969) is similarly lush in style and incantatory in mood as Walcott expresses his feelings of personal isolation, caught between his European cultural orientation and the black folk cultures of his native Caribbean. *Another Life* (1973) is a book-length autobiographical poem. In *Sea Grapes* (1976) and *The Star-Apple Kingdom* (1979), Walcott uses a tenser, more economical style to examine the deep cultural divisions of language and race in the Caribbean. *The Fortunate Traveler* (1981) and *Midsummer* (1984) explore his own situation as a black writer in America who has become increasingly estranged from his Caribbean homeland. Walcott's *Collected Poems, 1948–1984,* was published in 1986. In his book-length poem *Omeros* (1990), he retells the dramas of Homer's *Iliad* and *Odyssey* in a 20th-century Caribbean setting. *Tiepolo's Hound* (2000) is a poetic biography of artist Camille Pissarro.

Of Walcott's approximately 30 plays, the best known are *Dream on Monkey Mountain* (produced 1967), *Ti-Jean and His Brothers* (1958), and *Pantomime* (1978). Many of his plays make use of themes from black folk culture in the Caribbean.

Walcott, Jersey Joe, byname of ARNOLD RAYMOND CREAM (b. Jan. 31, 1914, Merchantville, N.J., U.S.—d. Feb. 25, 1994, Camden, N.J.), American world heavyweight boxing champion from July 18, 1951, when he knocked out Ezzard Charles in seven rounds in Pittsburgh, Pa., until Sept. 23, 1952, when he was knocked out by Rocky Marciano in 13 rounds in Philadelphia.

The son of immigrants from Barbados, Walcott became a professional boxer in 1930. He won the heavyweight title in 1951 only after losing two title bouts to the aging Joe Louis (including a controversial decision in New York City on Dec. 5, 1947) and two to Ezzard Charles. He was 37 years old when he knocked out Charles to become heavyweight champion. Between 1930 and 1953 Walcott had 69 professional bouts, winning 50, of which 30 were by knockouts. His bout with Marciano in 1952 was considered one of the most exciting heavyweight championship fights of all time.

Wald, George (b. Nov. 18, 1906, New York, N.Y., U.S.—d. April 12, 1997, Cambridge, Mass.), American biochemist who received (with Haldan K. Hartline of the United States and Ragnar Granit of Sweden) the Nobel Prize for Physiology or Medicine in 1967 for his work on the chemistry of vision.

While studying in Berlin as a National Research Council fellow (1932–33), Wald discovered that vitamin A is a vital ingredient of the pigment in the retina and, hence, important in maintaining vision. After further research in Heidelberg and at the universities of Zürich and Chicago, he joined the faculty of Harvard University in 1934. By the early 1950s he had succeeded in elucidating the chemical reactions involved in the vision process of the rods (receptors on the retina used for night vision). In the late 1950s, with Paul K. Brown, he identified the pigments in the retina that are sensitive to yellow-green light and red light and in the early 1960s the pigment sensitive to blue light. Wald and Brown also discovered the role of vitamin A in forming the three colour pigments and showed that colour blindness is caused simply by the absence of one of them.

Wald, Lillian D. (b. March 10, 1867, Cincinnati, Ohio, U.S.—d. Sept. 1, 1940, Westport, Conn.), American nurse and social worker who founded the internationally known Henry Street Settlement in New York City (1893).

In 1893 Wald and Mary M. Brewster founded a settlement house, which they soon moved to 265 Henry Street, on the Lower East Side of Manhattan. This address also became the headquarters of a visiting-nurse service organized by Wald. In 1902 one of her nurses was assigned to the city's public schools, and the municipal board of health then established the world's first public-school nursing system. Partly through her efforts, the American Red Cross initiated a rural nursing service in 1912, and the U.S. government established the Children's Bureau in the same year. Wald also promoted public playgrounds and cultural institutions, especially theatres, in slum areas in New York City. Her books include *The House on Henry Street* (1915) and *Windows on Henry Street* (1934).

Waldeck, a former *Kreis* (administrative district) and state of Germany, between Westphalia and Hesse-Nassau. For centuries a principality and from November 1918 to March 1929 a republic and constituent state of the Weimar Republic, it was on April 1, 1929, amalgamated with Prussia at the request of its people. The old capital was Arolsen.

Waldeck-Rousseau, René, in full PIERRE-MARIE-RENÉ WALDECK-ROUSSEAU (b. Dec. 2, 1846, Nantes, France—d. Aug. 10, 1904, Corbeil), politician who, as premier of France, settled the Dreyfus Affair. He was also responsible for the legalization of trade unions in France (1884).



Waldeck-Rousseau; in the Bibliothèque Nationale, Paris
By courtesy of the Bibliotheque Nationale, Paris

A rising conservative lawyer known for his eloquence and mastery of legal detail, Waldeck-Rousseau was elected a deputy in 1879. In 1881 he became minister of the interior in the Cabinet of Léon Gambetta, one of the founders of the Third Republic, and he filled the same post, under Jules Ferry, from 1883 to 1885. In 1884 he sponsored the Loi Waldeck-Rousseau, which made trade unions legal, though with important restrictions. After another term as deputy (1885–89), he retired to make his fortune at the bar. In 1894, however, he became a senator.

In June 1899, when demonstrations and counterdemonstrations over the Dreyfus Affair threatened public order, Waldeck-Rousseau was asked to form a "government of republican defense." His Cabinet was based on pro-Dreyfus moderates but included members of both the right and the left, such as Alexandre Millerand, the first Socialist to hold Cabinet office. When a military court persisted in finding Alfred Dreyfus guilty of treason (September 1899), though some of the evidence against him was known to be forged, the government persuaded the president to pardon him in the hope of avoiding further controversy.

The most important measure of the later part of Waldeck-Rousseau's administration was the Associations Act of July 1901, which abolished all restrictions on the right of association for legal purposes. This freedom was withheld from religious associations, however, because they were directed from abroad. Waldeck-Rousseau personally thought the act too severe to the religious congregations. He resigned because of ill health in June 1902 but emerged from retirement to protest against the interpretation of the law by his successor, the militantly anticlerical Émile Combes, who refused to authorize any religious associations

and was responsible for the closing of thousands of Roman Catholic schools.

Walden, Paul (b. July 14 [July 26, New Style], 1863, Cēsis, Latvia, Russian Empire—d. Jan. 24, 1957, Gammertingen, W.Ger.), chemist who discovered the Walden inversion, a reversal of stereochemical configuration that occurs in many reactions of covalent compounds.

Walden went to Germany after the Russian Revolution of 1917 and served as head of the chemistry department of the University of Rostock from 1919 to 1934. He became professor of chemistry at the University of Tübingen in 1947. Walden is also responsible for Walden's rule, which relates the conductivity and viscosity of nonaqueous solutions.

Walden Pond, small pond (about 64 acres [26 hectares]) in eastern Massachusetts, U.S., just south of Concord in Walden Pond State Reservation (304 acres [123 hectares]). It was immortalized by Henry David Thoreau, who retreated there (1845–47) from society in preparation for writing *Walden; or, Life in the Woods.* The spot by the north shore on which his cabin stood is marked with a cairn.

Waldenburg (Poland): *see* Wałbrzych.

Waldenses, also spelled VALDENSES, French VAUDOIS, Italian VALDESI, members of a Christian movement that originated in 12th-century France, the devotees of which sought to follow Christ in poverty and simplicity. In modern times the name has been applied to members of a Protestant church (centred on the Franco-Italian border) that formed when remnants of the earlier movement became Swiss Protestant Reformers.

Early Roman Catholic and Waldensian sources are few and unreliable, and little is known with certainty about the reputed founder, Valdes (also called Peter Waldo, or Valdo). As a layman, Valdes preached in Lyon (1170–76), but ecclesiastical authorities were disturbed by his lack of theological training and by his use of a non-Latin version of the Bible. Valdes attended the third Lateran Council (1179) in Rome and was confirmed in his vow of poverty by Pope Alexander III. Probably during this council Valdes made his *Profession of Faith* (which still survives); it is a statement of orthodox beliefs such as accused heretics were required to sign. Valdes, however, did not receive the ecclesiastical recognition that he sought. Undeterred, he and his followers (Paupers: "Poor") continued to preach; the archbishop of Lyon condemned him, and Pope Lucius III placed the Waldenses under ban with his bull *Ad Abolendam* (1184), issued during the Synod of Verona.

Thereafter, the Waldenses departed from the teaching of the Roman Catholic church by rejecting some of the seven sacraments and the notion of purgatory. Their views were based on a simplified biblicism, moral rigour, and criticism of abuses in the contemporary church. Their movement, often joined to and influenced by other sects, spread rapidly to Spain, northern France, Flanders, Germany, and southern Italy and even reached Poland and Hungary. Rome responded vigorously, turning from excommunication to active persecution and execution. Though the Waldenses confessed regularly, celebrated communion once a year, fasted, and preached poverty, they repudiated such Roman practices as prayers for the dead and the veneration of saints, and they refused to recognize secular courts because they did not believe in taking oaths.

In the early 13th century a number of Waldenses returned to orthodoxy; by the end of the century persecution had virtually eliminated the sect in some areas, and for safety the survivors abandoned their distinctive dress. By the end of the 15th century they were confined mostly to the French and Italian valleys of the Cottian Alps.

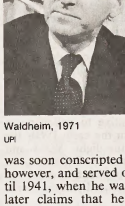
A second period in their history began when the French reformer Guillaume Farel introduced Reformation theology to the Waldensian ministers (*barbes*) in 1526. The Waldenses raised questions concerning the number of sacraments, the relationship between free will and predestination, and the problem of reconciling justification by faith with the scriptural emphasis on the necessity of good works. At a conference at Cianforan in 1532 most Waldenses accepted secular law courts and celibacy for their *barbes* and agreed to accept only two sacraments (baptism and Holy Communion) and the doctrine of predestination as presented by the Protestants in attendance. By further adapting themselves to Genevan forms of worship and church organization, they became in effect a Swiss Protestant church. Years of persecution continued, however, before they received full civil rights in 1848.

During the second half of the 19th century, Waldensian emigrants arrived in Uruguay and later moved from there to the United States. There, strengthened by arrivals from France and Switzerland, they established small communities in Missouri, Texas, and Utah and, most importantly, around Valdese, in Burke county, N.C., now a thriving industrial town whose population of about 3,000 is still largely Waldensian.

Today the Waldenses are governed by a seven-member board, called the Tavola ("Table"), elected annually by a general synod that convenes in Torre Pellice, Italy.

Waldheim, Kurt (b. Dec. 21, 1918, Sankt Andrä-Wördern, Austria), Austrian diplomat who served two terms as the fourth secretary-general of the United Nations, from 1972 to 1981. He was the elected president of Austria from 1986 to 1992.

Waldheim's father, a Czech by ethnic origin, changed his name from Waclawik to Waldheim. Kurt Waldheim served in the Austrian army as a volunteer (1936–37) before he began to study for a diplomatic career. He



Waldheim, 1971
UPI

was soon conscripted into the German army, however, and served on the Russian front until 1941, when he was wounded. Waldheim's later claims that he spent the rest of the war studying law at the University of Vienna were contradicted by the rediscovery in 1986 of documents suggesting that he had been a German army staff officer stationed in the Balkans from 1942 to 1945.

Waldheim entered the diplomatic service in 1945. He led Austria's first delegation to the UN (1955) and subsequently became Austrian minister (1956–58) and then ambassador to Canada (1958–60). After a period as director general for political affairs in the Austrian Foreign Ministry, he became his country's ambassador to the UN (1964–68, 1970–71). During 1968–70 he served as Austrian foreign minister and was an unsuccessful candidate for Austria's presidency on the conservative People's Party ticket (1971).

Waldheim's UN secretaryship beginning in 1972 was characterized as efficient and ministerial but rather less dynamic than that of some of his predecessors. Waldheim nonetheless oversaw effective and sometimes massive relief efforts in Bangladesh, Nicaragua, and Guatemala and peacekeeping operations in Cyprus, the two Yemens, Angola, Guinea, and the Middle East.

Waldheim was not reelected to a third term as UN secretary-general in 1981. He ran as the People's Party candidate for president of Austria in 1986. His candidacy became controversial when rediscovered wartime and postwar documents pointed to his being an interpreter and intelligence officer for a German army unit that had engaged in brutal reprisals against Yugoslav partisans and civilians and that had deported most of the Jewish population of Salonika (Thessaloníki), Greece, to Nazi death camps in 1943. Waldheim admitted that he had not been candid about his past but disclaimed all knowledge of or participation in wartime atrocities. He won election to the Austrian presidency in June 1986 for a six-year term. Owing to the controversy over his wartime past, however, he became a somewhat isolated figure on the international scene.

Waldmann, Hans (b. *c.* 1435?, Blickenstorf, Zug, Switz.—d. April 6, 1489, Zürich), Swiss leader who was for a time the burgomaster and virtual dictator of Zürich. He supplied mercenaries for half the countries of Europe, making himself one of the richest and most powerful men in the Swiss Confederation.

After serving with the Zürich contingent in the defeat of Charles the Bold of Burgundy at Morat (June 22, 1476) and participating in the agreement of Stans (Dec. 22, 1481), which averted cantonal strife, Waldmann was elected burgomaster of Zürich in 1483. He soon undermined the traditional aristocratic power structure of the government and broadened its constitutional base. Acquiring riches and international influence through the sale of Swiss mercenaries—he received pensions for his services from the rulers of Savoy, Württemberg, and Hungary—Waldmann achieved nearly absolute local ascendancy; but his attempts to extend his power over other cantons met with resistance. His continuing pretensions gradually eroded his local support as well; finally, a faction of Zürich citizens, in an act of dubious legality, secured his arrest and subsequent execution.

Waldseemüller, Martin, Waldseemüller also spelled WALTZEMÜLLER, or WALZENMÜLLER, Greek HYLACOMYLUS, or ILACOMILUS (b. *c.* 1470, Radolfzell, Württemberg [Germany]—d. 1518–21?, Saint-Dié, Lorraine [now in France]), German cartographer who in 1507 published the first map with the name America for the New World.

Educated at Freiburg im Breisgau, Waldseemüller moved to Saint-Dié, where in 1507 he published 1,000 copies of a woodcut world map, made with 12 blocks and compiled from the tradition of Ptolemy and the voyages of Amerigo Vespucci; he named the New World in Vespucci's honour. A later *Carta marina* (1516) was drawn in chart style.

Waldstein, Albrecht Wenzel Eusebius von (Bohemian general): *see* Wallenstein, Albrecht Wenzel Eusebius von.

Waldteufel, Emil, in full CHARLES EMIL WALDTEUFEL (b. Dec. 9, 1837, Strasbourg, France—d. Feb. 12, 1915, Paris), French (Alsatian) pianist and one of the best-known waltz composers of his time.

Born of a musical family, Waldteufel studied with his parents and later at the Paris Conservatory, after which time he worked for a piano manufacturer, gave piano lessons, and played at soirees.

In 1865 he became court pianist to Empress

Eugénie and the following year conductor of court balls. With the success of his first waltzes, Waldteufel decided to devote himself entirely to composing dance music, producing some 270 dances, including waltzes, polkas, and galops. Among his famous waltzes are *The Skaters, Estudiantina,* and *Dolores.*

Wales, Welsh CYMRU, component country of the United Kingdom—with England, Scotland, and Northern Ireland. It occupies a peninsula jutting westward from England into the Irish Sea. On three sides the boundaries of Wales are natural, with the shores of Liverpool Bay and the River Dee's estuary to the north, the Irish Sea and St. George's Channel to the west, and the coastline of Bristol Channel and the River Severn's estuary on the south. The eastern boundary—that with England—is an administrative frontier created in 1536 as part of the Act of Union that linked England with Wales. Area 8,015 square miles (20,756 square km). Pop. (1998 est.) 2,933,500.

A brief treatment of Wales follows. For full treatment, *see* MACROPAEDIA: United Kingdom: *Wales.*

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

Physical and human geography. Wales is dominated by the Cambrian Mountains, a region of deeply dissected plateaus and hills. The Cambrians are accentuated by the ranges of the Brecon Beacons and the Black Mountains in the south and, in the northwest, the ridges of Snowdonia, rising to 3,560 feet (1,085 m) at Snowdon, the highest peak in Wales. The uplands are girdled on the seaward side by a series of coastal plateaus ranging from 100 to 700 feet (30 to 210 m). The larger river valleys originate in the central upland mass and broaden as they descend either westward to the sea or eastward into the lowland plains of the English border; the Dee, Severn, and Wye are the longest rivers in the country.

Wales has an Atlantic maritime climate of mild winters, cool summers, and persistent precipitation throughout the year. Annual mean temperatures range from 40° F (4° C) in January to about 61° F (16° C) in July and August. The average annual precipitation is 55 inches (1,385 mm). There are, however, considerable variations in weather.

About two-thirds of Wales's population live in the south. The principal cities are the capital, Cardiff, and the seaports and industrial centres of Swansea and Newport. Many Welsh are adherents to Protestant and Nonconformist churches, with Calvinistic Methodism being the main denomination, but secularism greatly limits church influence.

Wales depended historically upon mining and heavy industry. The coal mines of South Wales were first developed in the 19th century and became the premier source of British coal, but by the late 20th century declining production had reduced coal to a minor factor in the economy. The country's principal manufactures now include electronics, automotive engines, and chemical products. Milford Haven and Pembroke are two of the major petroleum-importing and refining centres in Britain. Farming, forestry, and tourism are the most important occupations in the rural areas of Wales, with most small farms raising cattle and sheep.

Financial and business services, government, hotels, restaurants, and trade account for more than half of the gross domestic product and nearly two-thirds of employment in Wales. Tourism is also an important source of income, particularly around the upland national parks and in other scenic areas. Cardiff Airport handles both international and domestic traffic.

Welsh and English are the two major languages of Wales. Welsh was still spoken by about half of the population in 1900, but its use has since declined. It is now spoken by about one-fifth of the population, notably in the heartland—the so-called Y Fro Gymraeg ("Welsh-Speaking Region"). The proportion is much diminished in South Wales, falling below one-tenth in the extreme southeast.

Much effort is now being devoted to preserving the Welsh language and culture, with bilingual education, Welsh-language broadcasting, and attempts to maintain Wales's long literary tradition. In the traditional culture of Wales, great stress was laid on the spoken and written word in poetry and in prose, and vocal music—particularly choral singing—was also important.

The University of Wales is a federal university with constituent colleges, schools, or universities at Cardiff, Aberystwyth, Bangor, Swansea, and Lampeter. The Royal National Eisteddfod is an annual competitive festival that is held for a week each August and consists of competitions in all aspects of music, literature, drama, and art, all presented in the Welsh language.

History. The Romans had subdued the Brythonic Celts of Wales by the 1st century AD. After the end of Roman rule in the 4th–5th century, the Welsh Celts fought off incursions from the Anglo-Saxons to the east. A number of kingdoms arose in Wales, among them Gwynedd, Powys, Dyfed, and Gwent, and over the next several hundred years various rulers attempted unsuccessfully to unite them under one kingdom. Norman conquerors brought all of southern Wales under their suzerainty in 1093. The three kingdoms of Gwynedd, Powys, and Deheubarth in northern and central Wales remained autonomous for a time, but by the late 13th century they were under English sovereignty. By the Acts of Union of 1536 and 1543, Wales was incorporated within the realm of England, and English became the official language of the country. Over the next few centuries the Welsh people struggled to preserve a native culture threatened by progressive Anglicization. Wales's tradition of Nonconformist religion had parallels in political militancy and industrial unrest and in the popularity of first the Liberal and then the Labour parties.

Wales lost about 430,000 people through emigration to England and to areas overseas during the Great Depression of the 1930s. Despite industrial development after World War II, coal production continued to fall, and more workers and their families abandoned urban and rural areas.

Plaid Cymru, which was founded in 1925 as the Welsh Nationalist Party, achieved a measure of influence but did not have success in parliamentary elections until 1966. A referendum on the creation of a Welsh assembly was narrowly approved in 1997. The assembly was given responsibility for administering public services and implementing regional policies on education, health care, and economic development, among other areas. Its first elections took place in May 1999 and produced a minority Labour government.

Wales, Church in, independent Anglican church in Wales that changed from the Roman Catholic faith during the Protestant Reformation in the 16th century. At the time of the Reformation, the Welsh church was directly controlled by the English church and was thus separated from Rome when Henry VIII declared himself the head of the Church of England (1534).

The Reformation was generally accepted with little dissent in Wales, but in the 17th and 18th centuries the church went through a period of decay, primarily because of lack of leadership from Englishmen who were appointed to important positions in the Welsh church. When the Methodist revival began in the 18th century, the majority of the Welsh people left the Welsh Anglican church and joined the new church.

Because Anglicanism subsequently had little following in Wales, the church was disestablished in 1920. It gained in numbers and strength after disestablishment.

The Church in Wales forms one province made up of six dioceses. The bishops of the dioceses are elected by representatives from the dioceses, and they elect one of their number as archbishop of the church.

Wales, prince of, title reserved exclusively for the heir apparent to the British throne. It dates from 1301, when King Edward I, after his conquest of Wales and execution (1283) of David III, the last native prince of Wales, gave the title to his son, the future Edward II. Since that time most, but not all, of the eldest sons of English sovereigns have been given the title. It is specifically granted by the sovereign, and in due course the recipient is invested as prince of Wales. The title ceases to exist when a prince of Wales becomes king, until a monarch again bestows it upon a son.

Wałęsa, Lech (b. Sept. 29, 1943, Popowo, near Włocławek, Pol.), labour activist who helped form and led (1980–90) Communist Poland's first independent trade union, Solidarity (*q.v.*). The charismatic leader of millions of Polish workers, he received the Nobel Prize for Peace in 1983 and went on to become the president of Poland (1990–95).

Wałęsa, the son of a carpenter, received only primary and vocational education. In 1967 began work as an electrician at the huge Lenin Shipyard in Gdańsk. He witnessed the 1970 food riots in Gdańsk in which police killed a number of demonstrators. When new protests against Poland's Communist government erupted in 1976, Wałęsa emerged as an antigovernment union activist and lost his job as a result. On Aug. 14, 1980, during protests at the Lenin shipyards caused by an increase in food prices, Wałęsa climbed over the shipyard fence and joined the workers inside, who elected him head of a strike committee to negotiate with management. Three days later the strikers' demands were conceded, but when strikers in other Gdańsk enterprises asked Wałęsa to continue his strike out of solidarity, he immediately agreed. Wałęsa took charge of an Interfactory Strike Committee that united the enterprises of the Gdańsk-Sopot-Gdynia area. This committee issued a set of bold political demands, including the right to strike and form free trade unions, and it proclaimed a general strike. Fearing a national revolt, the Communist authorities yielded to the workers' principal demands, and on August 31 Wałęsa and Mieczysław Jagielski, Poland's first deputy premier, signed an agreement conceding to the workers the right to organize freely and independently.

When some 10 million Polish workers and farmers joined semiautonomous unions in response to this momentous agreement, the Interfactory Strike Committee was transformed into a national federation of unions under the name Solidarity (Solidarność), with Wałęsa as its chairman and chief spokesman. Solidarity was officially recognized by the Polish government in October, and Wałęsa steered the federation on a course of carefully limited confrontations with the government in order to avert the possibility of Soviet military intervention in Poland. The federation's gains proved ephemeral, however; on Dec. 13, 1981, the Polish government imposed martial law, Solidarity was outlawed, and most of the leaders of Solidarity were arrested, including

Wałęsa, who was detained for nearly a year. The awarding of the Nobel Prize for Peace to Wałęsa in 1983 was criticized by the Polish government; fearing involuntary exile, he remained in Poland while his wife, Danuta, traveled to Oslo, Nor., to accept the prize on his behalf.

As the leader of the now-underground Solidarity movement, Wałęsa was subjected to constant harassment until collapsing economic conditions and a new wave of labour unrest in 1988 forced Poland's government to negotiate with him and other Solidarity leaders. These negotiations led to an agreement that restored Solidarity to legal status and sanctioned free elections for a limited number of seats in the newly restored upper house of the Sejm (Parliament). Solidarity won an overwhelming majority of those seats in June 1989, and after Wałęsa refused to form a coalition government with the Communists, the Parliament was forced to accept a Solidarity-led government, though Wałęsa himself refused to serve as premier.

Wałęsa helped his Solidarity colleague Tadeusz Mazowiecki become premier of this government in 1989, but he ran against Mazowiecki for president in 1990 and won Poland's first direct presidential election by a landslide. As president, Wałęsa helped guide Poland through its first free parliamentary elections (1991) and watched as successive ministries converted Poland's state-run economy into a free-market system. Wałęsa had displayed remarkable political skills as the leader of Solidarity, but his plain speech, his confrontational style, and his refusal to approve a relaxation of Poland's strict new prohibitions on abortion eroded his popularity late in his term as president. In 1995 he sought reelection but was narrowly defeated by the former Communist Aleksander Kwasniewski, head of the Democratic Left Alliance.

Walewski, Alexandre-Florian-Joseph Colonna, Comte (b. May 4, 1810, Walewice, near Warsaw, Duchy of Warsaw [Poland]—d. Sept. 27, 1868, Strasbourg, France), French statesman and minister of foreign affairs under Louis-Napoléon (Napoleon III). He was the illegitimate son of Napoleon I and Maria, Countess Walewska.

At age 14 Walewski refused to enter the Russian army, escaping to London and thence to Paris, where the French government refused his extradition to the Russian authorities. Louis-Philippe sent him to Poland in 1830, and he was then entrusted by the leaders of the Polish rebellion with a mission to London. After the fall of Warsaw he took out letters of naturalization in France and entered the French army, seeing some service in Algeria. In 1837 he resigned his commission and began to write for the stage and for the press. He is said to have collaborated with Alexandre Dumas *père* on *Mademoiselle de Belle-Isle;* and a comedy of Walewski's, *L'École du monde* ("School of the World"), was produced at the Théâtre Français in 1840. In that year he was sent on a mission to Egypt, and under the François Guizot ministry he was sent to Buenos Aires, Arg.

The accession of Louis-Napoléon to supreme power in France guaranteed Walewski's career. He was sent as envoy extraordinary to Florence, to Naples, and then to London, where he announced the coup d'état to Lord Palmerston. In 1855 Walewski became minister of foreign affairs, and he acted as French plenipotentiary at the Congress of Paris the next year. When he left the Foreign Office in 1860, it was to become minister of state, an office that he held until 1863. Senator from 1855 to 1865, he entered the Corps Législatif (lower house of parliament) in 1865 and was installed, by the emperor's interest, as president of the chamber. A revolt against his authority two years later sent him back to the Senate.

Waley, Arthur David, original name ARTHUR DAVID SCHLOSS (b. Aug. 19, 1889, Tunbridge Wells, Kent, Eng.—d. June 27, 1966, London), English sinologist whose outstanding translations of Chinese and Japanese literary classics into English had a profound effect on such modern poets as W.B. Yeats and Ezra Pound. (The family name was changed from Schloss to Waley, his mother's maiden name, at the outset of World War I.)

Educated at Rugby School and at King's College, Cambridge, Eng., Waley was assistant keeper in the Department of Prints and Drawings at the British Museum from 1913 to 1929 and lectured thereafter in the School of Oriental and African Studies, London.

Among his most outstanding and influential translations are *170 Chinese Poems* (1918), *Japanese Poems* (1919), and the six-volume translation of *The Tale of Genji* (1925–33), by Murasaki Shikibu, which is one of the oldest novels extant in the world. This novel faithfully depicts aristocratic life in 11th-century Japan, as does a work by another court lady, which Waley translated as *The Pillow-Book of Sei Shōnagon* (1928). He also wrote on Oriental philosophy and translated and edited *The Analects* of Confucius (1938).

Waley's other works include *The Nō Plays of Japan* (1921), *Introduction to the Study of Chinese Painting* (1923), *The Opium War Through Chinese Eyes* (1958), and *The Ballads and Stories from Tun-huang* (1960).

Walgreen, Charles R., in full CHARLES RUDOLPH WALGREEN (b. Oct. 9, 1873, near Galesburg, Ill., U.S.—d. Dec. 11, 1939, Chicago, Ill.), American pharmacist and businessman, known as the father of the modern drugstore. He created the largest retail drugstore chain in the United States.

Walgreen was the son of Swedish immigrants and moved with his parents to Dixon, Ill., in 1887. After attending business college, he worked in a shoe factory there but soon became interested in pharmacology. He moved to Chicago in 1893 and became a registered pharmacist in 1897. He enlisted and served during the Spanish-American War, and upon his return to the United States, he again worked in Chicago as a pharmacist. He bought his first store in 1902 and established C.R. Walgreen & Company in 1909. In 1916 the name was changed to Walgreen Company. By the time of Walgreen's death, more than 490 stores were operated by the company.

Among Walgreen's many innovations was open-display merchandising. He is also noted for popularizing the lunch counter. He was president of the company until August 1939.

Walī Allāh, Shāh, Allāh also spelled ULLAH (b. 1702/03, Delhi [India]—d. 1762, Delhi), Indian theologian and founder of modern Islāmic thought who first attempted to reassess Islāmic theology in the light of modern changes.

Walī Allāh received a traditional Islāmic education from his father and is said to have memorized the Qur'ān at the age of seven. In 1732 he made a pilgrimage to Mecca, and he then remained in the Hejaz (now in Saudi Arabia) to study religion with eminent theologians. He reached adulthood at a time of disillusionment following the death in 1707 of Aurangzeb, the last Mughal emperor of India. Because large areas of the empire had been lost to Hindu and Sikh rulers of the Deccan and the Punjab, Indian Muslims had to accept the rule of non-Muslims. This challenge occupied Walī Allāh's adult life.

Walī Allāh believed that the Muslim polity could be restored to its former splendour by a policy of religious reform that would harmonize the religious ideals of Islām with the changing social and economic conditions of India. According to him, religious ideas were universal and eternal, but their application could meet different circumstances. The main tool of his policy was the doctrine of *tatbīq,* whereby the principles of Islām were reconstructed and reapplied in accordance with the Qur'ān and the Ḥadīth (the spoken traditions attributed to Muḥammad). He thereby allowed the practice of *ijtihād* (independent thinking by theologians in matters relating to Islāmic law), which hitherto had been curtailed. As a corollary, he reinterpreted the concept of *taqdīr* (determinism) and condemned its popularization, *qismat* (narrow fatalism, or absolute predetermination). Walī Allāh held that man could achieve his full potential by his own exertion in a universe that was determined by God. Theologically, he opposed the veneration of saints or anything that compromised strict monotheism. He was jurisprudentially eclectic, holding that a Muslim could follow any of the four schools of Islāmic law on any point of dogma or ritual.

The best known of Walī Allāh's voluminous writings was *Asrār ad-dīn* ("The Secrets of Belief"). His annotated Persian translation of the Qur'ān is still popular in India and Pakistan.

Walīd, al-, also called AL-WALĪD I, in full ABŪ AL-'ABBĀS AL-WALĪD IBN 'ABD AL-MALĪK IBN MARWĀN (b. 668?—d. 715, Damascus [now in Syria]), sixth caliph (reigned 705–715) of the Umayyad Arab dynasty, who is best known for the mosques constructed during his reign.

Al-Walīd, the eldest son of the caliph 'Abd al-Malīk ibn Marwān, was fervently orthodox in his religious views, and he had a great interest in architecture. As caliph, he confiscated the Christian Basilica of St. John the Baptist in Damascus and had the Great Mosque (Umayyad Mosque) erected on the site. He also had mosques built at Medina and Jerusalem. During al-Walīd's reign, areas in Central Asia, in coastal northern Africa, and in Spain were conquered and brought under the influence of Islām. Although al-Walīd did not actively direct this expansion, he did give support to capable subordinate officers and officials, allowing them great autonomy in the conduct of their affairs.

walk, in horsemanship, moderately slow four-beat gait of a horse, during which each foot strikes the ground separately and the horse is supported by two or three feet at all times.

The normal sequence of a walk is the order in which the feet are raised: a pattern such as right hind, right fore, left hind, and left fore. During the walk the horse's head moves down and forward and then up and back.

During a relaxed, or free, walk the reins are nearly slack, freeing the horse's head and neck. The extended walk, a variation of the relaxed walk, results in a cadenced swing of long, unhurried strides.

The collected walk, a short-striding gait, requires a balanced head and neck of the horse, controlled by the rider's handling of the reins. This gait also requires impulsion, produced by pressure of the rider's legs on the horse's sides. The speeding up of the collected walk creates the rack, which has a pronounced four-beat cadence.

walk (track-and-field sport): *see* walking.

Walker, David (b. Sept. 28, 1785, Wilmington, N.C., U.S.—d. June 28, 1830, Boston, Mass.), black American Abolitionist whose pamphlet *Appeal . . . to the Colored Citizens of the World . . .* (1829), urging slaves to fight for their freedom, was one of the most radical documents of the antislavery movement.

Born of a slave father and a free mother, Walker grew up free, obtained an education, and traveled throughout the country. Settling in Boston, he became involved in the Abo-

litionist movement and was a frequent contributor to *Freedom's Journal,* an antislavery weekly. Sometime in the 1820s he opened a secondhand clothing store on the Boston waterfront. Through this business he could purchase clothes taken from sailors in barter for drink, and then resell them to seamen about to embark. In the copious pockets of these garments, he concealed copies of his *Appeal,* which he reasoned would reach Southern ports and pass through the hands of other used-clothes dealers who would know what to do with them. He also used sympathetic black seamen to distribute pamphlets directly.

When the smuggled pamphlets began to appear in the South, the states reacted with legislation prohibiting circulation of Abolitionist literature and forbidding slaves to learn to read and write. Warned that his life was in danger, Walker refused to flee to Canada. His body was found soon afterward near his shop, and many believed he had been poisoned.

His *Appeal* for a slave revolt, widely reprinted after his death, was accepted by a small minority of Abolitionists, but most antislavery leaders and free blacks rejected his call for violence at the time.

His only son, Edwin G. Walker, was elected to the Massachusetts legislature in 1866.

Walker, Sir Emery (b. April 2, 1851, London, Eng.—d. July 22, 1933, London, Eng.), English engraver and printer associated with the revival of fine printing in England in the late 19th and early 20th centuries.

His formal schooling ended when he was 13. From 1873 to 1883 he was employed by the Typographic Etching Company in London, whose founder had developed the first commercial application in England of photoengraving. During that decade Walker developed a profound understanding of the history and processes of printing. In 1886 he joined Walter Boutall in a partnership that was the beginning of a prominent engraving and printing firm.

Walker met the poet William Morris in 1883; both men were deeply interested in fine typography. A talk given by Walker in 1888 before the Arts and Crafts Exhibition Society, London, inspired Morris' printing activities and led to the establishment of the Kelmscott Press (1891), considered the beginning of the private press movement in England. Walker played an important role in all of its activities throughout the seven years of its existence.

In 1900 Walker and Thomas James Cobden-Sanderson founded the Doves Press, known for its special type based on that of Nicolas Jenson and for its outstanding editions, particularly the Doves Bible, 5 vol. (1903–05), in which the special type was used. The partnership ended in 1909. Walker also played a role in creating type for two other notable private presses: the Ashendene Press and the Cranach-Presse, Weimar, Ger. He was knighted in 1930.

Walker, Francis A(masa) (b. July 2, 1840, Boston, Mass., U.S.—d. Jan. 5, 1897, Boston), American economist and statistician who led in modernizing and broadening the character and scope of economics.

Educated at Amherst College, Massachusetts, Walker enlisted in the Union Army in 1861 and was discharged with the rank of brevet brigadier general. In 1869 he was appointed head of the Bureau of Statistics in the U.S. Department of the Treasury, where he greatly improved the use of statistical techniques. He served as superintendent of the 1870 and 1880 censuses and expanded the coverage of the census to more accurately reflect the nation's development. He was commissioner of Indian affairs in 1871, professor of political economy at Yale University (1873–81), and president of the Massachusetts Institute of Technology from 1881 until his death. He was also president of the American Statistical Association (1883–97) and of the American Economic Association (1885–92).

Walker had a decisive influence in discrediting the generally accepted wages-fund doctrine, which held that the total wage bill was predetermined by the capital set aside for labour. He proposed instead his "residual claimant theory" of wages, which suggested that wage payments were based on what was left after three other costs of production—rent, interest, and profit—had been paid. His theory was never widely accepted. Instead, economists believe that wages reflect worker productivity.

Walker's books included *The Wages Question* (1876), *Money* (1878), and *Political Economy* (1883).

Walker, James J(ohn), byname JIMMY WALKER (b. June 19, 1881, New York City—d. Nov. 18, 1946, New York City), flamboyant mayor of New York City (1925–32) whose administration was marred by corruption.

The son of Irish Catholic immigrants Walker attended Saint Francis Xavier College and graduated from New York Law School in 1904. After graduation, however, he began frequenting Broadway's theatres and vaudeville and writing popular songs. In 1912 he was admitted to the New York State bar.

Already gravitating toward politics, he became a district captain and a member of the Assembly (1909) and, under the tutelage of Alfred E. Smith, was elected to the state senate (1914). With the backing of the Tammany organization and Governor Smith, Walker was nominated in 1925 as the Democratic mayoral candidate in the primary elections. He served as mayor of New York City for two terms. During his first term he created the Department of Sanitation, brought about unification of the city's public hospitals, and made considerable improvements in the playgrounds and park systems; and, under his guidance, the Board of Transportation approved contracts for the construction of an elaborate subway system.

Reelected to office in 1929, he soon came under critical fire. In 1931 the New York legislature formed a committee to investigate the affairs of New York City. It revealed extensive corruption, and 15 charges were leveled against Walker. Accused, among other things, of being actuated by improper and illegal considerations and of being unable to explain satisfactorily the large sums of money deposited in his bank account, he resigned on Sept. 1, 1932. He then went to Europe with his showgirl-mistress and did not return to the United States until 1935. He was named chairman of the National Cloak and Suit Industry in 1940; he later became the president of the Majestic Records Company.

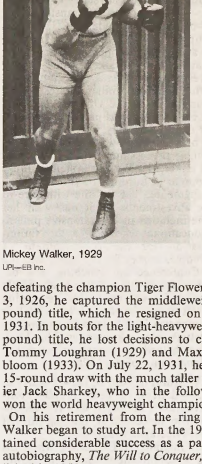
Walker, John E., in full JOHN ERNEST WALKER (b. Jan. 7, 1941, Halifax, Yorkshire [now West Yorkshire], Eng.), British chemist who was corecipient, with Paul D. Boyer, of the Nobel Prize for Chemistry in 1997 for their explanation of the enzymatic process that creates adenosine triphosphate (ATP). (Danish chemist Jens C. Skou also shared the award for separate research on the molecule.)

After receiving a doctorate from the University of Oxford in 1969, Walker undertook research projects at universities in the United States and Paris. His award-winning work was conducted at the University of Cambridge in the Medical Research Council Laboratory of Molecular Biology, which he joined in 1974, becoming senior scientist in 1982.

In the early 1980s Walker began studying ATP synthase—the central energy-producing molecule in most life-forms—which aides in the synthesis of ATP, the carrier of chemical energy. Focusing on the chemical and structural composition of the enzyme, he determined the sequence of amino acids that make up the synthase's protein units. In the 1990s, working with X-ray crystallographers, Walker clarified the three-dimensional structure of the enzyme. His work supported Boyer's "binding change mechanism," which explained the unusual way in which the enzyme functions. Walker's findings offer insight into the way life-forms produce energy.

Walker, Mickey, byname of EDWARD PATRICK WALKER, also called THE TOY BULLDOG (b. July 13, 1901, Elizabeth, N.J., U.S.—d. April 28, 1981, Freehold, N.J.), American professional boxer, a colourful sports figure of the 1920s and early 1930s, who held the world welterweight and middleweight championships and was a leading contender for the light-heavyweight and heavyweight titles.

Walker, a professional fighter from 1919, won the welterweight (147-pound) championship from Jack Britton on Nov. 1, 1922, and lost it to Pete Latzo on May 20, 1926. By



Mickey Walker, 1929
UPI—EB Inc.

defeating the champion Tiger Flowers on Dec. 3, 1926, he captured the middleweight (160-pound) title, which he resigned on June 19, 1931. In bouts for the light-heavyweight (175-pound) title, he lost decisions to champions Tommy Loughran (1929) and Maxie Rosenbloom (1933). On July 22, 1931, he fought a 15-round draw with the much taller and heavier Jack Sharkey, who in the following year won the world heavyweight championship.

On his retirement from the ring in 1935, Walker began to study art. In the 1940s he attained considerable success as a painter. His autobiography, *The Will to Conquer,* was published in 1953.

Walker, Robert J(ohn), also called ROBERT J(AMES) WALKER (b. July 19/23, 1801, Northumberland, Pa., U.S.—d. Nov. 11, 1869, Washington, D.C.), U.S. Senator from Mississippi (1835–45), secretary of the treasury (1845–49) during the Mexican War, and governor of Kansas Territory (April–December 1857) during the violent struggle over slavery there.

As senator he advocated the annexation of Texas and helped to make national expansion the major issue in the 1844 presidential campaign. Appointed secretary of the treasury by a grateful President James K. Polk, he financed the Mexican War, secured passage of the Walker Tariff Act (a concession to Great Britain in the Oregon boundary dispute), and prepared the statute that established the Department of the Interior.

In Kansas, Walker promised the free-soilers fair elections and stated that the slavery question there would be decided by "climate, not politics." This implication enraged the South and frightened the administration of Pres. James Buchanan. Walker resigned after refusing to accept the pro-slavery Lecompton Constitution.

Walker, Sarah Breedlove, *née* BREEDLOVE, byname MADAME C.J. WALKER (b. Dec. 23, 1867, near Delta, La., U.S.—d. May 25, 1919, Irvington-on-Hudson, N.Y.), businesswoman and philanthropist generally acknowledged to be the first black female millionaire in the United States.

Sarah Breedlove married at age 14, and at 20 she moved to St. Louis, Mo. She worked as a washerwoman for some years and during that time began experimenting at home with various hair dressings. In 1905 she developed a formula for creating a smooth, shiny coiffure for African American women. She quickly achieved local success with what later became known as the "Walker Method" or "Walker System." Moving to Denver, Colo., in 1906, she married Charles J. Walker, and thenceforward she was known as Madame C.J. Walker.

Walker organized agents to sell her hair treatment door-to-door and in 1910 transferred her business—by then the Madame C.J. Walker Manufacturing Co.—to Indianapolis, Ind. Her company at its peak employed some 3,000 people, many of them "Walker agents"—saleswomen dressed in long black skirts and white blouses who became familiar figures in the black communities of the United States and the Caribbean. Walker was president and sole proprietor of her company, and she soon became one of the best-known figures in America. Through the example of entertainer Josephine Baker, the Walker System coiffure became popular in Europe as well.

Walker augmented her fortune with shrewd real estate investments. Generous with her money, she included in her extensive philanthropies educational scholarships, the National Association for the Advancement of Colored People, homes for the aged, and the National Conference on Lynching. She bequeathed two-thirds of her estate to charitable and educational institutions. The remaining third was left to her daughter, A'Lelia Walker Kennedy, who was later known for supporting an intellectual salon—known as The Dark Tower—that helped to stimulate the cultural Harlem Renaissance of the 1920s.

Walker, William (b. May 8, 1824, Nashville, Tenn., U.S.—d. Sept. 12, 1860, Trujillo, Honduras), adventurer, filibuster, and revolutionary leader who succeeded in making himself president of Nicaragua (1856–57).

In 1850 he migrated to California, where his interest in a colonization scheme in Lower California developed into filibustering plans. On Oct. 15, 1853, he sailed from San Francisco with a small force. After landing at La Paz, he proclaimed Lower California and Sonora an independent republic. Lack of supplies and Mexican resistance forced him back to the United States in May 1854. Exactly a year later he sailed again, this time to Nicaragua at the invitation of a revolutionary faction. By the end of 1855 his military successes made him virtual master of Nicaragua, which was then a key transport link between Atlantic and Pacific ocean shipping.

When Walker arrived in Nicaragua, Cornelius K. Garrison and Charles Morgan, officers of Cornelius Vanderbilt's Accessory Transit Company, gave Walker financial assistance in a plot to gain control of the company. In return, Walker seized the company's property on the pretext of a charter violation and turned it over to Garrison and Morgan. Walker became president of Nicaragua on July 12, 1856, and maintained himself against a coalition of Central American states until May 1, 1857. In order to avoid capture, he surrendered to the United States Navy and returned to the United States.

In November he led another foray but was arrested and returned to the United States as a prisoner on parole. On his third descent on Central America (1860), he landed in Honduras, where he was taken prisoner by the British Navy. He was then turned over to Honduran authorities, who executed him.



William Walker

By courtesy of the Library of Congress, Washington, D.C.

Walker Cup, golf trophy awarded to the winner of a competition between amateur men's teams from the United States and the British Isles, held biennially since 1922 on sites alternating between the United States and Britain. The cup is named for George H. Walker, a president of the United States Golf Association (USGA) in the 1920s and a primary organizer of the event. Contests consist of four 18-hole foursome (partners taking alternate shots) matches and eight 18-hole singles matches on each of two days, with one point awarded to the winning side in each match. Teams of eight players, two alternates, and a captain are selected by the USGA and the Royal and Ancient Golf Club of St. Andrews, Fife, Scot. For results, *see* Sporting Record: *Golf.*

Walker Law (1920), first significant U.S. legislation concerning the sport of boxing, enacted in the state of New York under the sponsorship of James J. Walker, speaker of the state senate. The bill legalized professional boxing in New York, and its code of boxing rules, for the most part written by William Gavin, an English boxing promoter, provided a basis for similar legislation in other states. The law also established the New York State Athletic Commission, which has remained independent and continues to publish its own list of world boxing champions.

walking, activity that ranges from a competitive sport, usually known as race walking, to a popular form of outdoor recreation and mild aerobic exercise.

Race walking. The technique followed in the track-and-field sport of race walking requires that a competitor's advancing foot touch the ground before the rear foot leaves the ground, and for this reason the sport is sometimes known as heel-and-toe racing. In international competition the advancing leg must also be straightened briefly while that foot is in contact with the ground.

Walking as a competitive sport dates from the latter half of the 19th century, although stories of individual walking feats were recorded much earlier. A 7-mile (11-kilometre) walking event was introduced by the Amateur Athletic Club of England at its championships in 1866. During the 1870s and '80s, professional races in which athletes competed around the clock but were permitted to eat, rest, or nap were held indoors in New York City. The winner was the contestant who covered the greatest distance in six days.

Walking races of 10 miles and 3,500 metres were added to the men's Olympic program in 1908. Since 1956, however, the Olympic distances have been 20 and 50 kilometres. A women's 10-kilometre walk was introduced at the 1992 Games; at the 2000 Games the women's walking event was extended to 20 kilometres. *See* Sporting Record: *Athletics. See also* Olympic Games.

Recreational and fitness walking. Noncompetitive walking is extremely popular in the United States and Europe. Millions participate for the relaxation and exercise it offers. Walking for recreation or fitness is differentiated from hiking by its shorter distances, less challenging settings, and the lack of need for specialized equipment. Walking can simply be a casual meander around a local park for relaxation or a daily regimen of several miles that is undertaken for health benefits.

The shoes needed for comfortable recreational walking vary by conditions and the type of walk undertaken. While distance walkers often use conventional hiking boots, particularly in colder weather, shorter-distance walkers wear lighter shoes similar to those worn by runners.

The health benefits of walking range from better overall cardiovascular health to weight loss, stress relief, and a reduction in the risk of some forms of cancer by up to 40 percent. Fitness walking is less strenuous and less likely to cause injuries than running is. Walking is an ideal form of exercise for senior citizens and others who require a gentler workout.



20-kilometre race walk, 2000 Olympic Games, Sydney

Russ Kinnaird/Allsport

Organized walking associations have worked to establish sizable trail networks in cities and rural areas. In the United States the American Volkssport Federation is an umbrella organization made up of more than 500 local walking clubs nationwide that promote recreational walking and organize group walks. The Canadian Volkssport Federation is home to

another 100 local walking clubs. In Great Britain the British Walking Federation oversees approximately 40 walking clubs nationwide.

walking fern, fern that is a member either of the species *Camptosorus rhizophyllus,* of eastern North America, or of *C. sibiricus,* of eastern Asia, the only two species of the genus, in the family Aspleniaceae. The common name derives from the fact that new plantlets sprout wherever the parent plant's arching leaves touch the ground. The plant's leaves are evergreen, undivided, and slightly leathery; they are triangular in shape, tapering to a thin point. Spore-bearing structures are in clusters along the veins. Walking ferns are hardy plants



Walking fern (*Camptosorus rhizophyllus*)
Mary W. Ferguson

that inhabit shady areas of limestone ledges and limy wooded areas.

walking fish: *see* climbing perch.

walking leaf: *see* leaf insect.

Walking Purchase (Aug. 25, 1737), land swindle perpetrated by Pennsylvania authorities on the Delaware Indians, who had been the tribe most friendly to William Penn when he founded the colony in the previous century. Colonial authorities claimed to have found a lost treaty, of 1686, ceding a tract of Delaware tribal land between the fork of the Delaware and Lehigh rivers that extended as far as a man could walk in 1½ days—about 40 miles. William Penn's son Thomas Penn (1702–75), who was proprietor of Pennsylvania in 1737, hired the three fastest walkers in the colony and offered a large prize to the one who could cover the most land. The winner, running on a carefully cleared path, crossed more than twice the land the Delaware had anticipated—causing the tribe to lose about 1,200 square miles (3,100 square km) of their land. At Thomas Penn's request, members of the Iroquois League helped enforce this unpopular decision. In reaction to this and other frauds, the Delaware joined the French in the Ohio country and returned to ravage the Pennsylvania frontier during the last French and Indian War (1756–63). In 1758 the northern half of the purchase was relinquished to the Six Nations of the Iroquois League; the Delaware received £400 in compensation for it four years later.

walkingstick, also called STICK INSECT, any of about 2,000 species of slow-moving green- or brown-coloured insect belonging to the family Phasmatidae (order Phasmatodea). Its resemblance to twigs is a protective device; some species may also have sharp spines, an offensive odour, or eggs that closely resemble seeds.

Walkingsticks have the ability to regenerate legs and antennae. The wings of some species have short, leathery covers; some have large,



North American walkingstick (*Diapheromera femorata*)
D. Dwight Davis

colourful hind wings that are kept folded over the abdomen. Tropical species of walkingsticks are the largest and most abundant; certain species (such as the Asiatic *Palophus* and the East Indian *Pharnacia*) are more than 30 cm (12 inches) in length. The North American species *Diapheromera femorata* may defoliate oak trees during heavy infestations.

Walkyrie (Norse legendary figure): *see* Valkyrie.

wall, structural element used to divide or enclose, and, in building construction, to form the periphery of a room or a building. In tradiitional masonry construction, walls supported the weight of floors and roofs, but modern steel and reinforced concrete frames, as well as heavy timber and other skeletal structures, require exterior walls only for shelter and sometimes dispense with them on the ground floor to permit easier access.

The traditional load-bearing wall of masonry is of a thickness proportional to the forces it has to resist: its own weight, the dead load of floors and roofs, and the live load of people, as well as the lateral forces of arches, vaults, and wind. Such walls are often thicker toward the base, where maximum loading accumulates. They can be thickened along their entire length or only at particular points where the force is concentrated; the latter method is called buttressing.

Doors and windows weaken a wall and divert the forces above them to the parts on either side, which must be thickened in proportion to the width of the opening. The number of openings that can be used depends on the strength of the masonry and the stresses in the wall. Usually windows must be placed one above the other in multistory buildings to leave uninterrupted vertical wall masses to transfer loads directly to the ground.

Positioning of walls depends on the type of support given floors and roofs. The usual beam supports must be jointed to walls at both ends, and their maximum length establishes the distance between bearing walls. All types of floors and roofs except the dome are most easily supported on straight, parallel walls.

Nonbearing walls, used where loads are carried by girders, beams, or other members, are called curtain walls; they rest or hang on the frame members. Any durable, weather-resisting material—glass, plastic, metal alloy, or wood—may be used, since nonbearing walls are freed from the limitations of structural requirements.

wall creeper (*Tichodroma muraria*), bird of the mountains of southern Europe to central Asia, largest member of the family Sittidae (order Passeriformes). About 17 cm (6½ inches) long and mostly gray with broad, rounded black wings having central red patches, it has a long, thin, downcurved bill. In searching for insects on cliffs, it ascends jerkily while flicking its wings. In winter it may visit lowlands and climb the walls of city buildings.



Wall creeper (*Tichodroma muraria*)
Drawing by Murrell Butler

wall newspaper, newspaper produced for display on walls or in other prominent places in cities, towns, and villages, usually in developing countries. The practice is not new; in ancient Rome the *Acta* newspapers were regularly posted. Wall newspapers may serve a single population centre or several; they have been published by governmental agencies where newspapers are too costly to produce and distribute or where people are too poor to buy them. Usually, a single individual in a given locality has the responsibility of affixing the wall newspaper in a specified place—on a schoolhouse, community centre, or other easily accessible wall or display board. The same person or another may read the paper aloud to others who are illiterate.

Wall newspapers have been widely used in Asia, Africa, and South and Central America, and, where necessary, they are printed in various regional or local dialects. The papers generally feature numerous pictures, attractive makeup, and only a few articles or features.

Wall Street, street in the southern section of the borough of Manhattan, in New York City, which has been the location of some of the chief financial institutions of the United States. The street is narrow and short and extends only about seven blocks from Broadway to the East River. It was named for an earthen wall built by Dutch settlers in 1653 to repel an expected English invasion. Even before the American Civil War the street was recognized as the financial capital of the nation. The Wall Street, or financial, district contains the New York Stock Exchange, the American Stock Exchange, investment banks, government and municipal securities dealers, trust companies, the Federal Reserve Bank, many headquarters of utilities and insurance companies, and the International Cotton, Coffee, Sugar, Cocoa, and Commodity Exchanges. The district is the headquarters of many of the country's brokerage firms.

Wall Street is a worldwide symbol of high finance and investment and, as such, has entered modern mythology. To 19th-century Populists, Wall Street was a symbol of the rapacious robber barons who exploited farmers and labourers. In prosperous times Wall Street has symbolized the route to quick riches. After the devastating stock market crash of 1929, Wall Street seemed the bastion of financial manipulators able to destabilize national economies.

Wall Street Journal, The, U.S. business and financial newspaper published Monday through Friday and sold throughout the United States as well as internationally. *The Wall Street Journal* was founded by Charles H. Dow, of Dow Jones & Company, primarily to cover business and financial news. It also publishes the Dow Jones stock indexes. The paper's accuracy and breadth of its coverage have made it an influential business journal.

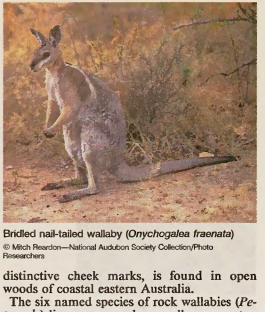
Following the publication of the first issue on July 8, 1889, the *Journal* rarely ventured beyond business and economic news until the early 1930s, when it began to publish occasional features on other subjects. After World War II this trend increased, so that by the 1960s the *Journal* regularly carried two feature articles on page one. In 2002 a comprehensive redesign of the newspaper introduced contemporary layouts, a liberal use of colour, and a new features section entitled Personal Journal.

Although perceived as favouring the interests of businesses, the *Journal's* opinion and editorial pages reflect a wide range of highly informed business, political, and economic opinion. The long-established structure of the *Journal* includes comprehensive tables reporting financial and stock market activity for the preceding day as well as reports and analyses of current business topics. In 2002 the entire staff was awarded the newspaper's 26th Pulitzer Prize for its breaking news coverage of the Sept. 11, 2001, attack on New York City's World Trade Center. The U.S., Asian, and European editions of the *Journal* had a combined circulation of more than two million in the early 21st century.

Walla Walla, city, seat (1859) of Walla Walla county, southeastern Washington, U.S. It lies along the Walla Walla River, near the Oregon state line. The American pioneer Marcus Whitman established a medical mission in the locality in 1836 and worked with the Cayuse Indians until he was massacred with his group in 1847 (marked by the Whitman Mission National Historic Site [1940]). A military post, Fort Walla Walla, was established on the site of the present-day city in 1856, and a settlement grew up around it. This settlement was first named Steptoeville but was incorporated as Walla Walla (an Indian word meaning "small rapid rivers") in 1862. The Idaho gold rush of 1861 brought an influx of pioneers who turned to ranching and agriculture. In 1875 the Walla Walla and Columbia River Railroad was completed.

The city eventually became the centre of an extensive wheat- and truck-farming area and developed food-processing and lumber industries, with port facilities for Columbia River barges. It is a district headquarters for the U.S. Army Corps of Engineers (responsible for the Columbia-Snake river development projects); and a U.S. Air Force dispersal base is at the City-County Airport. Whitman College (1859), Walla Walla College (1892), and Walla Walla Community College (1967) serve the city, which is also the site of Washington State Penitentiary. Pop. (2003 est.) 30,134.

wallaby, any of several middle-sized marsupial mammals belonging to the kangaroo family, Macropodidae (*see* kangaroo). They are found chiefly in Australia. The 11 species of brush wallabies (genus *Macropus,* subgenus *Protemnodon*) are built like the big kangaroos but differ somewhat in dentition. Their head and body length is 45 to 105 cm (18 to 41 inches), and the tail is 33 to 75 cm long. A common species is the red-necked wallaby (*M. rufogriseus*), with reddish nape and shoulders, which inhabits brushlands of southeastern Australia and Tasmania; this species is often seen in zoos. The pretty-faced wallaby, or whiptail (*M. elegans,* or *M. parryi*), with



Bridled nail-tailed wallaby (*Onychogalea fraenata*)
© Mitch Reardon—National Audubon Society Collection/Photo Researchers

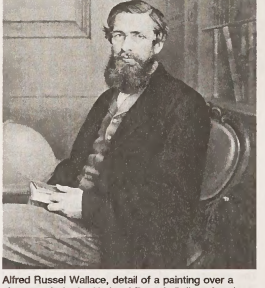
distinctive cheek marks, is found in open woods of coastal eastern Australia.

The six named species of rock wallabies (*Petrogale*) live among rocks, usually near water. They are prettily coloured in shades of brown and gray and are distinguished by stripes, patches, or other markings. They are extremely agile on rocky terrain. The three species of nail-tailed wallabies (*Onychogalea*) are named for a horny growth on the tail tip. They are handsomely striped at the shoulder. Because they rotate their forelimbs while hopping, they are often called organ-grinders. Two species are endangered.

The two species of hare wallabies (*Lagorchestes*) are small animals that have the movements and some of the habits of hares. Often called pademelons, the three species of scrub wallabies (*Thylogale*) of New Guinea, the Bismarck Archipelago, and Tasmania are small and stocky, with short hind limbs and pointy noses. They are hunted for meat and fur. A similar species is the short-tailed scrub wallaby, or quokka (*Setonix brachyurus*); this species is now restricted to two offshore islands of Western Australia.

Wallace, Alfred Russel (b. Jan. 8, 1823, Usk, Monmouthshire, Eng.—d. Nov. 7, 1913, Broadstone, Dorset), British naturalist, best known for having evolved a theory of the origin of species through natural selection independently of Charles Darwin.

As a youth Wallace became interested in botany and began collecting plants. In 1844–45, while a schoolteacher in the collegiate school at Leicester, he met the British naturalist Henry Walter Bates, who interested him in insects. They went on an expedition to the Amazon in 1848, and in 1853 Wallace published *A Narrative of Travels on the Amazon and Rio Negro.* On the return voyage his ship sank, and his collections were lost, except for materials already sent to England.



Alfred Russel Wallace, detail of a painting over a photograph; in the National Portrait Gallery, London
By courtesy of the National Portrait Gallery, London

In 1854–62 he toured the Malay Archipelago to assemble further evidence, in addition to that collected in the Amazon, to support his theory of evolution. In February 1855, staying at Sarawak in Borneo, he wrote a preliminary, though explicit, essay, "On the Law Which Has Regulated the Introduction of New Species," published later that year, in which he stated that "Every species has come into existence coincident both in time and space with a preexisting closely allied species." For 10 years, so he wrote, "the question of *how* changes of species could have been brought about was rarely out of my mind." Finally, in February 1858, during a severe attack of malaria at Ternate, in the Moluccas, while thinking about human evolution, he recalled the *Essay on Population* by the economist Thomas R. Malthus. "There suddenly flashed upon me," he reported, "the *idea* of the survival of the fittest." The theory was thought out, drafted in a single evening, written out in full in two succeeding evenings, and sent to Darwin by the next mail, which didn't leave Ternate, however, until March 9, 1858. Darwin in England said that he at once recognized his own theory in the young naturalist's manuscript essay. "I never saw a more striking coincidence," he wrote to the geologist Sir Charles Lyell on June 3, the day he received the paper, and added that even Wallace's "terms now stand as heads of my chapters."

On the advice of Lyell and the botanist Sir Joseph Hooker, Wallace's essay was read, together with an abstract of Darwin's own views, as a joint paper at the Linnean Society on July 1, 1858. The title of Wallace's section was "On the Tendency of Varieties to Depart Indefinitely from the Original Type." The struggle for existence, the rate of multiplication of animals, and the dependence of their average numbers upon food supply were demonstrated, and the conclusion was reached that "those that prolong their existence can only be the most perfect in health and vigour; . . . the weakest and least perfectly organized must always succumb."

Darwin's own *On the Origin of Species* was published the following year, in November 1859. Darwin is granted most of the credit for the idea of evolution by natural selection because he developed the theory in much greater detail than did Wallace, provided far more evidence for it, and was primarily responsible for the theory's acceptance.

The difference between Jean-Baptiste Lamarck's theory—which proposes that a structural change, resulting from a need that arises in the organism because of changes in the environment during the lifetime of an individual, is inherited by the next generation—and natural selection was discussed by Wallace in his original essay. He pointed out, for instance, that the falcon and the cat have retractile talons not because of their own volition but because "those always survived longest which had the greatest facilities for seizing their prey." Also, the giraffe did not develop a long neck because it stretched for food but because those giraffes possessing longer necks than usual "at once secured a fresh range of pasture over the same ground as their shorter-necked companions, and on the first scarcity of food were thereby enabled to outlive them."

Wallace's understanding of Lamarck was incomplete. The actual difference is that, for Lamarck, physical changes were inherited and were therefore responsible for changes in species, whereas Wallace emphasized the struggle for existence and the survival of the fittest. He also emphasized the way in which animals, especially insects, resemble their surroundings because "those races having colours best adapted to concealment from their enemies would inevitably survive the longest."

In his book *The Malay Archipelago* (1869),

Wallace divided the Archipelago into a western group of islands (Borneo and Bali), whose zoological affinities are Oriental, and an eastern group (Celebes and Lombok), with Australian links. The Oriental Borneo and Bali are, respectely, divided from Celebes and Lombok by a narrow belt known as Wallace's Line (*q.v.*). On the opposite sides of this line, his discovery of which was indeed fundamental, the indigenous mammals are as widely divergent as in any two parts of the world. Wallace originated his theory of natural selection during these travels.

In 1870 Wallace's two essays, written at Sarawak and Ternate, were published with others as a volume, *Contributions to the Theory of Natural Selection.* In this and in other works, Wallace differed from Darwin on various points. Both believed that humans evolved to their present bodily form by natural selection. But Wallace insisted that the higher mental capacities of humans could not have arisen by natural selection, as Darwin argued, but that some nonbiological agency must have been responsible. Here may be seen the influence of Wallace's convictions on the subject of spiritualism. He also expressed his dissatisfaction with Darwin's hypothesis of "sexual selection" by the female of the brightly coloured male. Emphasizing protection and concealment, Wallace argued that natural selection alone would establish the dull colours of female birds.

The British Government conferred the Order of Merit on Wallace in 1910. He was an enthusiast for land nationalization and woman suffrage.

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Wallace, Anthony F.C., in full ANTHONY FRANCIS CLARKE WALLACE (b. April 15, 1923, Toronto, Ont., Can.), Canadian-born American psychological anthropologist and historian known for his analysis of acculturation under the influence of technological change.

Wallace received his Ph.D. in 1950 from the University of Pennsylvania in Philadelphia and taught there from 1951 to 1988. His most important work, *Rockdale: The Growth of an American Village in the Early Industrial Revolution* (1978), is a psychoanthropological history of the Industrial Revolution. Wallace studied the cultural aspects of the cognitive process, especially when it involves the transfer of information during periods of technological expansion. In other books he compares religion as a movement of "social revitalization" among the American Indians and in modern times. His books include *King of the Delawares: Teedyuscung, 1700–1763* (1949), *Culture and Personality* (1961, rev. ed. 1970), *Religion: An Anthropological View* (1966), *Death and Rebirth of the Seneca* (1970), *The Social Context of Innovation* (1982), *St. Clair: A Nineteenth-Century Coal Town's Experience with a Disaster-Prone Industry* (1987), and *The Long, Bitter Trail: Andrew Jackson and the Indians* (1993).

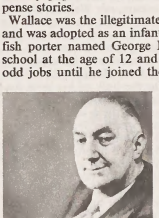
Wallace, DeWitt; and Acheson, Lila Bell (respectively b. Nov. 12, 1889, St. Paul, Minn., U.S.—d. March 30, 1981, Mount Kisco, N.Y.; b. Dec. 25, 1889, Virden, Manitoba, Can.—d. May 8, 1984, Mount Kisco), creators and publishers of *Reader's Digest,* one of the most widely circulated magazines in the world.

Wallace was the son of a professor at Presbyterian Macalester College in St. Paul. He attended Macalester for two years and then left to work in a bank. He began keeping a card index of his favourite articles in current periodicals. He subsequently entered the University of California at Berkeley and soon met Lila Bell Acheson while staying with a friend in Tacoma, Wash. Wallace successfully condensed some government pamphlets into a booklet on agriculture that he sold, and he was thinking of extending his condensed booklet technique to articles of general interest when the United States entered World War I. Wallace served in the U.S. Army, and, while recuperating from severe wounds, he plotted the magazine digest idea further. He carefully assembled a sample issue in 1920, which he had printed and sent out, a copy at a time, to various publishers, none of whom were interested. In the meantime, he had seen Lila Acheson again, who believed in his digest idea, and he proposed marriage to her.

The daughter of a Presbyterian minister, Acheson grew up in small towns in the Midwest before moving to Tacoma. While Wallace was at war she organized YWCA centres for women workers in war industries in Eastern states. She stayed on in social service work in the East after the war. In 1921 the two were married at Pleasantville, N.Y. The Wallaces began to publish *Reader's Digest* by themselves, marketing it by direct mail from a basement underneath a Greenwich Village speakeasy. The first issue appeared in February 1922. The magazine's circulation grew rapidly, rising from 1,500 in 1922 to 200,000 in 1929 and about 15,000,000 (worldwide) in 48 editions and 19 languages by 1999. DeWitt served as editor from 1921 to 1965 and as chairman from 1921 to 1973. The *Reader's Digest* carried only articles condensed or excerpted from other magazines for 11 years but began to include occasional original articles in 1933 and condensed versions of topical books in 1934. It began to appear in foreign-language editions in 1940, when advertisements were introduced. As publishers, the Wallaces sought a positive tone—which critics thought banal or reactionary—while printing articles on a wide range of subjects. The enormous success of the magazine brought them great wealth, and the pair became active in support of numerous philanthropic causes. In 1972 the Wallaces were presented with the U.S. Presidential Medal of Freedom. The Lila Wallace–Reader's Digest Fund became a major philanthropic benefactor of the arts and culture. The company became publicly traded in 1990.

Wallace, Edgar, in full RICHARD HORATIO EDGAR WALLACE (b. April 1, 1875, Greenwich, London, Eng.—d. Feb. 10, 1932, Hollywood, Calif., U.S.), British novelist, playwright, and journalist who was an enormously popular writer of detective and suspense stories.

Wallace was the illegitimate son of an actress and was adopted as an infant by a Billingsgate fish porter named George Freeman. He left school at the age of 12 and held a variety of odd jobs until he joined the army at 18; he served in the South African War until 1899, when he became a reporter. He returned to England and produced his first success, *The Four Just Men* (1905).



Edgar Wallace
Keystone

Wallace practically invented the modern "thriller"; his works in this genre have complex but clearly developed plots and are known for their exciting climaxes. His literary output—175 books, 15 plays, and countless articles and review sketches—was prodigious, and his rate of production so great as to be the subject of humour. His literary reputation has suffered since his death. His works include *Sanders of the River* (1911), *The Crimson Circle* (1922), *The Flying Squad* (1928), and *The Terror* (1930). His last work was part-authorship of the film script for *King Kong,* which was finished shortly before his death.

Wallace, George C., in full GEORGE CORLEY WALLACE (b. Aug. 25, 1919, Clio, Ala., U.S.—d. Sept. 13, 1998, Montgomery), U.S. Democratic Party politician and four-time governor of Alabama who led the South's fight against federally ordered racial integration in the 1960s.

A farmer's son, Wallace worked his way through the University of Alabama Law School, graduating in 1942. Following military service in World War II, he served as assistant state's attorney (1946), after which he was elected to two terms in the state legislature. As judge of the Third Judicial Circuit of Alabama (1953–59), he became known as the "fighting judge" owing to his defiance of the U.S. Commission on Civil Rights' investigation of discrimination in black voting rights.

Though defeated in the Alabama gubernatorial race in 1958, Wallace won four years later on a platform emphasizing segregation and economic issues. Within his first year in office he kept his pledge "to stand in the schoolhouse door" by blocking the enrollment of black students at the University of Alabama (June 1963). Declaring that the federal government was usurping state authority in the field of education, he yielded only in the face of the federalized National Guard. Further confrontations at Tuskegee, Birmingham, Huntsville, and Mobile made him a nationwide symbol of intransigence toward racial integration in the schools.

Because Wallace was ineligible for reelection, his first wife, Lurleen, successfully ran for governor in 1966, but she died in office in 1968. Wallace himself was reelected in 1970 and 1974. He was a vigorous but unsuccessful third-party candidate for the U.S. presidency in 1968, winning 46 electoral votes as the nominee of the antiliberal American Independent Party. Four years later, while campaigning for the Democratic presidential nomination, he was wounded and left permanently paralyzed below the waist in an assassination attempt on May 15, 1972, at Laurel, Md. He again campaigned for the Democratic presidential nomination in 1976. In the 1980s Wallace renounced his segregationist ideology and reconciled with civil rights leaders. In 1982 he sought a new term as governor while campaigning from a wheelchair and won the election with substantial support from black voters. He retired from politics in 1987 because of ill health.

Wallace, Henry A., in full HENRY AGARD WALLACE (b. Oct. 7, 1888, Adair county, Iowa, U.S.—d. Nov. 18, 1965, Danbury, Conn.), 33rd vice president of the United States (1941–45) who epitomized the "common man" philosophy of the New Deal Democrats. He shaped the administration's controversial farm policy but broke with the Democratic Party in 1946 on matters of foreign relations.

Wallace was originally an agricultural expert; his experiments with higher-yielding corn strains resulted in major advances in plant

genetics and later developed into a highly profitable hybrid corn business for him.

In 1928 he joined the Democratic Party. His extensive familiarity with the farm scene, combined with his success in delivering "conservative Iowa" to the "radical New Deal" in the 1932 national elections, made him a natural choice for secretary of agriculture (1933–40) in the first two administrations of President Franklin D. Roosevelt. As such he formulated and administered New Deal legislation (especially the Agricultural Adjustment Act of 1933) passed to raise and stabilize farm prices, conserve soil, store reserves, and control production.

As vice president during Roosevelt's third term (1941–45), Wallace became the president's goodwill ambassador to Latin America and also traveled in Siberia and China. When the United States entered World War II, he assumed many additional emergency duties, especially in national economic affairs.

Party conservatives—especially Southerners—opposed Wallace's renomination to the vice presidency in 1944, and he was superseded by Senator Harry S. Truman. Wallace served as secretary of commerce for the next two years, but his growing criticism of the Truman administration's "get-tough" Cold War policy toward the Soviet Union led to his resignation. He became editor of the liberal weekly *The New Republic* (1946–47) and then left to help form the new left-wing Progressive Party. In his 1948 campaign as the Progressive Party's candidate for president, Wallace advocated closer cooperation with the Soviet Union, United Nations administration of all foreign aid, and reduction of armaments. He received more than 1,000,000 popular votes but none in the Electoral College. Later he



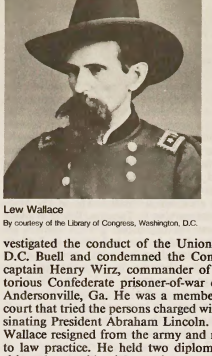
Henry A. Wallace
UPI

broke with the Progressives and returned to private life.

Wallace was a prolific writer whose works include *Sixty Million Jobs* (1945), in which he called for governmental action to supplement private enterprise, *The Century of the Common Man* (1943), *America Must Choose* (1934), and *The Long Look Ahead* (1960).

Wallace, Lewis, byname LEW WALLACE (b. April 10, 1827, Brookville, Ind., U.S.—d. Feb. 15, 1905, Crawfordsville, Ind.), American soldier, lawyer, diplomat, and author who is principally remembered for his historical novel *Ben-Hur*.

The son of an Indiana governor, Wallace left school at 16 and became a copyist in the county clerk's office, reading in his leisure time. He began his study of law in his father's office but left to recruit volunteers for the Mexican War, in which he served from 1846 to 1847. In 1849, already a practicing attorney in Indianapolis, he was admitted to the bar. In the American Civil War he served with the Union forces and attained the rank of major general of volunteers. At the Battle of Monocacy (July 9, 1864), he was defeated by the Confederate general Jubal A. Early but nevertheless prevented the latter from capturing the Federal capital, Washington, D.C. He served as president of the courts of inquiry that in-



Lew Wallace
By courtesy of the Library of Congress, Washington, D.C.

vestigated the conduct of the Union general D.C. Buell and condemned the Confederate captain Henry Wirz, commander of the notorious Confederate prisoner-of-war camp at Andersonville, Ga. He was a member of the court that tried the persons charged with assassinating President Abraham Lincoln. In 1865 Wallace resigned from the army and returned to law practice. He held two diplomatic positions by presidential appointment. He was governor of New Mexico (1878–81), and then minister to Turkey (1881–85).

Though Wallace also wrote poetry and a play, his literary reputation rests upon three historical novels: *The Fair God* (1873), a story of the Spanish conquest of Mexico; *The Prince of India* (1893), dealing with the Wandering Jew and the Byzantine Empire; and above all *Ben-Hur* (1880), a romantic tale set in the Roman Empire during the coming of Christ. Its main character, a young Jewish patrician named Judah Ben Hur, loses his family and freedom because of the injustice of a Roman officer but eventually triumphs through his own abilities and the intervention of Jesus. *Ben-Hur* was an enormous popular success and was made into a play and a motion picture (1925) and then remade on a spectacular scale in another motion-picture version (1959). *Lew Wallace: An Autobiography* was published in 1906.

Wallace, Sir Richard, BARONET (b. June 21, 1818, London, Eng.—d. July 20, 1890, Paris, France), British art collector and philanthropist whose name is perpetuated by the famous art collection, the Wallace Collection (*q.v.*), at Hertford House, London.

Wallace was a natural son of Viscount Beauchamp, later the 4th marquess of Hertford, and Agnes Jackson, *née* Wallace. He was educated in Paris and, after the death of the 3rd marquess in 1842, acted as confidential secretary to his father, the 4th marquess, assisting him in the formation of his superb art collection. In 1870 Lord Hertford died, leaving Wallace heir to the bulk of his large fortune, his unentailed property, and all his art collections. The part of these collections that eventually came to form the Wallace Collection at Hertford House owes its character to both men. Lord Hertford assembled most of the 17th- and 18th-century French furniture and minor arts along with the Old Masters and 19th-century French paintings, to which Wallace added the armour and medieval and Renaissance works of art.

Wallace was created a baronet in 1871 for his services to the English community during the siege of Paris (1870) of the Franco-German War. He was a British commissioner at the Paris Exhibition of 1878 and also a trustee of the National Gallery and the National Portrait Gallery and a governor of the National Gallery of Ireland. He sat in Parliament for Lisburn, Ire., from 1873 to 1885, when he retired to Paris. He died without surviving children, and the baronetcy became extinct. His wife, who died in 1897, bequeathed to the British nation those sections of the art collection, then housed on the ground and first floors of Hertford House, that now form the Wallace Collection.

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Wallace, Sir William (b. *c.* 1270, probably near Paisley, Renfrew, Scot.—d. Aug. 23, 1305, London, Eng.), one of Scotland's greatest national heroes, leader of the Scottish resistance forces during the first years of the long, and ultimately successful, struggle to free Scotland from English rule.

His father, Sir Malcolm Wallace, was a small landowner in Renfrew. In 1296 King Edward I of England deposed and imprisoned the Scottish king John de Balliol and declared himself ruler of Scotland. Sporadic resistance had already occurred when, in May 1297, Wallace and a band of some 30 men burned Lanark and killed the English sheriff. Wallace then organized an army of commoners and small landowners and attacked the English garrisons between the Rivers Forth and Tay. On Sept. 11, 1297, an English army under John de Warenne, earl of Surrey, confronted him at the Forth near Stirling. Wallace's forces were greatly outnumbered, but Surrey had to cross a narrow bridge over the Forth before he could reach the Scottish positions. By slaughtering the English as they crossed the river, Wallace gained an overwhelming victory. He captured Stirling Castle, and for the moment Scotland was nearly free of occupying forces. In October he invaded northern England and ravaged the counties of Northumberland and Cumberland.

Upon returning to Scotland early in December 1297, Wallace was knighted and proclaimed guardian of the kingdom, ruling in Balliol's name. Nevertheless, many nobles lent him only grudging support; and he had yet to confront Edward I, who was campaigning in France. Edward returned to England in March 1298, and on July 3 he invaded Scotland. On July 22 Wallace's spearmen were defeated by Edward's archers and cavalry in the Battle of Falkirk, Stirling. Although Edward failed to pacify Scotland before returning to England, Wallace's military reputation was ruined. He resigned his guardianship in December and was succeeded by Robert de Bruce (later King Robert I) and Sir John Comyn "the Red."

There is some evidence that Wallace went to France in 1299 and thereafter acted as a solitary guerrilla leader in Scotland; but from the autumn of 1299 nothing is known of his activities for more than four years. Although most of the Scottish nobles submitted to Edward in 1304, the English continued to pursue Wallace relentlessly. On Aug. 5, 1305, he was arrested near Glasgow. Taken to London, he was condemned as a traitor to the king even though, as he maintained, he had never sworn allegiance to Edward. He was hanged, disemboweled, beheaded, and quartered. In 1306 Bruce raised the rebellion that eventually won independence for Scotland.

Many of the stories surrounding Wallace have been traced to a late 15th-century romance ascribed to Henry the Minstrel, or "Blind Harry." The most popular tales are not supported by documentary evidence, but they show Wallace's firm hold on the imagination of his people. A huge monument (1861–69) to Wallace stands atop the rock of Abbey Craig near Stirling.

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Wallace Collection, in the United Kingdom, a national collection of fine and decorative artworks bequeathed to the British government in 1897. It is housed in Hertford House at Manchester Square, Westminster, London.

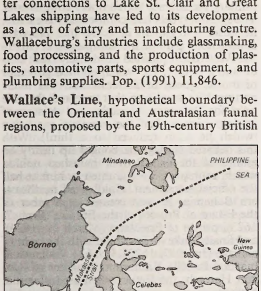
The fine, eclectic Wallace Collection was built up by the Seymour-Conway family, marquesses of Hertford, during the 18th and 19th centuries. In 1870 it was bequeathed by the 4th marquess of Hertford to his illegitimate son, Richard Wallace, who adapted the house to receive the collection and added to the collection himself. Wallace's widow left both the house and collection to the nation upon her decease. The house, built in 1776 and acquired in 1797 by the 2nd marquess of Hertford as his town home, was opened to the public in 1900.

The Wallace Collection is particularly notable for its 17th- and 18th-century French and British paintings and sculpture. There are also works by Dutch, Flemish, Italian, and Spanish artists, as well as a large holding of paintings by the 19th-century British artist Richard Parkes Bonington. A French furniture collection includes a number of important pieces, and there is an extensive collection of clocks. The armoury includes a choice collection of European arms and armour as well as Asian material. A collection of Sèvres porcelain contains representatives of each phase and style of the 18th century, and there is an important collection of 16th-century Italian majolica.

Consult the INDEX *first*

Wallaceburg, town, Kent county, southern Ontario, Canada. It lies at the confluence of the north and east branches of the Sydenham River, 30 miles (50 km) northeast of Detroit, Mich. The town was called The Forks until it was renamed for Sir William Wallace, a medieval Scottish national hero. Its deepwater connections to Lake St. Clair and Great Lakes shipping have led to its development as a port of entry and manufacturing centre. Wallaceburg's industries include glassmaking, food processing, and the production of plastics, automotive parts, sports equipment, and plumbing supplies. Pop. (1991) 11,846.

Wallace's Line, hypothetical boundary between the Oriental and Australasian faunal regions, proposed by the 19th-century British



Wallace's Line
Adapted from Sir A.L. Thomson (ed.), *A New Dictionary of Birds*

naturalist Alfred Russel Wallace. The line extends from the Indian Ocean through the Lombok Strait (between the islands of Bali and Lombok), northward through the Makasar Strait (between Borneo and the Celebes), and eastward, south of Mindanao, into the Philippine Sea. Although many zoogeographers no longer consider Wallace's Line a regional boundary, it does represent an abrupt limit of distribution for many major animal groups. Many fish, bird, and mammal groups are abundantly represented on one side of Wallace's Line, but poorly or not at all on the other side. *See also* Weber's Line.

Wallach, Otto (b. March 27, 1847, Königsberg, Prussia [now Kaliningrad, Russia]—d. Feb. 26, 1931, Göttingen, Ger.), German chemist awarded the 1910 Nobel Prize for Chemistry for analyzing natural fragrant oils.

Wallach studied under Friedrich Wöhler at the University of Göttingen, receiving his doctorate in 1869. He joined August Kekule at the University of Bonn (1870), where he taught pharmacy and became professor in 1876. From 1889 to 1915 he was director of the Chemical Institute at Göttingen.



Wallach
Bavaria-Verlag

While at Bonn, Wallach became interested in the composition of a group of volatile oils widely used in pharmaceutical preparations. Kekule virtually denied that they could be analyzed. Nevertheless, Wallach, a master of experimentation, by repeated distillation was able to separate the components of complex mixtures. Then, by studying their physical properties, he could distinguish among the compounds many that were quite similar to one another. He discovered that most of the compounds belonged to the class now called isoprenoids.

Wallachia (European principality): *see* Walachia.

Wallack, Henry John (b. 1790, London, Eng.—d. Aug. 30, 1870, New York, N.Y., U.S.), leading British-American actor and theatrical manager.

Born into a theatrical family, Wallack appeared at an early age at Astley's amphitheatre with his parents and siblings. After an unexceptional early career he developed into a distinguished actor and by 1824 was leading player at the Chatham Garden Theatre, and later at the Covent Garden. In 1829 he played Julius Caesar to his brother James's Antony.

Wallack had made his American debut in Baltimore in 1819 and first appeared in New York in 1821, and he thereafter traveled frequently between London and New York. In 1837 he joined his brother in taking over the National Theatre in New York, he as stage manager and James as general manager. The partnership lasted for two years until the theatre burned, and Henry returned to acting, performing until 1858. Wallack's three children—Fanny, Julia, and James William Wallack II—also were gifted actors.

Wallack, James William (b. Aug. 24, 1795, London, Eng.—d. Dec. 25, 1864, New York, N.Y., U.S.), leading British-American actor and manager of New York theatres, from whose acting company (continued by his son, Lester Wallack) developed many of the important American stage performers of the 19th century.

Wallack was born to a London stage family and at the age of four first performed with other members of his family at the Royal Circus. In 1807, when he was 12, he began appearing in plays by William Shakespeare and Richard Brinsley Sheridan at the Drury Lane. Between 1818, when he made his American debut as Macbeth, and 1852 he reputedly crossed the Atlantic 35 times for various engagements in London and New York.



James William Wallack, detail from an engraving by T. Woolnoth, 1807
By courtesy of the Victoria and Albert Museum, London

In 1837 with his brother, Henry John Wallack, he took over the National Theatre in New York, he as general manager and his brother as stage manager and a leading player. The theatre burned two years later, and James subsequently toured in America and the British Isles for several years. In 1852 he took over the Lyceum Theatre in New York City. He renamed it Wallack's Lyceum and, with his son Lester as stage manager and his son Charles as treasurer, for nine successful years managed the company in a repertory of Shakespeare, standard comedies, and some contemporary drama. He continued acting until 1859, when he returned entirely to management. In 1861 he moved the troupe to a new playhouse at Broadway and 13th Street called Wallack's Theatre.

Wallack, Lester, original name JOHN JOHNSTONE WALLACK (b. Jan. 1, 1820, New York, N.Y., U.S.—d. Sept. 6, 1888, Stamford, Conn.), actor, playwright, and manager of the Wallack Theatre Company, the training ground of virtually every important American stage performer of the 19th century.

Son of the actor-manager James William Wallack, Lester Wallack began his professional stage career by touring the English provinces; he made his New York debut in 1847. When his father took over the Lyceum Theatre in 1852 in New York City and renamed it the Wallack Theatre, Lester performed a number of comic and romantic parts with the company and worked also as stage manager until 1861, when he succeeded his father.

Under Lester Wallack, the theatre became famous for its polished productions of English plays and some new dramas, including his highly successful *Rosedale* (1863), in which he starred. The company included the actor James William Wallack II, Lester's cousin. In 1882 Lester opened a new Wallack Theatre and until his retirement five years later managed both playhouses. The new Wallack Theatre closed in 1915, but another Wallack playhouse flourished from 1924 to 1931. His *Memories of Fifty Years* was published in 1889.

wallaroo, also called EURO, one of the largest species of kangaroo (*q.v.*).

Wallas, Graham (b. May 31, 1858, Sunderland, Eng.—d. Aug. 10, 1932, London), British educator, public official, and political scientist known for his contributions to the development of an empirical approach to the study of human behaviour.

Wallas studied at Oxford (1877–81) and was a teacher (1881–90). He joined the Fabian Society in 1886 and was a contributor to *Fabian Essays in Socialism* (1889). Growing dissatis-

fied with the anti-liberal views of many of the leading Fabians, however, he resigned from the executive committee in 1895 and from the society in 1904.

Wallas began a distinguished career in higher education in 1890 as a university extension lecturer. In 1895 he joined the faculty of the London School of Economics, where he taught until his retirement in 1923. He served on the London County Council (1904–07) and was a member of its Education Committee (1908–10). He was also chairman of the school management committee of the London School Board. In 1914 he became university professor of political science at the University of London.

Wallas' writings reflected a basic optimism toward social problems mixed with some skepticism. He was highly critical of contemporary social science for not being sufficiently scientific. Among Wallas' major works are *The Life of Francis Place* (1898), a study of the 19th-century liberal reformer and trade union supporter; *Human Nature in Politics* (1908), an appeal for more understanding of the psychological aspects of political behaviour; and *The Great Society* (1914), an amplification of themes in *Human Nature in Politics*, examining human nature in a complex industrial society.

wallboard, any of various large, rigid sheets of finishing material used in drywall construction to face the interior walls of dwellings and other buildings. Drywall construction is the application of walls without the use of mortar or plaster.

Wallboard materials include plywood and wood pulp, asbestos-cement board, and gypsum. Wood fibre and pulp boards are made by compressing together layers or particles of wood with adhesives and are manufactured with wood grain and a variety of other surface effects. They are also available with high acoustic (sound-suppressing) and thermal (insulating) capacities. Asbestos-cement boards are formed from a mixture of portland cement and asbestos fibre that has been wetted and then pressed into a board or sheet form. Organic fibres are added to some asbestos-cement boards to promote resiliency and ease of machining, and boards can also be treated with curing agents, water-repellent admixtures, and a variety of other substances to improve their performance and the ease with which they can be worked. Thin asbestos-cement sheets are usually backed with plywood or insulating board to increase their resistance to impact.

One of the most common wallboard types is the gypsum panel. Gypsum, a natural mineral in crystalline form, is a hydrous sulfate of calcium. Gypsum board contains a gypsum rock core sandwiched between two layers of special paper. In fire-resistant panels, required for many types of construction, glass fibres are mixed with the gypsum base. Panels manufactured with an aluminum backing are used for insulation. Gypsum wallboard is manufactured both unfinished and finished with a variety of vinyl and other finishes in permanent colours and textures that require no additional treatment to complete the appearance of interior wall surfaces.

Gypsum boards, wood sheets, and wood pulp boards are also used as a sheathing material to cover the exterior of a building's wood superstructure.

Wallenberg, Raoul (b. Aug. 5, 1912, Stockholm—d. July 17, 1947, Moscow?), Swedish businessman and diplomat who became a legendary figure through his efforts to rescue Hungarian Jews during World War II and through his disappearance while a prisoner in the Soviet Union.

A descendant of a wealthy and prestigious family of bankers, industrialists, and diplomats, Wallenberg studied architecture and in 1936 became the foreign representative of a central European trading company, whose president was a Hungarian Jew. After the Nazis sent troops and SS units into Hungary in March 1944 to round up "subversives" and Jews, Wallenberg, with the help of U.S. and Swedish Jewish and refugee organizations, persuaded the Swedish Foreign Ministry to send him to Budapest on a diplomatic passport (July 9, 1944). There, several thousand Jews (diversely estimated at from 4,000 to 35,000) were enlisted and sheltered by Wallenberg in "protected houses" flying the flags of Sweden and other neutral countries. (By this time, some 400,000 Hungarian Jews, including 90,000 from Budapest, had already been deported to the Nazi death camps.) Wallenberg also dogged the Germans at deportation trains and on "death marches," distributing food and clothing to the Jewish prisoners and trying to rescue some of them with papers and money for their passage out of the country. He was more than once threatened by Adolf Eichmann.

Soon after Soviet troops reached Budapest, Wallenberg on Jan. 17, 1945, reported to the occupying authority but was forthwith arrested for espionage—his money, radio, and dubious diplomatic status making him suspect. According to Swedish authorities, the Soviets later privately admitted that his arrest had been a mistake, during a confused period at war's end, but that their only information was that Wallenberg had died of a heart attack in a Moscow prison cell in 1947. There were a number of unconfirmed reports from freed Soviet prisoners, however, that he had since been seen alive in prison, notably in 1951, 1959, and 1975.

On Sept. 22, 1981, the U.S. Congress granted honorary citizenship to the missing Wallenberg. (Such honorary citizenship had been granted only once before, to Sir Winston Churchill.)

Wallenda, Karl (b. 1905, Magdeburg, Ger.—d. March 22, 1978, San Juan, Puerto Rico), founder of The Great Wallendas, a circus acrobatic troupe famed for their three-man-high pyramid on the high wire.

The troupe first achieved fame in Europe for doing a four-man pyramid and cycling on the high wire. They joined the U.S. Ringling Bros. and Barnum & Bailey Combined Circus in 1928, where they developed a seven-man pyramid (1947). The Wallendas later performed as free-lancers. When the pyramid collapsed during a 1962 performance, two members of the troupe were killed and a third was paralyzed. Another was killed in a 1963 accident and still another in 1972. Karl died in a fall from a wind-whipped wire stretched 123 feet above the pavement, between two hotels in San Juan.

Wallenstein, Albrecht Wenzel Eusebius von, HERZOG (duke) VON FRIEDLAND, HERZOG VON MECKLENBURG, FÜRST (prince) VON SAGEN, Wallenstein also spelled WALDSTEIN, Czech ALBRECHT VÁCLAV EUSEBIUS Z VALDŠTEJNA, or VALŠTEJNA (b. Sept. 24 [Sept. 14, old style], 1583, Heřmanice, Bohemia—d. Feb. 25, 1634, Eger), Bohemian soldier and statesman, commanding general of the armies of the Holy Roman emperor Ferdinand II during the Thirty Years' War. His alienation from the Emperor and his political-military conspiracies led to his assassination.

Youth and early career. An orphan at the age of 13, Wallenstein was brought up by an uncle, who sent him to the Protestant grammar school at Goldberg in Silesia and, in 1599, to the Protestant university at Altdorf. His grand tour (1600–02) led him through Germany, France, and Italy. In Italy he attended lectures at Padua and Bologna and formed his



Wallenstein, portrait by Sir Anthony Van Dyck, 1629; in the Bayerische Staatsgemäldesammlungen, Munich
By courtesy of the Bayerische Staatsgemaldesammlungen, Munich

taste on Italian Baroque art and architecture. In 1604 he served with a Bohemian contingent against the Hungarians and ingratiated himself with the Habsburgs and with the Jesuits by his conversion to Catholicism (1606). His Jesuit confessor arranged his marriage (1609) to an elderly Czech widow, Lucretia Nekšova, with immense estates in Moravia, which permitted him to live lavishly, especially after her death (1614). At his own expense he aided the future Habsburg emperor Ferdinand II with a mercenary force in the latter's war against Venice (1617).

During the Bohemian rebellion against Habsburg rule (1618–23) he remained loyal to Ferdinand; he always despised the political and military inefficiency of his noble compatriots. Though the rebels had confiscated his estates, he raised a regiment of horse that played a conspicuous part in the campaigns of 1619–21. Wallenstein profited immensely from Ferdinand's victory. He was appointed governor of the Kingdom of Bohemia and was made partner of a syndicate that received the sole right for Bohemia, Moravia, and Austria of issuing coins at half the previous par value (which he soon reduced to a third). With this debased coinage he bought up nearly 60 estates of the executed or banished nobles, which, moreover, were granted to him at half the official assessment. Holding all northeastern Bohemia, he was created a member of the Estate of Princes of the Empire (Sept. 7, 1623), prince of Friedland (March 12, 1624), and finally duke of Friedland with the right of coinage (June 13, 1625). In 1623 Wallenstein married Isabella Katharina, daughter of Karl von Harrach, the Emperor's most influential adviser.

Rise to power. The outbreak of the Danish War (1625–29) gave Wallenstein his great opportunity. Ferdinand, mortified by his dependence on the Catholic League under Duke Maximilian I of Bavaria, readily agreed to Wallenstein's proposal to raise an independent imperial army of 24,000 men without charges upon the imperial treasury: Hans de Witte, Wallenstein's financial agent, was to advance the ready cash for equipment and pay to be reimbursed by taxes and tributes from the conquered districts. On this basis, Wallenstein was on April 7, 1625, appointed *capo* of all imperial forces in the Holy Roman Empire and the Low Countries, with the general Johann, Graf von Aldringen as his deputy. By advancing money to his colonels for enlisting their regiments, Wallenstein bound the officers to his person. His duchy of Friedland was turned into a huge centre of armaments and supply services. The defeat of the Protestant

commander, Ernst, Graf von Mansfeld, near Dessau was the new army's first success (April 25, 1626), but Wallenstein was reproached for having allowed Mansfeld to escape and tendered his resignation. Only an extension of his powers and the permission to increase the army to 70,000 men caused him to stay. He was instrumental in forcing the Peace of Pressburg (Pozsony, December 1626) on the Hungarian leader Gábor Bethlen, ejected the Danes from Silesia (July 1627), and, in conjunction with the Bavarian general Johann Tserclaes, Graf von Tilly, conquered Mecklenburg, Holstein, Schleswig, and the whole of continental Denmark. In lieu of repayment of his expenses, he obtained not only the Silesian principality of Sagan (Sept. 1, 1627), but also, on June 16, 1629, he was given the Duchy of Mecklenburg as a hereditary imperial fief. He had reached the zenith of his career.

Promotion to the place of the former dukes of Mecklenburg (outlawed for their support of Denmark) changed Wallenstein's whole outlook. He ceased to be a servant of the House of Habsburg and began to pursue an independent policy. His new conception of international affairs was strengthened by his first acquaintance, during the Danish War, with sea trade and sea power. He obtained appointment as general of the Imperial Armada and of the North and Baltic seas (1628) and planned a great trading company, comprising the Emperor, Spain, and the Hanseatic towns, to cut out the Dutch and English carrying trade; but this scheme collapsed when his general, Hans Georg von Arnim, failed to conquer Stralsund, which would have been a first-rate naval base. Even so, Wallenstein had so far diverged from the Catholicizing tendencies of Ferdinand II and from his own previous desire to make Ferdinand the supreme ruler of Germany that he entered into political and economic discussions with his Protestant neighbours, Brandenburg, Pomerania, and the Hanseatic towns, advised Ferdinand to grant Denmark easy peace terms, and strongly disapproved of Ferdinand's Edict of Restitution (1629) restoring to the Catholics all ecclesiastical lands in which Protestantism had been established after 1552.

The failure before Stralsund gave the German princes a pretext for dealing their long-prepared blow against the Emperor, ostensibly by attacking Wallenstein. Their main grievance was the creation of an imperial army, which had not existed since medieval times and which was to be the means of establishing imperial autocracy. The Electoral Diet at Regensburg (July–August 1630) threatened the Emperor with the combined opposition of the Catholic and Protestant princes under French leadership and with refusal to elect his son Ferdinand III as king of the Romans unless Wallenstein was dismissed and the army virtually disbanded. On Aug. 13, 1630, Ferdinand II dismissed his generalissimo.

Thenceforward Wallenstein was determined to wreak vengeance both on Ferdinand and on Maximilian of Bavaria, who had played a role in the decision of the Diet. From November 1630 he was intriguing with Gustav II Adolf, king of Sweden, who had invaded Germany in support of the princes against the Emperor. Gustav may have been willing to cooperate with the army that Wallenstein promised to raise at his own expense, to appoint him viceroy of the Habsburg dominions, and to support his election as king of Bohemia; but Gustav refused to put a Swedish corps under his command. Intercepted letters apprised the imperial court of these negotiations; but after the Swedish victory over General Tilly (who had replaced Wallenstein) at Breitenfeld (Sept. 17, 1631), the Emperor had to offer Wallenstein once more the supreme command. Wallenstein merely promised to provide an army of 40,000 men within three months; but as the army was useless without its generalissimo, Ferdinand eventually conceded Wallenstein's exorbitant claims (April 16, 1632), granting him absolute command over all imperial troops (whose officers were to be appointed by him), authorizing him to enter into negotiations with Saxony, allowing him first claim on all confiscations in the empire, and giving him the Silesian principality of Glogau in pawn for Mecklenburg (which Gustav had restored to its former dukes). Having cleared Bohemia of the Saxons under Arnim within a few weeks, Wallenstein forced Gustav out of Bavaria and Franconia by defensive strategy (July–September 1632) and, in order to detach the elector John George I from the Swedish alliance, occupied most of Saxony.

The Battle of Lützen (Nov. 16, 1632) was the final turning point in Wallenstein's career. There he and Gustav confronted one another, and though the Swedes were victorious, Gustav was killed. This event terminated Wallenstein's indispensability to the Emperor. Wallenstein meant to bring about the pacification of the empire, with himself as arbiter; for this he had to keep his army intact and under his control.

Downfall and death. From the Emperor's viewpoint, Wallenstein now became a rebel and a traitor. He quartered his army in Habsburg territory (Bohemia, Silesia, Austria); he did not move when the Swedes, having overrun Alsace, Franconia, Swabia, and Bavaria, crowned their success with the capture of the key fortress of Regensburg (November 1633); and he refused to support a Spanish force in southwestern Germany. He fought his last campaign in Silesia and Brandenburg (October 1633) for political reasons; *i.e.*, to frighten Brandenburg out of the Swedish alliance.

Simultaneously, Wallenstein conducted peace negotiations with Saxony, Brandenburg, Sweden, and France, making different and often contradictory offers to the various agents. Very soon he lost credit with all parties. Arnim, who negotiated on behalf of Saxony and Brandenburg, was especially disgusted with Wallenstein's double-dealing and became his bitterest opponent; the Swedish chancellor Axel Oxenstierna and Bernhard of Weimar correctly mistrusted Wallenstein's assurances that his generals would follow him; only the Bohemian emigrants pinned their hopes on their future king.

In fact, Wallenstein, largely blinded by his belief in astrological prognostications, was completely mistaken about his generals. Loyalty or calculation kept the leading officers among them on the Emperor's side: Ottavio Piccolomini, Matthias Gallas, Johann, Graf von Aldringen, Melchior von Hatzfeldt, and even Wallenstein's astrologer Gian Battista Zenno (or Seni) informed the court of Vienna of the progress of the conspiracy and secured the adherence of other officers. Wallenstein's brother-in-law Adam Trčka and the field marshals Christian von Ilow and Heinrich Holk were the only generals prepared to follow Wallenstein through thick and thin, but Holk died of the plague in September 1633.

In January 1634 Wallenstein convoked about 50 generals and colonels in Pilsen to prepare his revolt. On January 12 they pledged themselves to stand by him "so long as he remained in the Emperor's service"; but in the written declaration that they were made to sign on the same day, this stipulation was omitted. Piccolomini's report caused Ferdinand II to sign a letter patent (January 24) that deposed the generalissimo, replaced him by Gallas, amnestied the signatories of the Pilsen declaration except Trčka and Ilow, and ordered the capture or liquidation of Wallenstein and his chief conspirators.

A final volte-face of Wallenstein, who offered his resignation in return for considerable financial and territorial compensations, was disregarded in Vienna, as also was the second Pilsen declaration (Feb. 20, 1634), in which Wallenstein and 32 colonels affirmed their loyalty to the Emperor. When Prague declared for the Emperor, Wallenstein left Pilsen for Eger, to facilitate a conjunction with the Swedes and Saxons. There, on Feb. 25, he, Trčka, Ilow, and other officers were murdered by soldiers under the command of the Irish general Walter Butler and the Scots colonels Walter Leslie and John Gordon. An English captain, Walter Devereux, ran his halberd through Wallenstein, who, roused from sleep, asked in vain for quarter.

Wallenstein's life is the subject of a great dramatic trilogy by the German poet Johann Christoph Friedrich Schiller. (S.H.St.)

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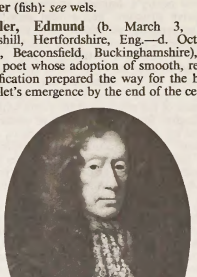
Where the same name may denote a person, place, or thing, the articles will be found in that order

waller (fish): *see* wels.

Waller, Edmund (b. March 3, 1606, Coleshill, Hertfordshire, Eng.—d. Oct. 21, 1687, Beaconsfield, Buckinghamshire), English poet whose adoption of smooth, regular versification prepared the way for the heroic couplet's emergence by the end of the century



Edmund Waller, oil painting after J. Riley; in the National Portrait Gallery, London
By courtesy of the National Portrait Gallery, London

as the dominant form of poetic expression. His importance was fully recognized by his age. "Mr. Waller reformed our numbers," said John Dryden, who, with Alexander Pope, followed him and raised the couplet to its most concentrated form.

Waller was educated at Eton College and the University of Cambridge and entered Parliament while still a young man. In 1631 he married the heiress of a wealthy London merchant, but she died three years later. He then paid unsuccessful court to Lady Dorothy Sidney (whom he addressed in poetry as Sacharissa) and in 1644 married Mary Bracey.

During the political turmoil of the 1640s, Waller tried to play a double game: at first an active member of the opposition, he moved over to the Royalist cause (though still trusted by the Parliamentarians) and in 1643 was deeply involved in a conspiracy (sometimes known as Waller's plot) to establish London as a stronghold of the King, leading to the poet's arrest in May. By wholesale betrayal

of his colleagues, and by lavish bribes, he managed to avoid the death sentence, but he was banished and heavily fined. He then lived abroad until 1651, when he made his peace with his distant cousin Oliver Cromwell, later lord protector of the Commonwealth.

Several of Waller's poems, including "Go, lovely Rose!"—one of the most famous lyric poems in English literature—had circulated for some 20 years before the appearance of his *Poems* in 1645. The first edition claiming full authorization, however, was that of 1664. In 1655 appeared his "Panegyrick to my Lord Protector" (*i.e.,* Cromwell), but in 1660 he also celebrated "To the King, upon his Majesties happy return." He became a member of the Royal Society and was returned to Parliament in 1661, where he held moderate opinions and advocated religious toleration. His later works include *Divine Poems* (1685). *The Second Part of Mr. Waller's Poems* was published in 1690.

Waller's poetry was held in high esteem throughout the 18th century, but his reputation waned in the 19th century along with that of Augustan poetry in general. His technical achievement in leading away from the dense verse of the Metaphysical poets lies in his incorporation of wit more related to rational judgment and in his replacement of Metaphysical poetry's dramatic immediacy, argumentative structure, and ethical seriousness with generalizing statement, easy associative development, and urbane social comment. His pursuit of definitive phrasing through inversion and balance led to the tight, symmetrical patterning of the Augustan heroic couplet. Waller helped to transmit to the Augustans a synthesis of the regular iambic norm with native English four-stress alliterative metre and showed its use for expressive emphasis, as in the line "Invite affection, and restrain our rage." Apart from this, Waller deserves to be remembered for the distinction of his poems on public themes and for his elegance, lyrical grace, and formal polish.

Waller, Fats, byname of THOMAS WRIGHT WALLER (b. May 21, 1904, New York City—d. Dec. 15, 1943, Kansas City, Mo., U.S.), American pianist and composer who was one of the few outstanding jazz musicians to win wide commercial fame, though this was achieved at a cost of obscuring his purely musical ability under a cloak of broad comedy.

Overcoming opposition from his clergyman father, Waller became a professional pianist at 15, working in cabarets and theatres, and soon became deeply influenced by James P. Johnson, the founder of the stride school of jazz piano. By the late 1920s he was also an established songwriter whose work often appeared in Broadway revues. From 1934 on he made hundreds of recordings with his own small band, in which excellent jazz was mixed with slapstick in a unique blend.

His best-known songs include "Ain't Misbehavin'," "Honeysuckle Rose," and his first success, "Squeeze Me" (1925), written with Clarence Williams. He was the first jazz musician to master the organ, and he appeared in several films, including *Stormy Weather* (1943). Usually remembered as a genial clown, he is of lasting importance as one of the greatest of all jazz pianists and as a gifted songwriter, whose work in both fields was rhythmically contagious. A biography, *Fats Waller,* by Maurice Waller, his son, and Anthony Calabrese, was published in 1977.

Waller, Max, pseudonym of LÉOPOLD-NICOLAS-MAURICE-ÉDOUARD WARLOMONT (b. Feb. 24, 1860, Brussels—d. March 6, 1889, Saint-Gilles, near Brussels), Belgian lyric poet who founded the review *La Jeune Belgique* ("Young Belgium"; 1881–97).

The leading literary journal of its day, *La Jeune Belgique* published the early work of most of the writers who made a name for themselves in the Belgian literary renaissance (*e.g.,* Maurice Maeterlinck, Émile Verhaeren, and Albrecht Rodenbach). Waller himself was sympathetic to the ideals of careful craftsmanship characteristic of the French Parnassian poets and was hostile to the free verse of the Symbolists. Nevertheless, he did much to make Belgian poets aware of all literary developments in Paris. Waller, who originally was trained as a lawyer, died young and left just one important collection of verse, *La Flute à Siebel* (1892), made up of deft and clever little poems in the Parnassian style.

Waller, Sir William (b. *c.* 1598, Knole, Kent, Eng.—d. Sept. 19, 1668, London), a leading Parliamentary commander in southern England during the first three years of the Civil War (1642–51).

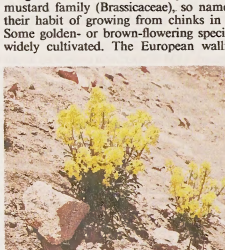
Waller fought for Bohemia in the early campaigns of the Thirty Years' War (1618–48) and was knighted in 1622. Elected to the Long Parliament in 1640, he became a colonel in the Parliamentary army upon the outbreak of the Civil War. In September 1642 he captured Portsmouth and, soon after, several other towns of southeastern England, thereby earning the nickname "William the Conqueror." Promoted to the rank of general, he seized Hereford, Herefordshire, in April 1643. Nevertheless, on July 13 Sir Ralph Hopton severely defeated him at Roundway Down, Wiltshire. Waller prevented the Royalists from invading Sussex in January 1644 and stopped Hopton's advance on London in March, but he was defeated by King Charles I near Banbury, Oxfordshire, in June. The setbacks suffered by Waller and other talented commanders led to demands for a reorganization of the Parliamentarian forces. Waller was evidently the first to suggest the creation of a professional army. This New Model Army was formed in February 1645, and two months later Waller resigned his commission.

Waller was a leader of the Presbyterians in Parliament during their unsuccessful struggle (1645–48) with the army, which was dominated by Independents (radical Puritans). For opposing Oliver Cromwell's Commonwealth regime, he was imprisoned several times between 1649 and 1659. Although elected to the Convention Parliament of 1660, Waller never took his seat and subsequently received no political encouragement from King Charles II. A biography by J. Adair, *Roundhead General,* was published in 1969.

Waller's gazelle (antelope): *see* gerenuk.

walleyed pike, also called WALLEYE, fish that is a type of pikeperch (*q.v.*).

wallflower, any of several plants belonging to the genera *Cheiranthus* and *Erysimum* of the mustard family (Brassicaceae), so named for their habit of growing from chinks in walls. Some golden- or brown-flowering species are widely cultivated. The European wallflower (*C. cheiri*), native to cliffsides and meadows of southern Europe, is naturalized in Great Britain. It is biennial to perennial, with erect, 70-centimetre (28-inch) stalks bearing spikelike, fragrant clusters of golden to brown, four-petaled flowers. The western wallflower (*E. asperum*), a 90-centimetre (35-inch) perennial found on prairies, sand hills, and open woods in central to western North America, produces fragrant, yellow to orange, elongated clusters of flowers.



Wallflower (*Erysimum*)

V.E. Ward from The National Audubon Society Collection/Photo Researchers—EB Inc.

Wallingford, urban town (township), New Haven County, south central Connecticut, U.S. It lies along the Quinnipiac River northeast of New Haven. The land was purchased from Montowese, son of an Indian sachem, in 1638 for 12 cloth coats. It was set off from New Haven and opened to white settlers in 1667. Originally called East River, it was incorporated in 1670 and renamed for Wallingford, Eng. The Borough of Wallingford, incorporated in 1853, was consolidated with the town in 1958. The town's silverware industry began in 1835 with the production of Britannia ware. There is now diversified manufacturing. Choate School (1896), a fashionable prep school for boys, merged with Rosemary Hall in 1977 and became the coeducational Choate Rosemary Hall. Pop. (1990) 40,822.

Wallis, Sir Barnes (Neville) (b. Sept. 26, 1887—d. Oct. 30, 1979, Leatherhead, Surrey, Eng.), British aeronautical designer and military engineer who invented the innovative "dambuster" bombs used in World War II.

Wallis trained as a marine engineer before joining the airship (dirigible) department of Vickers Ltd. in 1913 as a designer. Eventually turning to aircraft, he employed his geodetic system in the Royal Air Force's (RAF's) Wellington bomber in World War II. His researches into detonation effects led to his inventing the rotating bouncing bomb that, when dropped from an aircraft, skipped over the water and exploded while sinking to the base of the retaining wall of a dam. This type of bomb, used during World War II by the RAF on the Möhne and Eder dams in Germany's industrial Ruhr area, produced heavy floods that slowed industrial production.

Wallis produced not only the dambuster bombs but also the 12,000-pound "Tallboy" and the 22,000-pound "Grand Slam" bombs. He was also responsible for the bomb that destroyed the German warship *Tirpitz,* the V-rocket sites, and much of Germany's railway system. Wallis was chief of aeronautical research and development at the British Aircraft Corporation at Weybridge, Surrey, from 1945 to 1971. In 1971 he designed an aircraft that could fly five times the speed of sound and needed a runway only 300 yards (275 m) long. He became a fellow of the Royal Society in 1954 and was knighted in 1968.

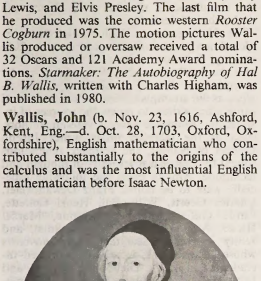
Wallis, Hal B(rent) (b. Sept. 14, 1899, Chicago—d. Oct. 5, 1986, Rancho Mirage, Calif.), American motion-picture producer, associated with more than 400 feature-length films from the late 1920s to the mid-1970s.

Wallis began work at age 14 as an office boy and later worked as a traveling salesman. In 1922 his family moved to Los Angeles, where he managed a movie theatre before joining the publicity staff of Warner Brothers in 1923. He soon headed publicity there and by 1928 was chief of production, a job temporarily taken over by Darryl F. Zanuck in 1931. Under Zanuck he produced *Little Caesar* (1930), which spawned a generation of Warner-produced gangster films, *I Am a Fugitive from a Chain Gang* (1932), and *Gold Diggers of 1933.* In 1933 Wallis succeeded Zanuck as executive producer in charge of production at Warner Brothers, and in the following decade he produced some of the most popular films in the history of Hollywood,

including *A Midsummer Night's Dream* and *Captain Blood* (both 1935), *The Adventures of Robin Hood* (1938), *Dark Victory* (1939), *The Letter* and *The Sea Hawk* (both 1940), *The Maltese Falcon* (1941), *Sergeant York* (1941), and *Casablanca* and *Yankee Doodle Dandy* (both 1942). Besides handling the finance and budgeting of motion pictures, Wallis displayed a knack for choosing the director and the actors who could most effectively exploit a given screenplay. He "discovered" the actors Burt Lancaster and Kirk Douglas, and he significantly aided the careers of Edward G. Robinson, James Cagney, Paul Muni, Bette Davis, Humphrey Bogart, Montgomery Clift, and Dean Martin and Jerry Lewis.

From 1944 Wallis worked as an independent producer, making movies for Warner Brothers, Paramount, and Universal Pictures. In this capacity he produced *Come Back, Little Sheba* (1952), *The Rose Tattoo* (1955), and *Gunfight at the O.K. Corral* (1957) and the lavish historical dramas *Becket* (1964), *Anne of the Thousand Days* (1969), and *Mary Queen of Scots* (1971). He also turned out purely commercial films starring Dean Martin, Jerry Lewis, and Elvis Presley. The last film that he produced was the comic western *Rooster Cogburn* in 1975. The motion pictures Wallis produced or oversaw received a total of 32 Oscars and 121 Academy Award nominations. *Starmaker: The Autobiography of Hal B. Wallis,* written with Charles Higham, was published in 1980.

Wallis, John (b. Nov. 23, 1616, Ashford, Kent, Eng.—d. Oct. 28, 1703, Oxford, Oxfordshire), English mathematician who contributed substantially to the origins of the calculus and was the most influential English mathematician before Isaac Newton.



John Wallis, oil painting after a portrait by Sir Godfrey Kneller; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

Wallis learned Latin, Greek, Hebrew, logic, and arithmetic during his early school years. In 1632 he entered the University of Cambridge, where he received B.A. and M.A. degrees in 1637 and 1640, respectively. He was ordained a priest in 1640 and shortly afterward exhibited his skill in mathematics by deciphering a number of cryptic messages from Royalist partisans that had fallen into the hands of the Parliamentarians. In 1645, the year of his marriage, Wallis moved to London, where in 1647 his serious interest in mathematics began when he read William Oughtred's *Clavis Mathematicae* ("The Keys to Mathematics").

Wallis' appointment in 1649 as Savilian professor of geometry at the University of Oxford marked the beginning of intense mathematical activity that lasted almost uninterruptedly to his death. A chance perusal of the works of the Italian physicist Evangelista Torricelli, who developed a method of indivisibles to effect the quadrature of curves, derived from the Italian mathematician Bonaventura Cavalieri, stimulated Wallis' interest in the age-old problem of the quadrature of the circle, that is, finding a square that has an area equal to that of a given circle. In his *Arithmetica Infinitorum* ("The Arithmetic of Infinitesimals") of 1655, the result of his interest in Torricelli's work, Wallis extended Cavalieri's law of quadrature by devising a way to include negative and fractional exponents; thus he did not follow Cavalieri's geometric approach and instead assigned numerical values to spatial indivisibles. By means of a complex logical sequence, he established the following relationship:

$$\frac{4}{\pi} = \frac{3 \cdot 3 \cdot 5 \cdot 5 \cdot 7 \cdot 7 \cdot 9 \cdot 9 \cdot 11 \cdot 11 \ldots}{2 \cdot 4 \cdot 4 \cdot 6 \cdot 6 \cdot 8 \cdot 8 \cdot 10 \cdot 10 \cdot 12 \ldots}$$

Isaac Newton reported that his work on the binomial theorem and on the calculus arose from a thorough study of the *Arithmetica Infinitorum* during his undergraduate years at Cambridge. The book promptly brought fame to Wallis, who was then recognized as one of the leading mathematicians in England.

In 1657 Wallis published the *Mathesis Universalis* ("Universal Mathematics"), on algebra, arithmetic, and geometry, in which he further developed notation. He invented and introduced the symbol ∞ for infinity. This symbol found use in treating a series of squares of indivisibles. His introduction of negative and fractional exponential notation was an important advance. The idea of the power of a number is very old; the application of the exponent dates from the 14th century. The French mathematician René Descartes in 1632 first used the symbol a^2; but Wallis was the first to demonstrate the utility of the exponent, particularly by his negative and fractional exponents.

Wallis was active in the weekly scientific meetings that, beginning as early as 1645, led to the formation of the Royal Society of London by charter of King Charles II in 1662. In his *Tractatus de Sectionibus Conicis* (1659; "Tract on Conic Sections"), he described the curves that are obtained as cross sections by cutting a cone with a plane as properties of algebraic coordinates. His *Mechanica, sive Tractatus de Motu* ("Mechanics, or Tract on Motion") in 1669–71 (three parts) refuted many of the errors regarding motion that had persisted since the time of Archimedes; he gave a more rigorous meaning to such terms as force and momentum, and he assumed that the gravity of the Earth may be regarded as localized at its centre.

Wallis' life was embittered by quarrels with his contemporaries, including the political philosopher Thomas Hobbes, who characterized his *Arithmetica Infinitorum* as a "scab of symbols," and the Dutch mathematician Christiaan Huygens, whom he once tricked with an anagram concerning a possible satellite of Saturn. Against the French philosopher and mathematician René Descartes he was particularly severe. Approaching his 70th year, Wallis published, in 1685, his *Treatise on Algebra,* an important study of equations that he applied to the properties of conoids, which are shaped almost like a cone. Moreover, in this work he anticipated the concept of complex numbers (*e.g.*, $a + b\sqrt{-1}$, in which a and b are real).

By applying algebraic techniques rather than those of traditional geometry, Wallis contributed substantially to solving problems involving infinitesimals—that is, those quantities that are incalculably small. Thereby mathematics, eventually through the differential and integral calculus, became the most powerful tool of research in astronomy and theoretical physics. Wallis' many mathematical and scientific works were collected and published together as the *Opera Mathematica* in three folio volumes in 1693–99.

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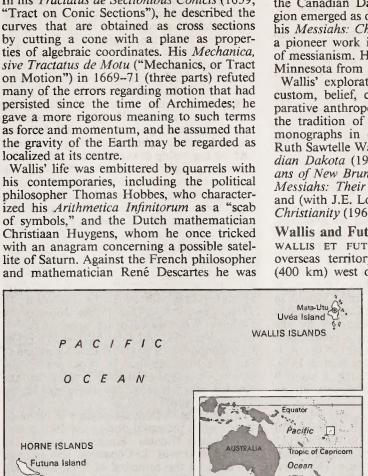
Articles are alphabetized word by word, not letter by letter

Wallis, Wilson D(allam) (b. March 7, 1886, Forest Hill, Md., U.S.—d. March 15, 1970, South Woodstock, Conn.), American anthropologist noted for his explorations of primitive science and religions.

Wallis was a Rhodes scholar at the University of Oxford (1907), and his interest in cultural anthropology and his approach to anthropological method were influenced by Sir E.B. Tylor, one of the foremost British anthropologists of the time. Returning to the United States, he continued his education and did ethnographic fieldwork among the Micmac Indians of eastern Canada (1911–12) and the Canadian Dakota (1914). Primitive religion emerged as one of his chief concerns, and his *Messiahs: Christian and Pagan* (1918) is a pioneer work in the anthropological study of messianism. He taught at the University of Minnesota from 1923 to 1954.

Wallis' exploration of questions relating to custom, belief, cultural diffusion, and comparative anthropological method perpetuated the tradition of Tylor. Wallis wrote several monographs in collaboration with his wife, Ruth Sawtelle Wallis, among them *The Canadian Dakota* (1947) and *The Malecite Indians of New Brunswick* (1957). He also wrote *Messiahs: Their Role in Civilization* (1943) and (with J.E. Longhurst) *Culture Patterns in Christianity* (1964).

Wallis and Futuna, French TERRITOIRE DE WALLIS ET FUTUNA, self-governing French overseas territory located about 250 miles (400 km) west of Western Samoa, and 150



Wallis and Futuna

miles (240 km) northeast of Vanua Levu, Fiji, in the southwestern Pacific Ocean. It consists of Uvea Island (Wallis Island) and the islands of Futuna and Alofi (known together as the Horne, or Futuna, Islands) 125 miles (200 km) to the southwest. The capital is Mata-Utu on Uvea. Area 106 square miles (274 square km). Pop. (1995 est.) 14,700.

A brief treatment of Wallis and Futuna follows. For full treatment, *see* MACROPAEDIA: Pacific Islands: *Wallis and Futuna.*

Geography. The two island groups are parts of separate geologic formations. Uvea, 23 square miles (60 square km), is an eroded volcanic atoll complex studded with craters that contain small lakes. It also has a lagoon surrounded by a barrier reef with 22 uninhabited islets. Futuna (25 square miles [64 square km]) and Alofi (11 square miles [29 square km]) are more recent, rugged volcanic islands separated by the deep 2-mile- (3-kilometre-) wide Sain Channel. Futuna, the highest of the three, rises to 2,493 feet (760 m). Both Futuna and Alofi are partly sheltered by fringing reefs. Alofi has no permanent settlements.

The climate is warm and humid, with rainfall averaging about 100 inches (2,540 mm) annually. Temperatures range from 77° to 82° F (25° to 28° C) and may reach 91° F (33° C) in the rainy season. Numerous streams and catchments or cisterns ensure a potable water supply on Uvea and Futuna.

Most of Uvea's inhabitants are Polynesians who speak Wallisian (Uvean), a dialect influenced heavily by Tongan. French is used for administrative purposes. Traditional culture remains strong in the islands. Houses, built on platforms of earth faced with coral slabs, have palm thatch roofs.

History. Futuna was probably settled late in the 1st millennium BC. On both Uvea and Futuna there were persistent wars for supremacy among the chiefs until early in the 19th century, when the three kingdoms of Uvea, Tua (Sigave), and Alo emerged. The present-day kings are descended from these. The first Europeans to visit the group were the Dutch expedition in 1616 under Willem C. Schouten and Jakob Le Maire, who named Futuna and Alofi the Hoorn (Horne) Islands. Captain Samuel Wallis of HMS *Dolphin* found Uvea in 1767, thus its Western name. The islanders were converted to Christianity in the mid-19th century, and European missionaries remained the main influence until 1887, when Wallis became a French protectorate. Futuna became a protectorate the following year. In 1959 the people of Wallis and Futuna voted to become an overseas territory of France, and the present government system was implemented.

Wallis Islands, French ÎLES WALLIS, group of 23 islands and islets forming the northeastern part of the French overseas territory of Wallis and Futuna, in the southwestern Pacific Ocean. Composed of the island of Uvea (also called Wallis Island) and its surrounding ring of coral islets, the group has a land area of 23 square miles (60 square km). Visited in 1767 by the British navigator Captain Samuel Wallis, the islands were occupied by the French in 1842. They became a French protectorate in 1887 and became part of the overseas territory following a referendum in 1959. Local administration is through a council headed by the traditional island royal family and a French advisory council.

The reef islets are small, low, and relatively unimportant. Uvea, however, is 30 miles (50 km) in circumference and rises to 476 feet (145 m). Its fertile volcanic soil and adequate rainfall support subsistence agriculture. The island has an international airport (Hihifo), a system of motor roads, and port facilities at Mata-Utu, the capital. Pop. (1996 est.) 9,400.

Wallonia, French WALLONNE, formally WALLOON REGION, French RÉGION WALLONNE, region that comprises the southern half of Belgium. Wallonia was created in 1995 in the reorganization of Belgium's provincial administration along ethnolinguistic lines. It consists of the French-speaking provinces of Hainaut, Liège, Luxembourg, Namur, and Walloon Brabant (*qq.v.*). A small German-speaking population is also present. Wallonia's elected assembly forms a regional government that has broad authority over social and economic policy and administration. Area 6,504 square miles (16,844 square km). Pop. (1999 est.) 3,332,454.

Walloon: *see* Fleming and Walloon.

Walloon Brabant, French BRABANT WALLON, province, south-central Belgium. It is bordered by the provinces of Flemish Brabant to the north, Liège to the southeast, Namur to the south, and Hainaut to the southwest. Walloon Brabant, which is French-speaking, was created in 1995 when Brabant province was divided into Walloon Brabant and Flemish Brabant provinces and the Brussels-Capital Region. Its capital is Wavre.

Walloon Brabant occupies part of the undulating, low-lying Central Plateaus and rises to 545 feet (166 m) above sea level in the south. It is covered by fertile, well-cultivated loams. The Senne (Zenne), Dijle, and Gete rivers flow north across the province. The province's western half is largely industrial. The eastern half is mainly agricultural, producing wheat, sugar beets, and cattle. Walloon Brabant is connected by road, rail, and canal with the Brussels-Capital Region to the north. The Waterloo battlefield is in the northwest. Area 421 square miles (1,091 square km). Pop. (1999 est.) 347,423.

Walloon literature, writings in the local dialect of French known as Walloon, which is spoken in Wallonia, composed of the modern Belgian provinces of Hainaut, Liège, Namur, Luxembourg, and Walloon Brabant.

Early writings. The origins of Walloon literature are obscure. From the 9th to the 11th century Latin held sway in the abbeys, the only intellectual centres of the period. With the exception of the *Cantilène de Sainte Eulalie* (*c.* 900), the first vernacular writings date only from the middle of the 12th century. They are chiefly anonymous tracts, among which the *Poème moral,* consisting of nearly 4,000 alexandrines, stands out. During the next three centuries Walloon literature is marked by the importance of its local chronicles and certain aspects of its religious drama.

At the beginning of the 17th century, Wallonia—particularly the district of Liège—became conscious of the literary possibilities of dialect, and from then on the number of writings increased. An "Ode" in the Liège dialect appeared in 1620, and *pasquèyes* (*paskeyes, paskeilles*), poems describing local life and history, enjoyed a vogue.

The 18th and 19th centuries. Use of the patois broadened in the 18th century. The success of comic opera at Liège resulted in several noteworthy librettos. *Li Voyadjue di Tchaudfontaine* (1757; "The Journey to Chaudfontaine"), *Li Lådjwès egagî* ("The Enlisted Liégeois"), and *Les Hypocondres* ("The Hypochondriacs") resulted in the formation of the Théâtre Liégeois. In lyric poetry the *cramignon* (a type of song for dancing) and the Noëls (Christmas carols and dialogue) adopted a genuine realism.

The number of Walloon poets and other dialect writers increased during the 19th century. Charles-Nicolas Simonon wrote the moving stanzas of "Li Côpareye" (the name of the clock of the cathedral of Saint-Lambert), François Bailleux his charming "Mareye," and the first great Walloon lyric poet, Nicolas Defrêcheux, his famous "Leyiz-m'plorer" (1854; "Let Me Weep"). The establishment at Liège, in 1856, of the Société Liégeoise de Littérature Wallonne had considerable influence on both language and literature. The number of poems, songs, plays, and even translations into Walloon of such authors as La Fontaine, Ovid, and Horace increased.

Other parts of Belgium, apart from prolific Liège, remained active centres of dialect writing. In the 19th century, Namur could boast especially of Charles Wérotte and Nicolas Bosret, poet of the touching song "Bia Bouquet." The works of Jean-Baptiste Descamps and others originated in Hainaut. Walloon Brabant was the home of a truculent Abbé Michel Renard.

By the end of the 19th century many writers working in Walloon dialects chose a rather doctrinaire Realism to depict workaday existence and remained somewhat hidebound by social conventions. Poets included Joseph Vrindts and, above all, Henri Simon, who sang of working peasantry. Successful playwrights included André Delchef and Édouard Remouchamps, whose vaudeville comedy in verse, *Tâtî l'pèriquê* (performed 1885; "Tati the Hairdresser"), married close observation and technical dexterity.

The 20th century. Walloon literature explored new paths during the course of the 20th century. Scholars undertook dialect studies, and standardization of spelling and grammar extended the literary possibilities of the dialect, as did attempts by Émile Lempereur and some other writers to renew the sources of inspiration. Alongside several veteran authors, such as the talented prose writer Joseph Calozet of Namur, the younger generations sought to achieve a strict unity of thought and technique. Among poets the following, especially were to be noted: Franz Dewandelaer, Charles Geerts, Willy Bal, Henri Collette, Émile Gilliard, Jean Guillaume, Marcel Hicter, Albert Maquet, Georges Smal, and Jenny d'Invérno. Storytellers and novelists whose achievements were widely praised included Léon Mahy, Dieudonné Boverie, and Léon Maret, among many others. The dramatists included François Roland, Jules Evrard, Georges Charles, Charles-Henri Derache, François Masset, and J. Rathmès. The work of dialect writers continued to be assisted by the Société de Littérature Wallonne, with its associations and publishing centres at Liège, Namur, Mons, La Louvière, Nivelles, and Brussels. (V.N.)

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wallpaper, ornamental and utilitarian covering for walls made from long sheets of paper that are usually stenciled, painted, or printed with abstract, narrative, or patterned designs. Wallpaper developed soon after the introduction of papermaking to Europe during the latter part of the 15th century. Although it is often assumed that the Chinese invented wallpaper, there is no evidence that it was in general use in Asia any earlier than the time of its appearance in Europe. The earliest wallpapers



Hand-printed wallpaper by Jean-Baptiste Réveillon, c. 1780–90; in the Victoria and Albert Museum, London

By courtesy of the Victoria and Albert Museum, London; photograph, The Cooper-Bridgeman Library, London

in England and France were hand painted or stenciled. During the 17th century, decorative techniques also included block printing and flocking, a process whereby powdered wool or metallic powders were scattered over paper on which the design had been drawn with a slow-drying adhesive or varnish. The oldest existing example of flocked wallpaper comes from Worcester and was created in approximately 1680.

Contemporary with flock work were painted Chinese papers, which first began to arrive in Europe toward the end of the 17th century. Generally referred to as India papers, they were produced especially for the European market. The absence of repeat, or repetitive design created when single sheets are juxtaposed on the wall, and the studied dissimilarity of detail between one length and another gave them a unique quality that was highly prized. European copies produced by etched plates or woodblocks, with colour applied by hand or stencil, were usually inferior to the originals. Because of their beauty and costliness, a large number of original Chinese papers have been preserved, and fine examples can be seen at Nostell Priory, North Yorkshire, and Woburn Abbey, Bedfordshire.

During the 18th century, wallpaper manufacture developed far beyond the expectations of the early makers. From the very beginning, wallpaper had been regarded as a substitute for tapestry, painted cloth, leather, and wood paneling, and the first wallpapers were esteemed because they so cleverly and inexpensively simulated the appearance of more costly hangings. Later designs, however, expressed the decorative possibilities inherent in the medium itself. In France and England new and varied styles became available—chintz patterns, satin grounds, and stripes, to mention but a few—and technical advances were making wallpaper more widely accessible. In 1785 Christophe-Philippe Oberkampf invented the first machine for printing wallpaper, and, shortly thereafter, Louis Robert designed a process for manufacturing endless rolls.

French supremacy in design and execution reached its apex during the early part of the 19th century with the flock papers and distemper-coloured papers of Jean-Baptiste Réveillon and panoramic decorations by Joseph Dufour. By this time French wallpapers used not only *paysage* (country landscape) designs but also simulated architectural forms, such as moldings, columns, and capitals, and narrative themes that called for special experience in hanging to match the scenes accurately.

Advances in the production and design of English wallpaper reached their zenith in the mid-19th century. Machine-printed wallpaper first appeared in 1840 at a firm of printers in Lancashire and, with the work of William Morris and the Arts and Crafts Movement, created a revolution in wallpaper design. Morris' designs for the medium, which first appeared in 1862, were characterized by flat, stylized, naturalistic patterns and rich, subdued colours. His work and the progressive designs of Walter Crane coexisted, however, with the more traditional taste expressed in the work of A.W.N. Pugin, Owen Jones, and James Huntington, who designed wallpaper in the Gothic and Rococo styles as late as the 1860s.

For the next 100 years, few advances took place in the wallpaper industry. The 1950s and '60s, however, brought more developments in wallpaper design and manufacture than any previous period. New processes enabled designers to decorate wallpaper with photogravure, and high-speed techniques were developed for the more traditional screen printing and woodblock methods. The wallpaper industry has kept abreast of modern trends in design, producing papers that range from reproductions of William Morris' original designs to those reflecting the latest fashions in the visual arts. Improvements in the durability and maintenance of wallpaper have been achieved through the use of plastic coatings.

Wallraf-Richartz Museum, art collection now housed in a modern building in Cologne, Ger. The strength of the collection, which dates from 1824, lies chiefly in German painting, though it includes fine works from most other western European schools. The museum also has collections of graphic arts and sculpture. In 1957 a research library was opened that now has over 130,000 volumes.

Wallsend, locality, North Tyneside district, metropolitan area of Tyne and Wear, England. The Romans built Segedunum there to defend the eastern end of Hadrian's Wall, a defensive embankment protecting England



Shipbuilding yards along the River Tyne at Wallsend, Tyne and Wear

J. Allan Cash—EB Inc.

from raids from the north. Modern Wallsend is an industrial community. Engineering has long been an important activity. The 19th-century British engineer George Stephenson, principal inventor of the railway locomotive, and his son Robert lived there for some time. Shipbuilding, mining, and the manufacture of glass have all played an important part in the life of the community. Pop. (1981) 44,622.

walnut, any of about 20 species of deciduous trees constituting the genus *Juglans* of the family Juglandaceae, native to North and South America, southern Europe, Asia, and





(Top) Black walnut (*Juglans nigra*), (bottom) English walnut (*J. regia*)

(Top) Walter Chandoha, (bottom) A to Z Botanical Collection—EB Inc.

the West Indies. The trees have long leaves with 5 to 23 short-stalked leaflets; male and female reproductive organs are borne in different, petalless flower clusters on the same tree; the twigs contain a many-chambered pith; and the fruit is a woody nut enclosed in a thick husk. Black walnut (*J. nigra*) of eastern North America and English, or Persian, walnut (*J. regia*), native to Iran, are valuable timber trees that produce edible nuts. The butternut (*J. cinerea*) of eastern North America also produces an edible nut. *See* butternut.

A black walnut tree usually is between 20 and 30 m (about 65 and 100 feet) tall and has a trunk about 60 to 90 cm (2 to 3 feet) in diameter, with a deeply furrowed, dark brown or grayish black bark. The leaves, about 30 to 60 cm long, consist of 15 to 23 leaflets borne on very short stalks. The nut contains a sweet, oily seed and is enclosed in a yellow-green, hairy husk. Black walnut trees are also planted for ornament and are cultivated for the wood and for a dye found in the fruit husks. Black walnut grows slowly,

maturing on good soils in about 150 years; it may have a life span of more than 250 years.

The English walnut, cultivated for many years in England, is now grown in parts of North and South America, both as an ornamental and for commercial nut production. A tree produces fine-quality nuts only on fertile, well-drained soils of medium-heavy texture. The round-tipped leaflets have smooth margins, and the terminal leaflet is the largest. The leaflets of native North American walnuts are largest toward the centre of the leaf, and have toothed margins.

The dark, fine-grained wood of English and black walnuts is used for furniture, panelling, and gunstocks.

Walnut Canyon National Monument, national monument in north central Arizona, U.S., on Walnut Creek, 10 mi (16 m) east-southeast of Flagstaff. Established in 1915, it preserves more than 300 pre-Columbian dwellings built by the Pueblo Indians in shallow caves on the canyon walls and protected by overhanging ledges. Main occupancy was from AD 1000 to 1200. Well supplied with fresh water, the Indians lived chiefly by farming the mesa tops. The monument, which occupies an area of 3 sq mi (8 sq km), has a museum and observation building.

Walnut Creek, city, Contra Costa County, western California, U.S., in the San Ramon Valley. Settled in 1849 during the Gold Rush, it was first known as The Corners but was renamed (1860) for the abundance of walnut trees. The Central Pacific Railroad reached the town in 1878, and by 1914 an electric commuter line connected the city with Oakland, 13 mi (5 km) southwest. Walnut Creek is the commercial and shipping centre for nearby agricultural (fruit, walnuts) and industrial areas. Inc. 1914. Pop. (1990) 60,569.

Walpi, Indian pueblo (village), Navajo County, northeastern Arizona, U.S., on the edge of a high mesa in the Hopi Indian Reservation. It comprises a group of angular stone houses of two to three stories crowded on a narrow tip of the steep-walled mesa at an elevation of 6,225 ft (1,897 m). The original pueblo (founded *c.* 1700) was on a lower part of the mesa, but following the Pueblo Rebellion (*q.v.*) the inhabitants moved to the top as a defense measure against Spanish retaliation. Walpi is known for an antelope ceremony and for snake dances, held during odd years in August. Shitchumovi (Sichomivi) pueblo is adjacent and Hano is nearby.

Walpole, Horace, 4TH EARL OF ORFORD, original name HORATIO WALPOLE (b. Sept. 24, 1717, London—d. March 2, 1797), English writer, connoisseur, and collector who was famous in his day for his medieval horror tale *The Castle of Otranto,* which initiated the vogue for Gothic romances. He is remembered today as perhaps the most assiduous letter writer in the English language.

The youngest son of the prime minister Sir Robert Walpole, he was educated at Eton and at King's College, Cambridge. In 1739 he embarked with his Eton schoolmate, the poet Thomas Gray (later to write "An Elegy Written in a Country Church Yard"), on a grand tour of France and Italy, in the midst of which they quarrelled and separated. They were later reconciled, and Walpole remained throughout his life an enthusiastic admirer of Gray's poetry. On his return to England in 1741, Walpole entered Parliament, where his career was undistinguished, although he attended debates regularly until 1768. In 1791 he inherited the peerage from a nephew, a grandson of Robert Walpole. He remained unmarried, and on his death the earldom became extinct.



Horace Walpole, detail of an oil painting by Sir Joshua Reynolds, 1757; in the City of Birmingham Museum and Art Gallery, England

By courtesy of Birmingham Museums and Art Gallery

The most absorbing interests of his life were his friendships and a small villa that he acquired at Twickenham in 1747 and transformed into a pseudo-Gothic showplace known as Strawberry Hill. Over the years he added cloisters, turrets, and battlements, filled the interior with pictures and curios, and amassed a valuable library. He established a private press on the grounds, where he printed his own works and those of his friends, notably Gray's *Odes* of 1757. Strawberry Hill was the stimulus for the Gothic revival in English domestic architecture.

Walpole's literary output was extremely varied. *The Castle of Otranto* (1765) succeeded in restoring the element of free invention to contemporary fiction. In it he furnished the machinery for a genre of fiction wherein the wildest fancies found refuge. He also wrote *The Mysterious Mother* (1768), a tragedy with the theme of incest; amateur historical speculations such as *Historic Doubts on the Life and Reign of King Richard the Third* (1768); and a genuine contribution to art history, *Anecdotes of Painting in England,* 4 vol. (1762–71).

His most important works were intended for posthumous publication. His private correspondence of more than 3,000 letters constitutes a survey of the history, manners, and taste of his age. Walpole revered the letters of Mme de Sévigné (1626–96) and, following her example, consciously cultivated letter writing as an art. Most of his letters are addressed to Horace Mann, a British diplomat whom Walpole met on his grand tour and with whom he maintained a correspondence that lasted for 45 years, although the two never met again. Walpole's correspondence, edited by W.S. Lewis and others, was published in 42 volumes (1937–80).

Walpole also left *Memoirs* (first published 1822–59) of the reigns of George II and III, a record of political events of his time.

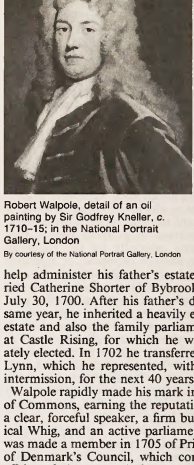
Walpole, Sir Hugh (Seymour) (b. March 13, 1884, Auckland, N.Z.—d. June 1, 1941, near Keswick, Cumberland, Eng.), British novelist, critic, and dramatist, a natural storyteller with a fine flow of words and romantic invention.

The son of an Anglican clergyman, Walpole was educated at King's School, Canterbury, then at Durham, and finally at Emmanuel College, Cambridge. After unsuccessful attempts at teaching and lay reading in the Anglican church, he devoted himself to writing and to reviewing books. He was knighted in 1937.

Walpole's first important works were the novels *Mr. Perrin and Mr. Traill* (1911), about two schoolmasters, and *The Dark Forest* (1916), based on his experiences in Russia during World War I; and the semi-autobiographical novel series that includes *Jeremy* (1919), *Jeremy and Hamlet* (1923), and *Jeremy at Crale* (1927). *The Cathedral* (1922) reflects his affection for the 19th-century English novelist Anthony Trollope. The four-volume "Herries Chronicle"—comprising *Rogue Herries* (1930), *Judith Paris* (1931), *The Fortress* (1932), and *Vanessa* (1933)—deals with an English country family. He also wrote critical works on Trollope, Sir Walter Scott, and Joseph Conrad.

Walpole, Robert, 1ST EARL OF ORFORD, also called (1725–42) SIR ROBERT WALPOLE (b. Aug. 26, 1676, Houghton Hall, Norfolk, Eng.—d. March 18, 1745, London), British statesman (in power 1721–42), generally regarded as the first British prime minister. He deliberately cultivated a frank, hearty manner, but his political subtlety has scarcely been equalled.

Education and early career. Walpole was the third son of Col. Robert Walpole by his wife, Mary Burwell. He was educated at Great Dunham, Norfolk, and afterward became a scholar of Eton (1690–96) and subsequently of King's College, Cambridge (1696–98). The death of his elder surviving brother, Edward, cut short his academic career, and, instead of entering the church, he returned to Norfolk to



Robert Walpole, detail of an oil painting by Sir Godfrey Kneller, *c.* 1710–15; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

help administer his father's estates. He married Catherine Shorter of Bybrook, Kent, on July 30, 1700. After his father's death in the same year, he inherited a heavily encumbered estate and also the family parliamentary seat at Castle Rising, for which he was immediately elected. In 1702 he transferred to King's Lynn, which he represented, with one short intermission, for the next 40 years.

Walpole rapidly made his mark in the House of Commons, earning the reputation of being a clear, forceful speaker, a firm but not fanatical Whig, and an active parliamentarian. He was made a member in 1705 of Prince George of Denmark's Council, which controlled the affairs of the navy during the War of the Spanish Succession (1701–14). His ability as an administrator brought him to the attention of both the Duke of Marlborough and Lord Godolphin. On Feb. 25, 1708, he was promoted to secretary at war and in 1710 to treasurer of the navy, a post from which he was dismissed on Jan. 2, 1711, with the advent of the Tory Party to power after the general election of 1710. During these years Walpole established himself as one of the foremost of the younger Whig leaders; in society as well as in politics he made his mark. He became a leading member of the Kit-Cat Club, a meeting place of many Whig men of letters.

He had many friends, but his expenses were so high that he fell heavily in debt. He had relied on his political offices to keep himself afloat; nevertheless, he refused to compromise his principles for the sake of his salary and perquisites.

His assiduity in attending the Commons and his ability in debate made him the effective leader of the opposition, and the Tories determined to ruin him along with Marlborough. In January 1712 Walpole was impeached for corruption as secretary at war, found guilty, expelled from the Commons, and sent to the Tower of London. He was immediately acclaimed as a martyr by the Whigs, and he himself developed a hatred for the Tory leaders Robert Harley, earl of Oxford, and Henry St. John, Viscount Bolingbroke, who brought about his fall. He enjoyed his revenge in 1714 at the accession of George I when, as well as being made paymaster general of the forces, he became chairman of the secret committee that led to the impeachment for treason of both Bolingbroke and Oxford. Walpole's mastery of the Commons, allied to his formidable industry, brought him rapid promotion. He became first lord of the Treasury and chancellor of the Exchequer on Oct. 11, 1715. His abilities so aroused jealousy, which was exacerbated by a conflict over foreign policy that saw Walpole and his brother-in-law, Charles, Viscount Townshend, on one side and two of the King's closest advisers, James Stanhope and Charles Spencer, earl of Sunderland, on the other. Walpole and Townshend maintained that British interests were being sacrificed to the King's Hanoverian interests in order to curry favour. The break came in 1717, and Walpole and Townshend left the ministry; shortly afterward a violent quarrel between the King and the Prince of Wales split the royal family, and the opposition acquired its own court at the Prince's residence, Leicester House.

During the next three years Walpole fought the government on every issue, achieving considerable success in bringing about the rejection of the Peerage Bill (1719), which would have limited the royal prerogative in the creation of peers. During this time, too, he became friendly with Caroline of Ansbach, the princess of Wales, who was to help maintain him in power when her husband succeeded to the throne in 1727 as George II. Walpole used his influence with the Prince to bring about a reconciliation with the King in April 1720 and his own subsequent return to the ministry as paymaster general of the forces.

No sooner was Walpole back in office than the country was caught up in the speculative frenzy associated with the South Sea Company, a joint-stock company with monopoly rights to trade with Spanish America. A scheme was set up in 1720 whereby the company would take charge of a large part of the national debt. Although Walpole had favoured letting the Bank of England take over the debt, he was no more prudent than many others and invested heavily in South Sea stock. He was saved from financial disaster by the foresight of his banker, Robert Jacomb. Nevertheless, Walpole had not been a promoter of the scheme, and he was free from the stigma of corruption that marked many other ministers as well as the King's German favourites. He used his great political skill and persuasive powers of argument in the Commons to save the Whig leaders and the court from the consequences of their folly. Some members had to be sacrificed to appease public opinion, among them John Aislabie, chancellor of the Exchequer; others died under the strain, the most notable being Stanhope and James Craggs and his son James. Walpole restored confidence, maintained the Whigs in office, and greatly improved his own and Townshend's standing at court. He became first lord of the Treasury and chancellor of the Exchequer in April 1721, offices that he was to hold until 1742. Townshend became once more secretary of state and took over the control of foreign affairs. For some time, Walpole and Townshend were forced to share power with John Carteret (later Earl Granville), who had succeeded to Sunderland's influence after Sunderland's sudden death in April 1722. By 1724, however, Walpole and Townshend obtained the dismissal of Carteret from his secretaryship of state and had him sent to Ireland as lord lieutenant. For the rest of George I's reign Walpole and Townshend remained at the head of the ministry. Their position steadily grew stronger. The hopes of the Jacobites, supporters of a return to the throne of the Stuarts, which the South Sea Bubble had fanned, were quashed in 1723 by the exposure of the insurrection planned by Francis Atterbury, bishop of Rochester. The outlook for the Tory Party was equally gloomy in spite of the pardon given to Bolingbroke in 1725.

The long ascendancy. The supremacy in the Commons was maintained by Walpole until 1742. In 1727, at the accession of George II, he suffered a minor crisis when for a few days it seemed that he might be dismissed, but Queen Caroline prevailed on her husband to keep Walpole in office. In 1730 he quarrelled with Townshend over the conduct of foreign affairs and forced Townshend's resignation, but his retirement had no effect on Walpole's position. These were the years of Walpole's greatness. His power was based on the loyal support given to him by George I and George II. This enabled him to use all royal patronage for political ends, and Walpole's appointments to offices in the royal household, the church, the navy, the army, and the civil service were, whenever possible, made with an eye to his voting strength in the House of Commons. By these means he built up the court and treasury party that was to be the core of Whig strength for many generations. These methods, however, never gave him control of the House of Commons. His majorities at Westminster came about because his policy of peace abroad and low taxation at home appealed strongly to the independent country gentlemen who sat in Parliament. Also, Walpole possessed remarkable powers in debate: his knowledge of the detail of government, particularly of finance, was unmatched, and his expression was clear, forceful, and always cogent. He never underestimated the powers of the Commons, and no minister, before or since, has shown such skill in its management.

Walpole needed all his art, for his rule was never free from crisis. Foreign affairs gave him constant trouble. Although Townshend had secured the prospect of a settlement by the Treaty of Hanover in 1725, which helped to strengthen the alliance between England and France, the difficulties that had arisen with Spain over Gibraltar and British trading rights in the West Indies proved intractable, and England hovered on the brink of war until Walpole intervened. By showing willingness to negotiate he secured the Treaty of Seville in 1729. This was followed by a general settlement in 1731 at the Treaty of Vienna. When war broke out on the Continent in 1733 over the question of the succession to the Polish throne, Walpole had to use all his influence with the King in order to maintain England's neutrality.

Many politicians, particularly those whom Walpole had driven into opposition, regarded his foreign policy as a betrayal of England's interests. They thought that he had become the dupe of France to the neglect of England's former allies (the Austrians and the Dutch), and that his desire to maintain friendship with France led to weakness toward Spain. They also disapproved of his use of patronage, which they stigmatized as corruption. They condemned his financial schemes as a sham, particularly the sinking fund to abolish the national debt. The prime movers in this opposition were William Pulteney, an able Whig whom Walpole had rejected in 1724 in favour of the Duke of Newcastle as secretary of state, and Bolingbroke. They drew together a miscellaneous collection of members in opposition: Jacobites, Hanoverian Tories, dissident Whigs, and urban radicals. They attempted to give coherence to the party so formed, but with little success. The liveliest part of their campaign was the violent press agitation against Walpole. For this purpose they founded *The Craftsman*, which denigrated Walpole's ministry week after week. Walpole was lampooned in pamphlets, ballads, and plays, as well as in the newspapers; and this constant stream of abuse, which was not without a certain element of truth, did much to bring both Parliament and politics into contempt.

The great opportunity for the opposition came in 1733 when Walpole decided to check smuggling and customs frauds by imposing an excise tax on wine and tobacco. This was extremely unpopular, particularly with the London merchants, and the opposition did all in its power to influence opinion. Walpole saved himself from defeat by withdrawing this measure, but those politicians who had been indiscreet enough to show opposition to Walpole's bill lost their offices. These dismissals, however, weakened Walpole's position; he lost considerable debating skill as well as votes in the House of Lords, which at that time still played an important part in government. After 1733 the list of able but dismissed Whig politicians grew large enough to supply an alternative Whig ministry to Walpole's own, and, after the excise crisis, the opposition Whigs had far less need to rely on Tory and Jacobite elements in their battle against Walpole. Bolingbroke himself realized this; he withdrew from politics and retired to France in 1735, admitting defeat in his lifelong struggle with Walpole.

Growing unpopularity. Walpole won the general election of 1734, which had given rise to many violent contests and a resurgence of the old bitterness about excise, but his growing unpopularity was underlined by the loss of many seats in the large seaports and heavily populated counties. Nevertheless, his majority, although diminished, remained comfortable. Without much difficulty he surmounted troubles that arose in Edinburgh (the Porteous riots) over the royal pardon of a captain of the guard who had fired on a crowd demonstrating at Edinburgh prison; he easily persuaded the Commons to reject Sir John Barnard's scheme to reduce the interest on the national debt and showed his contempt for the literary opposition (among whose members were Swift, Pope, and Fielding) by imposing regulations on London theatres (1737). Yet from 1737 his position began to weaken. The death of Queen Caroline had less effect than many have assumed, for by then George II had developed great loyalty to his minister. More important was Walpole's increasing age, which led young politicians, such as William Pitt (afterward earl of Chatham), to look elsewhere for their future advancement. The emergence as a leader of the opposition of Frederick Louis, prince of Wales, who had quarrelled violently with his parents, provided a focus and a court for the "patriot boys," as these young Whigs came to be called. The growing difficulties with Spain over trading matters in the West Indies were used by this opposition to embarrass Walpole. He did his utmost to settle these difficulties by negotiation, but in 1739 he was forced to declare war against Spain—the so-called War of Jenkins' Ear. He disapproved of the war and made his views clear to his Cabinet colleagues. These years, too, were darkened by private grief as well

as public anxiety. His wife, with whom he had been on indifferent terms, died in 1737, and he was married by March 3, 1738, to his mistress of long-standing, Maria Skerritt, a woman of great charm and wit. Three months later she died in childbirth.

The war with Spain did not prosper, and opposition continued to mount against Walpole. He succeeded in winning the general election of 1741, but many Whig politicians, and a number of independents, did not consider him capable of directing the war vigorously enough or of surviving another seven years' Parliament. His resignation was forced on Feb. 2, 1742, on a minor issue. The king created him Earl of Orford (he had been knighted in 1725) and gave him an annual pension of £4,000, but the Commons set up a committee to investigate his ministry with a view to impeachment. They failed to secure sufficient evidence and the rancour against Orford petered out. For the rest of his life he continued to play an active and valuable part in politics. He did his utmost to secure the dismissal of Carteret, who had become secretary of state on the fall of his ministry, and to secure the promotion of Henry Pelham, his protégé and leader of the Walpole Whigs, to the position of chief minister. Orford's influence with George II remained powerful up to his death.

Assessment. Although Walpole rejected the title of prime minister, which he regarded as a term of abuse, his control of the treasury, his management of the Commons, and the confidence that he enjoyed of the two sovereigns whom he served demonstrated the kind of leadership that was required to give stability and order to 18th-century politics. He used his power to maintain the supremacy of the Whig Party, as he understood it, and his prime concern was to forestall the machinations of the Jacobites, which he took very seriously, by securing the Hanoverian succession. He thought that this could best be achieved by prosperity and low taxation, which in turn depended on peace and on freedom from foreign entanglements. In order to achieve strong support for this policy he created as many obligations as possible among the politically powerful groups in the country. The Jacobite rebellion in 1745 demonstrated both the reality of his fears and the success of his policy.

The influence of Walpole's long ministry on the structure of 18th-century politics was profound. The Tory Party, split as it was between Hanoverians and Jacobites, faded into insignificance, and to be a Whig became a necessity for the politically ambitious. The struggle for power ceased to be a conflict between two parties and became a battle fought between divergent groups, personalities, and policies within the Whig Party itself, in order to gain the support of the court on the one hand and the independent country gentlemen in Parliament on the other. The frank realism that Walpole had used in all appointments to office, as well as the violent, prejudiced, and often exaggerated criticism to which this gave rise, did much to bring the institutions of government into disrepute and to strengthen the early growth of urban radicalism, particularly in the City of London. On the other hand, Walpole's ministry had little influence on constitutional development: many generations were to pass before any minister wielded power comparable to his. Like his master, George II, he disliked cabinet government and used it as sparingly as possible. He showed what could be done within the accepted conventions of the constitution; he never attempted to change them.

One side of Walpole's life is too little noted. He possessed remarkable delight in and judgment of works of art. His house, Houghton Hall, Norfolk, built and furnished under his close supervision, is a masterpiece of Palladian architecture. To the distress of his son Horace, the famous man of letters, Walpole's collection of pictures was sold to the empress of Russia by Walpole's grandson George in 1779. Now in the Hermitage Museum, St. Petersburg, it was one of the most remarkable collections in Europe. He delighted in ostentation and lived in great magnificence, spending freely the huge fortune that he made out of judicious speculation and public office.

(Jo.Pl.)

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Walpurgis, SAINT: *see* Walburga, Saint.

Walras, Léon, in full MARIE-ESPRIT-LÉON WALRAS (b. Dec. 16, 1834, Évreux, Fr.—d. Jan. 5, 1910, Clarens, near Montreux, Switz.), French-born economist whose outstanding work, *Éléments d'économie politique pure* (1874–77; *Elements of Pure Economics*), was one of the first comprehensive mathematical analyses of general economic equilibrium.

After twice failing the entrance examination to the École Polytechnique in Paris for lack of preparation in mathematics, Walras entered the École des Mines in 1854. Leaving school after a year, he tried literature unsuccessfully. In 1858 his father, the economist Auguste Walras, convinced him to devote his life to economics. Lacking the necessary formal training, however, Walras could not get a university position. After a brief, abortive flirtation with journalism, he worked for several business firms unsuccessfully. Sharing in the popular belief that cooperatives offered an alternative to the revolutionary activity in western Europe, Walras and Léon Say began in 1865 a bank for producers' cooperatives, of which Walras became managing director. The two men also began to publish a monthly journal on cooperatives, *Le travail* ("Work"), in 1866. Both bank and periodical failed in 1868. In 1870, however, Walras was appointed to the chair of political economy at the Academy of Lausanne, Switz. He retired in 1892. He is generally credited with having founded what subsequently became known, under the leadership of the Italian economist and sociologist Vilfredo Pareto, as the "Lausanne school" of economists.

Walras applied techniques for treating systems of simultaneous equations that were well known in classical mechanics to the economic universe. Assuming a "regime of perfectly free competition," Walras constructed a mathematical model in which productive factors, products, and prices automatically adjust in equilibrium. He thus tied together the theories of production, exchange, money, and capital.

Walras also postulated reforms that he conceived to be necessary for the effective functioning of the system of free enterprise, notably land nationalization and modification of the gold standard.

walrus, also called MORSE (species *Odobenus rosmarus*), large, seallike mammal, the sole living member of the family Odobenidae, found in Arctic seas of Eurasia and North America. There are two subspecies: the Atlantic walrus (*O.r. rosmarus*) and the Pacific walrus (*O.r. divergens*); males of the latter are slightly larger and have longer tusks than those of the former. The walrus is a heavy-bodied animal with a rounded head, small eyes, and no external ears. Its muzzle is short, broad, and covered with stiff, quill-like whiskers. Its thick grayish skin, which has deep folds over the shoulders, is covered with short, reddish hair, very scanty on old animals. The



Atlantic walrus (*Odobenus rosmarus rosmarus*)
Francisco Erize/Bruce Coleman Ltd.

male walrus is about one-third larger than the female, reaching a maximum length and weight of about 3.7 m (12 feet) and 1,700 kg (3,700 pounds). Members of both sexes possess long tusks (the upper canine teeth) that project downward from the mouth and may, in the male, attain a length and weight per tusk of about 1 m (3 feet) and 5.4 kg (12 pounds).

The walrus, like the sea lion and fur seal (family Otariidae), can turn its hind flippers forward under the body when on land and can thus move about on all four limbs. A sociable animal, it lives in groups sometimes including more than 100 walruses. It is polygynous. Unlike the young of most other pinnipeds (aquatic mammals), the single walrus pup remains with the female for about two years. The walrus usually frequents comparatively shallow water and hauls out on beaches and ice floes. It feeds largely on clams, which it locates with its stiff whiskers; an occasional "rogue" walrus feeds on seals and other marine animals.

The walrus is valued, both by Eskimos and commercial hunters, for its blubber, hide, and ivory tusks. As with many other pinnipeds, its numbers have been reduced by sealers.

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Walsall, district and borough, in the metropolitan area of West Midlands, England. It is situated on a ridge between the industrial districts of Wolverhampton and Birmingham.

Walsall's prosperity from an early date was based on local supplies of coal, iron ore, and limestone. It has been a metal-processing town since the 14th century, and leatherworking developed as well. By the 17th century Walsall was an important industrial town with saddlery, nail, and iron manufactures. The improvement of road and canal transport by the 18th century brought further industrial development, which reached its peak in the 19th century.

Modern Walsall is a thriving industrial centre manufacturing a wide range of products. It includes the locality of Willenhall, important for lock and key making, and that of Darlaston, known for nuts and bolts. The Aldridge and Brownhills areas have retained their residential character, although deposits of limestone and ironstone were exploited there in the 19th and 20th centuries, and coal was mined until the 1930s. Area 41 square miles (106 square km). Pop. (1991) town, 174,739; (2001) district, 253,502.

Walsenburg, city, seat (1874) of Huerfano County, southern Colorado, U.S., on the Cucharas River, east of the Sangre de Cristo Range and south of Pueblo, at an altitude of 6,187 ft (1,886 m). Formed in 1873 from a small Spanish village (La Plaza de Los Leones), it was named for Fred Walsen, who organized the community. Walsenburg developed as a coal-shipping point following the arrival (*c.* 1876) of the Denver and Rio Grande Western Railroad. With the decline of coal production, the economy is now based mainly upon agricultural produce, ranching, tourism, and industries including flour milling, saw milling, meat packing, and the manufacture of transportation equipment and sporting goods. Nearby are Huajatolla (a twin-peak spur of the Sangre de Cristos), Great Sand Dunes National Monument, Indian hieroglyphics in Cucharas Canyon, parts of the San Isabel National Forest, and Huerfano Butte, a volcanic remnant. Inc. 1873. Pop. (1990) 3,300.

Walsh, Raoul (b. March 11, 1887, New York City—d. Dec. 31, 1980, Simi Valley, near Los Angeles), U.S. motion-picture director popular in the 1930s and '40s for his tough, masculine films.

Walsh began acting for the stage in 1910 and on film in 1912, the same year that he began directing. He played John Wilkes Booth in D.W. Griffith's greatest success, *The Birth of a Nation* (1915), and went on to direct about 200 motion pictures, usually characterized by their simplicity and quick action.

In 1949 he completed the film *White Heat*, a classic study of a pathological criminal. Other of Walsh's more complex pictures include *High Sierra* (1941), a sympathetic portrayal of an aging criminal whose life ends in tragedy, and *The Naked and the Dead* (1958), an effective translation of Norman Mailer's novel into film. Walsh's other films include: *The Thief of Bagdad* (1924), *What Price Glory?* (1926), *The Roaring Twenties* (1939), *They Died with Their Boots On* (1941), *The Tall Men* (1955), and *A Distant Trumpet* (1964).

Walsh, Thomas J(ames) (b. June 12, 1859, Two Rivers, Wis., U.S.—d. March 2, 1933, en route by train from Florida to Washington, D.C.), U.S. Democratic senator (1913–33) who exposed (1923) the Teapot Dome scandal that shook the Republican administration of Pres. Warren G. Harding.

A leading Montana lawyer, Walsh won election to the U.S. Senate in 1912. His 20 years' service was marked by dedication to such causes as child labour regulation, women's suffrage, the League of Nations, arms limitation, and exemption of farm organizations and labour unions from antitrust suits. By a 1922 Senate resolution, Walsh was asked to undertake a subcommittee investigation of the leasing of naval oil reserves in California

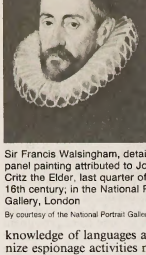


Thomas J. Walsh

By courtesy of the Library of Congress, Washington, D.C.

and Wyoming. Through his patient, precise methods, the story of corrupt public servants' illegal involvement in the oil leases (including bribery of one Cabinet member) was revealed 18 months later. As a result, public confidence in the Harding administration was undermined. Appointed U.S. attorney general in 1933, Walsh died two days before his scheduled inauguration.

Walsingham, Sir Francis (b. *c.* 1532, probably Footscray, Kent, Eng.—d. April 6, 1590, London), English statesman and the principal secretary to Queen Elizabeth I from 1573 to 1590. He was a skilled diplomat whose



Sir Francis Walsingham, detail of a panel painting attributed to John de Critz the Elder, last quarter of the 16th century; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

knowledge of languages and capacity to organize espionage activities made him invaluable in the execution of Elizabeth's foreign policy. In addition, he was a staunch Puritan who uncovered a number of dangerous Roman Catholic conspiracies against the Queen.

The son of a lawyer, Walsingham was admitted to the bar in 1552, and in 1563 he obtained his first seat in Parliament. William Cecil (later Baron Burghley), the principal secretary, soon discovered his potential; from 1568 to 1570 he was employed to obtain information on the activities of foreign spies in London. As ambassador to the French court from 1570 to 1573, Walsingham was mainly concerned with establishing an alliance with France in order that England might better be able to control the threat of French intervention in the Netherlands and to gain support for the impending and inevitable conflict with Spain. The negotiations were at first connected with the proposal for a marriage between Elizabeth and King Charles IX's brother Henri, duc d'Anjou (later King Henry III). But neither party was willing to compromise in religious practice, and Walsingham eventualy realized that Elizabeth had no serious intention of marrying Anjou. Negotiations were then begun for a marriage with Anjou's younger brother François, duc d'Alençon (later duc d'Anjou). Meanwhile Walsingham successfully concluded a defensive alliance, the Treaty of Blois (April 1572). During the summer of 1572, when revolt broke out against Spanish rule in the northern Netherlands, Walsingham encouraged the French king Charles IX to support a Huguenot raid in favour of the rebels. When this was repulsed, Charles swung over to a repressive policy, and the massacre of St. Bartholomew's Day ensued. Nevertheless, before his recall to England in April 1573, Walsingham had reestablished friendly relations with the French court.

In December 1573 he was admitted to the Privy Council and became secretary of state, a post he held until his death. From 1576 he was a member of Parliament for Surrey. He was knighted in 1577 and made chancellor of the Order of the Garter in the following year.

As secretary, Walsingham was not allowed to pursue an independent policy. His own intense Protestantism caused him to single out Catholic Spain as his country's worst enemy, but he faithfully carried out the behests of the Queen even when, as frequently happened, her policies contradicted those he advocated. Politically he was closely allied with Robert Dudley, earl of Leicester.

Walsingham went on his last embassy abroad in 1583, and from then until his death he was mainly occupied in detecting and frustrating conspiracies by Catholics against Elizabeth's life. His vigilance uncovered Francis Throckmorton's plot—involving France and Spain—to free Elizabeth's prisoner, the Catholic Mary Stuart (Mary, Queen of Scots). In exposing the Babington plot three years later, he found a letter from Mary to Anthony Babington giving full support to a plan for the murder of Elizabeth. As a result, Mary was executed in February 1587, a course of action that Walsingham had advocated.

Walsingham was married three times, and his daughter, Frances, had three husbands, including the great poet Sir Philip Sidney and the renowned courtier Robert Devereux, 2nd earl of Essex. Conyers Read's definitive *Mr. Secretary Walsingham* was published in 1924.

Walsingham, Thomas (d. *c.* 1422), English Benedictine monk and chronicler of the abbey at St. Albans (Hertfordshire).

Walsingham continued the work of Matthew Paris (died 1259) in an attempt to provide an unbroken St. Albans narrative from the creation to his own time. The work of Walsingham is an important source for the reigns of Richard II, Henry IV, and Henry V. His *Historia Anglicana* (ed. H.T. Riley, 2 vol., 1862–64) covers the years from 1272 to 1422 and is a continuation of Paris' *Chronica majora*, which itself continues the *Flores historiarum* by Roger of Wendover (died 1236). Walsingham also prepared an abridged version, the *Chronicon angliae*, 1328–88 (ed. E.M. Thompson, 1874), as well as other works in this area. An edition entitled *The St. Albans Chronicle, 1406–20* was prepared by V.H. Galbraith (1937).

Waltari, Mika (Toimi) (b. Sept. 19, 1908, Helsinki—d. Aug. 26, 1979, Helsinki), Finnish author whose historical novels were international best-sellers.

Waltari studied theology and philosophy at the University of Helsinki. His early novels



Waltari

By courtesy of the Embassy of Finland, Washington, D.C.

were concerned with the crises of the generation that came of age between the world wars. He gained international recognition with the appearance of *Sinuhe, egyptiläinen* (1945; *The Egyptian*, 1949), a story of life in Egypt 1,000 years before the birth of Christ. It was made into a lavish Hollywood motion picture (1954). Other works include *Mikael Hakim* (1949; *The Wanderer*, 1951), *Johannes Angelos* (1952; *The Dark Angel*, 1953), and *Turms, kuolematon* (1955; *The Etruscan*, 1957); *Valtakunnan salaisus* (1959; *The Secret of the Kingdom*, 1961); and *Ihmiskunnan viholliget* (1964; *The Roman*, 1966).

Walter OF COVENTRY (fl. 1290–1300). English monk or friar, compiler of historical materials, best known for his collection *Memoriale Fratris Walteri de Coventria*. He probably belonged to a religious house in York diocese.

Walter was not a historian or chronicler in his own right; he merely brought together the works of Marianus Scotus, Florence of Worcester, Henry of Huntingdon, Roger of Hoveden, and an anonymous annalist from the Augustinian priory of Barnwell, Cambridgeshire. The Barnwell chronicle, the most important part of Walter's collection, covers the period 1201–25 and is the most valuable contemporary source for King John's reign and especially for his struggle with the church and the English barons. The last date given in the *Memoriale* is 1293.

Walter, Bruno, original name BRUNO WALTER SCHLESINGER (b. Sept. 15, 1876, Berlin—d. Feb. 17, 1962, Beverly Hills, Calif., U.S.), German conductor known primarily for his interpretations of the Viennese school. Though



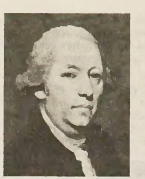
Bruno Walter
By courtesy of the Österreichische Nationalbibliothek, Vienna

out of step with 20th-century trends, he was such a fine musician that he became a major figure—filling the wide gulf between the extremes of his day, Arturo Toscanini and Wilhelm Furtwängler.

He began his career as a pianist but made his debut as a conductor in 1894 at the Cologne Opera. By 1900 he was at the State Opera in Berlin, and in the following year he became Gustav Mahler's associate in Vienna—the beginning of what was to be a lifetime spent in promotion of the master's music; he conducted the premieres of *Das Lied von der Erde* (1911) and the *Ninth Symphony* (1912). Walter moved to the Munich Opera (1914–22) and from 1922 conducted at Salzburg, where his interest in Mozart developed. Other appointments followed: at the Berlin Municipal Opera (1925–29) and as Furtwängler's successor in Leipzig with the Gewandhaus Orchestra (1929–33). The advent of the Nazi regime in Germany forced him to leave Leipzig and his Berlin concerts; he moved first to Vienna (1936–38), then to Paris, and finally to the United States (1939). He conducted frequently at the Metropolitan Opera and the New York Philharmonic (musical adviser, 1947–49).

Walter, Hubert: *see* Hubert Walter.

Walter, John, I (b. 1739, probably in London—d. Nov. 16, 1812, Teddington, Middlesex, Eng.), English founder of *The Times*, London, and of a family that owned the newspaper for almost 125 years. Considered neither an outstanding nor an honest journalist, Walter nevertheless turned from scandal to more serious reportage and organized (while in prison for libelling members of the British royal family) a news service from the European continent, thereby launching *The Times* on its course toward preeminence in covering foreign news.

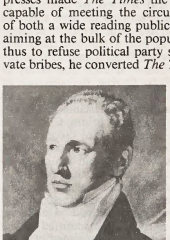


John Walter I, detail of an oil painting by an unknown artist; in *The Times* Board Room, London
The Times, London

Previously a coal dealer and marine-insurance underwriter, Walter in 1783 acquired the patent for a system of printing from logotypes (fonts of words or portions of words rather than single letters). He then took over a disused printing works in Blackfriars, London. Intending to print and sell books and pamphlets, he began on Jan. 1, 1785, to publish a newspaper, the *Daily Universal Register*, merely to call attention to his printing process and his other publications. When the logotype process failed, he was forced to concentrate on the newspaper itself, renaming it *The Times* for the issue of Jan. 1, 1788. For several years he drew much of his income from prominent persons wishing to suppress news. Because he had published criminal libels on the Prince of Wales (afterward King George IV) and the Duke of York, Walter for two years had to edit *The Times* from prison. From 1795 he allowed his sons William Walter and John Walter II to manage the paper.

Walter, John, II (b. Feb. 23, 1776, Battersea, London—d. July 28, 1847, London), English journalist, second son of John Walter I, founder of *The Times*, London, who developed (along with Thomas Barnes, editor in chief from 1817 to 1841) a great daily newspaper from a small partisan sheet. Building on the foreign news services established by his father, he gave *The Times* an advantage over not only its rivals but also the official government dispatches; he published an account of the British naval victory of Trafalgar several days before the British government received a navy report.

Succeeding his elder brother, William Walter, as manager in 1803, he made *The Times* solvent by 1814, in which year he became the first to adapt steam power to printing. Steam presses made *The Times* the first newspaper capable of meeting the circulation demands of both a wide reading public and advertisers aiming at the bulk of the population. Enabled thus to refuse political party subsidies or private bribes, he converted *The Times* into what



John Walter II, detail of an oil painting by an unknown artist
The Times, London

was described (by the 4th earl of Clarendon) as "the true exponent of what English public opinion is or will be."

Walter spent large sums on maintaining an "Extraordinary Express" to bring news from British India. He organized a courier service from Marseille to Paris, a carrier-pigeon delivery from Paris to Boulogne, and a cross-Channel steamer service from Boulogne to Dover linked with a special train to London. In addition, he was the first newspaperman to use the electric telegraph and is said to have appointed the first full-time war correspondent.

Walter, John, III (b. Oct. 8, 1818, London—d. Nov. 3, 1894, near Wokingham, Berkshire, Eng.), English proprietor of *The Times*, London, from the death of his father, John Walter II, in 1847.

Walter made his most important contribution in 1866 with the Walter rotary press, which printed rapidly and simultaneously on both sides of paper wound on a roll; his press facilitated *The Times*'s struggle with *The Daily Telegraph* and other newly established penny



John Walter III
The Times, London

papers. He was succeeded by his second son, Arthur Fraser Walter (1846–1910).

Walter, Lucy (b. 1630?, Roch Castle, near Haverfordwest, Pembrokeshire, Wales—d. September/October 1658, Paris), mistress of the British king Charles II and reputed mother of James Scott, duke of Monmouth (*q.v.*).

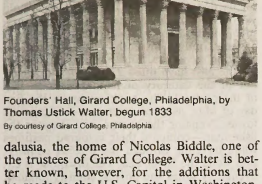
Her family, the Walters, were Welsh of good standing, who declared for King Charles I during the Civil War. Roch Castle having been captured and burned by the Parliamentary forces in 1644, Lucy Walter found shelter first in London and then at The Hague. There, in 1648, she met the future king, possibly renewing an earlier acquaintance. There is little reason for believing the story that she was his first mistress; it is certain that he was not her first lover. The intimacy between him and this "brown, beautiful, bold but insipid creature," as the diarist John Evelyn called her, who chose to be known as Mrs. Barlow (Barlo), lasted with intervals until the autumn of 1651, and Charles claimed the paternity of a child born in 1649, whom he subsequently created duke of Monmouth. A daughter, Mary (b. 1651), of whom the reputed father was Henry Bennet, earl of Arlington, married William Sarsfield, brother of Patrick Sarsfield, earl of Lucan. On the termination of her liaison with Charles II, Lucy Walter abandoned herself to a life of promiscuity, which may have resulted in her premature death.

Walter, Thomas Ustick (b. Sept. 4, 1804, Philadelphia—d. Oct. 30, 1887, Philadelphia), architect important in American architecture for the quality and influence of his designs based upon ancient Greek models.

Walter was professor of architecture at the Franklin Institute, Philadelphia; engineer for the harbour at La Guaira, Venezuela (1843–45); and president of the American Institute of Architects (1876–87), which in 1857 he had helped to found. His style was partially formed by two brief periods of employment in the Philadelphia office of the classical revival architect William Strickland.

In 1833 Walter was selected to design the main building of Girard College in Philadelphia, and the form that he finally gave to

Founders' Hall remains one of the finest examples of Greek Revival architecture in the United States. Another of his Greek Revival masterpieces in the Philadelphia area is Andalusia, the home of Nicolas Biddle, one of the trustees of Girard College. Walter is better known, however, for the additions that he made to the U.S. Capitol in Washington, D.C., and especially for the massive cast-iron dome with which he replaced the earlier, low wooden one (1855–63). Illustrative of Walter's rare use of styles other than the Greek Revival was the Gothic design of the Philadelphia county prison (Moyamensing) with its Egyptian debtors' wing (1835). His last years were spent in the architectural office of John McArthur, Jr., where he is assumed to have had some part in the design of the Philadelphia City Hall.



Founders' Hall, Girard College, Philadelphia, by Thomas Ustick Walter, begun 1833
By courtesy of Girard College, Philadelphia

Waltham, city, Middlesex county, eastern Massachusetts, U.S., on the Charles River, just west of Boston. Settled in the 1630s, it was part of Watertown until separately incorporated in 1738. Abundant waterpower attracted early gristmills and paper mills. In 1813 the first textile mill for processing raw cotton into cloth under one roof was established there. Industrialization followed, and for many years the American Waltham Watch Company (founded 1854) was one of the world's largest and played an important role in the city's progress. Diversified manufactures now include precision instruments, electrical machinery, cameras, electronic systems, missiles, and fabricated metal products. Waltham is a leading electronic research and development centre. It is the seat of Brandeis University (founded under Jewish auspices in 1948) and Bentley College (1917). Lyman and Browne houses are notable colonial restorations, while Gore Place is an excellent example of Federal architecture. The first U.S. training school for nurses (outside of hospital wards) was started in 1885 in Waltham. Inc. city, 1884. Pop. (1990) 57,878.

Waltham Forest, outer borough of Greater London metropolitan area, on the northeastern perimeter of the metropolis, adjoining the Greenbelt. It is bounded on the northeast by Epping Forest and on the west by the Lea Valley and the Metropolitan Water Board's chain of reservoirs. It is predominantly residential in character and includes the suburbs of Chingford, Leyton, and Walthamstow. There is some industry.

Many Roman and Saxon antiquities have been uncovered at Leyton. The hunting lodge of Queen Elizabeth I, a Tudor building restored by the Corporation of the City of London, stands at Rangers Road, Chingford. Within Lloyd Park is Water House, a Georgian mansion that was once the home of William Morris, the 19th-century poet, craftsman, and artist. Waltham Forest is well provided with parks and open spaces, including an extensive area of Epping Forest. The area of the borough is 15 square miles (40 square km). Pop. (1986 est.) 215,800.

Waltharius, a Latin heroic poem of the 9th or 10th century dealing with Germanic hero legend. Its author was once thought to be the Swiss monk Ekkehard I the Elder (d. 973), but research since 1941 has determined that the author was probably a Bavarian, one Geraldus, or Gerald, who was certainly the author of the metrical prologue.

The action of the 1,456-line poem is set in the time of the migrations of the peoples. Threatened by the Huns under Attila, the kings of the Franks, of the Burgundians, and of Aquitaine decide to pay tribute and give hostages: Gibicho gives his noble follower Hagano; Herricus, his daughter Hiltgunt; and Alphere, his son Waltharius—*i.e.,* Walter of Aquitaine. The three children are educated by the Huns in a manner suited to their station.

Hagano escapes when it is learned that Gibicho has died and his son Gunthārius does not intend to continue the tribute. In order to bind Walthārius to him, Attila proposes that he should marry a princess of the Hun realm; but he and Hiltgunt have been betrothed as children, and they plan an escape. Their presence in his realm is revealed to Gunthārius as they cross the Rhine River. Hagano recognizes from their description who they are, but Gunthārius insists on pursuing them to take their treasure. The rest, and by far the larger part, of the poem is devoted to his attempts to do so.

When Walthārius sees the danger, he takes up his position in a narrow ravine in the Vosges, where only one adversary can approach at a time, and there follows a series of single combats (skillfully varied by the poet) of Walthārius with the 11 warriors of Gunthārius, all of whom Walthārius kills. After resting for the night, he and Hiltgunt continue their journey and are attacked in open country by Gunthārius and Hagano, who has hitherto refrained from taking arms against his friend but is finally persuaded by his master that his duty to him now requires it. Gunthārius, Hagano, and Walthārius are all seriously wounded, but none is killed; and Walthārius and Hiltgunt continue on their way.

The story became well known in Germany, and there is an account, albeit with considerable differences, in the Norse *Thidriks saga.* Two short fragments of *Waldere* in Anglo-Saxon alliterative verse are clearly related, in spite of differences; they are not believed to predate *Walthārius.* It is possible that both *Waldere* and *Walthārius* are derived from a lost Germanic heroic lay; three of the principal characters, Attila, Gunther, and Hagen, are known from other poems of the heroic age. However, the part of the poem containing the single combats draws heavily on Latin literature.

Waltheof (d. May 31, 1076), earl of Northumbria and ancestor of the Scottish kings through the marriage of his daughter Matilda to King David I.

Son of Siward, the Danish earl of Northumbria (1041–55), and Aelflaed, daughter of Aldred, earl of Northumbria, he received an earldom consisting of the shires of Huntingdon, Northampton, Bedford, Rutland, and Cambridge in 1065. He submitted to King William I the Conqueror in 1067 and, though he joined northern rebels in 1069, was restored to favour and allowed to marry William's niece Judith. Later he was drawn into a rebellion against William (1075), for which he was condemned for treason and executed.

Walther VON DER VOGELWEIDE (b. *c.* 1170—d. *c.* 1230, Würzburg? [Germany]), greatest German lyric poet of the Middle Ages, whose poetry emphasizes the virtues of a balanced life, in the social as in the personal sphere, and reflects his disapproval of those individuals, actions, and beliefs that disturbed this harmony. He was no respecter of persons: whoever came between him and his ideals, even the pope himself, received the full force of his anger.

The place of Walther's birth has never been satisfactorily identified, though the title *hêr,* which he is given by other poets, indicates that he was of knightly birth. It is clear from his poetry that he received a formal education at a monastery school. He learned the techniques of his art at the Viennese court of Leopold V, duke of Austria; but, when one of the latter's successors, Leopold VI, took up residence in Vienna, Walther failed to win his favour (for reasons perhaps connected with his rivalry with Reinmar von Hagenau, the most sophisticated of the earlier minnesingers, who was resident at the Viennese court). Instead, he gained the patronage of the Hohenstaufen Philip of Swabia, by writing in support of the Hohenstaufen cause against the Welf faction during their struggle for the kingship following the emperor Henry VI's death in 1197. Pope Innocent III came out on behalf of the Welfs, and from this time dates the antipapal feeling that runs through much of Walther's political poetry.

Disappointed with Philip's treatment of him, however, Walther then served several masters until, in 1212, he once more entered the political arena—this time in support of the Welf emperor Otto IV against Innocent III. Again he was not treated with the generosity he expected, and, in the same year, when Frederick II reclaimed the throne for the house of Hohenstaufen, Walther turned to welcome the new ruler, who was crowned in 1215. From him he received a small fief, symbol of the security he had so long desired. Two 14th-century records suggest that it was in the see of Würzburg, and it is likely that he spent the rest of his life there.

Rather more than half of the 200 or so of Walther's poems that are extant are political, moral, or religious; the rest are love poems. In his religious poems he preached the need for man actively to meet the claims of his Creator by, for instance, going on pilgrimage or on crusade; in his moral-didactic poems he praises such human virtues as faithfulness, sincerity, charity, and self-discipline—virtues that were not especially prominent in his own life. As a love poet he developed a fresh and original treatment of the situations of courtly love and, ultimately, in such poems as the popular "Unter der Linden," achieved a free, uninhibited style in which the poses of court society gave way before the natural affections of village folk.

Walther, Carl Ferdinand Wilhelm (b. Oct. 25, 1811, Langenchursdorf, Saxony [Germany]—d. May 7, 1887, St. Louis, Mo., U.S.), highly orthodox theologian whose conserva-



Carl Walther
By courtesy of the Concordia Historical Institute, St. Louis, Mo.

tive views played an important role in the early development of the Missouri Synod of American Lutheranism.

Educated at the University of Leipzig, Walther was ordained in 1837. In 1839 he followed Martin Stephan and a group of Saxons

(Germans) to Missouri, where he combined a pastorate in Perry county with teaching in their log cabin seminary. After Stephan's banishment for adultery, Walther led the group and became president of the synod that it founded in 1847, serving until 1850 and again from 1864 to 1878. In addition, he headed Concordia Seminary, St. Louis, where he also taught theology (1850–87). The periodical *Der Lutheraner,* which he founded in 1844, rallied many Midwestern Lutherans who held fundamentalist or conservative views. His other writings grew out of controversies with other Lutheran groups over the doctrines of election and predestination, the church, and law and gospel. In his high regard for biblical literalism, evangelical church confessions, and the scholastic theology of post-Reformation Germany, he believed he represented classic Lutheranism. The conservative Lutheran Church–Missouri Synod, which includes about one-third of American Lutherans, views him as the spiritual father of their denomination.

Walther, Johann Gottfried (b. Sept. 18, 1684, Erfurt, Mainz [Germany]—d. March 23, 1748, Weimar, Weimar), German organist and composer who was one of the first musical lexicographers.

In 1702 Walther was organist at the Thomaskirche at Erfurt, in 1707 organist at Weimar, and from 1721 court musician there. Between 1708 and 1714 he formed a friendship with J.S. Bach, of whom he was a second cousin. Walther's compositions, which were highly respected by his contemporaries, include chorale preludes and variations for the organ, and organ arrangements of concerti by Tomaso Giovanni Albinoni, Giuseppe Torelli, and other Italian composers. His *Musicalisches Lexikon,* completed in 1732, was the first music encyclopaedia of biography, bibliography, and musical terms. It remains an invaluable work in the study of Baroque music.

Walton, Ernest Thomas Sinton (b. Oct. 6, 1903, Dungarvan, County Waterford, Ire.—d. June 25, 1995, Belfast, N.Ire.), Irish physicist, corecipient, with Sir John Douglas Cockcroft of England, of the 1951 Nobel Prize for



E.T.S. Walton
By courtesy of A.J. Walton

Physics for the development of the first nuclear particle accelerator, known as the Cockcroft-Walton generator.

After studying at the Methodist College, Belfast, and graduating in mathematics and experimental science from Trinity College, Dublin (1926), Walton went in 1927 to Trinity College, Cambridge, where he was to work with Cockcroft in the Cavendish Laboratory under Lord Rutherford until 1934. In 1928 he attempted two methods of high-energy particle acceleration. Both failed, mainly because the available power sources could not generate the necessary energies, but his methods were later developed and used in the betatron and the linear accelerator. Then in 1929 Cockcroft and Walton devised an accelerator that generated large numbers of particles at lower energies. With this device in 1932 they disintegrated lithium nuclei with protons, the first artificial nuclear reaction not utilizing radioactive substances.

After gaining his Ph.D. at Cambridge, Walton returned to Trinity College, Dublin, in 1934, where he remained as a fellow for the next 40 years and a fellow emeritus thereafter. He was Erasmus Smith's professor of natural and experimental philosophy from 1946 to 1974 and chairman of the School of Cosmic Physics at the Dublin Institute for Advanced Studies after 1952.

Walton, Izaak (b. Aug. 9, 1593, Stafford, Staffordshire, Eng.—d. Dec. 15, 1683, Winchester, Hampshire), English biographer and author of *The Compleat Angler* (1653), a pastoral discourse on the joys and stratagems of fishing that has been one of the most frequently reprinted books in English literature.



Izaak Walton, detail of an oil painting by Jacob Huysmans, *c.* 1675; in the National Portrait Gallery, London
By courtesy of the National Portrait Gallery, London

After a few years of schooling, Walton was apprenticed to a London ironmonger, acquired a small shop of his own, and began to prosper. Despite his modest education he read widely, developed scholarly tastes, and associated with men of learning. Walton's dwelling and ironmonger's shop was close to St. Dunstan's Church, and he became active in parish affairs and a friend and fishing companion of the vicar, John Donne. Donne died in 1631, and when his poems were published two years later Walton composed "An Elegie" for the volume. In 1640 he wrote *The Life and Death of Dr. Donne* to accompany a collection of Donne's sermons. The *Life* was revised and enlarged in 1658.

During the Civil Wars, Walton, a staunch Royalist, quit London for the relative security of his native Staffordshire. After the Royalist defeat at Worcester in 1651, he took part in a successful adventure to preserve a jewel belonging to Charles II. He spent the remainder of his life reading, writing and editing, fishing, and visiting among the eminent clergymen who were his friends.

The second of Walton's biographies, *The Life of Sir Henry Wotton* (provost of Eton), appeared in 1651. Two years later the work that made Walton immortal, *The Compleat Angler, or, the Contemplative Man's Recreation,* was published. Walton enlarged and improved the work through four subsequent editions, a quest for perfection also evident in repeated revisions of the biographies. He wrote *The Life of Mr. Richard Hooker,* the Elizabethan bishop, in 1665 and revised it the next year. In 1670 he issued *The Life of Mr. George Herbert* (a priest and poet who, like Donne and Wotton, had been his fishing companion), and in the same year he brought out an edition containing all four lives.

Upon the Restoration, one of Walton's Royalist friends, George Morley, was made bishop of Winchester and offered Walton residence in the bishop's palace, where he stayed for the rest of his life. His final personal revision (the fifth edition) of *The Compleat Angler* appeared in 1676 and included additional material written by his friend Charles Cotton. Walton published a biography of Bishop Sanderson in 1678.

Since the late 18th century, more than 300 editions of *The Compleat Angler* have appeared, and the unpretentious treatise, of which Walton did not even claim authorship on its first appearance, became a household word. Many of its devotees have been fishermen, but Walton's attractive style in dialogue and description, his enthusiasm for innocent outdoor recreation, and his genial partiality for the past have lifted *The Compleat Angler* out of the category of handbooks into that of the pastoral. The book opens on the first day of May, as three sportsmen—Auceps the fowler, Venator the hunter, and Piscator the fisherman—compare their favoured pastimes while traveling through the English countryside along the River Lea. The discourse is enlivened by songs and poems, country folklore, recipes, anecdotes, moral meditations, quotes from the Bible and from classic literature, and lore about fishing and waterways. The central character, Piscator, is not simply a champion and expositor of the art of angling but a man of tranquil, contented temper, pious and sententious, with a relish for the pleasures of friendship, verse and song, good food, and drink.

Walton, Samuel Moore, byname SAM WALTON (b. March 29, 1918, Kingfisher, Okla., U.S.—d. April 5, 1992, Little Rock, Ark.), American retail magnate who founded Wal-Mart Stores, Inc., the largest retail-sales chain in the United States.

Walton graduated from the University of Missouri with a degree in economics (1940) and entered a J.C. Penney Co. management-training program in Des Moines, Iowa. He opened his own Ben Franklin variety (five-and-dime) store in Newport, Ark., in 1945, and relocated the store to Bentonville, Ark., five years later. By the early 1960s he and his brother, James, operated a regional chain of Ben Franklin stores, and when that company's executives rejected his concept for a new discount-store chain to be based in small towns, Walton decided to set up such a chain on his own. He opened the first Wal-Mart store, Wal-Mart Discount City, in Rogers, Ark., in 1962, offering a wide variety of merchandise at discount prices in a no-frills setting.

Large American discount-store chains typically situated their stores in or near large cities, but Walton was convinced that even small towns could generate enough business to make such stores profitable. To operate in out-of-the-way locations, he situated a regional cluster of stores within one day's truck route of a giant Wal-Mart warehouse that made large-volume purchases and distributed the goods to the stores using its own trucking services. Volume buying and a low-cost delivery system enabled Wal-Mart stores to offer name-brand goods at discount prices in locations where there was little competition from other retail chains. As a result, the Wal-Mart chain experienced tremendous and sustained growth, with 190 stores by 1977 and 800 stores by 1985.

Walton founded Sam's Wholesale Club, a chain of deep-discount wholesale warehouse outlets, in 1983, and in 1987 he began a chain of Hypermarts and Supercenters, which dwarfed even the barnlike Wal-Mart stores in size. By 1991 Wal-Mart Stores had passed Sears, Roebuck and Company to become the largest retailer in the United States.

Walton stepped down as chief executive officer in 1988, but he remained company chairman. By the time of his death he had established 1,735 Wal-Marts, 212 Sam's Clubs, and 13 Supercenters and Hypermarts with a total of 380,000 employees and annual sales

of almost $50 billion. Walton made his family the wealthiest in the United States, with a net worth of more than $20 billion by his death.

Walton, Sir William, in full SIR WILLIAM TURNER WALTON (b. March 29, 1902, Oldham, Lancashire, Eng.—d. March 8, 1983, Ischia, Italy), English composer especially known for his orchestral music. His early work made him one of England's most important composers between the time of Vaughan Williams and that of Benjamin Britten.

Walton, the son of a choirmaster father and a vocalist mother, studied violin and piano desultorily as a boy and also sang, with somewhat better results, in his father's choir. He taught himself composition, although he received advice from both Ernest Ansermet and Ferruccio Busoni. In 1912 he entered the University of Oxford, where he sang in the choir of Christ Church. He put in the requisite four years of study but failed by one examination (Responsonions) to win a bachelor of music degree. At Oxford he had met the Sitwell brothers, Osbert and Sacheverell, by whom he was virtually adopted, and he spent most of the next decade traveling with them or living with them at Chelsea. During this period he composed *Façade* (1923)—a set of pieces for chamber ensemble, to accompany the Sitwells' sister Edith in a recitation of her poetry—as well as *Sinfonia Concertante* for piano and orchestra (1928; revised 1943) and *Portsmouth Point* (1926), which established his reputation as an orchestral composer.

Walton was influenced by some of his older contemporaries, notably Edward Elgar, Igor Stravinsky, and Paul Hindemith. Hindemith was soloist in the first performance of one of Walton's finest works, his *Viola Concerto* (1929). Walton also composed a number of scores for motion pictures, including *Major Barbara* (1941), *Henry V* (1944), *Hamlet* (1947), and *Richard III* (1954). His vocal music includes the oratorio *Belshazzar's Feast* (1931) and the operas *Troilus and Cressida* (1954) and *The Bear* (one act; 1967). The composer received a knighthood in 1951.

Walton-le-Dale, locality, industrial suburb of the town of Preston, county of Lancashire, England. It is situated in South Ribble district, overlooking the Rivers Darwen and Ribble. Waletune was of Anglo-Saxon origin, and the suffix "le Dale" was added in Norman times. The parish church of St. Leonard also dates from this period, although only the chancel and tower of the original building remain. In 1648 the town was the site of a battle between the armies of Oliver Cromwell and James Hamilton, 1st duke of Hamilton. Diversified industries have replaced the area's once-prominent cotton and paper mills. Pop. (1981) 29,009.

waltz (from German *walzen,* "to revolve"), highly popular ballroom dance evolved from the ländler (*q.v.*) in the 18th century. Characterized by a step, slide, and step in $\frac{3}{4}$ time, the waltz, with its turning, embracing couples, at first shocked polite society. It became the ballroom dance par excellence of the 19th century, however, and tenaciously maintained its popularity in the 20th. Its variations include the rapid, whirling Viennese waltz and the gliding, dipping Boston. Composers of famous waltzes include Frédéric Chopin, Peter Ilich Tchaikovsky, and Johann Strauss and his sons, especially Johann Strauss the Younger, who was known as "the Waltz King."



Waltzing couples in a Vienna dance hall
The Bettmann Archive

Waltzemüller, Martin: *see* Waldseemüller, Martin.

Waluguru (people): *see* Luguru.

Walvis Bay, Afrikaans WALVISBAAI, town and anchorage in west-central Namibia (formerly South West Africa), lying along the Atlantic Ocean. It constituted an exclave of South Africa until 1992.

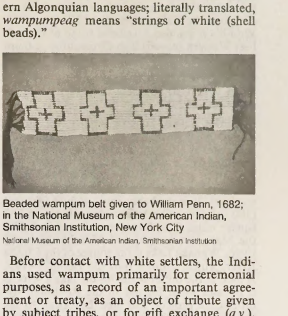
A mid-19th-century rush for guano deposits on a number of adjacent islands was followed by British annexation of the bay and the adjacent hinterland in 1878. It was incorporated into Britain's Cape Colony (now part of South Africa) in 1884, the same year in which Germany established the colony of South West Africa. By the Act of Union (1910) Walvis Bay was included in the newly united South Africa. For reasons of convenience, it was administered as part of South West Africa from 1922 until 1977. From 1978 it was governed directly by South Africa, which retained the exclave after Namibia reached independence in 1990. The latter disputed South Africa's possession of Walvis Bay, claiming the exclave was Namibian territory. In 1992 the two countries agreed to administer the exclave jointly, and in 1994 South Africa transferred sovereignty over Walvis Bay to Namibia.

The town of Walvis Bay lies on the edge of the Namib Desert at the mouth of the intermittently flowing Kuiseb River. A portion of the town lies below sea level (4 feet [1.2 m]) and is protected by a dike against flooding. Walvis Bay Harbour serves as Namibia's chief port. It is sheltered by Pelican Point Peninsula on the northwest and is connected to the interior by road, rail, and air. The harbour was formerly a deepwater anchorage for the South African navy, and since the late 1970s the port has exported uranium from one of the world's most important deposits, at Rössing, 50 miles (80 km) northeast. Severe coastal overfishing from the mid-1970s caused a decline in importance of the town's former economic mainstay. Pop. (1985) town, 9,687.

Wampanoag, Algonquian-speaking Indians of eastern North America who formerly occupied parts of the states of Rhode Island and Massachusetts, Martha's Vineyard, and adjacent islands. They were semisedentary, with seasonal movements between fixed sites. Corn (maize) was the staple of their diet, supplemented by fish and game. They were divided into several subtribes, each with its own subchiefs, or sachems.

When the Pilgrims settled at Plymouth in 1620, the Wampanoag chief, Massasoit, made a peace treaty with the English that was observed until his death. Bad treatment by whites who encroached on Indian lands, however, led his son, Metacom, or Metacomet, known to the English as King Philip, to organize a confederacy of tribes to drive out the whites (*see* King Philip's War). Philip and other leading chiefs were killed, and the Wampanoag and Narraganset were almost exterminated. Some survivors fled to the interior, while others joined their kinsmen on the islands of Nantucket and Martha's Vineyard who had remained neutral. Disease and epidemics destroyed most of the Nantucket Indians, but mixed descendants survive to the present, particularly on Martha's Vineyard.

wampum, tubular shell beads that have been assembled into strings or woven into belts or embroidered ornaments, formerly used as a medium of exchange by some North American Indians. The terms *wampum* and *wampumpeag* were initially adopted by English settlers, who derived them from one of the eastern Algonquian languages; literally translated, *wampumpeag* means "strings of white (shell beads)."



Beaded wampum belt given to William Penn, 1682; in the National Museum of the American Indian, Smithsonian Institution, New York City
National Museum of the American Indian, Smithsonian Institution

Before contact with white settlers, the Indians used wampum primarily for ceremonial purposes, as a record of an important agreement or treaty, as an object of tribute given by subject tribes, or for gift exchange (*q.v.*). Its value derived from its ceremonial importance and the skill involved in making it. In the early 17th century wampum came to be used as money in trade between whites and Indians because of a shortage of European currency. When machines were invented in the mid-18th century for mass production of wampum, the resulting inflation stopped its use as money in the eastern United States. Western Indians, however, continued to use it commercially until the mid-19th century.

Wan-dang (Korean calligrapher): *see* Kim Chŏng-hui.

Wan-hsien, also called SHA-HO-TZU, Pinyin WANXIAN, or SHAHEZI, city in eastern Szechwan *sheng* (province), central China. It is an important port along the Yangtze River, being situated at the western end of that river's system of gorges.

An ancient city and administrative centre, Wan-hsien was largely a commercial centre for eastern Szechwan. The city also had a handicraft cotton industry. In 1917 it was opened to foreign trade and became a commercial centre of medium importance, a centre of the wood-oil (tung-oil) trade, and a distribution centre for Western goods. It also had some minor industries, such as junk (boat) building, papermaking, and flour milling. During the Sino-Japanese War (1937–45), a number of industrial plants evacuated from Wu-han in Hupeh and from Shanghai were rebuilt in Wan-hsien. But in 1945 most of these factories returned to the east, leaving only various textile companies (weaving cotton and hemp), flour mills, and tanneries. Diversified industries (notably electronics and chemical products) were later established in the city.

Since 1949 Wan-hsien has grown considerably. The river port has been improved, and highways have been built linking Wan-hsien to Chungking, Nan-ch'ung, and Ch'eng-tu. Pop. (1990) 156,823.

Wan-li, Pinyin WANLI (reign name), personal name (*hsing-ming*) CHU I-CHÜN, posthumous name (*shih*) HSIEN-TI, temple name (*miao-hao*) (MING) SHEN-TSUNG (b. Sept. 4, 1563—d. Aug. 18, 1620), emperor of China from 1573 to 1620, during the latter portion of the Ming dynasty (1368–1644).

Wan-li was a recluse whose apparent inattention to government affairs contributed

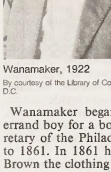
to the abuses of power by provincial officials and other political figures that came to dominate that era of Chinese history. The violence and corruption among leaders of the northern provinces led to much popular dissatisfaction and unrest, preparing the way for the invasion from the north by the Manchu, who subsequently conquered all of China and established the Ch'ing dynasty (1644–1911/12). Wan-li's reign also witnessed some of the earliest Western inroads into China, among them the establishment by the Italian priest Matteo Ricci of missions there.

Wan-yen Min (Chinese emperor): *see* T'ai-tsu (1069–1123).

Wanaka Lake, lake in west-central South Island, New Zealand. The lake occupies 75 square miles (193 square km) of a valley that is dammed by a moraine (glacial debris) and that lies at the eastern foot of the Southern Alps. The lake's surface is 915 feet (280 m) above sea level. It is probably more than 1,000 feet (300 m) deep. The lake drains a basin of 982 square miles (2,543 square km) and is fed by the Makarora (north) and Matukituki (west) rivers. Wanaka Lake is the source of the Clutha River, which empties into the Pacific Ocean. A dam at the outlet regulates the lake's level as it releases water for use in the Roxburgh hydroelectric project. The first European to see the lake was Nathaniel Chalmers in 1853. The lake's name is from the Maori word *oanaka,* "place of Anaka," an early Maori chief. Wanaka is separated from Hawea Lake to the east by a narrow ridge of land known as The Neck.

The town of Wanaka, at the southern tip of the lake, is the centre of a resort region that also supports some sheep grazing and crop farming. First known as Roys Bay and then Pembroke (until 1940), it lies 175 miles (282 km) northwest of Dunedin by road.

Wanamaker, John (b. July 11, 1838, Philadelphia, Pa., U.S.—d. Dec. 12, 1922, Philadelphia), merchant and founder of one of the first American department stores.

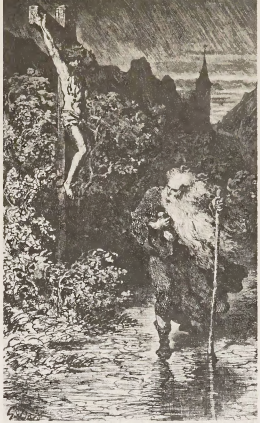


Wanamaker, 1922

By courtesy of the Library of Congress, Washington, D.C.

Wanamaker began work at age 14 as an errand boy for a bookstore and served as secretary of the Philadelphia YMCA from 1857 to 1861. In 1861 he established with Nathan Brown the clothing firm of Brown and Wanamaker, a partnership that ended with Brown's death in 1868. In 1869 he founded John Wanamaker and Company and in 1875 bought the freight depot of the Pennsylvania Railroad to house the store. A "new kind of store," it collected specialty shops under one roof and soon became one of the largest department stores in the nation. Wanamaker also acquired the former A.T. Stewart Store in New York City in 1896. The two Wanamaker's stores remained among the nation's largest and most innovative department stores under the direction of John's son Lewis Rodman Wanamaker (1863–1928). John Wanamaker was noted for his successful use of advertising, and he was one of the first major merchandisers to employ advertising agencies. From 1889 to 1893 he served as U.S. postmaster general.

wandering Jew, in Christian legend, character doomed to live until the end of the world because he taunted Jesus on the way to the Crucifixion. A reference in John 18:20–22 to an officer who struck Jesus at his arraignment before Annas is sometimes cited as the basis



The wandering Jew, illustration by Gustave Doré, 1856

By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

for the legend. The medieval English chronicler Roger of Wendover describes in his *Flores historiarum* how an archbishop from Greater Armenia, visiting England in 1228, reported that there was in Armenia a man formerly called Cartaphilus who claimed he had been Pontius Pilate's doorkeeper and had struck Jesus on his way to Calvary, urging him to go faster. Jesus replied, "I go, and you will wait till I return." Cartaphilus was later baptized Joseph and lived piously among Christian clergy, hoping in the end to be saved. An Italian variant of the story named the culprit as Giovanni Buttadeo ("Strike God").

The legend was revived in 1602 in a German pamphlet, "Kurze Beschreibung und Erzählung von einem Juden mit namen Ahasverus" ("A Brief Description and Narration Regarding a Jew Named Ahasuerus"). This version, in which the name Ahasuerus is first given to the wanderer, who was not baptized, describes how at Hamburg in 1542 Paulus von Eitzen (d. 1598), a Lutheran bishop of Schleswig, Ger., met an aged Jew who claimed to have taunted Jesus on the way to the Crucifixion. He received the reply "I stand and rest, but you will go on." The popularity of the pamphlet may have been the result of the anti-Jewish feeling aroused by the belief that the Antichrist would appear in 1600 and be aided by the Jews. The pamphlet was rapidly translated into other languages of Protestant Europe. Appearances of the wandering Jew were frequently reported in various European cities. As late as 1868 he was reputedly seen in Salt Lake City, Utah.

The wandering Jew has been the subject of many plays, poems, novels, and works of visual art. One of the best-known literary treatments is Eugène Sue's Romantic novel *Le Juif errant,* 10 vol. (1844–45; *The Wandering Jew*), but this anti-Jesuit melodrama has little to do with the original legend. Gustave Doré produced a series of 12 wood engravings on the theme in 1856.

wandering Jew, in horticulture, any of several popular houseplants in the family Commelinaceae. *See* spiderwort; Zebrina.

Wandsworth, inner borough of Greater London, lying west of Lambeth and stretching for 5 miles (8 km) along the south bank of the River Thames. Wandsworth was established as a borough in 1965. Most of the area was urbanized in the late 19th century with the arrival of the railways. A century later Wandsworth's terraced streets became popular with white-collar families, bringing restaurants and antique shops in their wake. Fronting the Thames in the northeastern corner of the borough is Battersea (*q.v.*), including Battersea Park (200 acres [80 hectares]), which was laid out in 1858.

The River Wandle, which bisects the borough, has strong historical associations with the growth of industry in London. Huguenot refugees in the 18th century introduced their felt-making techniques along its banks. Some manufacturing (brewing, paint, candles, computers) survives along the riverside, and service industries are especially important. New Covent Garden Market occupies a large tract at Nine Elms in the northeastern corner of the borough.

Wandsworth is linked by five main road bridges over the Thames, and rail lines from London to the south of England converge at Clapham Junction Station. Area 13 square miles (35 square km). Pop. (1993 est.) 265,700.

Waner, Paul; and Waner, Lloyd, in full PAUL GLEE WANER and LLOYD JAMES WANER, respective bynames BIG POISON and LITTLE POISON (respectively b. April 16, 1903, Harrah, Okla., U.S.—d. Aug. 29, 1965, Sarasota, Fla.; b. March 16, 1906, Harrah, Okla.—d. July 22, 1982, Oklahoma City, Okla.), American professional baseball outfielders, brothers who played much of their career together. Their nicknames did not refer to their size but to their batting: Big Poison, who batted and threw left-handed, hit more long balls (doubles and triples); Little Poison, who batted left-handed and threw right-handed, was known for the number of singles he hit.

Both played minor league baseball at San Francisco (Paul, 1923–25; Lloyd, 1925–26) and at Columbia, S.C. (1926), and with the National League Pittsburgh Pirates (Paul alone, 1926; both 1927–40; Lloyd alone, 1941). Both were fast, but Lloyd was faster both in the outfield and as a base runner, and he had a better throwing arm. Single-hitter Lloyd batting ahead of his long-ball-hitting brother made for a formidable run-producing combination. Paul's batting average in each of his first 12 seasons was more than .300; he led the league three times and had a career average of .333. Lloyd hit better than .300 in his first six seasons, with a career average of .316. Both played, together and separately, with other National League clubs through the 1945 season. Lloyd served as a scout for the Pirates until 1949. After his retirement Paul operated a batting practice range in Florida. Paul was elected to the Baseball Hall of Fame in 1952 and Lloyd in 1967.

Wang, An (b. Feb. 7, 1920, Shanghai, China—d. March 24, 1990, Boston, Mass., U.S.), Chinese-born American executive and electronics engineer who founded Wang Laboratories.

The son of a teacher, Wang earned a bachelor's degree in science from Chiao-t'ung Uni-

versity in Shanghai in 1940. He immigrated to the United States in 1945 and earned a Ph.D. in applied physics and engineering from Harvard University in 1948. Having been introduced to computers while at Harvard, Wang in 1948 invented the magnetic memory core, which served as the core of computer memories until the advent of the microchip. In 1951 he founded Wang Laboratories, a manufacturer of desktop calculators and office computers that was one of the most successful American high-technology companies in the 1970s and early '80s. Wang served as president of the company until 1986 and was succeeded by his son Frederick. An Wang invented many basic components for word-processing systems and held about 40 patents in all. His family retained ownership of Wang Laboratories after his death.

Wang An-shih, Pinyin WANG ANSHI, courtesy name (*tzu*) CHIAI-FU, literary name (*hao*) PAN-SHAN (b. 1021, Kiangsi province, China—d. 1086), Chinese poet and prose writer, best known as a governmental reformer who implemented his unconventional idealism through the "New Laws," or "New Policies," of 1069–76. The academic controversy sparked by his reforms continued for centuries.

Wang emerged from a rising new group of southern bureaucrats with a strong utilitarian bent, who challenged their more conservative, large-landholding colleagues from the north. At the age of 21 Wang earned his *chin shih* ("doctorate") degree in the civil service examinations, and for nearly two decades he served ably as a local administrator in various posts in the south.

In 1058 Wang submitted to the Sung emperor Jen Tsung his "Ten Thousand Word Memorial," which contained rudiments of his later policies and political theories; no action was taken on his proposals. Their thrust was aimed at the bureaucracy—that more capable officials with skills suited for their duties should be trained and recruited. Wang entered the central government in 1060, but not until the succession of a new emperor, Shen Tsung, in 1067/68 did he achieve a powerful rank close to the throne and gain the trusting imperial ear.

With his appointment in 1069 as second privy councillor, Wang launched his multifaceted reform program, its cornerstone resting on fiscal policies. He held the view, unconventional by traditional Confucian theories, that a sound state economy, to expand economic growth, required not just measures of economy but also stimulation, whereby both the government and the people would benefit. Accordingly, he first created a fund for agricultural loans at interest to farmers, who were thereby spared the exorbitant demands of moneylenders. To fuel a dynamic money economy and to meet the demand created by expanded state finance, he also pumped more currency into the economy.

The two measures that drew particularly heavy fire from conservatives were a land survey to reassess property taxes more equitably and a system that made the government an active agent in trade. Officials were allowed to purchase supplies at the cheapest price and in the most convenient market, thus discontinuing the cumbersome tribute system used to supply the central government. Other areas of reform included the establishment of a village militia system for local policing and for the buildup of army reserves, the replacement of corvée (unpaid labour) with a hired service system financed by a graduated tax levied on all families, and the creation of both a directorate of weapons for armament development and a horse-breeding program to obviate importation of cavalry mounts. Wang also reorganized the Hanlin Academy (sometimes known as the National Academy), which trained expectant bureaucrats; emphasized professional courses in law, medicine, and military science; restructured the civil-service examinations around policy discussions and interpretation of the Classics, doing away with the previously required rote recitation of the Classics and poetry composition; and, finally, brought government clerks under stricter supervision and provided incentives for promotion.

Increasing popular discontent with some reform measures and a disastrous famine strengthened the conservatives' stand against Wang. His pride wounded, he bowed to pressures to resign in 1074, only to return the following year but with less political power and without imperial carte blanche. This frustration, plus the death of his son, depressed Wang to the point that he retired in late 1076. The framework of the reform remained intact until the emperor's death in 1085/86, when, to Wang's great dismay, a virulent antireform clique dismantled the system. Wang died in 1086. Subsequent decades of continued intense factional politics saw a weakened revival of the reform between 1093 and 1125.

Because he was unable to win sufficiently wide cooperation from high-ranking officials and because of unscrupulous or inept men in the lower bureaucracy, Wang and his policies were doomed to eventual rebuff. In retirement he lived a simple, withdrawn life, continuing his literary endeavours and his scholarly pursuits, mostly in etymological study.

Desiring to emphasize the practical application of the Confucian Classics, Wang wrote original interpretations of several ancient works and instituted these as standard texts for the state examinations—moves that caused great consternation among conservatives. Friend and foe alike, however, did not deny Wang's skill with the pen. The elegance and depth of his prose earned him fame as one of the "Eight Great Masters of the T'ang and Sung Dynasties." The facile genius of his verses, especially those composed later in his life (with an occasional Zen Buddhist flavour), have also earned high critical acclaim.

Wang's reform measures, of unprecedented scope in the imperial era, were idealistically directed—though not always with the desired results—toward the moral and material improvements of the people; but in the end they strengthened the power and finances of the state. In some measure because of Wang's own personal and political shortcomings but mainly due to rabid opposition from conservatives, the reform and Wang himself have with some exceptions been denigrated until the 20th century. (E.H.W., Jr.)

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Wang Chen, Pinyin WANG ZHEN (d. 1449, China), Chinese eunuch who monopolized power during the reign of the Ming dynasty emperor Cheng-t'ung (1427–64).

Wang was denounced by later historians as the first of a series of eunuchs whose mismanagement helped destroy the Ming dynasty (1368–1644). Wang was the constant companion and personal servant of the emperor Cheng-t'ung, who ascended the throne while still a boy. Isolated from his peers, the young emperor was dominated by Wang even after he came of age.

Ignoring the counsel of the regular military leaders, Wang persuaded the emperor to embark on a war against the Oyrat branch of the Mongol tribes, who had rapidly increased their power along China's northwestern borders under the leadership of Esen Taiji. The imperial army was ambushed about 50 miles (80 km) northwest of Peking, the emperor was captured, and Wang and all the leading Chinese generals were slain.

Wang Ching-wei, Pinyin WANG JINGWEI, original name WANG CHAO-MING (b. May 4, 1883, Canton, China—d. Nov. 10, 1944, Nagoya, Japan), associate of the revolutionary Nationalist leader Sun Yat-sen, rival of Chiang Kai-shek for control of the Nationalist (Kuomintang) government in the late 1920s and early '30s, and finally head of the regime established in 1940 to govern the Japanese-conquered territory in China.

As a student of Western thought in Japan, Wang joined the newly formed revolutionary party of Sun Yat-sen, the United League (T'ung-meng hui), and soon became one of the group's leading polemicists. In 1910, influenced by anarchist thought and desperate to revitalize the United League, Wang decided to assassinate the regent to the imperial throne. The plot was discovered, and Wang was captured. His courage in the face of execution so impressed the regent that Wang's punishment was reduced to life imprisonment. After the Republican Revolution of 1911 overthrew the Ch'ing dynasty, Wang was released from prison a hero.

In 1917 Wang again joined Sun Yat-sen, who had become dissatisfied with the warlord regimes dominating China after 1911 and was trying to organize a new revolutionary party. For the next seven years Wang served as Sun's personal assistant and was one of the major officials in Sun's new Nationalist Party. Sun died in 1925 just as the Nationalist armies were ready to embark on their Northern Expedition to liquidate the warlords and unite China. Wang became the new chairman of the national government, but as the Northern Expedition progressed successfully, Chiang Kai-shek, who controlled the Nationalist army, came to be favoured by right-wing members of the party. These members finally formed their own regime in the South China city of Nanking, while the left wing, in alliance with the Communists, formed a regime headed by Wang in the central China city of Wu-han. Wang, however, found it increasingly difficult to cooperate with the Communists, and in July 1927 he purged them. Most of the left wing of the Nationalist Party rejoined Chiang, who held the dominant military power.

Wang continued to lead an opposition movement to Chiang until February 1932, when the two men were reconciled by a settlement in which Wang became president of the Nationalist Party while Chiang continued to head the military. War erupted with Japan in 1937. Late in 1938 Wang flew to Hanoi and there issued a public statement calling on the Chinese government to work out a peaceful settlement with the Japanese. On March 30, 1940, in cooperation with the Japanese, he became the head of a new regime, which governed the Japanese-occupied areas of China centred in the former Nationalist capital of Nanking. Although Wang had hoped to be granted virtual autonomy in his government, the Japanese continued to exercise strong military and economic dominance over the area. Wang died while undergoing medical treatment in Japan.

Wang Ch'ung, Pinyin WANG CHONG (b. AD 27, K'uei-chi, China—d. 100?, K'uei-chi), one of the most original and independent Chinese thinkers of the Han period (206 BC–AD 220).

A rationalistic naturalist during an age of superstition, Wang dared attack the belief in omens and portents that had begun to creep into the Confucian doctrines. He helped pave the way for the critical spirit of the next philosophical period and prepared China for the advent of Neo-Taoism. Born into a poor fam-

ily and orphaned at an early age, Wang did much of his reading in a bookstore. He held a few minor government positions, but during much of his life he taught in his hometown.

Accepting Confucius, Wang opposed the contemporary, debased Confucianism. He declared that natural things occur spontaneously and that there is no such thing as teleology. Wang rejected the notion that man's actions influence the workings of the natural universe (*i.e.*, a bad king will produce bad weather). He stated that man, though noble and intelligent, has no exceptional position in the universe. A rationalist, he insisted that any theory must be supported by concrete evidence and experimental proof.

Wang has never been greatly popular in China, though in the 20th century the prevailing critical spirit, scientific method, and revolt against the past have attracted new attention to his ideas. His outstanding work, the trenchant and critical *Lun-heng* ("Disquisitions"), written about 85, has been translated into English by Alfred Forke (2 vol., 1907–11).

Wang Fu-chih, Pinyin WANG FUZHI (b. Oct. 7, 1619, Heng-yang, Hunan province, China—d. Feb. 18, 1692, Heng-yang), Chinese nationalistic historian and poet in the early years of the Ch'ing dynasty (1644–1911), whose works were revived by Chinese nationalists in the middle of the 19th century.

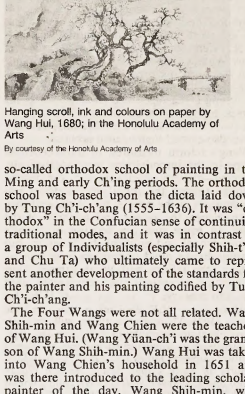
Born and educated during the last years of the Ming dynasty (1368–1644), Wang was an ardent patriot who bitterly resisted the invasion of China by the Manchu tribes of Manchuria and their subsequent establishment of the Ch'ing dynasty. He raised an army and joined the resistance led by the last remnants of the Ming dynasty. By 1650, however, he realized the cause was hopeless. The next year he returned to his native village where he devoted his life to study, writing works on history, philosophy, and literature. His best-known studies are the *Tu t'ung-chien lun* ("Commentary on Reading the Comprehensive Mirror" of Ssu-ma Kuang) and the *Sung lun* ("Commentary on the Sung"), in which he clearly demonstrated the differences between the institutions of ancient China that were sanctified in the Confucian Classics and the institutions of the Chinese dynasties that followed the feudal period in which those classics were written.

He argued that the ancient institutions were not relevant to his own time and that the purpose of the state was to serve the people. At a time when nationalistic feelings were still unknown in China, he argued that the ultimate aim of the government should be the preservation of the Chinese people and their culture. Ethics were important only if they first served to preserve the race. Alien rulers were impermissible, no matter how sinicized they seemed, and Wang glorified past heroes who fought to save Chinese land from encroachment by various Central Asian barbarians.

Wang Hsi-chih, Pinyin WANG XIZHI (b. *c.* 303, Shantung, China—d. *c.* 361), the most celebrated of Chinese calligraphers.

It is said that even in his lifetime a few of Wang Hsi-chih's characters or his signature were beyond price; down through the ages aspiring students of that most basic yet highest art in China, calligraphy, have copied preserved traces of his style. The most famous example of his writing is the *Lan-t'ing hsü* ("Preface to the Poems Composed at the Orchid Pavilion"), which recorded a famous gathering of some 42 literary figures during the Spring Purification Festival of AD 353 to compose poems and enjoy the companionship of wine. Wang Hsi-chih's memorial was written in the *hsing shu,* or "running script," and has become the model for that particular style of writing. The historical incident itself became a popular subject for paintings of later times, especially under the Ming dynasty (1368–1644) with its antiquarian interests. Among other generations of calligraphers in the family, Wang Hsien-chih (AD 344–386), the youngest son of Wang Hsi-chih, was the most famous.

Wang Hui, Pinyin WANG HUI (b. 1632, Ch'ang-shu, Kiangsu province, China—d. 1717), probably the paramount member of the group of Chinese painters known as the Four Wangs (including Wang Shih-min, 1592–1680, Wang Chien, 1598–1677, and Wang Yüan-ch'i, 1642–1715), who represented the



Hanging scroll, ink and colours on paper by Wang Hui, 1680; in the Honolulu Academy of Arts

By courtesy of the Honolulu Academy of Arts

so-called orthodox school of painting in the Ming and early Ch'ing periods. The orthodox school was based upon the dicta laid down by Tung Ch'i-ch'ang (1555–1636). It was "orthodox" in the Confucian sense of continuing traditional modes, and it was in contrast to a group of Individualists (especially Shih-t'ao and Chu Ta) who ultimately came to represent another development of the standards for the painter and his painting codified by Tung Ch'i-ch'ang.

The Four Wangs were not all related. Wang Shih-min and Wang Chien were the teachers of Wang Hui. (Wang Yüan-ch'i was the grandson of Wang Shih-min.) Wang Hui was taken into Wang Chien's household in 1651 and was there introduced to the leading scholar-painter of the day, Wang Shih-min, who had in turn been the disciple of Tung Ch'i-ch'ang. Thus Wang Hui enjoyed a broad and profound contact with both the theory and practice of what Tung Ch'i-ch'ang had taught and, according to the praise of both his teachers and contemporaries, excelled in painting. Wang Hui's fame reached the court in Peking, and in the period 1691–98 he was commissioned to supervise the production of a series of handscrolls commemorating the K'ang-hsi emperor's tour of the South. After that, however, he returned to the cultivated elegance of private life.

Wang Hui, much like the other Wangs, primarily painted landscapes. Though much of his painting is academic and pedestrian, there is in his best works an intensity in the handling of brush-stroke rhythms and textures that yields a dense and detailed unity without any loss of either particular clarity or the general statement.

Wang Jingwei (Chinese Nationalist leader): *see* Wang Ching-wei.

Wang Mang, Pinyin WANG MANG, posthumous name, or *shih* (Wade-Giles romanization) CHIA HUANG-TI, OF SHE HUANG-TI (b. 45 BC, China—d. Oct. 6, AD 23, China), founder of the short-lived Hsin dynasty (AD 9–25). He is known in Chinese history as the "Usurper."

Early life. Wang Mang was born into a distinguished Chinese family. Three years earlier, his father's half sister Cheng-chün had become the empress of China, which was then ruled by the Han dynasty. Upon the death of her husband, she was given the traditional title of empress dowager, which meant added prestige and influence for herself and her clan. Emperor Ch'eng, her son and Wang Mang's first cousin, was a pleasant but weak and irresponsible man, who showed little interest in personal government. He appointed, one after the other, as regents, four maternal relatives, the last of whom retired in 8 BC.

During that period, Wang Mang's career had been unpromising, perhaps because his father's early death had deprived him of a protector and a sponsor. From 22 BC he held a number of relatively low positions at the court, and it was not until 16 BC that he was given a noble title as marquis of Hsin-tu. His great opportunity seemed to have come in 8 BC, when he was appointed to the vacant regency, probably on November 28. Emperor Ch'eng died without an heir, however, in 7 or 6 BC, and with the enthronement of his successor the political climate changed. The new emperor, Ai, was not related to the Wang clan, had no reason to favour it, and soon accepted Wang Mang's resignation. Wang Mang remained in the Imperial capital (Ch'ang-an) until the summer of 5 BC, when he was sent to live on his estates.

This might have ended Wang Mang's political career, had Emperor Ai not died in August of 1 BC. On the same day Wang Mang's aunt, the empress dowager, summoned him to the capital, where once more he was appointed regent. He quickly outmaneuvered his opponents in the central government and consolidated his position by having his daughter enthroned as the empress of the new emperor, P'ing. The sudden death of the 14-year-old P'ing on Feb. 3, AD 6, may have been inconvenient to Wang Mang, although his enemies charged that he had poisoned him. Wang Mang solved the succession problem to his own advantage by selecting the youngest among more than 50 eligible heirs, a boy born in AD 5. The child was not officially enthroned but merely called the Young Prince, while Wang Mang in AD 6 was given the title of acting emperor.

At this point Wang Mang encountered sporadic and disjointed opposition from the Imperial clan and its supporters, which he subdued with ease. He also embarked on an intensive propaganda campaign, intending to prove that the Han dynasty had ruled by its allotted time and that Heaven was granting the mandate for a new dynasty to him. On Jan. 10, AD 9, he ascended the throne and proclaimed the foundation of the Hsin dynasty.

Reign as emperor. The sources for Wang Mang's reign, as for his earlier life, are meagre and distorted. This is because the Han dynasty was restored after his fall, whereupon its partisan historians depicted him as a villain and usurper. Some modern scholars have accepted this verdict. Others have gone to the opposite extreme and presented him as a visionary and selfless social reformer. Wang Mang was neither. He was a competent politician, a convinced Confucian, as superstitious as most men of his time, and something of a pedant. His fiscal and agrarian enactments were in line with the practices of the Han dynasty or Confucian precepts. He was a stickler for law and executed three of his sons, one grandson, and one nephew for having broken it. He en-

couraged scholarship and broad learning. His foreign policy was successful. There is no reason why his dynasty should not have lasted, had it not been for a natural catastrophe beyond his control.

Between AD 2 and AD 5, and again in AD 11, the Yellow River changed its course, devastating one of the most populous regions of China. The cumulative effects of the disaster—displaced population, famine, and epidemics—led to increasing unrest, civil war, and a migration southward. Peasants banded together in ever larger units. One of these groups, the so-called Red Eyebrows, became from AD 18 strong enough to defeat Wang Mang's armies. Secondary rebellions followed, including uprisings in the capital region itself. On Oct. 4, AD 23, rebels broke through one of the city gates on the east wall of the capital. After hours of street fighting they reached the Imperial palace, about four miles distant, at sundown. On the next morning, October 5, some people within the city joined the rebels, forced their way into the palace, and set parts of it afire. The conflagration spread, and fighting raged throughout the day. Wang Mang, in purple garments and girded with the Imperial seals, attempted to marshal magical defenses. He did not eat and became more and more exhausted. At dawn on October 6 he was conducted by chariot to the Terrace Bathed by Water, where his attendants, still more than 1,000 strong, made their last stand. They defended themselves with crossbows until their supply of arrows was exhausted, then drew their swords and fought hand-to-hand. In the late afternoon, the rebels forced their way onto the terrace, where Wang Mang was killed, along with his adherents.

(H.H.A.B.)

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Wang Meng, Pinyin WANG MENG (b. 1308, Wu-hsing, Chekiang Province, China—d. 1385), Chinese painter who is placed among the group later known as the Four Masters of the Yüan dynasty (1206–1368) although, being in the second generation of that group, he had a more personal style that was less based upon an emulation of ancient masters.

Wang Meng was a grandson of another famous Yüan dynasty painter, Chao Meng-fu, whose wife (Kuan Tao-sheng, Wang Meng's grandmother) was also a painter. Wang Meng served in a minor capacity in the governments of both the Yüan and the Ming but was linked (erroneously, it was later revealed) with a prime minister who conspired against the Ming emperor T'ai-tsu; as a result, he was imprisoned for the last five years of his life.

Wang Meng was a close friend of Ni Tsan, whose paintings are typically thin and spare, whereas Wang's are thick and dense with agitated forms and much ink. Like those of Ni Tsan, however, his paintings show less concern than those of his Yüan predecessors with deliberate opposition to the pictorially splashy Southern Sung (1127–1279) academic traditions through the conscious exploitation of archaic pictorial means; instead, they place more emphasis upon uniqueness and privacy of vision, an individual attitude encouraged by the revolution brought about in the earlier painting of the Yüan dynasty.

Wang Mo-ch'i (Chinese poet and painter): *see* Wang Wei.

Wang Pi, Pinyin WANG BI (b. AD 226, China—d. 249, China), one of the most brilliant and precocious Chinese philosophers of his day.

By the time of his death at the age of 23, Wang was already the author of outstanding commentaries on the Taoist classic, the *Tao-te Ching*, or *Lao-tzu*, and the Confucian mystical classic, the *I Ching* ("Classic of Changes"). Through these commentaries he helped introduce metaphysics into Chinese thought, anticipating the work of the later Neo-Confucianists.

According to Wang, there is one principle that underlies and unites all phenomena. Everything is governed by its own principle, but there is one ultimate principle that unites all things. This ultimate principle is Tao, which he interprets as nonbeing (*pen-wu*). Unlike earlier Taoists, Wang does not see nonbeing as essentially in conflict with being. On the contrary, it is the ultimate of all being; it is pure being (*pen-t'i*).

In his theory of emotions, Wang was concerned with the need for man to control his emotions. At one time he had a low opinion of Confucius because the famous sage was capable of expressing great joy and sorrow. Later, however, Wang decided that emotion belongs to human nature and that even a sage, being a man, can react only like a man. The difference between a sage and a normal man is that a sage will not be ensnared by emotion.

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"Scholar in a Pavilion Under Trees," ink and slight colour on album leaf by Wang Meng, mid-14th century, Yüan dynasty; in the Mrs. A. Dean Perry Collection, Cleveland

By courtesy of the Mrs. A. Dean Perry Collection, Cleveland

Wang Shih-fu, Pinyin WANG SHIFU, also called (Wade–Giles romanization) WANG TE-HSIN (b. *c.* 1250, Ta-tu, now Peking—d. 1337?, China), leading dramatist of the Yüan dynasty (1206–1368), which saw the flowering of Chinese drama.

Of 14 plays attributed to Wang, only three survive, of which *Hsi hsiang chi* (*Romance of the Western Chamber*, 1935) is widely regarded as the best northern play of the period and is still popular. The work is an amplified *tsa-chü*, a then-popular theatrical form, most of the conventions of which Wang employed, but with innovations—particularly in giving singing parts to all, instead of only one, of the important characters. Despite the rigid conventions of the stock actor, he also succeeded in creating a convincing character in the maid, Hung Niang; the dialogue is also excellent. In five acts, the *Hsi hsiang chi* is several times the length of a regular *tsa-chü*, foreshadowing the *ch'uan-ch'i*, the dominant dramatic form of the Ming (1368–1644) and Ch'ing (1644–1911/12) dynasties.

Wang Shou-jen (Chinese scholar): *see* Wang Yang-ming.

Wang T'ao (b. Nov. 10, 1828, Fu-li-chen, Manchuria—d. 1897?, Shanghai), one of the pioneers of modern journalism in China and early leader of the movement to reform traditional Chinese institutions along Western lines.

Wang's sympathy with the long, widespread Taiping Rebellion in South China (1850–64) aroused the enmity of officials in the Ch'ing dynasty (1644–1911) government. Forced to flee to British-controlled Hong Kong, Wang met the Scottish scholar James Legge, whom he aided in his monumental translation of the Five Classics of Confucianism. During this 10-year period, Wang spent two years with Legge in Europe, where he became acquainted with Western thought and institutions.

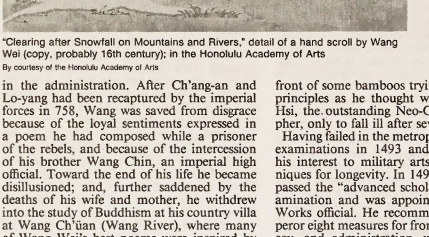
Returning to Hong Kong in 1870, he became an independent journalist, founding and editing one of the first modern newspapers in China. Later, he also wrote for the influential Shanghai newspaper *Shun Pao*. In his newspaper writing he urged the introduction of Western-style arsenals, shipyards, and mines. He also was one of the first to warn that the strength of the West lay not merely in its superior military technology but also in its democratic political system, which encouraged its superior technology to develop. He therefore called for the reform of the Chinese military, educational, administrative, and legal systems.

Wang did not see Western institutions as something foreign to China but felt that democratic and scientific ideas were implicit in the Confucian Classics, which he maintained the Chinese had misinterpreted in recent centuries. Wang influenced many Chinese leaders of the generation that followed his, including the famous scholar-reformer K'ang Yu-wei (1858–1927) and the great Chinese revolutionary Sun Yat-sen (1866–1925).

Wang Wei, Pinyin WANG WEI, also called WANG MO-CH'I (b. 699, Ch'i-hsien, Shansi Province, China—d. 759), one of the most famous men of arts and letters during one of the golden ages of Chinese cultural history. Wang Wei is popularly known as a model of humanistic education as expressed in poetry, music, and painting. In the 17th century, the writer on art Tung Ch'i-ch'ang (*q.v.*) established him as the founder of the revered Southern school of painter-poets, considering the painting of such literati (*wen-jen*) as more concerned with personal expression than surface representation.

Because of that later elevation to an almost

mythical status, it is difficult to ascertain the man himself. Wang Wei was born and brought up during the T'ang dynasty (618–907) when the capital, Ch'ang-an, was a truly cosmopolitan city which enjoyed both wealth and security. He received the prestigious *chin-shih* ("advanced scholar") degree in the imperial civil-service examination system at the age of 21—probably more for his musical talents than anything else, although he is said to have revealed his literary talents as early as the age of nine. He rose to high office but was soon demoted and given an unimportant position in Shantung, being recalled to the capital in 734, and given a post in the censorate. In 756, when Ch'ang-an was occupied by the troops of the rebellious general An Lu-shan, Wang Wei was captured and taken to the rebel capital at Lo-yang, where he was forced to accept a post



"Clearing after Snowfall on Mountains and Rivers," detail of a hand scroll by Wang Wei (copy, probably 16th century); in the Honolulu Academy of Arts
By courtesy of the Honolulu Academy of Arts

in the administration. After Ch'ang-an and Lo-yang had been recaptured by the imperial forces in 758, Wang was saved from disgrace because of the loyal sentiments expressed in a poem he had composed while a prisoner of the rebels, and because of the intercession of his brother Wang Chin, an imperial high official. Toward the end of his life he became disillusioned; and, further saddened by the deaths of his wife and mother, he withdrew into the study of Buddhism at his country villa at Wang Ch'üan (Wang River), where many of Wang Wei's best poems were inspired by landscape in the vicinity.

Wang Wei's art can only be theoretically reconstructed on the basis of contemporary records and surviving copies of his paintings. He undoubtedly painted a variety of subjects and employed various styles, but he is particularly famous for being among the first to develop the art of landscape. He is best known for ink monochrome (*shui-mo*) landscapes, especially snowscapes. The latter demanded the use of the broader ink wash technique with which he is associated known as *p'o-mo*, "breaking the ink."

His paintings, then, were both integrations of past traditions and innovative; but certainly it was that combination of the painter who is also a great poet that brought about his almost holy status in later ages. Virtually every anthology of Chinese poetry includes his works, and he is mentioned together with such famous T'ang poets as Li Po (701–762) and Tu Fu (712–770) as among those who perfected the "lyric poetry" (*shih*) form.

Wang Xizhi (Chinese calligrapher): *see* Wang Hsi-chih.

Wang Yang-ming, Pinyin WANG YANG-MING, original name (Wade–Giles romanization) WANG SHOU-JEN, literary name PE-AN, canonized as WEN-CH'ENG, Japanese ŌYŌ-MEI (b. 1472, Yu-yao, Chekiang Province, China—d. 1529, Nan-en, Kiangsi), Chinese scholar-official whose Idealistic interpretation of Neo-Confucianism influenced philosophical thinking in East Asia for centuries. Though his government career was rather unstable, his suppression of rebellions brought a century of peace to his region. His philosophical doctrines, emphasizing understanding of the world from within the mind, were in direct conflict with the rationalism espoused by Chu Hsi, a highly esteemed Neo-Confucianist of the 12th century, and Wang's "false teaching" was for a time proscribed.

Early life and adventures. Wang was the son of a high government official. At 15 he visited a frontier pass and practiced archery. When he married, he was so absorbed in discussing "nourishing life" (*yang-sheng*), the search for immortality, with a Taoist priest that he stayed at the Taoist temple throughout the wedding night. In 1492 he obtained the civil service degree "a recommended person." Visiting his father in Peking, he sat quietly in front of some bamboos trying to discern their principles as he thought was taught by Chu Hsi, the outstanding Neo-Confucian philosopher, only to fall ill after seven days.

Having failed in the metropolitan civil service examinations in 1493 and 1495, he shifted his interest to military arts and Taoist techniques for longevity. In 1499, however, Wang passed the "advanced scholar" (*chin-shih*) examination and was appointed a Ministry of Works official. He recommended to the Emperor eight measures for frontier defense, strategy, and administration, which earned him early recognition. In 1500 he was appointed a Ministry of Justice secretary and in 1501 was ordered to check prisoners' records near Nanking. He corrected injustices in many cases.

His health declined, and he returned home to recuperate in the Yang-ming ravine, where he probably practiced Taoist techniques. In 1504 he returned to Peking, supervised provincial examinations in Shantung, and then became a secretary in the Ministry of War. Beginning in 1505, scholars became his students. He lectured on making up one's mind to become a Confucian sage and attacked the practice of reciting Classics and writing flowery compositions. Conservative scholars accused him of courting popularity. Chan Jo-shui, a respected scholar-official, however, praised and befriended him.

A critical event occurred in 1506, when Wang defended a supervising censor who had been imprisoned for attacking a powerful, corrupt eunuch. For his actions Wang was beaten with 40 strokes, imprisoned for several months, and banished to remote Kweichow as head of a dispatch station, where he lived among aborigines and often fell sick. The hardship and solitude led him to realize, suddenly one night at the age of 36, that to investigate the principles of things is not to seek for them in actual objects, as the rationalistic Chu Hsi had taught, but in one's own mind. Thus he brought Idealist (Hsin Hsüeh) Neo-Confucianism—as first taught by a 12th-century philosopher, Lu Hsiang-shan—to its highest expression.

Political and military career. A year later he pronounced another epoch-making theory: that knowledge and action are one. One knows filial piety, he argued, only when one acts upon it, and correct action requires correct knowledge. As a magistrate in Kiangsi in 1510, he carried out many reforms, including a novel "joint registration system" whereby 10 families shared responsibility for security. An Imperial audience followed and then appointments as Ministry of Justice secretary, Ministry of Personnel director (1511), Imperial Studs vice minister (1512), State Ceremonials minister (1514), and assistant censor in chief and governor of southern Kiangsi and adjacent areas (1516).

Bandits and rebels had controlled Kiangsi for decades. In four military campaigns in 1517–18, Wang eliminated them. He carried out reconstruction, tax reform, joint registration, establishment of schools, and the "community compact" to improve community morals and solidarity.

On his way to suppress a rebellion in Fukien in 1519, he learned that Chu Ch'en-hao, prince of Ning, had rebelled. He turned to surround the Prince's base, Nan-ch'ang. Four days later he joined battle with the Prince and captured him. Because Wang had been in contact with the Prince, jealous officials at the capital accused him of plotting rebellion and attacking the Prince only because Imperial armies were approaching. One of his pupils, whom he had sent to the Prince for negotiation, was imprisoned. The crisis was soon over, however, and Wang was made governor of Kiangsi.

In 1521 the new emperor appointed him war minister and awarded him the title of earl of Hsin-chien. His father died in 1522, and he remained home to mourn his loss. For more than five years he stayed home and discussed doctrines with his followers, who came from various parts of China and numbered in the hundreds. These conversations and those earlier constitute his main work, *Ch'uan-hsi lu* (*Instructions for Practical Living*). In 1521 he had enunciated his doctrine of complete realization of the innate knowledge of the good.

Posthumous reputation. In June 1527 Wang was called to suppress a rebellion in Kwangsi. He succeeded in six months. His coughing, which had bothered him for years, then grew acute, and he became very ill. He died on his way back in Nan-an, Kiangsi, in 1529. Because a powerful minister hated him, his earldom and other hereditary privileges were revoked, disinheriting his two sons. Some who protested were dismissed or banished; his teachings were severely proscribed. Thirty-eight years later (1567), a new emperor honoured him with the title of marquis of Hsin-chien and the posthumous title of Wen-ch'eng (Completion of Culture). Beginning in 1584 he was offered sacrifice in the Confucian temple, the highest honour.

Wang's philosophy spread all over China for 150 years and greatly influenced Japanese thought during that time. He is regarded as one of the greatest Chinese thinkers in the last 2,000 years. (W.-t.C.)

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Wang Zhen (Chinese courtier): *see* Wang Chen.

Wanganui, city ("district") and port, Manawatu-Wanganui local government region, southwestern North Island, New Zealand, near the mouth of the Wanganui River. The site lies within a tract bought by the New Zealand Company in 1840. The company established a settlement in 1841 and named it Petre. It was renamed in 1844, the present name deriving from a Maori term meaning "big mouth," "big bay," or "big heaven." Wanganui was declared a town in 1862, a borough in 1872, and a city in 1924.

Wanganui is linked to Wellington (122 miles [196 km] south) by rail and road. It serves the surrounding lamb-, beef-, and dairy-farming country. Industries include meat-freezing, food-processing, furniture, woolens, footwear, clothing, printing, and soap plants and general-engineering works. The natural-gas pipeline from the Kapuni field passes through Wanganui. The city exports wool, meat, and dairy products and imports cement, coal, and fertilizer, mainly through Castlecliff, at the river's mouth. Pop. (1992 est.) urban area, 41,400; (1991 prelim.) district, 44,933.

Wanganui River, river in central North Island, New Zealand. It rises on the western slopes of Mount Ngauruhoe and flows northwest to Taumarunui and then south to empty into the Tasman Sea at South Taranaki Bight. Draining a basin of 2,850 square miles (7,380 square km), the Wanganui, 180 miles (290 km) long, is fed by the Ongarue, Tangarakau, and Ohura rivers. A sandbar at its mouth, near Wanganui city, blocks the channel to large ships; but small boats can navigate almost its entire length. Coursing through a narrow valley, the river is a potential source of hydroelectricity.

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Wangaratta, city, northern Victoria, Australia. It lies at the confluence of the Ovens and King rivers, northeast of Melbourne. The site was first settled in 1837 by a sheepherder, George Faithfull, and was proclaimed a town in 1845. Its name is derived from an Aboriginal term meaning either "meeting of the rivers" or "home of the cormorants." The city is a junction of the Hume and Ovens highways and also a rail junction, and it serves as a gateway to the Australian Alps. It is a regional centre for the marketing and processing of wool, wheat, grapes, dairy products, tobacco, and flax. Industries include woolen and nylon factories, motor-engineering works, and bulk storage of petroleum and gas. Wangaratta is the site of an Anglican cathedral and the see of a bishop. The city celebrates an Australia Day sports competition each January. It became a borough in 1863 and a city in 1959. Pop. (1991 prelim.) 15,984.

Wankel, Felix (b. Aug. 13, 1902, Lahr, Ger.—d. Oct. 9, 1988, Lindau, W.Ger.), German engineer and inventor of the Wankel rotary engine. The Wankel engine is distinguished by the presence of an orbiting rotor in the shape of a curved equilateral triangle that does the work done by the moving pistons in other internal-combustion engines. Advantages of the Wankel engine include light weight, few moving parts, compactness, low initial cost, fewer repairs, and relatively smooth performance.

Wankel, originally a sealing specialist, carried out development work on rotary valves between 1936 and 1945 with the German Aeronautical Research Establishment DVL. In 1951 he began working in Lindau with the research department of the NSU Motorenwerk AG, based at Neckarsulm. He completed his first design of a rotary-piston engine in 1954, and the first unit was tested in 1957. Mazda, a Japanese automobile company, produced and developed the Wankel engine, introducing it to the American market in 1971. During the next few years, poor fuel economy and a world oil crisis discouraged buyers, but the engine was constantly improved, and by the end of the decade the company's sports cars were being enthusiastically received in Europe and the United States. Wankel became director of his own research establishment at Lindau, where he continued to investigate the fundamental problems and future applications of the rotary-piston engine.

Wankel engine, type of internal-combustion rotary engine distinguished by an orbiting triangular rotor that functions as a piston. *See* gasoline engine.

Wankie (Zimbabwe): *see* Hwange.

Wankie National Park (Zimbabwe): *see* Hwange National Park.

Wannsee Conference (Jan. 20, 1942), meeting of Nazi officials in the Berlin suburb of Grossen-Wannsee for the purpose of planning the "final solution" (*Endlösung*) of the "Jewish question" (*Judenfrage*). On July 31, 1941, Hermann Göring had issued orders to Reinhard Heydrich to prepare a comprehensive plan for this "final solution." The Wannsee Conference, held six months later, was attended by 15 Nazi bureaucrats led by Heydrich and including Adolf Eichmann, chief of Jewish affairs for the Reich Central Security Office (Reichssicherheitshauptamt).

An earlier idea, to deport all of Europe's Jews to the island of Madagascar, was abandoned as impractical in wartime. Instead, the newly planned "final solution" would entail rounding up all Jews throughout Europe, transporting them eastward, and organizing them into labour gangs. The work and living conditions would be sufficiently hard as to fell large numbers by "natural diminution"; those that survived would be "treated accordingly." The final protocol of the Wannsee Conference never explicitly mentioned extermination, but, within a few months after the meeting, the first poison-gas chambers were installed in Poland in what came to be called extermination camps. Responsibility for the entire project was put in the hands of Heinrich Himmler and his SS and Gestapo. *See also* Holocaust.

Wansbeck, district, county of Northumberland, northern England. It lies along the North Sea in the southeastern corner of the county. Wansbeck district spans a narrow coastal plain edging the Northumberland uplands to the west. Its three principal towns (Ashington, Bedlington, and Newbiggin-by-the-Sea) suffered economic decline in the 1960s and '70s because of the loss of employment both in the Northumberland coalfields centred on the district and in the North Sea fishing industry. Many inhabitants of Wansbeck have more recently sought employment in the manufacturing industries in the metropolitan area of Tyne and Wear, about 18 miles (29 km) to the south. The district's landscape is marked by many abandoned coal pits. Where possible, dairy cattle are grazed and there is mixed farming. The sandy beaches at Newbiggin-by-the-Sea suffer from wave erosion. The 14th-century spire of St. Bartholomew's Church, historically a landmark for passing ships, is situated precariously near the shoreline. Metal and steel foundries are local industries. Ashington is the district seat. Area 25 square miles (66 square km). Pop. (1991 prelim.) 60,100.

Wansdyke, district, county of Avon, southwestern England. It lies southeast of the city of Bristol and encircles the city of Bath in the northeast. Wansdyke district is named for an ancient fortification running generally east-west through the district. The now mostly obliterated, trenched embankment was probably constructed (from near Portishead to near Marlborough) to keep out Saxon invaders from the north. Wansdyke is an area of gently rolling hills and valleys that incorporates a section of the River Avon and the southernmost of the limestone Cotswold Hills on the north; the limestone Mendip Hills rise to 1,000 feet (305 m) on the southwest. Dairy and some beef cattle graze the fertile valley pasturelands, where cereals and fodder crops are also extensively grown.

The light-industrial town ("parish") of Norton-Radstock in the south is a former centre of the exhausted Somerset coalfield. The quaint historical villages of Claverton, Freshford, and Monkton Combe east of Bath have numerous buildings constructed of locally quarried Cotswold limestone, much of which is used in modern road construction. Many remains of Roman villas and related structures in the district are probably associated with the Roman spa at Bath. Keynsham, between Bath and Bristol, is the district seat and largest town. It produces chocolates, soap, and paper products. Area 125 square miles (323 square km). Pop. (1991 prelim.) 78,700.

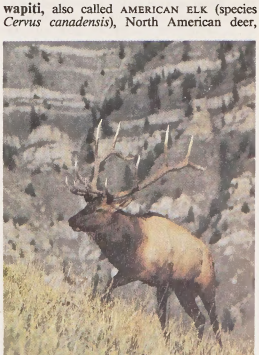
Wantage, town ("parish"), Vale of White Horse district, county of Oxfordshire, England. It is an old market town and the birthplace of the Anglo-Saxon ruler Alfred the Great (871–899), whose statue stands in the marketplace. The town is a modest service centre in rural surroundings, but research establishments, including the atomic-energy research station at nearby Harwell, employ many people. Pop. (1981) 8,899.

Wanxian (China): *see* Wan-hsien.

Wanyika (people): *see* Manyika.

wapentake, an administrative division of the English counties of York, Lincoln, Leicester, Nottingham, Derby, and Rutland, first clearly referred to at the end of the 10th century and corresponding to the "hundred" in other parts of England. The term wapentake is of Scandinavian origin and meant the taking of weapons; it later signified the clash of arms by which the people assembled in a local court expressed assent. Danish influence was strong in those English counties where wapentakes existed.

wapiti, also called AMERICAN ELK (species *Cervus canadensis*), North American deer,



Male wapiti (*Cervus canadensis*)
Alan Carey

family Cervidae (order Artiodactyla), considered by some authorities to be of the same species as the red deer (*C. elaphus*) of Eurasia. Once common over most of North America, the elk now is confined to the Rocky Mountains and southern Canada. The second largest living deer, it is exceeded in size only by the moose. The male wapiti may stand taller than 1.5 m (5 feet) at the shoulder and, though it averages about 295 kg (650 pounds), may weigh up to 500 kg (1,100 pounds); the female is shorter and lighter. The coat of the wapiti is light to dark brown with a pale rump patch; the shoulders and neck are covered with long, shaggy, dark brown hair. The male has large antlers, which usually bear five tines and tower about 1.2 m (almost 4 feet) above his head. It is prized as a game animal for trophy heads as well as for its flesh and hide.

The wapiti lives in large bands in winter; in summer the bands break up into smaller groups, the older bulls living alone or in groups of two or three. The wapiti requires large amounts of grasses, leaves, and other such food; when natural supplies are low, as in a severe winter, it may resort to cultivated crops, orchards, and haystacks. In the vicinity of civilization, its numbers are sometimes regulated by controlled hunting.

Wapping-Rotherhithe Tunnel: *see* Thames Tunnel.

Wappinger, a confederacy of Algonquian-speaking Indians in eastern North America who early in the 17th century lived along the east bank of the Hudson River from Manhattan Island to what is now Poughkeepsie and eastward to the lower Connecticut River valley. They were semisedentary, moving seasonally between fixed sites as food resources required. They depended largely on corn (maize)—cultivated by women—for their subsistence; this was supplemented by hunting and fishing. The tribes were divided into bands, each governed by a sachem (chief) and a council of elders.

Pressure from white settlers caused the Connecticut Wappinger to sell their lands and join other Algonquian-speaking tribes elsewhere, in what is today the United States or in Canada. The western bands took part in a war with the Dutch between 1640 and 1645, in which they suffered severe losses. In 1756 the majority of the Wappinger remaining in Westchester county joined the Nanticoke at Chenango, N.Y., and then finally merged with the Delaware; others joined various other Indian groups.

Wāqidī, al-, in full ABŪ ʿABD ALLĀH MUḤAMMAD IBN ʿUMAR AL-WĀQIDĪ (b. 747, Medina, Arabia [now in Saudi Arabia]—d. 823, Baghdad, Iraq), Arab historian, author of the *Kitāb al-maghāzī*, a well-known work on the military campaigns (*al-maghāzī*) of the Prophet Muḥammad.

As a youth al-Wāqidī is said to have been such an authority on the sacred cities of Mecca and Medina that he was guide to the ʿAbbāsid caliph Hārūn ar-Rashīd during the latter's pilgrimage. Al-Wāqidī became a grain dealer but eventually fled to Baghdad to escape his creditors. Yaḥyā ibn Khalid, the vizier there, gave him money and, some reports say, made him *qāḍī* (religious judge) of the western district of the city. In 819 al-Wāqidī was appointed *qāḍī* of Rusafah on the east side by the caliph al-Maʾmūn, who was his close friend and later his executor.

Al-Wāqidī is said to have written about 21 books, largely historical, including histories of the cities of Mecca and Medina. Some works also dealt with the Qurʾān (Islāmic sacred scripture), *fiqh* (jurisprudence), and Ḥadīth (tradition). Only the *Kitāb al-maghāzī*, a monumental chronology, survives.

war, a state of usually open and declared armed hostile conflict between political units, such as states or nations or between rival political factions of the same state or nation. War is characterized by intentional violence on the part of large bodies of individuals who are expressly organized and trained to participate in such violence. Wars between nation-states may be fought to gain reparation for a particular injury; to acquire a particular territory or advantage; to gain recognition of a particular claim; or to achieve the extermination or unconditional surrender of the enemy. With the progress of science and technology and consequent increases in the destructive power of armaments, war has had an increasingly catastrophic effect on human existence.

The subject of war is treated in two articles in the MACROPAEDIA. For the theoretical, tactical, legal, and economic aspects, *see* War, The Theory and Conduct of. For technological aspects, *see* War, The Technology of.

For the place of war in the circle of learning and for a list of MACROPAEDIA and MICROPAEDIA articles on the subject, *see* PROPAEDIA: Part Five, Section 544. *See also* INDEX under names of individual wars.

war, just: *see* just war.

war, law of, that part of international law dealing with the inception, conduct, and termination of warfare.

A brief treatment of the law of war follows. For full treatment, *see* War, The Theory and Conduct of: Law of war.

The law of war applies to declared and undeclared war and regulates relations between warring states and between those states and neutral countries. It establishes the responsibilities and rights of individuals during a war, the types of weaponry and the uses to which they may be put, and the rights of civilians.

War in ancient times knew few restraints, and slavery or death awaited those who were defeated. By the late Middle Ages, a substantial body of law, influenced by religious concepts and chivalry as well as by rationalist and humanist sentiment, had evolved in Europe. For example, Christians captured by other Christians were not to be enslaved. Medieval law applied primarily to gentlemen-soldiers, however, and civilians and soldiers of lower rank were likely to suffer grievously.

In Europe, efforts to regulate warfare grew when weapons became more destructive. In 1864, the first Geneva Convention was adopted to protect those wounded in war.

Conferences at The Hague in 1899 and 1907 codified much of the existing laws of war. The Geneva Conventions in 1906, 1929, and 1949 expanded and refined the law of war as applied to civilians, prisoners of war, and wounded and sick military personnel. Several treaties banned particular weapons. The Geneva Protocol on Gas Warfare (1925) prohibited the use of lethal gases and bacteriological warfare.

The law of war is based on the principle that the weapons and methods of war are not unlimited. By setting limits to armed conflict, it reinforces the principle that the aim of warfare is to incapacitate the armed forces of the enemy and not to cause severe, indiscriminate suffering among combatants and civilians alike. The law of war at times has been enforced through judicial punishment of war criminals (*see* war crime).

war, prisoner of: *see* prisoner of war.

War Communism, in the history of the Soviet Union, economic policy applied by the Bolsheviks during and shortly after the period of the Russian Civil War (1918–20). The policy's chief features were the expropriation of private business and the nationalization of industry throughout Soviet Russia, and the forced requisition of surplus grain and other food products from the peasantry by the state.

These measures negatively affected both agricultural and industrial production. In the countryside, the peasants had no incentive to grow surplus grain (because the government would simply confiscate it), and in the cities the bureaucracy charged with running the newly centralized, state-owned economy was untrained and hastily organized. By 1921 industrial production had dropped to one-fifth of its prewar levels, and the real wages of urban workers had declined by an estimated two-thirds in three years. Uncontrolled inflation rendered paper currency worthless, forcing the government to do without the use of money.

By early 1921 public discontent with the state of the economy had spread from the countryside to the cities, resulting in numerous strikes and protests that culminated in March of that year in the Kronshtadt Rebellion. In response, the Bolsheviks adopted the New Economic Policy, thus temporarily abandoning their attempts to achieve a socialist economic system by government decree.

war crime, in international law, serious violation of the laws or customs of war as defined by international customary law and international treaties.

Definition and early development. The term *war crime* is difficult to define with precision, and its usage has evolved constantly, particularly since the end of World War I. The first systematic attempt to define a broad range of war crimes was the *Instructions for the Government of Armies of the United States in the Field*—also known as the "Lieber Code" after its main author, Francis Lieber—issued by U.S. President Abraham Lincoln and distributed to Union military personnel in 1863. The Lieber Code stipulated that it is a "serious breach of the law of war to force the subjects of the enemy into service for the victorious government," and it prohibited "wanton violence committed against persons in the invaded country," including rape, maiming, and murder. More recent definitions of war crimes have been codified in international statutes, such as those creating the International Criminal Court and the war crimes tribunals in Yugoslavia and Rwanda. Modern definitions are more expansive than earlier ones and tend to criminalize behaviours committed by civilians as well as by military personnel.

Immediately following World War I, the victorious Allied Powers convened a special Commission on the Responsibility of the Authors of the War and on Enforcement of Penalties. The commission's report recommended that war crimes trials be conducted before the victors' national courts and, when appropriate, before an inter-Allied tribunal. The Allies prepared a list of about 900 suspected war criminals. Although heads of state traditionally had enjoyed immunity from prosecution, the commission's main target was Germany's supreme leader, Emperor (Kaiser) William II. William, however, took refuge in The Netherlands, which refused to extradite him, and he was never tried. Most of the remaining suspected war criminals on the list similarly managed to avoid prosecution. Instead, a compromise was reached whereby the Allies permitted a small number of suspects to be tried in Germany before the Supreme Court in Leipzig. These prosecutions resulted in few convictions.

The Nürnberg and Tokyo trials. The next major attempt to prosecute war criminals occurred in Europe and Asia after World War II. Throughout the war, the Allies had cited Nazi atrocities and announced their intention to punish those guilty of war crimes. The Moscow Declaration of 1943, issued by the United States, Great Britain, and the Soviet Union, and the Potsdam Declaration of 1945,

issued by the United States, Great Britain, and China (and later adhered to by the Soviet Union), addressed the issue of punishing war crimes committed by the German and Japanese governments, respectively.

At the war's conclusion, representatives of the United States, the United Kingdom, the Soviet Union, and the provisional government of France signed the London Agreement, which provided for an international military tribunal to try major Axis war criminals whose offenses did not take place in specific geographic locations. This agreement was supported by 19 other governments and included the Nürnberg Charter, which established the Nürnberg tribunal and categorized the offenses within its jurisdiction. The charter listed three categories of crime: crimes against peace, consisting of the preparation and initiation of a war of aggression; war crimes ("conventional war crimes"), including murder, ill treatment, and deportation; and crimes against humanity, including the political, racial, and religious persecution of civilians. The last category encompassed what is now commonly called genocide (*q.v.*).

The Convention on the Prevention and Punishment of the Crime of Genocide, adopted by the General Assembly of the United Nations in 1948, defined genocide as including killing or inflicting serious physical or mental injury on members of a national, ethnic, racial, or religious group with the intention of bringing about the group's destruction, in whole or in part. The convention made genocide an international crime that could be prosecuted in any country. Because the Nürnberg trials preceded the convention, however, Nazi war criminals were not prosecuted for this crime.

The International Military Tribunal in Nürnberg, Ger., tried 22 Nazi leaders, including one, Martin Bormann, in absentia. All but three of the defendants were convicted; 12 were sentenced to death. The remaining defendants received lengthy prison terms, which they served at Spandau Prison in West Berlin.

Japanese defendants accused of war crimes were tried by the International Military Tribunal for the Far East, which was established by a charter issued by U.S. Army General Douglas MacArthur. The so-called Tokyo Charter closely followed the Nürnberg Charter. Of the 25 Japanese defendants (all of whom were convicted), 7 were sentenced to hang, 16 were given life imprisonment, and 2 were sentenced to lesser terms. Except for those who died early of natural causes in prison, none of the convicts served a life sentence. Instead, by 1958 the remaining prisoners had been pardoned or paroled.

From their outset, the war crimes trials were dismissed by critics as merely "victor's justice," because only individuals from defeated countries were prosecuted and because the defendants were charged with acts that allegedly had not been criminal when committed. In support of the trials, the Nürnberg Tribunal cited the Kellogg-Briand Pact (1928), which formally outlawed war and made the initiation of war a crime for which individuals could be prosecuted.

Post-World War II developments. After the Nürnberg and Tokyo trials, numerous international treaties and conventions attempted to devise a comprehensive and enforceable definition of war crimes. The four separate Geneva Conventions, adopted in 1949, in theory made prosecutable certain acts committed in violation of the laws of war. The conventions provided for the protection of wounded, sick, and shipwrecked military personnel, prisoners of war, and civilians. Like the convention on genocide, however, the Geneva Conventions specified that trials were to be arranged by individual governments. In 1977 the second of two protocols adopted as supplements to the Geneva Conventions afforded greater protection to guerrilla combatants in civil wars or wars of "self-determination."

Nearly 50 years passed between the Nürnberg and Tokyo trials and the next formal international prosecution of war crimes in May 1993. In order to prevent further acts of ethnic cleansing (*q.v.*) in the conflict between states of the former Yugoslavia and to restore peace and security in the Balkans, the UN Security Council established the International Criminal Tribunal for the Prosecution of Persons Responsible for Serious Violations of International Humanitarian Law Committed in the Territory of the Former Yugoslavia since 1991, commonly known as the ICTY. In November 1994 the UN responded to charges of genocide in Rwanda by creating the ICTR, formally known as the International Criminal Tribunal for the Prosecution of Persons Responsible for Genocide and Other Serious Violations of International Humanitarian Law Committed in the Territory of Rwanda and Rwandan Citizens Responsible for Genocide and Other Such Violations Committed in the Territory of Neighbouring States between 1 January and 31 December 1994.

Both the ICTY and ICTR were international in composition, and neither tribunal sat in the country where the covered conflict occurred. The tribunals had nearly identical governing statutes and a common appellate chamber. Whereas the Nürnberg and Tokyo tribunals could order defendants to death, the ICTR and ICTY could impose only terms of imprisonment. However, no centralized international prison system was established to house persons convicted by the tribunals.

The governing statutes of the ICTY and ICTR defined war crimes broadly. The ICTY was given jurisdiction over four categories of crime: grave breaches of the Geneva Conventions; violations of the laws or customs of war; genocide; and crimes against humanity. Recognizing that crimes against humanity do not necessarily involve a "nexus to armed conflict" and taking into account legislation specifically enacted by the Rwandan government, the statute of the ICTR limited the jurisdiction of the tribunal to Rwandan leaders, leaving lower-level defendants to be tried in domestic courts. In both tribunals rape, murder, torture, deportation, and enslavement were subject to prosecution. The tribunals thus were among the first international bodies to recognize sexual violence formally as a war crime.

Like the statutes of the Nürnberg and Tokyo tribunals, the statutes of the ICTY and ICTR did not consider the official position of an individual, including his position as head of state, to be a sufficient basis for avoiding criminal culpability. Accordingly, in 1999 the ICTY indicted Slobodan Milošević, the Serbian (1989–97) and Yugoslav (1997–2000) president, for war crimes and crimes against humanity, and in 2001 he was arrested and extradited to The Hague; he was subsequently charged with genocide. Likewise, military and civilian leaders who knew or should have known that their subordinates were committing war crimes were subject to prosecution under the doctrine of command or superior responsibility. Finally, individuals who committed war crimes pursuant to government or military orders were not thereby relieved of criminal liability, though the existence of the order could be used as a mitigating factor. In these respects the rules adopted for the Nürnberg and Tokyo trials continued to influence later efforts to bring suspected war criminals to justice.

Recent trends. In 1993 the Belgian legislature passed a controversial law giving its courts the right to try any individual accused of a war crime anywhere in the world. The law, which resulted in lengthy prison sentences for two Rwandan nuns found guilty of genocide and in judicial complaints against many world leaders, was invalidated by the International Court of Justice in 2002. In 1998 in Rome, some 150 countries attempted to establish a permanent international criminal court; the negotiations eventually resulted in the adoption by 120 countries of a governing statute for an International Criminal Court (ICC) to be located permanently at The Hague. The ICC's jurisdiction included crimes of aggression, genocide, crimes against humanity, and war crimes. Over the next several years, the number of signatories to the statute increased to nearly 140. On July 1, 2002, after the number of ratifications surpassed the required number of 60, the court began sittings. By 2003 the statue had been ratified by some 90 countries; three of the permanent members of the UN Security Council (China, Russia, and the United States), however, had not yet approved it. Indeed, the United States, which earlier had taken the unusual step of withdrawing its signature from the statute, attempted to secure commitments from various governments not to surrender U.S. citizens to the court for trial.

(M.M.P./Ed.)

War Democrat, in the history of the United States, any of the Northern Democrats who supported the continued prosecution of the American Civil War.

The great majority of Northern Democrats stayed loyal to the Union after the South seceded. So-called Peace Democrats (or "Copperheads" in pejorative Unionist terminology) opposed the war and advocated a negotiated peace with concessions to the South so that it would rejoin the Union.

War Democrats, while supporting the war, objected to Republican economic policies and to President Abraham Lincoln's abrogation of civil rights. During the 1864 presidential election, they joined with Republicans in forming the Union Party, which renominated Lincoln for president and selected War Democrat Andrew Johnson of Tennessee as Lincoln's running mate.

war finance, the fiscal and monetary methods that are used in meeting the costs of war, including taxation, compulsory loans, voluntary domestic loans, foreign loans, and the creation of money.

Government efforts to finance major wars have frequently led to major changes in the tax system. In the United States, for example, higher personal income tax rates, lower exemptions, and a deduction-at-source system of collection were introduced. Great Britain and many other belligerents in World War II resorted to general sales taxes.

Compulsory loans have been used as an alternative to taxation. Voluntary loans, in which money is raised by selling government bonds, are of two types: those financed by the public from its savings and those financed by bankers and others from credit created by expansion of the monetary supply. The first type of loan is generally anti-inflationary because it eliminates excess purchasing power; the second type, under wartime conditions, is likely to be as inflationary as would be the printing of new paper currency.

The most dangerous form of war finance is the printing of new paper money, resorted to when no more taxes can be collected and the government's credit has broken down. Usually the printing is not done by the government directly but by the central bank, which then lends the printed money to the government through purchases of bonds.

Major wars are usually financed to some extent by inflationary measures. Inflation distributes the burden of war costs in an arbitrary manner, penalizing persons with fixed incomes. After a certain point, inflation may even lower production by placing a premium on the hoarding of raw materials and durable goods, as well as the holding of real estate and

other fixed assets, thus shifting resources from productive to nonproductive uses.

War Hawk, in U.S. history, any of the expansionists primarily composed of young Southerners and Westerners elected to the U.S. Congress in 1810, whose territorial ambitions in the Northwest and Florida inspired them to agitate for war with Great Britain. The War Hawks, who included such future political leaders as Henry Clay and John C. Calhoun, fiercely and aggressively resented American economic injuries and national humiliation during the Napoleonic Wars. They were further indignant over British encouragement of Indian hostilities toward settlers in the Northwest and hoped to use war with England to wrest Florida from Spain, Britain's ally. The nationalistic fervour and anti-British sentiment whipped up by the War Hawks was a contributing cause to the War of 1812.

War of ———: *see under* substantive word or words or date (*e.g.,* Austrian Succession, War of the; 1812, War of; theatres, war of the).

War of the Sons of Light Against the Sons of Darkness, The, Hebrew MEGILLAT MILḤAMAT B'NE, OR BEB'NE ḤOSHEKH, also called WAR RULE, or WAR SCROLL, a Dead Sea Scroll, and one of the most important documents of the Essene sect of Jews that established a community at Qumrān in the Judaean desert during the first half of the 2nd century BC. The Essenes thought themselves to be the holy elect of Israel, the Sons of Light, who would at the end of time engage in a catastrophic war with the enemies of Israel, the Sons of Darkness.

The *War Rule,* discovered in Cave I of Qumrān in 1947, is a manual for military organization and strategy, including detailed specifications for battle gear and signals. It is also a theological discourse that develops the doctrine of the spirits of truth and perversity mentioned in the sect's *Manual of Discipline.* The scroll's apocalyptic portrayal of a 40-year "holy war" between the forces of good and evil involves heavenly as well as earthly soldiers. The elect of Israel are joined by an angelic host, while the devil and the evil angels fight alongside other nations of the Earth. The victory of the forces of light was to signal the final destruction of evil, after which the God of Israel would rule eternally in justice.

Most scholars identify the enemy "Kittim" of the scroll as Romans, who invaded and occupied Judaea in 63 BC. If this is so, the major sections of the scroll (probably a composite work) were written after that date but before AD 68, when the Qumrān community was disbanded because of the Jewish revolt of AD 66–70. *See also* Dead Sea Scrolls.

Warabi, city, Saitama *ken* (prefecture), Honshu, Japan. It lies on the alluvial plain of the Ara River. An early post town, it has long been a centre of cotton fabric manufacture. The city was linked to a major railway in 1899, and urbanization developed after World War II. Low rice paddies have been reclaimed to accommodate the growing number of factories and dwellings. The city's woolen textile and electric industries are relatively large. Warabi is now a suburb of the Tokyo-Yokohama metropolitan area, with a rapidly increasing commuter population. Pop. (1990) 73,620.

Warangal, city, northern Andhra Pradesh state, southern India. It lies along the Madras-Kāzipet-Delhi railway. Warangal was the ancient capital of the Kākatiyas, an Andhra dynasty that flourished in the 12th century AD. Warangal's fort, lying southeast of the present-day city, was once surrounded by two walls, and traces of the outer wall remain, as do the four stone gateways (*saiṅār*) of the inner wall. A thousand-pillared temple, built in 1162, is located within the city itself. Warangal is now a commercial and industrial centre, its main products being carpets, blankets, and silks. The city has colleges of medicine, engineering, and arts and sciences. Pop. (1991 prelim.) 446,760.

Warao (people): *see* Warrau.

Waray-waray (people): *see* Samaran.

Warbeck, Perkin (b. 1474?, Tournai, Flanders [now in Belgium]—d. Nov. 23, 1499, London, Eng.), impostor and pretender to the throne of the first Tudor king of England, Henry VII. Vain, foolish, and incompetent, he was used by Henry's Yorkist enemies in England and on the European continent in an unsuccessful plot to threaten the new Tudor dynasty.

The son of a local official in Flanders, Warbeck spent his youth in the service of various employers, ending up in Ireland in 1491. He was in Cork dressed in his master's lavish silk clothes when excited townspeople there decided he must be of royal descent. The Yorkist interest was still strong in Ireland, and his admirers told Warbeck that he was a Yorkist heir to the crown of England, obligingly changing the identification as he denied one name after another. In the end he was persuaded to impersonate Richard, the young duke of York, who was presumed murdered with his brother King Edward V in 1483 in the Tower of London.

Assured of Irish support, Warbeck went to the continent to gather forces for an invasion of England. In the Netherlands the dowager duchess Margaret, sister of Edward IV, coached him on his impostor's role, and he was supported at one time or another by France, by Maximilian I of Austria (Holy Roman emperor 1493–1519), by King James IV of Scotland (reigned 1488–1513), and by powerful men in England. After two feeble, abortive invasions of England in 1495 and 1496, he landed in Cornwall in 1497. The rebel forces soon numbered more than 6,000 men, but, faced with Henry's troops, Warbeck fled to sanctuary at Beaulieu in Hampshire, where he was captured. Although at first treated leniently, he was hanged after trying to escape from the Tower of London.

warble fly, also called CATTLE GRUB, or HEEL FLY, any of several species of insects included either in the bot fly family Oestridae or the family Hypodermatidae (order Diptera). The



Ox warble fly larva (*Hypoderma bovis*)
William E. Ferguson

warble flies *Hypoderma lineatum* and *H. bovis*—large, heavy, and beelike—deposit their eggs on cattle legs. The larvae penetrate the skin, migrate through the body for several months, and produce a characteristic lump, or warble, on the animal's back. The warble contains a hole, which is used for breathing. When mature, the cattle grub emerges and drops to the ground to pupate and transform into an adult fly. The insect's breathing holes in the cowhide reduce the latter's commercial value. Another warble fly that causes economic losses of leather, meat, and milk is a reindeer pest (*Oedemagena tarandi*).

The warble fly is widespread in Europe and North America. Control methods include the oral administration to cattle of an insecticide and manual removal of the larvae from the animals' backs.

warbler, any of various species of small songbirds belonging to either the family Sylviidae (sometimes considered a subfamily, Sylviinae, of the family Muscicapidae; *q.v.*) or the family Parulidae, with both belonging to the order Passeriformes. Warblers are small, active insect eaters found in gardens, woodlands, and marshes.



Reed warbler (*Acrocephalus scirpaceus*)
Stephen Dalton—Natural History Photographic Agency

The Old World warblers of the family Sylviidae comprise almost 350 species and are intimately related to the thrushes and the Old World flycatchers. Members of the family occur mainly from Europe and Asia to Australia and Africa, but a few of these birds, notably the kinglet (*q.v.; Regulus*) and gnatcatcher (*q.v.; Poliptila*), live in the Americas. Many warblers of Europe are familiar enough to have received special names, such as the blackcap (*Sylvia atricapilla*), the whitethroat (*S. communis*), and the chiffchaff (*Phylloscopus collybita*). Reed, bush, and swamp warblers (*Acrocephalus, Bradypterus, Calamocichla,* and *Cettia*) are mostly brown-plumaged and harsh-voiced birds. Among other well-known genera of Old World warblers are the fantail warblers (*see* cisticola) and longtail warblers (*see* prinia).

Old World warblers are rather drab, with green, olive, brown, buff, and black the predominant colours. They are mostly small birds (from 9 to 26 cm [3.5 to 10 inches]), and their slender bills are adapted for gleaning insects from foliage. Their nests vary from simple cups to domed structures placed in trees, bushes, or grass or hidden in the ground. The tailorbirds (*Orthotomus*) of India sew leaves together into purse-shaped containers for their nests. Old World warblers' eggs are usually speckled, and the young are cared for by both parents.

The New World warblers, or woodwarblers, of the family Parulidae comprise about 120 species of small songbirds. Although these birds are closely related to the New World tanagers, they take their name from their superficial resemblance in form, structure, and habits to the distantly related Old World warblers. The woodwarblers are mainly found in North and Central America and live in forest, brush, or swampy grass country. They are small birds, ranging up to 18 cm (7 inches) in length, and are more brightly coloured than Old World warblers. Many woodwarblers

have weak, lisping songs, but a few have loud voices. Their feeding and nesting habits resemble those of Old World warblers. *See* woodwarbler.

Warburg FAMILY, a family whose members were eminent in banking, philanthropy, and scholarship.

Presumably of Italian origin, they settled in the German town of Warburgum (from which the family derived its name) in 1559. Subsequently, branches settled in Scandinavia, England, and the United States. Simon Elias Warburg (1760–1828) founded the first Jewish community in Sweden; his grandson Frederik Elias Warburg (1832–99) was the cofounder of the Central London Electric Railway. The Copenhagen branch assumed the family's original name, Del Banco.

Moses Marcus Warburg (d. 1830) and his brother Gerson (d. 1825) founded in 1798 the bank of M.M. Warburg & Co. of Hamburg. Among their descendants were five brothers, grandsons of Moses M., of whom four were bankers: Max M. Warburg (1867–1946), financial adviser to the German delegation to the Paris peace conference in 1919; Paul Moritz Warburg (1868–1932), member of the U.S. bank of Kuhn, Loeb and Co. and of the Federal Reserve Board; Felix Moritz Warburg (1871–1937), partner in Kuhn, Loeb and Co.; and Fritz Moritz Warburg (1879–1964). Felix M. was a supporter of adult education and Jewish theological schools and was active in other philanthropic organizations. James Paul Warburg (1896–1969), son of Paul M., was a banker and economist, member of President Franklin D. Roosevelt's original "brain trust," and author of several books.

Among the scholars were Emil Warburg (1846–1931), a physicist; Karl Johan Warburg (1852–1918), a Swedish historian of literature and member of Parliament; Otto Warburg (1859–1938), a botanist and supporter of Jewish colonization and agricultural work in Palestine; Aby Moritz Warburg (1866–1929; brother of the four banker-brothers named previously), a historian of Renaissance art; and Otto Heinrich Warburg (*q.v.*; son of Emil).

Among those active in social and community service were Frieda Schiff (Mrs Felix M.) Warburg (1876–1958) and her sons Frederick Marcus Warburg (b. 1897), investment banker and president of the 92nd Street Young Men's Hebrew Association in New York City; Gerald Felix Warburg (1902–71), prominent cellist and patron of music; Paul Felix Warburg (1904–65), financier and philanthropist; and Edward Mortimer Morris Warburg (1908–92), a philanthropist and patron of modern art, as well as a collector.

Warburg, Otto (Heinrich) (b. Oct. 8, 1883, Freiburg im Breisgau, Ger.—d. Aug. 1, 1970, West Berlin, W.Ger.), German biochemist awarded the Nobel Prize for Physiology or Medicine in 1931 for his research on cellular respiration.

After gaining doctorates in chemistry at the University of Berlin (1906) and in medicine at Heidelberg (1911), Warburg became a prominent figure in the institutes of Berlin-Dahlem. He first became known for his work on the metabolism of various types of ova at the Marine Biological Station in Naples. His Nobel Prize in 1931 was in recognition of his research into respiratory enzymes. In 1944 he was offered a second Nobel Prize but, being Jewish, was prevented from accepting the award by the Hitler regime, which nonetheless dared not imprison him because of his international prestige. From 1931 he was head of the Max Planck Institute for Cell Physiology in (West) Berlin.

Warburg's research began in the early 1920s, when, investigating the process by which oxygen is consumed in the cells of living organisms, he introduced the use of manometry (the measurement of changes in gas pressure) for studying the rates at which slices of living tissue take up oxygen. His search for the active cell constituents led to identification of the role of the cytochromes, a family of enzymes in which the iron-containing heme group binds molecular oxygen, just as it does in the blood pigment hemoglobin.

By 1932 Warburg had isolated the first of the so-called yellow enzymes, or flavoproteins, which participate in dehydrogenation reactions in cells, and he discovered that these enzymes act in conjunction with a nonprotein component (now called a coenzyme), flavin adenine dinucleotide. In 1935 he discovered that nicotinamide forms part of another coenzyme, now called nicotinamide adenine dinucleotide, which is also involved in biological dehydrogenations.

Warburg also investigated photosynthesis and was the first to observe that the growth of malignant cells requires markedly smaller amounts of oxygen than that of normal cells.

Warburton, William (b. Dec. 24, 1698, Newark, Nottinghamshire, Eng.—d. 1779, Gloucester, Gloucestershire), Anglican bishop of Gloucester, literary critic and controversialist.

Ordained priest in 1727, Warburton was appointed to the parish of Brant Broughton, Lincolnshire, the following year. During his 18 years at Brant Broughton, Warburton wrote

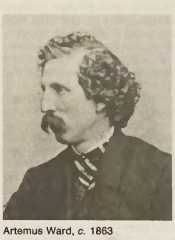


Warburton, detail from an engraving by John Hall, 1784, after an oil painting
BBC Hulton Picture Library

The Alliance Between Church and State (1736) and *The Divine Legation of Moses,* 2 vol. (1737–41). In *The Alliance* he advocated tolerance by the established Anglican church for those whose beliefs and worship were at variance. In *The Divine Legation,* he sought to demonstrate, on deist principles, the divine authority of the Mosaic writings, which deists denied.

In a subsequent series of articles (1738–39) defending *An Essay on Man,* by Alexander Pope, against attacks by the Swiss professor Jean-Pierre de Crousaz, Warburton gained Pope's friendship. He wrote a commentary for the *Essay,* persuaded Pope to write *The New Dunciad* (published in 1742), and served as the poet's literary executor on his death in May 1744. In 1747 Warburton published an edition of William Shakespeare's works incorporating Pope's earlier edition, and in 1751 he issued an edition of Pope's own works. Through Pope, Warburton also became involved in numerous lively and acrimonious debates and literary controversies. Having become bishop of Gloucester in 1759, Warburton aroused opposition from Methodists for his attack on them in 1762 in *The Doctrine of Grace.* In general, his works were admired more for their imagination and satiric wit than for their scholarship.

Ward, Artemus, pseudonym of CHARLES FARRAR BROWNE (b. April 26, 1834, Waterford, Maine, U.S.—d. March 6, 1867, Southampton, Hampshire, Eng.), one of the most popular 19th-century American humorists, whose lecture techniques exercised much influence on such humorists as Mark Twain.



Artemus Ward, *c.* 1863
Lightfoot Collection

Starting as a printer's apprentice, Browne went to Boston to work as a compositor for *The Carpet-Bag,* a humour magazine. In 1860, after several years as local editor for the Toledo (Ohio) *Commercial* and the Cleveland *Plain Dealer,* he became staff writer for *Vanity Fair* in New York.

While working on the *Plain Dealer,* Browne created the character Artemus Ward, the manager of an itinerant sideshow who "commented" on a variety of subjects in letters to the *Plain Dealer, Punch,* and *Vanity Fair.* The most obvious features of his humour are puns and gross misspellings. In 1861 Browne turned to lecturing under the pseudonym Artemus Ward. Though his books were popular, it was his lecturing, delivered with deadpan expression, that brought him fame. His works include *Artemus Ward: His Book* (1862); *Artemus Ward: His Travels* (1865); and *Artemus Ward in London* (1867).

Ward, Arthur Sarsfield: *see* Rohmer, Sax.

Ward, Elizabeth Stuart Phelps, original name MARY GRAY PHELPS, also called (1852–88) ELIZABETH STUART PHELPS (b. Aug. 31, 1844, Boston, Mass., U.S.—d. Jan. 28, 1911, Newton, Mass.), popular 19th-century American author and feminist.

Mary Phelps assumed her mother's name after the latter's death in 1852. From the age of 13 she wrote juvenile fiction. In 1868 *The Gates Ajar,* her greatest success, was published. It is the story of a girl's struggle to renew her faith despite the death of a beloved brother. The novel was immediately popular, selling 80,000 copies in the United States and 100,000 in England; it was translated into at least four languages.

Phelps subsequently wrote 56 more books, in addition to poetry, pamphlets, and short articles. Her later work was often concerned with the domestic status of women. *The Story of Avis* (1877) and *Doctor Zay* (1882), for example, focused on the problem of women facing the demands of both career and marriage. Phelps also advocated the causes of labour, temperance, and antivivisection in her novels.

In 1888 she married Herbert Dickinson Ward, a young writer. Her autobiography, *Chapters From a Life,* was published in 1896.

Ward, Frederick Townsend (b. Nov. 29, 1831, Salem, Mass., U.S.—d. Sept. 21, 1862, Tzeki, now Tz'u-cheng-chen, Chekiang province, China), adventurer who commanded the "Ever Victorious Army," a body of Western-trained troops that aided the Ch'ing dynasty (1644–1911/12) in suppressing the Taiping Rebellion, the giant religious-

political uprising that occupied South China between 1850 and 1864.

In 1860, with Taiping forces about to take Shanghai, Ward organized a force of foreign mercenaries and helped to save the city. At this time, the Western powers were attempting to maintain neutrality in the civil war, and the British arrested Ward to halt his military aid to the dynasty. He escaped, however, and organized a new army in 1862, which used Chinese troops with Western officers and arms.

The arrogance of Ward's troops aroused tremendous resentment among the regular Chinese forces, but his tactics resulted in numerous victories, and he was therefore subsidized at great expense by the Ch'ing government. When Ward was mortally wounded in battle, a British major, Charles George ("Chinese") Gordon (1833–85), took his place as commander of the "Ever Victorious Army." Although most modern Western historians believe that this army had no more than marginal effect on suppression of the rebellion, the traditional Western interpretation and the modern Communist interpretation is that these Western troops were crucial in the defeat of the Taipings.

Ward, Mrs. Humphry, *née* MARY AUGUSTA ARNOLD (b. June 11, 1851, Tasmania—d. March 24, 1920, London), English novelist whose best known work, *Robert Elsmere,* created a sensation in its day by advocating a Christianity based on social concern rather than theology.

The daughter of a brother of the poet Matthew Arnold, she grew up in an atmosphere of religious searching. Her father resigned his position as a school official in Australia to become a Roman Catholic but later returned temporarily to the Anglican Church and settled the family at Oxford. There Mary Augusta matured in stimulating scholarly surroundings. In 1872 she married Humphry Ward, a Fellow at Brasenose College. In 1881 they moved to London, where she wrote for the *Pall Mall Gazette* and other periodicals.

Mary Augusta Ward's rejection of a supernaturally oriented Christianity in favour of a strong social commitment found eloquent expression in her novel *Robert Elsmere* (1888), the story of a young Anglican clergyman's conversion to the belief that "Religion consists alone in the service of the people." The popularity of this controversial work was only increased by William Gladstone's polemical reply, "Robert Elsmere and the Battle of Belief " (1888). Ward followed its success with more than 20 other didactic novels. She usually based her characters on actual people recognizable to her readers.

Ward worked tirelessly for social improvement; she was responsible for the foundation of the Invalid Children's School (1899) and for the establishment of evening play centres by the London County Council in 1905. She opposed the Women's Suffrage Movement, however, fearing in emancipation a loss of women's moral influence. In 1908 she founded the Anti-Suffrage League.

Ward, James (b. Jan. 27, 1843, Hull, Yorkshire, Eng.—d. March 4, 1925, Cambridge, Cambridgeshire), philosopher and psychologist who exerted a major influence on the development of psychology in Great Britain.

After completing his theological studies at Spring Hill College, later Mansfield College, Oxford (1869), he obtained a one-year scholarship at the University of Göttingen and began studying under Rudolf Hermann Lotze, champion of the emerging science of physiological psychology.

Returning to England, Ward proved unpopular as a Congregational preacher because of his unconventional views. He resigned to continue studies at Trinity College, Cambridge, where he became a fellow (1875–1925). He established a laboratory for research in physiological psychology in 1891.

Ward's outlook was also influenced by the German philosopher-psychologist Franz Brentano and by the theory of evolution. Like Brentano, he conceived of the mind as a principle that is active in perceiving and judging. Further, he regarded mental processes as evolving toward a state of increasing differentiation. Ward was opposed to associationism, a theory prevalent at that time, and together with G.F. Stout introduced a functionalistic approach that was later developed in the United States by William James. He advanced his system in a celebrated article, "Psychology" (1886), in the 9th edition of *Encyclopædia Britannica,* and he revised and further refined it for the 11th edition (1911). He completed the elaboration of his system in *Psychological Principles* (1918).

Ward, Sir Joseph (George) (b. April 26, 1856, Melbourne—d. July 8, 1930, Wellington, N.Z.), New Zealand statesman, prime minister (1906–12, 1928–30), and a key member of the Liberal Party ministries from 1891 to 1906, noted for his financial, social welfare, and postal measures.

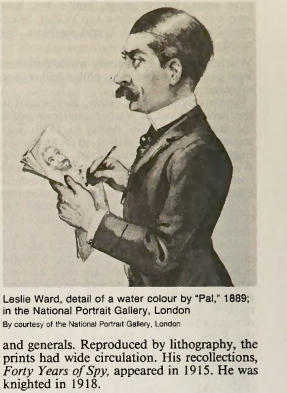
Ward established a successful grain trade in Invercargill, N.Z., in 1877 and soon became prominent in local politics, gaining a seat in Parliament in 1887. When the Liberal Party took office in 1891 under John Ballance, he became postmaster general and added the post of minister of finance in the succeeding ministry of Richard John Seddon (1893–1906). Ward was responsible for legislation creating state guarantee for the Bank of New Zealand (1894), the Advances to Settlers Act (1894), penny postage service (1901), and a retirement plan for railroad employees (1902). He floated large overseas loans to finance the social welfare measures of the Liberal ministries from 1891 to 1906. In 1901, the year that he was knighted, he established what is considered to have been the world's first ministry of public health.

Ward's major domestic accomplishments as prime minister from 1906 to 1912 were the National Provident Fund, the Defence Act (1910), and the widows' pensions bill (1911). He was an advocate of greater unity within the British Empire and increased New Zealand's contribution to the Royal Navy. He led the Liberal Party in a coalition (1915–19) with Prime Minister W.F. Massey, in which he again led the post office and finance ministries and accompanied Massey to meetings of the Imperial War Cabinet and to the Paris Peace Conference of 1919.

After a six-year absence from national politics (1919–25), he returned to Parliament in 1925 and became prime minister in 1928 as head of the United Party, the new name of the Liberal Party. Failing health forced his retirement from leadership in May 1930.

Ward, Sir Leslie, pseudonym SPY (b. Nov. 21, 1851, London—d. May 15, 1922, London), English caricaturist noted for his portraits of the prominent people of his day in the pages of *Vanity Fair.*

Born into a family of painters, Ward first exhibited his work in 1867 while he was a student at Eton College. After studying architecture briefly, he joined the Royal Academy schools, London, in 1871. The painter Sir John Everett Millais was favourably impressed by Ward's caricatures and was instrumental in bringing him to the attention of *Vanity Fair,* which was looking for a new caricaturist. Beginning in 1873 Ward was a regular contributor to *Vanity Fair.* Over the years he pictured a wide assortment of notables, including politicians, authors, judges, musicians,



Leslie Ward, detail of a water colour by "Pal," 1889; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

and generals. Reproduced by lithography, the prints had wide circulation. His recollections, *Forty Years of Spy,* appeared in 1915. He was knighted in 1918.

Ward, Lester F(rank) (b. June 18, 1841, Joliet, Ill., U.S.—d. April 18, 1913, Washington, D.C.), sociologist who was instrumental in establishing sociology as an academic discipline in the United States. An optimist who believed that the social sciences had already given mankind the information basic to happiness, he advocated a planned, or "telic," society ("sociocracy") in which education, nationally organized, would be the dynamic factor. Social scientists, assembled into a legislative advisory academy in Washington, D.C., would occupy in his system much the same role as did the sociologist-priests in the utopian plan of the French sociologist Auguste Comte.

After fighting for the Union in the American Civil War, he obtained degrees in botany and law. For most of his life he worked for the federal government, mainly in the fields of geology, paleontology, botany, and paleobotany; he made some significant contributions to botanical theory. In 1906, when he was 65 years old, he was appointed professor of sociology at Brown University, Providence, R.I.

Ward followed Comte in conceiving of sociology as the fundamental social science, the primary responsibility of which is to teach methods of achieving a better society. Ward's emphasis on social function and planning, rather than social structure, had considerable effect on Thorstein Veblen and the institutional economists.

The original subject of Ward's most important book, *Dynamic Sociology,* 2 vol. (1883), was education. By 1876 Ward had shifted the focus of the work, which was begun in 1869, to sociology. Among his other writings are *Pure Sociology* (1903), *A Textbook of Sociology* (with James Quayle Dealey, 1905), and *Applied Sociology* (1906), which concerns his ideas of "social telesis," sociocracy, and social planning.

Ward, (Aaron) Montgomery (b. Feb. 17, 1844, Chatham, N.J., U.S.—d. Dec. 7, 1913, Highland Park, Ill.), U.S. merchant who introduced the mail-order method of selling general merchandise and who founded the great mail-order house of Montgomery Ward & Company, Inc.

In 1859 Ward became a salesman in a general store in St. Joseph, Mich., for $6 a month and board, and later he was made manager. Afterward, while working in rural areas as a travelling salesman, he became aware of the hard-pressed farmers' resentment of the middlemen's profit. This observation led Ward to conceive the idea of buying goods wholesale



Montgomery Ward, detail of an engraving by Finlay & Conn., 1930, after a photograph, *c.* 1890

By courtesy of Montgomery Ward & Co., Chicago

for cash and selling them by mail at a low markup for cash.

In August 1872, with a capital of $1,600, Ward issued his first catalog, a single sheet listing about 150 items. His brother-in-law, George R. Thorne, bought a half interest in the business for $500 in 1873. The 1875 catalog introduced another novelty—a money-back guarantee of customer satisfaction. By 1888 annual sales had reached $1,000,000. At Ward's death, they were $40,000,000.

In 1886 Ward, while retaining the presidency, turned the management over to Thorne and his five sons. During the next 20 years Ward devoted much of his time to the preservation of the natural assets of the Chicago lakefront and vigorously opposed attempts to build public or other structures in the area that is now Grant Park.

Ward, Nathaniel (*b. c.* 1578, Haverhill, Suffolk, Eng.—d. October 1652, Shenfield, Essex), Puritan minister and writer.

Forced to leave his native England at a time of Puritan persecution, Ward settled in the colony of Massachusetts, where he wrote *The Body of Liberties* (1641), a code of law for use in Massachusetts that combined parts of English common law with the Mosaic law, and *The Simple Cobler of Aggawam in America* (1647), a vigorously written pamphlet defending the status quo and attacking, among other things, tolerance.

Ward, Samuel Ringgold (b. Oct. 17, 1817, Md., U.S.—d. *c.* 1866, St. George Parish, Jam.), black American abolitionist known for his oratorical power.

Born a slave, Ward escaped with his parents in 1820 and grew up in New York state. He was educated there and later became a teacher in black schools. In 1839 he became an agent of the American Anti-Slavery Society. Licensed the same year by the New York Congregational Association, he served as pastor to an all-white congregation in South Butler, N.Y., from 1841 to 1843. His second pastorate, from 1846 to 1851, was in Cortland, N.Y.

It was more as platform speaker, however, than as a preacher that Ward achieved fame in antebellum America. During the 1840s he joined the Liberty Party and spoke against slavery in nearly every Northern state. For his eloquence he was styled "the black Daniel Webster," but in 1850 he criticized Webster sharply for his acquiescence concerning the Fugitive Slave Law.

Ward himself became involved in the rescue of a fugitive slave in 1851. Then, fearing arrest, he fled to Canada. During his two years in Canada, he served as an agent of the Anti-Slavery Society of Canada and assisted the fugitive American slaves who had taken residence north of the border.

In April 1853 Ward went to England on a fund-raising mission. During his two-year stay, he gave many speeches and published his life story, *Autobiography of a Fugitive Negro* (1855). In 1855 he settled in Kingston, Jam. Until 1860 he served as pastor to a small group of Baptists there. He later moved to St. George Parish.

Ward, William George (b. March 21, 1812, London, Eng.—d. July 6, 1882, London), English author and theologian, one of the leaders of the Oxford movement, which sought to revive in Anglicanism the High Church ideals of the later 17th-century church. He eventually became a convert to Roman Catholicism.

Ward was educated at Christ Church, Oxford, and became a fellow of Balliol College, Oxford, in 1834. He was ordained in the Anglican church in 1840. Under the influence of John Henry Newman, later cardinal, he joined the Oxford movement, in which his role was that of an extremist pressing for submission to the Roman Catholic authority. Protestants strongly opposed his argument that the Thirty-nine Articles—the doctrinal formularies of the Church of England—were incompatible with the Catholic status of the Church of England.



William George Ward, engraving

BBC Times Hulton Picture Library

He was suspended from Balliol for supporting Newman in a series of pamphlets. After publishing *The Ideal of a Christian Church* (1844), which urged the Church of England to "sue humbly" at Rome's feet "for pardon and restoration," his work was condemned by the University of Oxford.

In September 1845 he joined the Roman Catholic church, followed in the next month by Newman and many other members of the movement. Ward then taught theology at St. Edmund's College, Ware, Hertfordshire (1851–58), and received a doctorate of philosophy in 1854 from Pope Pius IX. From 1863 to 1878 he edited the *Dublin Review*, an influential Roman Catholic quarterly. With the poet laureate Alfred, Lord Tennyson, and Archbishop Manning of Westminster, Ward founded the Metaphysical Society in 1869. He eventually retired to the Isle of Wight.

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Wardar River (Europe): *see* Vardar River.

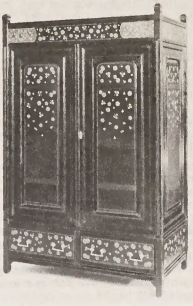
Wardha, town, eastern Mahārāshtra state, western India, near the Wardha River, southwest of Nāgpur. Situated on major routes between Nāgpur and Bombay, it is closely linked with the history of Nāgpur. The town was important in the national freedom movement; the Sevagram ashram (religious retreat) founded by Mohandas Gandhi close to Wardha was later the headquarters of Vinoba Bhave, a disciple of Gandhi. The town has several colleges affiliated with the University of Nāgpur. The surrounding region lies within the Wardha River valley at the foot of the Sātpura Range. Agriculture is the chief economic activity; crops include millet, cotton, and oilseeds. Pop. (1981) 88,495.

Wardian case: *see* terrarium.

wardrobe, in furniture, a large cupboard, usually equipped with drawers, a mirror, and other devices, used for storing clothes.

The word wardrobe has a long and varied history. Geoffrey Chaucer used it to mean a lavatory, and for some time it signified not a piece of furniture but a room or apartment; in medieval England, for instance, the king's wardrobe was the centre of a good deal of administrative machinery. The actual piece of furniture in which clothes were kept was originally known as a press, and at quite an early date its division into two parts—one for hanging garments, the other for laying them out flat—became established. By the 17th century the word wardrobe was coming to be accepted as descriptive of this kind of piece, while the earlier emphasis on heavy carvings on and surrounding the doors was being supplanted by elaborate veneers and marquetry. In some instances, wardrobes were incorporated into the paneling of bedrooms. By the end of the 18th century wardrobes usually consisted of a clothes press flanked by slightly recessed cupboards.

The mass production of furniture in the 19th century, combined with growing affluence, which meant that people possessed more clothes, led to great importance being attached to the wardrobe as a piece of bedroom furniture. Massively and ornately constructed, they were usually part of a bedroom suite consisting of drawers, washhand stand, dressing table, and bed. In the 1860s the practice was introduced of fitting a mirror on the exterior of the centre door; though this arrangement is still found in the 20th century, it is more customary for it to be on the inside of the door. Contemporary fashion also tends to prefer wardrobes that form an integral part of the architectural structure.



Wardrobe, ebonized and inlaid cherry, by Herter Brothers, American, *c.* 1880, in the Metropolitan Museum of Art, New York City

By courtesy of the Metropolitan Museum of Art, New York City, gift of Kenneth O. Smith, 1969

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wardship and marriage, in feudal law, rights belonging to the lord of a fief with respect to the personal lives of his vassals. The right of wardship allowed the lord to take control of a fief and of a minor heir until the heir came of age. The right of marriage allowed the lord

to have some say as to whom the daughter or widow of a vassal would marry. Both rights brought the lord increased revenue. In the right of marriage a woman would often pay to have a suitor accepted by the lord or to get out of marrying the lord's choice for her. This was particularly true in medieval England, where these rights became increasingly commercial and were often sold. Wardship rights were generally exercised in fiefs held by military service but sometimes also in fiefs held by socage, or agricultural service. The lord received the income of a fief belonging to an heir in his minority until the heir was old enough to render the military and other services required of him, at which time the lord released the fief to him in the material condition in which the lord had originally received it.

In theory, the rights of wardship were instituted to protect a minor heir or a widow from unscrupulous relatives who might wish to gain control of the property. In France, for example, the lands of a minor heir were often administered by those who might later inherit them. Custody, on the other hand, went to someone who could not inherit the property and who would, therefore, have no interest in seeing the heir lose the land or die. Elsewhere in Europe a system of simple guardianship by close relatives prevailed. Gradually, however, the system of wardship began to take hold, particularly in Normandy and England, under the theory that since the minor could not provide military service, the lord should be able to use the revenues of the fief to provide it.

The lord could control the marriages of both male and female wards, as well as those of widows and daughters of tenants. Marriage without the lord's consent was not void, but certain legal rights over the land were then open to challenge. In general, if a tenant wished to marry off his daughter, he had to have the approval of his lord or of the king. A widow could not, however, be forced to marry against her will. In France these rights of the lord had ceased to exist by the 16th century except in Normandy, where they lasted until the Revolution. In England only the king had such rights in the 16th century, and he lost them by the end of the 17th.

Ware, parish (town), East Hertfordshire district, county of Hertfordshire, England. The parish is situated on the northern periphery of the metropolitan area of Greater London. In ancient times it was probably the site of a fishing weir on the River Lea; later it became an important malting centre. A priory was founded there in the 14th century. In modern times Ware has attracted light industry, including pharmaceutical and plastics manufacture. Pop. (1981) 14,334.

Warenne, John de: *see* Surrey and Sussex, John de Warenne, 7th earl of; Surrey and Sussex, John de Warenne, 8th earl of.

Warens, Louise-Éléanore de la Tour du Pil, baronne de (baroness of) (b. 1700, Vevey, Switz.—d. 1762, Chambéry, Savoy), benevolent aristocrat who engaged the philosopher Jean-Jacques Rousseau in an idyllic liaison from 1728 to 1742, furthering his education and social position as his lover and maternal protectress.

Married at a young age to the Baron de Warens, she left her husband and became a convert to Catholicism. Her many business ventures, which included a silk stocking factory, were failures. She sought the protection of King Victor of Savoy, who engaged her in political espionage and the conversion of Protestants. Among her converts was the young Rousseau, who met her at Annecy in Savoy when he was 16 and in flight from his engraver's apprenticeship in Geneva. After resuming his vagabondage, Rousseau returned in 1733—on foot—to Mme de Warens at Chambéry, and she, 12 years his senior, formally proposed their affair, installing him at her country house Les Charmettes, where he remained on and off until 1742. Rousseau admired her instinctive morality and natural religion. He shared her favours with her steward Claude Anet; after Rousseau's long absence resulting from illness, she acquired a new and younger lover but retained an affectionate solicitude for Rousseau's welfare. When Rousseau last visited her in 1754, she gave her ring to his wife Thérèse, assuming the final role of Maman ("Mama"), which he had always called her.



Baronne de Warens, engraving
Harlingue—H. Roger-Viollet

Wareru, also called MOGADO, or CHAO FA RUA (fl. 1300), famous king of Hanthawaddy (Hansavadi, or Pegu), who ruled (1287–96) over the Mon people of Lower Burma.

Wareru was a Tai adventurer of humble origins who had married a daughter of King Ramkhamhaeng of Sukhothai and had established himself as overlord of Martaban on the Salween River in 1281. Since the reign of King Anawrahta of Pagan (1044–77), the Mon had been under Burmese rule; but after the Mongols sacked Pagan in 1287, Wareru and his ally, Tarabya, a Mon prince of Pegu, drove the Burmese out of the Irrawaddy Delta and reestablished the independence of the Mon. Subsequently, Wareru killed Tarabya and made himself the sole ruler of the Mon, with his capital at Martaban. Although he was nominally a vassal of Ramkhamhaeng, he conducted independent diplomatic relations with the emperor Kublai Khan in China. A legendary achievement of his reign was the compilation of the *Dharma-śāstra,* or *Dhammathat,* the earliest surviving law code of Burma. Wareru was murdered by his grandsons.

Warfield, David (b. Nov. 28, 1866, San Francisco—d. June 27, 1951, New York City), one of the few American pre-motion-picture actors who became a millionaire. He made his fortune and enjoyed a stellar career as a result of playing four major roles over a 25-year period: Anton von Barwig in *The Music Master,* Wes Bigelow in *A Grand Army Man,* the title role in *The Return of Peter Grimm,* and his most famous role, Simon Levi in *The Auctioneer.*

Warfield made his debut as Melter Moss in *The Ticket-of-Leave Man* (1888; Napa, Calif.) and worked for 10 years in the Weber and Fields burlesque company. David Belasco saw him and had *The Auctioneer* written for him (1901); the play ran for three years and made Warfield a dedicated Broadway actor. His one classical role was Shylock in *The Merchant of Venice* (1923). He turned down offers to work in films and successfully invested his earnings in real estate with Marcus Loew; their enterprises eventually developed into a nationally known entertainment corporation. He often remarked that his success as a character actor was calculated upon the fact that "people want to weep sweetly."

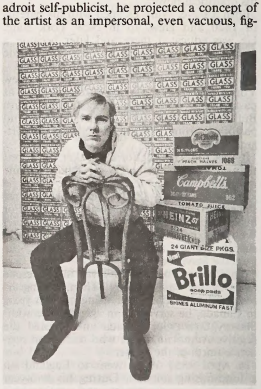
Wargla (Algeria): *see* Ouargla.

Warham, William (b. *c.* 1450, Malshanger, Hampshire, Eng.—d. Aug. 22, 1532, Canterbury, Kent), last of the pre-Reformation archbishops of Canterbury, a quiet, retiring intellectual who nonetheless closed his career with a resolute stand against the anticlerical policies of King Henry VIII of England. His natural death perhaps prevented a martyrdom similar to that of the earlier archbishop whom he revered, St. Thomas Becket.

Warham was educated at New College, Oxford (doctor of civil law, 1486), served as master of the rolls for several years before his formal appointment to the office (1494), and was frequently employed by Henry VII on diplomatic missions. He was ordained priest in 1493, became bishop of London and keeper of the great seal in 1502, and in January 1504 was made archbishop of Canterbury and lord chancellor. However, he proved to be rather colourless in this eminent position and was easily eclipsed, in the reign of Henry VIII, by Thomas Wolsey, to whom he had to surrender the chancellorship in 1515. As cardinal and papal legate, Wolsey thereafter aggressively interfered with Warham's ecclesiastical administration of the archbishopric. Wolsey's fall in 1529 came too late to revive the fortunes of Warham, because the archbishop, though trained as a lawyer to serve the crown without question, could not follow Henry VIII into the first stages of the Reformation. After presiding submissively over the convocation (1531) that declared Henry to be the head of the Church in England, Warham bravely published (February 1532) a dignified but emphatic protest against the enactments of the Reformation Parliament from 1529. He died shortly thereafter.

Articles are alphabetized word by word, not letter by letter

Warhol, Andy, original name ANDREW WARHOLA (b. Aug. 6, 1928?, Pittsburgh?, Pa., U.S.—d. Feb. 22, 1987, New York City), American artist and filmmaker, an initiator and leading exponent of the Pop art movement of the 1960s whose mass-produced art apotheosized the supposed banality of the commercial culture of the United States. An adroit self-publicist, he projected a concept of the artist as an impersonal, even vacuous, fig-



Andy Warhol, photograph by Ken Heyman
Ken Heyman

ure who is nevertheless a successful celebrity, businessman, and social climber.

The son of Czechoslovak immigrants, Warhol graduated from the Carnegie Institute of Technology, Pittsburgh, with a degree in pictorial design in 1949. He then went to New York City, where he worked as a commercial illustrator for about a decade. Warhol began painting in the late 1950s and received sudden notoriety in 1962, when he exhibited paintings of Campbell's soup cans, Coca-Cola bottles, and wooden replicas of Brillo soap pad boxes. By 1963 he was mass-producing these purposely banal images of consumer goods by means of photographic silk screen prints, and he then began printing endless variations of portraits of celebrities in garish colours. The silk screen technique was ideally suited to Warhol, for the repeated image was reduced to an insipid and dehumanized cultural icon that reflected both the supposed emptiness of American material culture and the artist's emotional noninvolvement with the practice of his art. Warhol's work placed him in the forefront of the emerging Pop art movement in America.

As the 1960s progressed, Warhol devoted more of his energy to filmmaking. Usually classed as underground films, such motion pictures of his as *The Chelsea Girls* (1966), *Eat* (1963), *My Hustler* (1965), and *Blue Movie* (1969) are known for their inventive eroticism, plotless boredom, and inordinate length (up to 25 hours). In 1968 Warhol was shot and nearly killed by one of his would-be followers, a member of his assemblage of underground film and rock music stars, assorted hangers-on, and social curiosities. Warhol had by this time become a well-known fixture on the fashion and avant-garde art scene and was an influential celebrity in his own right. Throughout the 1970s and until his death he continued to produce prints depicting political and Hollywood celebrities, and he involved himself in a wide range of advertising illustrations and other commercial art projects. His *The Philosophy of Andy Warhol,* published in 1975, was followed by *Portraits of the Seventies* (1979) and *Andy Warhol's Exposures* (1979).

Waring, Edward (b. 1734, Old Heath, near Shrewsbury, Shropshire, Eng.—d. Aug. 15, 1798, Pontesbury, Shropshire), English mathematician who was the first to set forth a method of approximating the values of imaginary roots.

Waring practiced medicine in various London hospitals and later at Addenbrooke's, Cambridge. St. Ives, and Huntingdonshire hospitals. From 1760 he served as Lucasian professor of mathematics at Cambridge University, and in 1770 he gave up his medical practice.

In 1776 Waring proposed the Cauchy ratio test. In 1909 the solution of Waring's problem marked a new era in analysis and led to far-reaching theorems in arithmetic. Besides his classification of quartic curves into 12 main divisions with 84,551 species, he gave proofs of Descartes's rule of signs and set forth the theory of symmetrical functions of algebraic roots. He presented a series of propositions in number theory concerning the decomposition of a number into a sum of cubes and biquadratics and suggested a method (unproven) for decomposing any even number into the sum of two prime numbers. His published works include *Miscellanea analytica* . . . (1762; "Miscellany of Analysis . . ."), *Meditationes algebraicae* (1770; "Thoughts on Algebra"), *Proprietates algebraicarum Curvarum* (1772; "The Properties of Algebraic Curves"), *Meditationes analyticae* (1776; "Thoughts on Analysis"), *On the Principle of Translating Algebraic Quantities into Probable Relations and Annuities* (1792), and *An Essay on the Principles of Human Knowledge* (1794).

Wariston, Archibald Johnston, Lord: *see* Warriston, Archibald Johnston, Lord.

Warkā', Tall al- (ancient Mesopotamian city): *see* Erech.

Warkworth, parish in Alnwick district, county of Northumberland, England. It lies along the River Coquet, 1.5 miles (2.5 km) from that stream's North Sea mouth. The town is dominated by a ruined Norman castle (dating from 1200), comprising Lion Tower, Great Hall, and a 15th-century keep. The castle belonged to the Percy family for nearly six centuries (1332–1922) and is mentioned in Shakespeare's *Henry IV.* The river is crossed by a 14th-century stone bridge that is guarded at its southern end by a ruined gatehouse. The church has a Norman chancel and nave and a tower built around 1200. Pop. (1981) 1,308.

warlock, a male witch. *See* witchcraft.

Warlock, Peter, byname of PHILIP HESELTINE (b. Oct. 30, 1894, London—d. Dec. 17, 1930, London), English composer, critic, and editor known for his songs and for his exemplary editions of Elizabethan music. He used his real name chiefly for his literary and editorial work, reserving his assumed name for his musical works.

Warlock was largely self-taught but received encouragement from the composers Frederick Delius and Bernard van Dieren. In 1920 he founded the musical journal *The Sackbut.* His books include *Frederick Delius* (1923) and *Carlo Gesualdo, Prince of Venosa, Musician and Murderer* (1926; with C. Gray). He also published monographs on Thomas Whythorne and on the English ayre. He transcribed and edited the compositions of John Dowland, Thomas Ravenscroft, Henry Purcell, and others. His music shows the influence of Elizabethan music, of Delius, and (especially in counterpoint) of van Dieren, all incorporated into a highly personal idiom. His songs, which form the largest part of his compositions, are admired for their unity of music and text, melodic qualities, and unique harmonies. They include the song cycles *Liligay* (1923), *The Curlew* (1924), and *Candlelight* (1924). Other compositions are the *Capriol Suite* for strings (1927) on tunes from T. Arbeau's *Orchésographie* (1589), *Folksong Preludes* for piano (1918), and choral works. He died by suicide.

Warlomont, Léopold-Nicolas-Maurice-Édouard: *see* Waller, Max.

warlord, Wade–Giles romanization TU-CHÜN, Pinyin DUJUN, independent military commander in China in the early and mid-20th century. Warlords ruled various parts of the country following the death of Yüan Shih-k'ai (1859–1916), who had served as the first president of the Republic of China from 1912 to 1916. Yüan's power had come from his position as head of the Peiyang Army, which was the only major modern military force in China at the time. His conduct of the government through a reliance upon military power rather than parliamentary methods made him the "father of the warlords"; at least 10 of the major warlords that came to power in the 1920s had originally served as officers in his Peiyang Army. The other warlords achieved power through the backing either of various provincial military interests or of foreign powers, most notably Japan but also Britain and the Soviet Union.

New factions and alliances constantly ensured that no one warlord ever became powerful enough to destroy all the rest. As a result, few warlords were able to extend their power over more than one or two provinces. Nevertheless, a major cleavage developed between warlord groups in North China and those in the South.

The South was the heartland of Chinese Republican spirit and nationalistic feeling. In 1921 the great nationalist leader Sun Yat-sen established an independent revolutionary regime under the control of his Nationalist Party (Kuomintang) at the South China city of Canton. This regime soon came to exercise a preeminent position among the squabbling southern warlords.

In the North, conditions were quite different. There, three leading personalities emerged in the early 1920s: Chang Tso-lin, a former bandit based in Manchuria who, with Japanese support, came to control that northeastern region's three provinces; Wu P'ei-fu, a traditionally educated former Peiyang officer who tried to establish order in central China; and Feng Yü-hsiang, the "Christian General" (he baptized his troops with fire hoses), who seized Peking in 1924 and destroyed the facade of parliamentary government and a unified China that had been presented by the capital.

Meanwhile, Sun Yat-sen received aid from the small Chinese Communist Party and the Soviet Union to build the Republican Army, through which the Nationalist Party consolidated its control in the South. Sun died in 1925, but the next year Nationalist forces under Chiang Kai-shek swept northward and in 1928 reunified China, abolishing the separate warlord regimes. Chiang, however, did not really eliminate the warlords, but rather, by means of alliances, incorporated many of them into his army. Local warlords continued to exert de facto power over their own domains and to be a factor in Chinese politics until the establishment of the Communist government in 1949.

warm-bloodedness, also called HOMOIOTHERMY, also spelled HOMEOTHERMY, in animals, the ability to maintain a relatively constant internal temperature (about 37° C [99° F] for mammals, about 40° C [104° F] for birds), regardless of the environmental temperature. The ability to maintain an internal temperature distinguishes these animals from cold-blooded, or poikilothermic, animals, which usually have about the same temperature as their environment. Warm-blooded animals are able to remain active in situations in which cold-blooded ones cannot. Body temperatures of homoiotherms are kept at a constant value by regulatory mechanisms that counteract the effects of the external environment. In cold environments, regulatory mechanisms maintain body temperature by increasing heat production and decreasing heat loss. In hot environments, regulatory mechanisms maintain body temperatures by increasing heat loss. Within a neutral range of several degrees (27° to 31° C [81° to 88° F] for man), neither heat gain nor heat loss is necessary to maintain body temperature.

Shivering, a regulatory mechanism of many warm-blooded animals, increases heat production. Hibernation, another mechanism used by certain warm-blooded animals, decreases heat loss by means of a general slowing-down of bodily functions. Panting and perspiring are mechanisms for increasing heat loss.

Warm Springs, health resort, Meriwether County, western Georgia, U.S., near the Franklin D. Roosevelt State Park. The springs discharge about 800 gallons (3,030 l) of water per minute at a temperature of about 88° F (31° C). The national prominence of the springs dates from Franklin D. Roosevelt's visit there in 1924 following an attack of polio. Convinced that the warm waters would aid in the aftercare of polio victims who needed supported exercise, Roosevelt organized the Warm Springs Foundation in 1927. This nonprofit corporation developed a complete medical community there; its 900-acre (360-hectare) facility was purchased by the state of Georgia in 1973. President Roosevelt died

at Warm Springs on April 12, 1945, in the Little White House, now a state shrine.

The city of Warm Springs, just southwest of the springs, developed as a railroad junction



The Little White House, residence of President Franklin D. Roosevelt, Warm Springs, Ga.
Milt and Joan Mann from CameraMann

for the resort and was incorporated in 1924. Pop. (2003 est.) 482.

Warmerdam, Cornelius, byname DUTCH WARMERDAM (b. June 22, 1915, Long Beach, Calif., U.S.—d. Nov. 13, 2001, Fresno, Calif.), American pole-vaulter, the first to attain 4.57 m (15 feet) and the last to set major records with a bamboo pole.

Warmerdam, who was of Dutch ancestry, began vaulting at age 12, using the limb of a peach tree. A graduate of Fresno State College



Warmerdam, 1942
UPI—EB Inc.

and Stanford University, he taught physical education and coached athletics (track and field) at Fresno State (later California State University at Fresno). On April 13, 1940, at Berkeley, Calif., he first achieved a vault of 15 feet. Using a bamboo pole, he established a world outdoor record of 15 feet 7¾ inches (4.77 metres) on May 23, 1942, at Modesto, Calif. Few other athletes have so dominated their sport: Warmerdam cleared 15 feet or higher on 43 occasions before any other person performed the feat once. He won the U.S. pole-vault title continuously from 1937 to 1944, except in 1939. In 1942 he received the Sullivan Award as the best American amateur athlete. Regrettably, World War II deprived him of the opportunity to compete in the Olympics.

Warmerdam retired from pole-vaulting competition in 1944, and his records stood for several years. Not until Jan. 27, 1951, did Bob Richards become the second man to vault 15 feet. Don Bragg, who used an aluminum pole, broke Warmerdam's long-standing outdoor record on July 2, 1960.

Warming, Johannes Eugenius Bülow (b. Nov. 3, 1841, Manø, Den.—d. April 2, 1924, Copenhagen). Danish botanist whose work on the relations between living plants and their surroundings made him a founder of plant ecology.

Warming was educated at the University of Copenhagen (Ph.D., 1871). From 1882 to 1885 he was professor of botany at the Royal Institute of Technology in Stockholm. He traveled to western Greenland in 1884 as part of the Fylla Expedition to study the ecological adaptations of native plants.

Warming returned to the University of Copenhagen in 1885 as professor of botany and director of the botanical garden there (1885–1913). The result of his trip to Greenland was his first book, *Om Grønlands Vegetation* (1888; "On the Vegetation of Greenland"), in which he described the structural adaptations of plants to their surroundings. Warming extended this type of study to several other countries, including Denmark, Venezuela, and some islands of the West Indies. His famous work, *Lagoa Santa* . . . (1892; "Lagoa Santa, a Contribution to Biological Phytogeography"), together with his other books, provided a thorough survey of the vegetation of temperate, tropical, and arctic zones. This work prepared him for his most significant contribution to plant ecology, *Plantesamfund* (1895; *Oecology of Plants*). The book was an attempt to group and characterize plant communities (by which Warming meant a group of species growing in the same locality) that are subject to the same external conditions arising from the interaction of ecological factors.

Warmińsko-Mazurskie, *województwo* (province), northern Poland. It comprises the former provinces (1975–98) of Olsztyn, Suwałki, and Elbląg, as well as portions of Toruń, Ciechanów, and Ostrołęka. Bordering Russia to the north, the province is characterized by postglacial moraines, coniferous trees, and thousands of lakes, primarily in the Masurian Lakeland. It has the coolest climate in Poland, with long winters. One of the most sparsely populated provinces, Warmińsko-Mazurskie was repatriated after World War II, when thousands of Germans were deported and thousands of Ukrainians and Ruthenians relocated there. Agriculture is a mainstay of the economy, and farmers raise chickens, grow cereal crops, and breed dairy cattle and pigs. Local timber supplies a number of furniture manufacturers. Olsztyn is the provincial capital. Prussians and Teutonic Knights dominated the early history of the province. Numerous lake resorts attract tourists, as does medieval architecture. Area 9,345 square miles (24,203 square km). Pop. (2003 est.) 1,428,200.

Warna (Bulgaria): *see* Varna.

Warner, Pop, byname of GLENN SCOBEY WARNER (b. April 5, 1871, Springville, N.Y., U.S.—d. Sept. 7, 1954, Palo Alto, Calif.), American college gridiron football coach who devised the dominant offensive systems used over the first half of the 20th century. Over a 44-year career as a coach (1895–1938), Warner won 319 games, the most in the NCAA until the 1980s. He also is remembered for having started one of the country's major football organizations for young boys, the Pop Warner Youth Football League, in 1929.

At Cornell University, Warner excelled in several sports while obtaining his law degree (1894). He then coached at the University of Georgia, Cornell, the Carlisle Indian Industrial School, the University of Pittsburgh, Stanford University, and Temple University.

Warner's popular image is most closely tied to his association at Carlisle with Jim Thorpe, their relationship immortalized in the 1951 film *Jim Thorpe—All-American*. But his chief contributions to football were the wingback formations he introduced at Carlisle and further developed at Pittsburgh and Stanford: the single wing and the less-popular double wing. In mid century Warner's single wing was gradually replaced by the split-T as the dominant offensive system.

Warner, Rex (Ernest) (b. March 9, 1905, Birmingham, Warwickshire, Eng.—d. June 24, 1986, Wallingford, Oxfordshire), British novelist, Greek scholar, poet, translator, and critic who in his fictional work warned—in nightmarish allegory—against the evils of a capitalist society.

After graduating from Wadham College, Oxford (1928), Warner was a schoolteacher in England and Egypt. In the 1940s he served as director of the British Institute in Athens. He moved to the United States in 1961 and was professor of English at the University of Connecticut from 1964 to 1974.

Warner wrote only one book of poetry, *Poems* (1937). His translations from the Greek—particularly Aeschylus' *Prometheus Bound* (1947), Xenophon's *Anabasis* (1949), and Euripides' *Hippolytus* (1950) and *Helen* (1951)—are elegant, clear, and direct. Most notable of Warner's novels are *The Professor* (1938) and *The Aerodrome* (1941).

Warner also wrote two fictionalized "autobiographies" of Julius Caesar: *The Young Caesar* (1958) and *Imperial Caesar* (1960). Other works of historical fiction include *Pericles the Athenian* (1963) and *The Converts* (1967). *Men of Athens* (1972) is a series of essays on the great Athenians of the 5th century BC.

Warner, W(illiam) Lloyd (b. Oct. 26, 1898, Redlands, Calif., U.S.—d. May 23, 1970, Chicago, Ill.), influential American sociologist and anthropologist who was noted for his studies on class structure.

Warner studied at the University of California at Berkeley, majoring in anthropology. While pursuing graduate studies at Harvard University (1925–35), he taught at Harvard and Radcliffe. There he began to do research on the social life of communities in New England, the South, and, later, the Midwest, focusing on race relations, class structure, and symbolic behaviour. This brought about his definition of three social classes: lower, middle, and upper, with each of these classes further divided into upper and lower.

He was professor of anthropology and sociology at the University of Chicago (1939–59) and professor of social research at the University of Michigan from 1959. Considered one of the leading sociologists in the United States, he adapted the research methods of cultural anthropology to contemporary social problems. His contributions to the understanding of contemporary American culture reflect his interest in the study of class structure, symbol systems, and human motivation.

His discoveries are presented in many publications, including *Democracy in Jonesville* (1949), a study in equality and inequality, and *Social Class in America* (1949), which is a manual of procedures for the measurement of social study. His fundamental conclusions are presented in *American Life: Dream and Reality*, written in 1953 and revised in 1962. *The Living and the Dead*, a study of the symbolic behaviour of Americans and considered one of his most important works, was published in 1959. *The Emergent American Society*, which he edited, was published in 1967.

Warner Bros., in full (1923–69) WARNER BROTHERS PICTURES, INC., or (from 1969) WARNER BROS., INC., American motion-picture company that introduced talking pictures in 1927 and later became one of the leading Hollywood studios. The company was founded by four brothers: Harry (b. Dec. 12, 1881, Poland—d. July 25, 1958, Hollywood, Calif.,

U.S.), Albert (b. July 23, 1884, Poland—d. Nov. 26, 1967, Miami Beach, Fla., U.S.), Sam (b. Aug. 10, 1887, Baltimore, Md., U.S.—d. Oct. 5, 1927, Los Angeles, Calif.), and Jack (b. Aug. 2, 1892, London, Ont., Can.—d. Sept. 9, 1978, Los Angeles, Calif., U.S.).

The Warner brothers began their careers by exhibiting motion pictures in Pennsylvania and Ohio. Beginning in 1903, they started acquiring movie theatres and expanded their operation to include film distribution. They began producing their own films about 1913 and four years later shifted their production headquarters to Hollywood, Calif., where they established Warner Brothers Pictures, Inc., in 1923. Harry, the oldest brother, was president of the company; Albert was treasurer and head of sales and distribution; and Sam and Jack managed the studio in Hollywood. Most early Warner films were slapstick comedies, although they also produced serious films that explored social and political issues, such as *Why Girls Leave Home* (1919).

When the company ran into financial difficulties in the mid-1920s, Sam Warner persuaded his brothers to enter into a partnership with the Western Electric company; the combined entities then collaborated on the Vitaphone process that made sound films possible. Vitaphone was first used for *Don Juan* (1926), which had only a musical soundtrack, and then for *The Jazz Singer* (1927), which had synchronized music and dialogue. Other sound films followed, and their success enabled Warner Bros. to become a major studio.

Of all the studios during Hollywood's "Golden Age" of the 1930s and '40s, it was perhaps Warner Bros. that had the most identifiable house style, which was achieved by concentrating on specific film genres (such as gangster films, swashbuckling adventures, and the musicals of Busby Berkeley) and by allowing writing, directing, and acting, rather than large budgets, to be the main determinants of quality. The studio's leading stars were also a component in both the success and individuality of the studio: James Cagney, Edward G. Robinson, Bette Davis, Humphrey Bogart, and Errol Flynn were among those known to the public as the "Warner actors." Classic Warner Bros. films during these years include *The Public Enemy* (1931), *Scarface* (1932), *42nd Street* (1933), *The Petrified Forest* (1936), *The Maltese Falcon* (1941), *Casablanca* (1942), and *Yankee Doodle Dandy* (1942). Also notable were the Looney Tunes and Merrie Melodies series of cartoons produced by the studio; most of them (featuring such characters as Bugs Bunny and Daffy Duck) are considered classics of animation.

Jack Warner, who ran the studio single handedly after the death of his brother Sam in 1927, was among the most powerful moguls in Hollywood by the end of the 1940s. His power diminished, however, as Hollywood's studio system waned in the 1950s, allowing actors and directors to become free agents rather than contractually bound to a studio. Fearing the rise of television, Harry Warner sold the family interest in the company. Jack nevertheless ran the company until 1966. Among the last films he produced were *My Fair Lady* (1964) and *Who's Afraid of Virginia Woolf?* (1966).

In 1969 the company became Warner Bros., Inc., a subsidiary of Warner Communications, Inc. By the 1970s it had diversified into the production of television programs, books, and musical recordings. After merging with Time Inc. in 1989, the conglomerate of Time Warner Inc. became the largest media and entertainment company in the world. Among its ventures was the WB television network, launched in 1995. In a highly publicized move, the company merged with America Online to form AOL Time Warner Inc. in 2001. In 2001–03 it was reorganized as AOL Time Warner (*q.v.*). The company continues to produce and distribute films under the Warner Bros. banner; later efforts included the Harry Potter series (from 2001) and *The Matrix Revolutions* (2003).

Warnerius (Italian scholar): *see* Irnerius.

warrant, in law, authorization in writing empowering a person to perform an act or to execute an office. The term is applied to a great variety of documents, most commonly judicial or quasi-judicial warrants, of which the most common are for arrest or search.

A warrant is necessary if an arrest is to be considered legal, except in situations in which arrest without warrant is recognized by law or statute (*see* arrest). In the ordinary case, the warrant is issued at the behest of a complainant who provides an affidavit setting forth facts sufficient to satisfy the belief that an offense has been committed and that the person accused is the guilty party. Usually the facts stated must be sworn to as within the direct knowledge of the complainant. Hearsay and facts stated on information and belief are generally not sufficient basis for issuing a warrant. The warrant must identify the person to be arrested, but, if the person's name is unknown, a fictitious name may be substituted (a so-called John Doe warrant); in such cases a description of the person is required. The legality of a warrant and, hence, of the arrest may be tested by a civil suit for false imprisonment or, in common-law countries, by a habeas corpus proceeding (*see* habeas corpus).

The issuance of search warrants is governed by many of the same limitations as the issuance of arrest warrants. The descriptions of the property to be seized or of the place to be searched must be detailed. Other judicial warrants include escape warrants, issued for the recapture of escaped prisoners, and warrants of commitment, issued to incarcerate a prisoner either before or after trial.

Other types of warrants include tax warrants, which provide the authority to collect taxes, and land warrants, transferable certificates issued by the government entitling the holder to a specific tract of public land.

Warrau, also spelled WARAO, or GUARAUNO, nomadic South American Indians speaking a language of the Macro-Chibchan group and, in modern times, inhabiting the swampy Orinoco River delta in Venezuela and areas eastward to the Pomeroon River of Guyana. Some Warrau also live in Suriname. The tribe was estimated to number about 20,000 in the late 20th century.

The Warrau subsist mainly by fishing, hunting, and gathering wild plants, though the cultivation of plantains, sugarcane, watermelons, cassava, and chili peppers is practiced in the drier regions. The undomesticated *Mauritia* palm is particularly important: its sap provides a fermented drink; its pith is made into bread; the fruit is eaten; and the fibre is fashioned into hammocks and clothing. Villages are composed of lean-tos and thatch huts, and in swampy areas the village may be erected over a platform of logs covered with clay.

The Warrau share numerous cultural traits with other South American tribes. They resemble other river agriculturists in their village life and a social structure based on kinship; yet they also have unique and complex social classes of chiefs, priests, shamans, magicians, and labourers associated with the temples. Similarly, although their puberty rites, death rituals, and shamanistic cures are similar to those of other tropical forest Indians, the Warrau also have priests, temples, and idols, and they worship a supreme creator god. Their priestly ceremonials and complex social classes are common to developed agricultural chiefdoms of the Caribbean area but are rarely found among hunting and gathering nomads.

Most authorities believe that the Warrau once lived to the north or west as an agricultural chiefdom but, on being pushed into the delta region, were unable to maintain their original culture except for a few residual elements such as the temple cult. Others believe that the Warrau may have borrowed congenial features from more developed agricultural neighbours in a gradual cultural accumulation. In any case, the unique features of Warrau society are not derived from their present simple economy.

Warren, city, northern suburb of Detroit, Macomb county, southeastern Michigan, U.S. Organized in 1837 as Hickory township, it was called Aba (or Alba, 1838) until renamed (1839) for General Joseph Warren, a hero of the U.S. War of Independence. Warren was incorporated as a village in 1893 and remained rural in character until it was linked to Detroit by streetcar and rail in 1901. After World War II development accelerated, and Warren became a city in 1955. Manufactures include automobiles and parts for motor vehicle companies. Pop. (2003 est.) 136,016.

Warren, city, Trumbull county, northeastern Ohio, U.S. It lies along the Mahoning River and is part of the Youngstown metropolitan complex. Settled (1799) by Ephraim Quinby, a stockholder in the Connecticut Land Company, it was named for Moses Warren, a surveyor. Warren became the seat of the Western Reserve, and in 1803 it was made the county seat. After the completion (1840) of the Pennsylvania and Ohio Canal from Pittsburgh to Akron (there connecting with the Ohio and Erie Canal), Warren developed as an inland port. The city's prosperity grew with the discovery of coal in the Mahoning valley and the development of the local iron industry after 1870. Warren's proximity to Youngstown and the subsequent arrival of two transcontinental highways and the Ohio Turnpike were also stimulants to growth.

The city's diversified industries now include automotive and basic steel production and the manufacture of industrial equipment and electrical products. The Trumbull Campus of Kent State University opened in Warren in 1959. Packard Music Hall and the John Stark Edwards House (1807), the oldest dwelling in the Western Reserve, are in the city. Inc. village, 1834; city, 1869. Pop. (2003 est.) city, 46,608; Youngstown-Warren MSA (2000), 594,746.

Warren, Bertram Eugene (b. June 28, 1902, Waltham, Mass., U.S.—d. June 27, 1991, Arlington, Mass.), American crystallographer whose X-ray studies contributed to an understanding of both crystalline and noncrystalline materials and of the transition from the amorphous to the crystalline state.

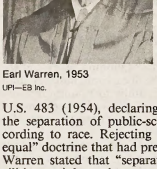
Most of Warren's academic and professional life was spent at the Massachusetts Institute of Technology, Cambridge; he received the Sc.D. degree there in 1928 and joined the faculty in 1930, serving successively as assistant, associate, and, finally, full professor of physics. With Sir Lawrence Bragg he conducted a study of diopside, a member of the pyroxene group of silicate minerals. Their X-ray analysis, a milestone in the understanding of the silicate minerals, provided an explanation of the observed variation in silicon-oxygen ratios of silicates. Warren later turned his attention to noncrystalline materials. He showed that carbon black was not completely amorphous but possessed randomly oriented two-dimensional layer structures and that the general physical properties of metals are largely determined by crystal imperfections.

Warren, Earl (b. March 19, 1891, Los Angeles, Calif., U.S.—d. July 9, 1974, Washington, D.C.), American jurist, the 14th chief justice of the United States (1953–69),

who presided over the Supreme Court during a period of sweeping changes in U.S. constitutional law, especially in the areas of race relations, criminal procedure, and legislative apportionment.

The son of a railroad worker, Warren was educated in law at the University of California, Berkeley. In public office uninterruptedly for 50 years, he served as district attorney for Alameda County, Calif. (1925–39), attorney general of California (1939–43), and governor of the state for three terms (1943–53). His only defeat at the polls came in 1948, when he was the Republican candidate for vice president of the United States.

Nominated as chief justice of the U.S. Supreme Court by President Dwight D. Eisenhower in 1953, Warren served in that capacity until his retirement in 1969. In his first term on the bench, he spoke for a unanimous court in the leading school-desegregation case, *Brown v. Board of Education of Topeka,* 347



Earl Warren, 1953
UPI—EB Inc.

U.S. 483 (1954), declaring unconstitutional the separation of public-school children according to race. Rejecting the "separate but equal" doctrine that had prevailed since 1896, Warren stated that "separate educational facilities are inherently unequal." In *Watkins* v. *United States,* 354 U.S. 178 (1957), Warren upheld the right of a witness to refuse to testify before a congressional committee, and, in other opinions concerning federal and state loyalty and security investigations, he likewise took a position discounting the fear of communist subversion that was prevalent in the United States during the 1950s.

In *Reynolds* v. *Sims,* 377 U.S. 533 (1964), known as the "one man, one vote" decision, he held that representation in state legislatures must be apportioned equally on the basis of population rather than geographical areas, remarking that "legislators represent people, not acres or trees." In *Miranda* v. *State of Arizona,* 384 U.S. 436 (1966)—a landmark decision of the Warren court's rulings on criminal justice—he ruled that the police, before questioning a criminal suspect, must inform him of his rights to remain silent and to have counsel present (appointed for him if he is indigent) and that a confession obtained in defiance of these requirements is inadmissible in court.

On Nov. 29, 1963, President Lyndon B. Johnson appointed Warren chairman of a commission established to investigate the assassination of President John F. Kennedy (November 22) and the murder of the presumed assassin, Lee Harvey Oswald. The report of the Warren Commission (*q.v.*) was submitted in September 1964 and was published later that year.

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Warren, Harry, original name SALVATORE GUARAGNA (b. Dec. 24, 1893, Brooklyn, N.Y., U.S.—d. Sept. 22, 1981, Los Angeles, Calif.), American songwriter who, by his own estimate, produced 300 to 400 songs from 1922 through 1960, many for Hollywood films and Broadway musical productions.

Warren received little public attention during his long life, despite three Academy Awards (for "Lullaby of Broadway" in 1935, "You'll Never Know" in 1943, and "On the Atchison, Topeka and the Santa Fe" in 1946). Nevertheless, he amassed a fortune from his Depression-era contracts with major motion-picture studios and from royalty payments.

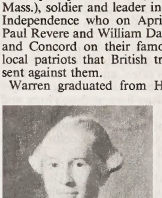
Self-taught musically and the youngest of 12 children, Warren toured with brass bands and carnivals from age 15. He worked as a property man for Vitagraph Studios and later played piano to accompany its silent films. He apprenticed as staff pianist and song promoter for the music publishers Stark & Cowan, who bought his first song, "Rose of the Rio Grande," in 1922.

Warren wrote more than 60 popular songs for successful Broadway musicals into the early 1930s, collaborating with lyricists Mort Dixon and Joe Young on *The Laugh Parade* (1931), which included "You're My Everything," and with Dixon and Billy Rose on "I Found a Million Dollar Baby in a Five-and-Ten-Cent Store" for *Crazy Quilt* (1931). In 1932 he moved to Hollywood, entering into a major collaboration with lyricist Al Dubin that lasted through 1939. Together, they created music for such films as *Gold Diggers of 1933* (1933; including "We're in the Money") and *42nd Street* (1933; including the title song, as well as "You're Getting to Be a Habit with Me" and "Shuffle Off to Buffalo"). Warren's music fit the needs of the script rather than expressing a particular personal style.

During the 1940s Warren teamed with lyricist Mack Gordon to produce songs for a number of motion pictures, including *Down Argentine Way* (1940) and *Sun Valley Serenade* (1941; "Chattanooga Choo-Choo"). He also wrote "You Must Have Been a Beautiful Baby" and "Jeepers, Creepers," to lyrics by Johnny Mercer, as well as music for such films as *Marty* (1955), *An Affair to Remember* (1957), Jerry Lewis's *The Caddy* (1953) and *Cinderfella* (1960), and *Satan Never Sleeps* (1962) and the theme for the television series "The Legend of Wyatt Earp." He continued to compose but published little music after 1962.

Warren, Joseph (b. June 11, 1741, Roxbury, Mass. [U.S.]—d. June 17, 1775, Bunker Hill, Mass.), soldier and leader in the U.S. War of Independence who on April 18, 1775, sent Paul Revere and William Dawes to Lexington and Concord on their famous ride to warn local patriots that British troops were being sent against them.

Warren graduated from Harvard in 1759,



Joseph Warren, detail of a portrait by John Singleton Copley; in the Museum of Fine Arts, Boston

By courtesy of the Museum of Fine Arts, Boston, gift of Buckminster Brown, M.D., through Church M. Matthews, Jr., Trustee

studied medicine in Boston, and soon acquired a high reputation as a physician. The passage of the Stamp Act in 1765 aroused his patriotic sympathies and brought him into close association with other prominent Whigs in Massachusetts. He helped draft a group of protests to Parliament known as the "Suffolk Resolves," which were adopted by a convention in Suffolk county, Mass., on Sept. 9, 1774, and endorsed by the Continental Congress in Philadelphia.

Warren was a member of the first three provincial congresses held in Massachusetts (1774–75), president of the third, and an active member of the Massachusetts Committee of Public Safety. On June 14, 1775, he was chosen a major general, but three days later he was killed in the Battle of Bunker Hill (Breed's Hill).

Warren, Leonard, original name LEONARD WARENOFF (b. April 21, 1911, Bronx, New York City, N.Y., U.S.—d. March 4, 1960, New York City), American operatic baritone known for his work in operas of Ruggero Leoncavallo and Giacomo Puccini.

The son of Russian Jewish immigrants, Warren first studied music at the Greenwich House Music School in New York City and sang in the chorus at Radio City Music Hall from 1935 to 1938. In 1938, after vocal study with Sidney Dietch, he entered the Metropolitan Opera radio auditions and won both a contract and a scholarship to study in Milan. He first appeared at the Metropolitan in 1938 in a concert of operatic excerpts and made his operatic debut—as Paolo in Giuseppi Verdi's *Simon Boccanegra* at the Metropolitan—in 1939.

In addition to an extensive American career, Warren toured South America, Canada, Italy, and the Soviet Union. His greatest successes were in the operas of Verdi, as Tonio in Leoncavallo's *Pagliacci,* and as Scarpia in Puccini's *Tosca.* He made numerous appearances on radio and film and made many recordings. He died on stage at the Metropolitan during a performance of Verdi's *La forza del destino.*

Warren, Robert Penn (b. April 24, 1905, Guthrie, Ky., U.S.—d. Sept. 15, 1989, Stratton, Vt.), American novelist, poet, critic, and teacher, best-known for his treatment of moral dilemmas in a South beset by the erosion of its traditional, rural values. He became the first poet laureate of the United States in 1986.

In 1921 Warren entered Vanderbilt University, Nashville, Tenn., where he joined a group of poets who called themselves the Fugitives (*q.v.*). Warren was among several of the Fugitives who joined with other Southerners to publish the anthology of essays *I'll Take My Stand* (1930), a plea for the agrarian way of life in the South.

After graduation from Vanderbilt in 1925, he studied at the University of California, Berkeley (M.A., 1927), and at Yale. He then went to the University of Oxford as a Rhodes scholar. From 1930 to 1950 he served on the faculty of several colleges and universities—including Vanderbilt and the University of Minnesota. With Cleanth Brooks and Charles W. Pipkin, he founded and edited *The Southern Review* (1935–42), possibly the most influential American literary magazine of the time. He taught at Yale University from 1951 to 1973. His *Understanding Poetry* (1938) and *Understanding Fiction* (1943), both written with Cleanth Brooks, were enormously influential in spreading the doctrines of the New Criticism (*q.v.*).

Warren's first novel, *Night Rider* (1939), is based on the tobacco war (1905–08) between the independent growers in Kentucky and the large tobacco companies. It anticipates much of his later fiction in the way it treats a historical event with tragic irony, emphasizes violence, and portrays individuals caught in moral quandaries. His best-known novel, *All*



Robert Penn Warren
By courtesy of Random House, Inc.

the King's Men (1946), is based on the career of the Louisiana demagogue Huey Long and tells the story of an idealistic politician whose lust for power corrupts him and those around him. This novel won the Pulitzer Prize in 1947 and, when made into a film, won the Academy Award for best motion picture of 1949. Warren's other novels include *At Heaven's Gate* (1943); *World Enough and Time* (1950), which centres on a controversial murder trial in Kentucky in the 19th century; *Band of Angels* (1956); and *The Cave* (1959). His long narrative poem, *Brother to Dragons* (1953), dealing with the brutal murder of a slave by two nephews of Thomas Jefferson, is essentially a versified novel, and his poetry generally exhibits many of the concerns of his fiction. His other volumes of poetry include *Promises: Poems, 1954–1956; You, Emperors, and Others* (1960); *Audubon: A Vision* (1969); *Now and Then; Poems 1976–1978; Rumor Verified* (1981); *Chief Joseph* (1983); and *New and Selected Poems, 1923–1985* (1985). *The Circus in the Attic* (1948), which included "Blackberry Winter," considered by some critics to be one of Warren's supreme achievements, is a volume of short stories, and *Selected Essays* (1958) is a collection of some of his critical writings.

Besides receiving the Pulitzer Prize for fiction, Warren twice won the Pulitzer Prize for poetry (1958, 1979) and, at the time of his selection as poet laureate in 1986, was the only person ever to win the prize in both categories. In his later years he tended to concentrate on his poetry.

Warren Commission, formally PRESIDENT'S COMMISSION ON THE ASSASSINATION OF PRESIDENT JOHN F. KENNEDY, commission appointed by U.S. president Lyndon B. Johnson on Nov. 29, 1963, to investigate the circumstances surrounding the assassination of his predecessor, John F. Kennedy, in Dallas, Texas, on Nov. 22, 1963, and the shooting of Lee Harvey Oswald (*q.v.*), the alleged assassin, two days later. The chairman of the commission was the chief justice of the United States, Earl Warren; the other members were two U.S. senators, Richard B. Russell of Georgia and John Sherman Cooper of Kentucky; two members of the U.S. House of Representatives, Hale Boggs of Louisiana and Gerald R. Ford of Michigan; and two private citizens, Allen W. Dulles, former director of the Central Intelligence Agency, and John J. McCloy, former president of the International Bank for Reconstruction and Development.

After months of investigation the commission submitted its findings to President Johnson in September 1964, and they were immediately made public. The commission reported that the bullets that had killed President Kennedy were fired by Oswald from a rifle pointed out a sixth-floor window of the Texas School Book Depository. The commission also reported that it had found no evidence that either Oswald or Jack Ruby, a Dallas nightclub operator charged with Oswald's murder, was part of any conspiracy, foreign or domestic, to assassinate President Kennedy. This conclusion of the commission was later questioned in a number of books and articles and in a special congressional committee report in 1979.

The commission described in detail its investigation of Oswald's life but did not itself attempt to analyze his motives. The commission also proposed the strengthening of the Secret Service organization; the adoption of improved procedures for protecting the president; and the enactment of legislation to make killing the president or vice president a federal offense. The report was published by the U.S. Government Printing Office under the title *Report of the President's Commission on the Assassination of President John F. Kennedy* (1964).

Warrensburg, city, seat (1836) of Johnson county, west-central Missouri, U.S. It lies 52 miles (84 km) southeast of Kansas City. Named for Martin Warren, a Revolutionary War soldier and farmer who settled the area in 1833, the town developed as an agricultural-trade centre. The arrival of the Missouri Pacific Railroad (1864) stimulated its growth, and flour and woolen mills, grain elevators, and a brewery were built. In the late 19th century Warrensburg was known for its mineral springs. Its modern economy is diversified, with agriculture (wheat, corn [maize], hay, and cattle) still important. Leading manufactures include clothing, lawn mowers, electronic products, chemicals, and metal castings. Sandstone is quarried locally. Central Missouri State University (1871) was established in the city as a state normal school. Whiteman Air Force Base is 10 miles (16 km) east of the town.

The original county courthouse was the scene of the 1870 trial over the killing of the dog Old Drum, at which the future U.S. senator George Vest recited his "Tribute to the Dog," a classic of American oratory. Inc. town, 1844; city, 1856. Pop. (1992 est.) 15,469.

Warri, town and port, Delta state, southern Nigeria. It lies along the Warri River in the western Niger River delta, 30 miles (48 km) upstream from the port of Forcados on the Bight of Benin. Founded by Prince Ginuwa from Benin (60 miles [97 km] north) in the late 15th century, it grew to become the political and trading capital of the Itsekiri kingdom of Warri (Ouwerre). From the 15th to the 17th century, its *obis* ("kings") had considerable contact with the Portuguese, and several converted to Roman Catholicism; they later became quite active in the slave trade. Although Warri switched to the export of palm oil and kernels in the mid-19th century, the kingdom declined and its territory came under British protection in 1884.

Long a market centre for local produce as well as a port, the town has assumed new economic importance with the discovery of natural gas and petroleum in the area. A Petroleum Training Institute opened there in 1972, and in 1978 Warri became the site of Nigeria's second petroleum refinery. An oil-products pipeline runs from the refinery to Kaduna and Kano in northern Nigeria. At nearby Aladja, an integrated steel plant, designed to make greater Warri one of the leading steel centres in the country, opened in 1981. Warri town has furniture and soft-drink factories, secondary schools, trade schools, government hospitals, and a handicraft centre. Pop. (1991 est.) 111,300.

warrigal (dog): *see* dingo.

Warring States, also called CONTENDING STATES, Wade-Giles romanization CHAN-KUO, Pinyin ZHANGUO (475–221 BC), six or seven small feuding Chinese kingdoms whose careers constitute an era in Chinese history. The Warring States period was one of the most fertile and influential in Chinese history. It not only saw the rise of many of the great philosophers of Chinese civilization, including the Confucian thinkers Mencius and Hsün-tzu, but also witnessed the establishment of many of the governmental structures and cultural patterns that were to characterize China for the next 2,000 years.

The Warring States period is distinguished from the preceding age, the Spring and Autumn (Ch'un Ch'iu) period (770–476 BC), when the country was divided into many even smaller states. The name Warring States is derived from an ancient work known as the *Chan Kuo ts'e* ("Intrigues of the Warring States"). In these intrigues, two states, Ch'in and Ch'u, eventually emerged supreme. In 223 BC, Ch'in defeated Ch'u and two years later established the first unified Chinese empire.

Warrington, district and borough in the north of the county of Cheshire, England. It lies along the River Mersey and the Manchester Ship Canal between Liverpool and Manchester. The district straddles the former Cheshire-Lancashire boundary, which followed the Manchester Ship Canal; before the administrative reorganization of 1974, most of the district was in Lancashire.

Warrington was founded in pre-Roman times at the crossing of the Mersey, and it became a medieval market town with tool and textile industries. Today it is an industrial borough with sawmills, breweries, printers, and factories manufacturing metal and leather products and clothing. Part of the district has been developed as a new town with a separate development corporation. Urban renewal has also taken place in the older inner areas of the borough. Warrington is at the crux of the Liverpool-Manchester region's motorway system. Research establishments and centres for distribution and warehousing are being established near these crossing points as part of the new town development plan. Area 68 square miles (176 square km) Pop. (1981) new town, 135,946; (1991 prelim.) district, 179,500.

Warriston, Archibald Johnston, Lord, Warriston also spelled WARISTON (b. 1611—d. July 22, 1663, Edinburgh, Scot.), Scottish Presbyterian who was a leading anti-Royalist during the English Civil Wars between the Royalists and the Parliamentarians. Later he became an official in Oliver Cromwell's Commonwealth regime. He was known to his contemporaries as petulant and quarrelsome.

Trained in law, Johnston was a principal author of the Scottish National Covenant (1638), which denounced King Charles I's attempts to impose Anglican forms of worship on the Presbyterian Church of Scotland. In his judgment, episcopacy was "that great-grandmother of all our corruptions." During Charles I's conciliatory visit to Scotland in 1641, Johnston was knighted and appointed a lord of session with the courtesy title of Lord Warriston. From 1644 to 1646 he assisted in the coordination of joint military operations of Covenanting and Parliamentary armies against the forces of Charles. He was made lord advocate in October 1646.

When the moderate Covenanters joined Charles against the Parliamentarian Independents (radical Puritans) in 1647, Warriston led the extremist Covenanters who opposed the alliance. Nevertheless, after the Independents executed Charles and formed the Commonwealth (1649), Warriston reluctantly backed Charles I's son and successor, the exiled Charles II, who had agreed to honour the Covenant. Warriston was ousted from the government when Cromwell conquered Scotland in 1651, but he accepted from Cromwell in 1657 the offices of lord clerk register and commissioner for the administration of justice in Scotland. In 1658 he sat in Cromwell's

Parliament, and in the following year he sat in Richard Cromwell's Parliament. In 1663, however, three years after the Restoration of King Charles II, Warriston was hanged for his previous anti-Royalist activities.

Warrnambool, city, southwestern Victoria, Australia, on Lady Bay, near the mouth of Hopkins River. The bay, too shallow for modern ships, was first visited in 1802 by Nicolas Baudin, a French admiral and scientific explorer. Once used by whalers, the bay was the scene of many wrecks but is now protected by a lighthouse. A settlement of graziers was organized as a village in 1847 and called Warnimble (Aboriginal for "plenty of water," or "running swamps"). It developed as an entrepôt for agricultural produce of the hinterland. Proclaimed a municipality (1855), a town (1883), and then a city (1918), it now depends chiefly on dairying, clothing manufacture, and the auto industry for its economic base. Cultural resources include the Warrnambool Institute of Advanced Education. Pop. (2001 prelim.) 29,616.

Warrumbungle Range, mountain chain in northern New South Wales, Australia. Extending northwest for 80 mi (130 km) and volcanic in origin, the massif rises abruptly from a plain to an average elevation of 2,000 ft (600 m) culminating in Mt. Exmouth (3,953 ft). It was crossed in 1818 by the explorer John Oxley and named Arbuthnot Range; the present name comes from Aboriginal words for "broke" and "small mountains." The region's spectacular scenery has been protected by the creation of a national park (1953). An unusual structure is the Breadknife, a wedge of rock 300 ft high and 5 ft wide. Siding Spring Mountain (3,822 ft) is the site of an astronomical observatory (developed by the Australian National University) and a 150-in. (3.8-m) British-Australian telescope. The range is the source of the headstreams of the Castlereagh and Namoi rivers.

Wars of Yahweh, Book of the, lost document referred to and quoted in the Old Testament (Num. 21:14ff.). The book is probably a collection of early Israelite war songs including hymns of victory, curses, mocking songs, and other literary genres recounting the victories of Yahweh, the God of Israel, over his enemies; it indicates that biblical books rely on both written and oral tradition. Similar to the *Book of Jashar,* the *Book of the Wars of Yahweh* is not identical with it, according to most scholars.

Warsaw, Polish WARSZAWA, city, capital of Poland. The city, which is an autonomous administrative unit, is located on the Vistula (Wisła) River in the middle of the Warsaw Plain in east central Poland.

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

Warsaw is situated at the junction of two important routes; the east–west route across the European Plain and the route linking the Baltic Sea with southern Europe. The city is the centre of the Polish transportation and communication system, as well as a centre of important transportation routes to all of eastern Europe. Warsaw's many historic buildings attest to its long period of development and to its role as the capital of Poland. The city centre and the inner suburbs on the west bank of the Vistula were reconstructed after suffering heavy damage during World War II.

Warsaw's climate is moderate and somewhat cool; July temperatures average about 66° F (19° C), and January temperatures average 27° F (−3° C). Most of the city's precipitation, which averages 21 in. (541 mm) annually, occurs during the summer months. Snow covers the ground for 50 to 64 days a year.

Warsaw's economy is diversified. During the 1990s, the city's vibrant economy reduced unemployment to levels one-fourth that of the rest of country and attracted large-scale foreign investment. Its industrial sector, which employs about one-fifth of the labour force, is well developed, producing automobiles, electronics, and steel. However, since the fall of communism, the city's service sector—particularly tourism and retail trade—has become increasingly important, employing more than two-thirds of workers. The Warsaw region is also a highly specialized gardening and vegetable centre.

The city proper is subdivided into seven districts, following a layout that reflects an effort to locate industries and warehouses on the outskirts of the city or close to workers' homes. Other modernizing efforts include the widening of streets, remodeling of churches and palaces, and expansion of park areas.

Warsaw houses the Sejm (parliament) and other political and government bodies, and it is the most important educational centre in Poland. Educational institutions include the Technical University of Warsaw and the University of Warsaw, the latter known for its extensive library. It is the headquarters of the Polish Academy of Sciences, which coordinates research in both physical and social sciences through a number of institutes and industrial establishments. An active centre of research, Warsaw has received much acclaim for work done in the fields of parasitology and nuclear physics.

Warsaw is also the leading centre of Polish cultural and artistic life. It has many art galleries and exhibition halls, the best known being the National Museum and the Zachęta Art Gallery; several theatres and museums; and many cultural associations, including the Friends of History in Warsaw and the Chopin societies.

Warsaw's well-developed metropolitan transit system includes suburban trains, surface tramways, and an expressway system. In 1983, work began on a subway system, which opened in 1995. Area city, 172 sq mi (445 sq km). Pop. (2000) 1,615,369.

Warsaw, Compact of (Jan. 28, 1573), charter that guaranteed absolute religious liberty to all non-Roman Catholics in Poland. After the death of Sigismund II Augustus (July 1572) had brought an end to the rule of the Jagiellon dynasty, the Polish nobility had the duty of choosing a new king. Five candidates from various ruling houses of Europe emerged as major contenders for the Polish throne, but Henry of Valois, duc d'Anjou (brother of the French king Charles IX and the future Henry III of France), appeared to be the favourite. A major objection to his election was raised, however, by the Polish Protestants; Henry had participated in the planning of the Massacre of St. Bartholomew's Day (Aug. 23–24, 1572), in which thousands of French Protestants were slaughtered. To overcome this objection the politically dominant Polish Catholics agreed to adopt the Compact of Warsaw. Signed by the entire lay membership of the Sejm (legislature) before its election of Henry, the compact provided religious freedom to all non-Roman Catholic denominations without exception. That agreement marked the high point of the Reformation in Poland. Reaffirmed by succeeding electoral conventions as well as by the kings-elect of Poland, the compact helped Poland avoid the religious wars that plagued other European countries, but it proved insufficient as a permanent barrier to discrimination against non-Catholics.

Warsaw, Duchy of, also called GRAND DUCHY OF WARSAW, French DUCHÉ, OF GRAND-DUCHÉ, DE VARSOVIE, Polish KSIĘSTWO, OF WIELKOKSIĘSTWO, WARSZAWSKIE (1807–15), independent Polish state created by Napoleon. It became a focal point of efforts to



The Duchy of Warsaw, 1807–15

restore the Polish nation, which had been destroyed by the partitions of Poland made by Russia, Prussia, and Austria in 1772, 1793, and 1795.

Established by the Treaties of Tilsit (July 7 and 9, 1807) after the Poles had helped Napoleon defeat Prussia, the duchy consisted originally of the major portion of the central Polish provinces that had been absorbed by Prussia in 1793 and 1795. Exceptions were Danzig (Gdańsk), which became a free city; the district of Białystok, which was ceded to Russia; and the region of the Noteć (Netze) river, acquired by Prussia in 1772, which was added to the duchy. In 1809 the duchy was increased by the territory that Austria had seized in the third partition.

Shortly after the Duchy of Warsaw had been founded, Napoleon dictated its constitution (July 22, 1807). Framed on the French model, it established a powerful executive branch of government, which was headed by Frederick Augustus I, the king of Saxony and grandson of Augustus III. The Napoleonic Code became the law of the duchy (May 1, 1808).

Poland's hopes for greater things revived once more when Napoleon announced his war against Russia (1812) as his "second Polish war." The duchy, by an immense effort, put an army corps of nearly 98,000 men into the field. But the calamity that overtook Napoleon in Russia also sealed the fortunes of the duchy. The remainder of the Polish troops faithfully followed Napoleon in his campaign of 1813–14, during which the heroic leader of the Poles, Prince Jozef Antoni Poniatowski, perished in covering the Emperor's retreat from Leipzig.

On Feb. 8, 1813, the Russians occupied Warsaw and assumed control of the duchy. Subsequently, the Congress of Vienna determined that the Duchy of Warsaw was to be divided into three parts: the Grand Duchy of Poznań, which was returned to Prussia; the free Republic of Cracow (Kraków), which was placed under the protection of Russia, Prussia, and Austria; and the Congress Kingdom of Poland, which was joined to Russia by making the Russian emperor its king.

Warsaw Ghetto Uprising (1943), resistance by Polish Jews under Nazi occupation to being deported from Warsaw and sent to the Treblinka extermination camp. The revolt began on April 19, 1943, and was quelled four weeks later, on May 16.

As a part of Hitler's "final solution" for ridding Europe of Jews, ghettos were established wherever Germany was in power to confine Jews until they could be executed. The Warsaw Ghetto, enclosed at first with barbed wire but later with a brick wall 10 feet high and 11 miles long, comprised the former Jewish quarter. Into it Jews were herded from surrounding areas until by the summer of 1942 nearly 500,000 of them lived within its 840 acres (340 hectares); many had no housing at

all, and those who did were crowded in at an average of 13 per room. Starvation and disease (especially typhoid) killed thousands each month; and, beginning July 22, 1942, transfers to the death camp at Treblinka began at the rate of more than 5,000 Jews per day.

By January 1943 the Nazis had emptied most of the ghetto by deceiving Jews into the belief that they were being deported to "labour camps" in serene rural settings. A handful of Jews had escaped Treblinka, however, and word had reached the underground in the Warsaw Ghetto that the deportations were actually one-way trips to gas chambers. On January 18 the Nazis entered the ghetto to assemble a shipment of Jews and were met with surprising armed resistance by the underground Jewish Combat Organization (Żydowska Organizacja Bojowa; ŻOB). Street fighting went on for four days, leaving about 50 Germans—and many more Jews—dead, but affording ŻOB an opportunity to seize some German arms. The Germans withdrew and stopped the deportation scheme until April 19, when SS chief Heinrich Himmler launched a special *Aktion* to clear the ghetto by force in honour of Hitler's birthday, April 20. The 19th was also the first day of Passover, the Jewish holy days celebrating freedom from slavery in Egypt. Before dawn, 2,000 SS men and army troops moved into the area with tanks, rapid-fire artillery, and ammunition trailers. While most remaining Jews hid in bunkers, by prearrangement, the ŻOB and a few independent bands of Jewish guerrillas, in all some 1,500 strong, opened fire with their motley weaponry—pistols, a few rifles, one machine gun, and homemade bombs—destroying a number of tanks, killing German troops, and holding off reinforcements trying to enter the ghetto. The Germans withdrew at evening. The next day the fighting resumed and casualties mounted. The Germans used gas, police dogs, and flamethrowers in an effort to rout the Jews from their bunkers, leaving the city under a pall of smoke for days. Not until May 8 did the Nazis manage to take the ŻOB headquarters bunker. Civilians hiding there surrendered, but many of the surviving ŻOB fighters took their own lives to avoid being taken alive; so died Mordecai Anielewicz, the charismatic young commander of the underground army. The one-sided battle continued until May 16, becoming sporadic as Jewish ammunition was exhausted. Total casualty figures for the uprising are uncertain, but the Germans likely lost several hundred soldiers during the 28 days that it took them to kill or deport over 56,000 Jews. SS Major General Jürgen Stroop supervised the coup de grace: the dynamiting of the Great Synagogue of Warsaw. Thereupon he wrote his report: "The Warsaw Ghetto Is No More."

Warsaw Pact, formally WARSAW TREATY OF FRIENDSHIP, COOPERATION, AND MUTUAL ASSISTANCE (May 14, 1955–July 1, 1991), treaty establishing a mutual-defense organization (Warsaw Treaty Organization) composed originally of the Soviet Union and Albania, Bulgaria, Czechoslovakia, East Germany, Hungary, Poland, and Romania. (Albania withdrew in 1968, and East Germany did so in 1990.) The treaty (which was renewed on April 26, 1985) provided for a unified military command and for the maintenance of Soviet military units on the territories of the other participating states.

The immediate occasion for the Warsaw Pact was the Paris agreement among the Western powers admitting West Germany to the North Atlantic Treaty Organization. The Warsaw Pact was, however, the first step in a more systematic plan to strengthen the Soviet hold over its satellites, a program undertaken by the Soviet leaders Nikita Khrushchev and Nikolay Bulganin after their assumption of power early in 1955. The treaty also served as a lever to enhance the bargaining position of the Soviet Union in international diplomacy, an inference that may be drawn by the concluding article of the treaty, which stipulated that the Warsaw agreement would lapse when a general East-West collective-security pact should come into force.

The Warsaw Pact, particularly its provision for the garrisoning of Soviet troops in satellite territory, became a target of nationalist hostility in Poland and Hungary during the uprisings in those two countries in 1956. The Soviet Union invoked the treaty when it decided to move Warsaw Pact troops into Czechoslovakia in August 1968 to bring the Czechoslovak regime back into the fold after it had begun lifting restraints on freedom of expression and had sought closer relations with the West. (Only Albania and Romania refused to join in the Czechoslovak repression.)

After the democratic revolutions of 1989 in eastern Europe, the Warsaw Pact became moribund and was formally declared "nonexistent" on July 1, 1991, at a final summit meeting of Warsaw Pact leaders in Prague, Czech. Deployed Soviet troops were gradually withdrawn from the former satellite countries, now politically independent countries; and the decades-long confrontation between eastern and western Europe was formally rejected by members of the Warsaw Pact.

Warsaw Uprising (August-October 1944), insurrection in Warsaw during World War II by which Poles unsuccessfully tried to oust the German army and seize control of the city before it was occupied by the advancing Soviet army. The uprising's failure allowed the pro-Soviet Polish administration, rather than the Polish government-in-exile in London, to gain control of Poland.

As the Red Army approached Warsaw (July 29–30, 1944), Soviet authorities, promising aid, encouraged the Polish underground there to stage an uprising against the Germans. However, the Polish underground, known as the Home Army, was anxious because the Soviet Union had already assumed direct control of eastern Poland and had sponsored the formation of the Polish Committee of National Liberation to administer the remainder of Soviet-occupied Polish territory. Hoping to gain control of Warsaw before the Red Army could "liberate" it, the Home Army followed the Soviet suggestion to revolt.

Commanded by General Tadeusz Komorowski (known as Bór), the Warsaw corps of 50,000 troops attacked the relatively weak German force on August 1 and within three days gained control of most of the city. The Germans sent in reinforcements, however, and forced the Poles into a defensive position, bombarding them with air and artillery attacks for the next 63 days.

Meanwhile, the Red Army, which had been detained during the first days of the insurrection by a German assault, occupied a position at Praga, a suburb across the Vistula River from Warsaw, and remained idle. In addition, the Soviet government refused to allow the western Allies to use Soviet air bases to airlift supplies to the beleaguered Poles.

Without Allied support, the Home Army split into small, disconnected units and was forced to surrender when its supplies gave out (October 2). Bór and his forces were taken prisoner, and the Germans then systematically deported the remainder of the city's population and destroyed the city itself.

By allowing the Germans to suppress the Warsaw Uprising, the Soviet authorities also allowed them to eliminate the main body of the military organization that supported the Polish government-in-exile in London. Consequently, when the Soviet army occupied all of Poland, there was little effective organized resistance to its establishing Soviet political domination over the country and imposing the communist-led Provisional Government of Poland (Jan. 1, 1945).

wart, also called VERRUCA, a well-defined small growth of varying shape on the skin surface, caused by a virus. The wart is composed of an abnormal proliferation of cells of the epidermis; the overproduction of these cells is caused by the viral infection. The most common type of wart is a round, raised lesion having a dry and rough surface; flat or threadlike lesions are also seen. Warts are usually painless, except for those in pressure areas, such as the plantar warts occurring on the sole of the foot. They may occur as isolated lesions or grow profusely, especially in moist regions of the body surface.

A single wart may persist for many years without change, or it may spread and give rise to satellite warts in other parts of the body. Warts are considered contagious. Methods of treatment are many but are generally aimed at removing the wart with a minimum of scarring. These methods range from the application of acids or other chemicals that gradually dissolve the wart to surgical excision, which remains the quickest procedure. Warts sometimes disappear spontaneously.

wart cress, also called SWINE CRESS (genus *Coronopus*), any of 10 species of plants of the mustard family (Brassicaceae), native to dry parts of Eurasia and North America. Lesser swine cress (*C. didymus*), a coarse, tough cosmopolitan weed with small, four-petaled white flowers and finely cut leaves, is native to North America but naturalized in Europe. An annual or biennial herb, wart cress bears tightly clustered small flowers, warty, dumbbell-shaped fruits, and a long taproot. It has a strong odour and is tough enough to grow, flattened to the ground, in pathways.

wart snake (genus *Acrochordus*), either of two species of fish-eating aquatic snakes of the Far East, constituting the family Acrochordidae, which is sometimes considered a subfamily of the Colubridae. Wart snakes have thick bodies, loose skins, tiny pyramidal scales that extend across the belly, and valves that close off the mouth and nostrils under water.

The Java wart snake, or elephant's-trunk snake (*A. javanicus*), is a brown snake about 1.2 m (4 feet) long and is found in rivers and coastal waters from China to northern Australia. It provides a sturdy leather commercially known as "water snake." Observations of captive wart snakes have shown that the rough filelike skin serves to grip fish, which are then killed by constriction.

The other species of wart snake, *A. granulatus,* is somewhat smaller and has a finlike keel of skin on its belly. It ranges from southern Asia to the Solomon Islands.

Warta River, river in west-central Poland, flowing 502 miles (808 km) north and west from its source near Zawiercie in the Silesian-Kraków uplands to its confluence with the Oder River at Kostrzyn in the western part of Gorzów Wielkopolski *województwo* (province). It is the second longest river lying entirely in Poland; its basin of 21,084 square miles (54,607 square km) makes it the third largest in Poland. About half its length, from Kostrzyn to Konin, is navigable. The Warta drops 1,224 feet (373 m) from its headwaters to its mouth. The river drains a largely agricultural area of the Polish plain. Częstochowa, Poznań, and Gorzów Wielkopolski are the only major cities along its course.

Wartburg, castle renowned in German history and legend standing on a steep hill overlooking the town of Eisenach, Thuringia, Ger. The hill was fortified as early as 1080. The landgrave Hermann I of Thuringia (died

1217) rebuilt the castle and made it the seat of a lively court frequented by vagrant poets and musicians, including Walther von der Vogelweide and Wolfram von Eschenbach.

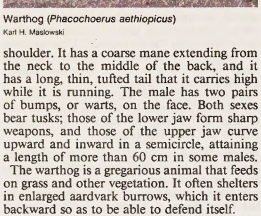
The character of Hermann's Wartburg was recalled, a generation or two later, in the poem known as the *Sängerkrieg*, in which poets compete in singing their rival patrons' praises. Richard Wagner adapted the story for his opera *Tannhäuser* (1845).

From 1485 the castle and the surrounding lands belonged to the Ernestine dukes of Saxony. The elector Frederick III of Saxony sheltered Martin Luther in the Wartburg from May 1521 to March 1522, and Luther began his German translation of the original Greek New Testament there.

In 1817 the Wartburg was the scene of a festival celebrating the Luther tercentenary. A nationalist demonstration by Protestant German students led to repressive measures by governments of the conservative German states.

Charles Alexander of the Ernestine house of Saxe-Weimar-Eisenach (1818–1901) was the chief sponsor of a great restoration of the Wartburg, which had decayed since Luther's time. The castle includes the Romanesque palace of the Thuringian landgraves.

warthog (*Phacochoerus aethiopicus*), member of the pig family, Suidae (order Artiodactyla), found in open and lightly forested areas of Africa. The warthog is a sparsely haired, large-headed, blackish or brown animal standing about 76 centimetres (30 inches) at the



Warthog (*Phacochoerus aethiopicus*)
Karl H. Maslowski

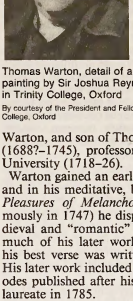
shoulder. It has a coarse mane extending from the neck to the middle of the back, and it has a long, thin, tufted tail that it carries high while it is running. The male has two pairs of bumps, or warts, on the face. Both sexes bear tusks; those of the lower jaw form sharp weapons, and those of the upper jaw curve upward and inward in a semicircle, attaining a length of more than 60 cm in some males.

The warthog is a gregarious animal that feeds on grass and other vegetation. It often shelters in enlarged aardvark burrows, which it enters backward so as to be able to defend itself.

Warton, Joseph (baptized April 22, 1722, Dunsfold, Surrey, Eng.—d. Feb. 23, 1800, Wickham, Hampshire), English critic and classical scholar who anticipated some of the critical tenets of Romanticism. His brother Thomas was poet laureate from 1785 to 1790.

Warton was impatient with some aspects of Neoclassical poetry, as is shown by his poem *The Enthusiast; or the Lover of Nature* (1744). His *Odes on Various Subjects* (1746) was an attempt to emphasize the role of imagination in verse. This was followed in 1756 by the first part of the *Essay on the Writings and Genius of Pope*. Its most striking feature is its insistence on the sublime and pathetic as the highest kinds of poetry and on the importance of originality and freedom from rules. Ethical, didactic, or satiric poetry, such as that of Pope, was considered to be of a second and inferior order.

Warton, Thomas, THE YOUNGER (b. Jan. 9, 1728, Basingstoke, Hampshire, Eng.—d. May 21, 1790, Oxford), poet laureate from 1785 and author of the first history of English poetry, brother of the poet and critic Joseph



Thomas Warton, detail of an oil painting by Sir Joshua Reynolds, 1784; in Trinity College, Oxford
By courtesy of the President and Fellows of Trinity College, Oxford

Warton, and son of Thomas Warton the Elder (1688?–1745), professor of poetry at Oxford University (1718–26).

Warton gained an early reputation as a poet, and in his meditative, blank verse poem *The Pleasures of Melancholy* (published anonymously in 1747) he displayed the love of medieval and "romantic" themes that coloured much of his later work as a critic. Most of his best verse was written before he was 23. His later work included the mandatory formal odes published after his appointment as poet laureate in 1785.

Warton is now most highly regarded as a scholar and as a pioneer of literary history. His *Observations on the Faerie Queene of Spenser* (1754; 2nd enlarged edition, 1762) contains a final section that briefly surveys English literature from Chaucer to the Restoration. It prefigures the work that was to occupy Warton for the rest of his life: *The History of English Poetry from the Close of the Eleventh to the Commencement of the Eighteenth Century*, 3 vol. (1774–81), which he did not live to complete, the history running to the end of Queen Elizabeth's reign early in the 17th century.

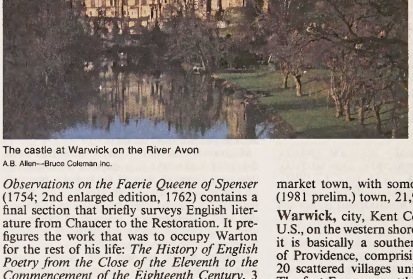
Warwick, city, southeastern Queensland, Australia, on the Condamine River, in the southern Darling Downs. It became associated with sheep breeding in 1840 when Patrick Leslie, the area's first settler, who later played a prominent role in the movement for separating Queensland from New South Wales, moved his flock from New South Wales. Dairying and wheat farming are now the main economic factors. Irrigation is provided by Leslie Dam on nearby Sandy Creek. Named after Warwick, Eng., it was proclaimed a town in 1861 and a city in 1936. Pop. (1981) 8,853.

Warwick, district in the central part of the county of Warwickshire, England, with an area of 109 sq mi (282 sq km). It lies on the southern fringe of the Midlands industrial region, just south of the industrial city of Coventry, while its southern boundary adjoins the rural district of Stratford-on-Avon. The two towns in the district, Warwick and Kenilworth, both grew up around castles. Royal Leamington Spa, chartered in 1875, still functions as a watering place, with both recreational and health facilities. Both Warwick town and Leamington Spa have some light industries, reflecting their proximity to the manufacturing cities of the West Midlands. Pop. (1983 est.) 115,600.

Warwick, parish (town), Warwick district, county of Warwickshire, England, best known for its historic castle. It grew up at a crossing place on the River Avon and was fortified in about 915. By 1086, "Warwic" was a royal borough with 225 houses, and William I ordered the castle to be enlarged. The present castle structure dates mainly from the 14th and 15th centuries and was the work of the Beauchamp family. In 1604 Fulke Greville took possession and converted the castle from a fortress into a dwelling. With its great size, its virtually intact structure, and its fine collections of paintings and armour, Warwick Castle has become a major tourist attraction of the English Midlands.

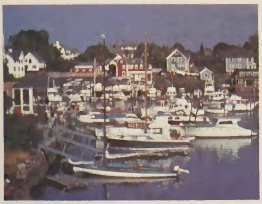
The town has developed around the castle. Only fragments of the medieval walls remain, but these include the east and west gates. Other buildings of note are Lord Leycester Hospital (14th–15th centuries) and Market Hall (1670). Much of the town was rebuilt after a fire in 1694.

Warwick is an administrative centre and a market town, with some light industry. Pop. (1981 prelim.) town, 21,936.



The castle at Warwick on the River Avon
A.B. Allen—Bruce Coleman Inc.

Warwick, city, Kent County, Rhode Island, U.S., on the western shore of Narragansett Bay; it is basically a southern residential suburb of Providence, comprising a group of about 20 scattered villages united administratively. The first European settlement on the site was made at Shawomet (1642) by Samuel Gorton. Later, the colony was named for Robert, earl of Warwick, who supported Gorton's quest to gain protection of a royal charter against the Massachusetts Bay Colony. Town (township) government was organized in 1647. After the widespread destruction caused by King Philip's (Indian) War (1675–76), the township was rebuilt, and gristmills and fulling mills were established along the Pawtuxet River. Warwick has some light industry, including the manufacture of jewelry and silverware, metals, and machinery. The Knight campus



Harbour off Narragansett Bay at Warwick, R.I.
Alan Pitcairn from Grant Heilman—EB Inc.

of Rhode Island Junior College was opened in 1972 in Warwick. The homestead (1774) at Potowomut of Nathanael Greene, the American Revolutionary War general, is preserved. An annual event is the Gaspee Day celebration, recalling the burning offshore of the British revenue schooner *Gaspee* in 1772 by Rhode Island patriots. Warwick's Musical Theater is one of the largest arena theatres in the world. Inc. city, 1931. Warwick is part of the Providence metropolitan area. Pop. (1990) 85,427.

Warwick, EARLS OF, titled English nobility of several creations, grouped below chronologically and indicated by the symbol •.

• Warwick, Thomas II de Beauchamp, 4th Earl of (d. July 8, 1401), one of the leaders in the resistance to England's king Richard II.

He succeeded his father, Thomas I de Beauchamp, as earl in 1369. He served on the lords' committee of reform in the Good Parliament in 1376 and again in 1377, and he was a member of the commission of inquiry in 1379. Appointed governor to Richard II in February 1381, Warwick joined the nobles who sought to impose their authority on the king and was one of the lords appellant in 1388.

After the overthrow of his party in 1389, Warwick lived in retirement; but, although he had for the moment escaped Richard's vengeance, he was not forgiven. Being invited with both Thomas of Woodstock, Duke of Gloucester, and Thomas Arundel to a banquet at court on July 10, 1397, he alone of the three was imprudent enough to obey the summons. He was immediately arrested and imprisoned in the Tower of London, in that part of the fortress since known as the Beauchamp Tower. Warwick made a full confession in Parliament; his honours were forfeited, and he himself banished. He was again in the Tower in 1398 but was liberated and restored to his honours on the accession of Henry IV.

• Warwick, Richard Beauchamp, 5th Earl of (b. Jan. 25/28, 1382, Salwarpe, Worcestershire, Eng.—d. April 30, 1439, Rouen, Fr.), soldier and diplomatist, a knightly hero who served the English kings Henry IV, Henry V, and Henry VI.

Richard Beauchamp succeeded his father, the 4th earl, in 1401. He fought for Henry IV against Sir Henry Percy ("Hotspur") in the Battle of Shrewsbury (July 21, 1403), and he assisted in the suppression of Owen Glendower's rebellion in Wales. On his return from a pilgrimage to Rome and the Holy Land, Warwick was made a member of the King's Council (1410).

Warwick was appointed captain of Calais (February 1414) by Henry V, was the king's chief lay representative at the Council of Constance (October 1414), and frequently was employed in diplomatic negotiations with the French and Burgundian courts. He was also one of Henry V's principal lieutenants in the conquest of Normandy and Picardy (1417–22); as a reward he received the French county of Aumale (1419).

After the death of Henry V (Aug. 31, 1422), Warwick helped to prevent Humphrey, Duke of Gloucester, from becoming regent for the infant Henry VI. Although he was a member of the council that ruled England for some years, Warwick evidently spent much time in France. Because of his prudence, the council appointed him tutor to the young king (June 1428–May 1436). While attending the king in France (1430–32), Warwick was present at the trial and execution of Joan of Arc and scored a notable victory over the French near Beauvais (1431). He died while serving as English military governor in France and Normandy (from 1437).

One of the greatest English landowners, Warwick enlarged his estates by successive marriages to two heiresses. He founded (1422–23) a chantry at Guys Cliffe, Warwickshire; a chaplain there, John Rous, in the second



Richard Beauchamp, Earl of Warwick, kneeling to receive the appointment of captain of Calais, manuscript illumination from "The Pageant of Richard Beauchamp," 15th century; in the British Library (Ms. Cotton Julius E.IV)
Reproduced by permission of the British Library

half of the 15th century wrote a biography of the earl, stressing his deeds of chivalry. The Beauchamp Chapel in the Church of St. Mary, Warwick, was built (1443–64) by the earl's executors. In the chapel is the earl's tomb (a brass recumbent effigy on a Purbeck marble tomb chest), one of the finest medieval monuments in England.

• Warwick, Richard Neville, 1st Earl of, 2ND EARL OF SALISBURY, byname THE KINGMAKER (b. Nov. 22, 1428—d. April 14, 1471, Barnet, Hertfordshire, Eng.), English nobleman called, since the 16th century, "the Kingmaker," in reference to his role as arbiter of royal power during the first half of the Wars of the Roses (1455–85) between the houses of Lancaster and York. He obtained the crown for the Yorkist king Edward IV in 1461 and later restored to power (1470–71) the deposed Lancastrian monarch Henry VI.

The son of Richard Neville, 1st (or 5th) Earl of Salisbury (d. 1460), he became, through marriage, Earl of Warwick in 1449 and thereby acquired vast estates throughout England. In 1453 Warwick and his father allied with Richard, Duke of York, who was struggling to wrest power from the Lancastrian Edmund Beaufort, Duke of Somerset, chief minister to the ineffectual king Henry VI. The two sides eventually took up arms, and, at the Battle of St. Albans, Hertfordshire, in May 1455, Warwick's flank attack won a swift victory for the Yorkists. As his reward Warwick was appointed captain of Calais, an English possession on the coast of France. From Calais he crossed to England in 1460 and defeated and captured Henry VI at Northampton (July 10). York and Parliament agreed to let Henry keep his crown, probably because of the influence of Warwick, who preferred to have a weak king.

The situation soon changed, however. York and Warwick's father, the Earl of Salisbury, were killed in battle in December 1460, and on Feb. 17, 1461, the Lancastrians routed Warwick at St. Albans and regained possession of the king. Retreating, Warwick joined forces with York's son Edward; they entered London unopposed, and on March 4, 1461, Edward proclaimed himself king as Edward IV. Later that month Warwick and Edward won a decisive victory over the Lancastrians at Towton, Yorkshire.

Although Warwick wielded the real power for the first three years of Edward's reign, gradually the king began to assert his independence. Warwick hoped to marry Edward to a French noblewoman—thereby gaining France as an ally—but Edward spoiled this scheme by secretly wedding Elizabeth Woodville in May 1464. Tensions between the two men mounted as Edward provided his wife's relatives with high state offices.

Warwick then won to his side Edward's brother George, Duke of Clarence. In August 1469 they seized and briefly detained the king and executed the queen's father and one of her brothers. A fresh revolt engineered by Warwick broke out in northern England in March 1470; after suppressing it, Edward turned on Warwick and Clarence, both of whom fled to France (April 1470). There Warwick was reconciled with his former enemy, Margaret of Anjou, Henry VI's wife. Returning to England in September 1470, he drove Edward into exile and put Henry VI on the throne. Once more Warwick was master of England. Edward landed in the north in March 1471, however, and on April 14 his troops killed Warwick at the Battle of Barnet.

BIBLIOGRAPHY. Warwick's career is recounted in Paul Murray Kendall, *Warwick the Kingmaker* (1957, reissued 1985).

• Warwick, John Dudley, 1st Earl of: *see* Northumberland, John Dudley, Duke of.

• Warwick, Robert Rich, 2nd Earl of, BARON RICH (b. June? 1587—d. April 19, 1658, London, Eng.), English colonial administrator and advocate of religious toleration in the North American Colonies. As admiral of the fleet in 1642, he secured the adherence of the navy to the Parliamentary cause in the English Civil Wars (1642–51).

He was the eldest son of Robert Rich, 1st Earl of Warwick, and his wife, Penelope (*née* Devereux; the "Stella" of Sir Philip Sidney's *Astrophel and Stella*); and he succeeded to the earldom in 1619. He joined the Bermudas, Guinea, Amazon River, and New England companies, and also the Virginia Company, which was suppressed in 1624 because of a quarrel between Warwick and other members. His Puritan sympathies, which lost him favour at the English court, were advantageous to his association with the New England Colonies. In 1628 he helped the Puritans to obtain the patent for the Massachusetts Bay Colony, and

in 1632 he granted the patent for the settlement (1635) of Saybrook, Conn. Compelled in 1632 to resign the presidency of the New



Robert Rich, 2nd Earl of Warwick, engraving
By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

England Company, he continued to manage the Bermudas Company as well as the Providence Island Company (founded 1630), which administered Old Providence on the Mosquito Coast of Central America and which provided a convenient meeting place for critics of royal policy.

In England Warwick and his brother Henry Rich, 1st Earl of Holland, were among the leading Puritans, particularly in the House of Lords in the Long Parliament. In March 1642 the House of Commons, despite a veto by King Charles I, appointed Warwick admiral of the fleet; in July of that year the navy, induced by Warwick, went over to the side of Parliament. During the English Civil Wars he intercepted the king's ships and relieved threatened ports.

In 1643 Warwick was appointed head of a colonial government commission, which in 1644 incorporated Providence Plantations, afterward Rhode Island. In this office he attempted to secure a guarantee of religious liberty in the colonies. The city of Warwick, R.I., is named for him.

Warwickshire, county of England in the Midlands. As an administrative unit the county dates from the 10th century, with the historic county town of Warwick lying roughly at its centre. In the reorganization of local government in 1974, however, the county was considerably reduced in area and altered in character. The populous, industrial northwestern section, containing the cities of Birmingham and Coventry, was cut away to form part of a new county, West Midlands, which was designated a metropolitan area in 1986. Warwickshire was left with a largely rural landscape of woodland and meadow, with only a few small towns. Its area is 765 square miles (1,981 square km) and includes five districts: North Warwickshire, Nuneaton and Bedworth, Rugby, Stratford-on-Avon, and Warwick.

Warwickshire is drained mainly to the west by the River Avon and its tributaries. In the extreme south are the headwaters of the River Cherwell, a tributary of the River Thames, and in the north a small area drains to the River Trent. The undulating countryside is developed upon sedimentary rocks, many of which have the bright red colour of the New Red Sandstone. In the north there are coal measures, and mining has taken place since the 13th century around Nuneaton. Glacial drift coats many parts of the county.

In early times much of the county was heavily wooded, and there is little evidence of prehistoric settlement. Several major Roman roads passed through the area, and one of them, Watling Street, still forms the county boundary with Leicestershire on the northeast. However, there were no important Roman settlements. In Saxon times the area formed a border zone between the kingdoms of Wessex and Mercia. The lands north of the Avon became known as Arden: they were heavily wooded, with dispersed settlement and isolated farmsteads. To the south of the Avon lay Feldon, open countryside with nucleated villages such as Brailes and Kineton. This distinction continued well into the Norman era.

During the medieval period two major centres grew up at Warwick and Kenilworth, each with a Norman castle. There are also a number of moated houses in the county, such as Baddesley Clinton Hall and Maxstoke Castle, both built in the 14th century. Beaudesert and Berkswell have Norman churches. Sutton-under-Brailes and Pillerton Hersey have Early English churches, and Knowle has a Perpendicular, or Late Gothic, structure. Stratford has many famous buildings associated with William Shakespeare. The Battle of Edgehill, the first serious clash of the English Civil Wars, was fought in Warwickshire near the Oxfordshire border in 1642.

Modern Warwickshire is predominantly a farming county. Dairy farming is important, and the southwestern part of the county, bordering the fruit-growing Vale of Evesham, is noted for orchards and market gardening. The coalfield in the northern tip of the county is industrialized, and light industries and residential suburbs have spread from the manufacturing belt of the West Midlands. Pop. (1988 est.) 484,600.

Warwickshire Avon (river, England): *see* Avon, Upper.

Was, Juan: *see* Guas, Juan.

Wasatch National Forest, in the Stansbury, Sheeprock, Wasatch, and Uinta mountains of Utah and Wyoming, U.S. Established in 1906, it has an area of 1,072,443 acres (434,002 hectares) in four divisions. The forest contains a portion of the High Uintas Primitive Area, which extends into Ashley National Forest on the south, and a number of ski resorts. Other of the forest's popular sports are trout fishing, hunting, riding, and hiking. Headquarters are at Salt Lake City.

Wasatch Range, segment of the south-central Rocky Mountains, extending southward for about 250 miles (400 km), from the bend of the Bear River in southeastern Idaho, U.S., to beyond Mount Nebo, near Nephi in north-central Utah. It lies east of Great Salt Lake and Salt Lake City and includes the Bear River Range at the northern end. South and east of Salt Lake City are many peaks that surpass 11,000 feet (3,400 m), including Mount Timpanogos (12,008 feet [3,660 m]), the highest point in the Wasatch. The mountains tower more than 6,000 feet (1,830 m) above the lake valley immediately to their west.

The Mormons, present in the valley since 1847, used the mountain streams for irrigation. A headstream region for the Ogden River, the range embraces parts of the Cache, Uinta, and Wasatch national forests and the Timpanogos Cave National Monument. Mining and tourism are the main economic activities.

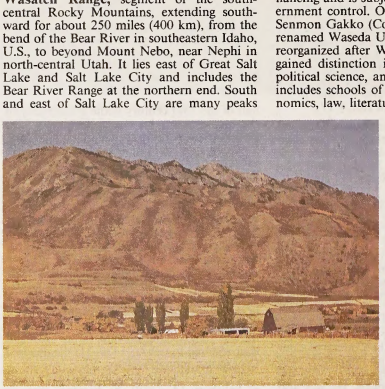
Wase (ancient Egypt): *see* Thebes.

Wase, town, Plateau state, east-central Nigeria, near the Wase River and at the intersection of roads from Bashar, Langtang, and Shendam. It was founded about 1820 by Hassan, a Fulani official from Bauchi, 85 miles (137 km) north, in an area traditionally inhabited by the Basherawa people and at that time ruled by the Jukun. It became the headquarters of a chiefdom, which was enlarged by the conquest of neighbouring peoples and owed allegiance to the emir of Bauchi. Troops of the Royal Niger Company entered the walled town in 1898; following the British occupation of Bauchi in 1902, Wase was declared independent of Bauchi, and its *sarkin* ("chief") was titled emir.

Wase emirate continues to function as a unit, within Plateau state, for some traditional purposes. The majority of its inhabitants are the Yergum (Yergam), Angas, and Basherawa peoples (all predominantly non-Muslim) and the Muslim Fulani. Farming is the chief occupation; the staple crops are sorghum and millet. Mining has long been important around Zurak, 40 miles (64 km) east-northeast of Wase town; the production at Wase and at Zurak of lead and zinc, some of which is exported to Europe, is now controlled by the emir of Wase.

A notable topographic feature, Wase Rock, an 800-foot- (240-metre-) high hill, rises sharply above the savanna. The town has a health office and a dispensary. Pop. (latest census) 4,304.

Waseda University, Japanese WASEDA DAIGAKU, coeducational institution of higher learning founded in 1882 in Tokyo. The school is private but receives some government financing and is subject to some degree of government control. Originally known as Tokyo Senmon Gakko (College), the institution was renamed Waseda University in 1902 and was reorganized after World War II. Waseda has gained distinction in the fields of literature, political science, and business education and includes schools of political science and economics, law, literature, education, commerce,



Cache Valley in the Wasatch Range, northern Utah
Josef Muench

science and engineering, and social science. Attached to the university are institutes of social sciences, comparative law, language teaching, business administration research, research in contemporary political and economic affairs, and system science; a castings research laboratory; an electronic computation centre; and a science and engineering research laboratory.

Waser, Johann Heinrich (b. April 2, 1600, Zürich—d. Feb. 20, 1669, Zürich), burgomaster (mayor) of Zürich and one of the most prominent Swiss political figures of the mid-17th century.

Waser enjoyed an active role as an arbiter among the Protestant cantons and in the confederation Diet, and in 1644 he presided over a tribunal adjudicating an intercommunal dispute in the Grisons. Chosen burgomaster of Zürich in 1652, he succeeded in peacefully quelling a local peasant disturbance the following year; but his counsels of moderation in the face of widespread rural discontent were largely ignored in the other cantons. Against threats of a disruption of the confederation—the results of continuing antagonism between Catholic and Protestant cantons—he urged the strengthening of the confederation and proposed the replacement of the numerous traditional local alliances with a single unitary treaty conferring equal rights and obligations on all confederation members (1655). Despite his initial opposition to continuing the French alliance, Waser subsequently headed the official confederation delegation at Paris that brought about its renewal (1663).

wash (dry stream bed): *see* arroyo.

Wash, The, shallow bay of the North Sea, 15 mi (24 km) long and 12 mi wide, between the counties of Lincolnshire and Norfolk, England. It once extended as far inland as Peterborough and Cambridge but was largely filled in by silt, brought chiefly by rivers but partly washed in by coastal currents. Land was reclaimed by artificial drainage at several points, and seawalls were built to protect the low coastal lands. At low tide the river waters reach the sea through shallow creeks between banks of sand and mud. The two main channels, Boston and Lynn deeps, provide anchorage for small vessels trading to Boston and King's Lynn.

wash drawing, artwork in which a fine layer of colour—usually diluted ink, bistre (*q.v.*), or watercolour—is spread with a brush over a broad surface evenly enough so that no brush marks are visible in the finished product. Usually the technique is used in conjunction with lines made by a pen or pencil that define and outline, while the wash provides colour, depth, and volume. The free use of coats of wash first appeared in the works of such 15th-century Italian artists as Sandro Botticelli and Leonardo da Vinci. Within the next 100 years, this technique was so highly developed that two-tone washes were used concurrently, one shading into the other.

Because it was considered especially suitable for landscape, the technique was very popular with the topographical painters of the 18th and 19th centuries, who built up their pictures by superimposing thin washes in the same way that an oil painter would construct a work with successive glazes: a preliminary foundation of monochrome was laid in over the whole surface (except areas left for highlights), and colours were then added, building up toward the final effect. The use of wash has declined considerably since the end of the 19th century.

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Washakie (b. *c.* 1804, Montana—d. Feb. 20, 1900, Ft. Washakie, Wyo., U.S.), Shoshoni chief who performed extraordinary acts of friendship for white settlers while exhibiting tremendous prowess as a warrior against his people's tribal enemies.

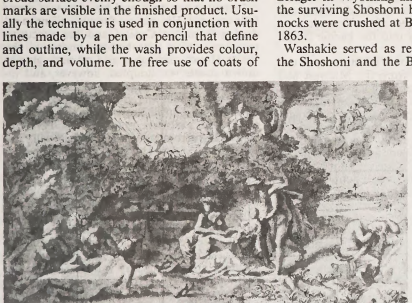
The son of a Umatilla father and Shoshoni mother, he left the Umatilla while an adolescent to join his mother's tribe. By the 1840s Washakie was chief of the Eastern Band (sometimes called Washakie's Band) of Wyoming Shoshoni.

Although quite vain—he loved to be the centre of elaborate ceremonies—Washakie was kind and generous to whites passing through Shoshoni territory under his control. He and his people assisted emigrants in crossing dangerous rivers and in recovering stray animals. Nine thousand grateful settlers once signed a document commending Washakie and his Shoshoni Band for their exemplary treatment. Even when livestock belonging to whites destroyed his people's root and herding grounds, Washakie made sure no violent repercussions occurred.

In the fall of 1862, however, Washakie was unable to prevent a large number of his followers from joining the Bannocks in attacking and plundering white settlements. He took loyal members of his band with him to Ft. Bridger in Wyoming and then reunited with the surviving Shoshoni hostiles after the Bannocks were crushed at Bear River on Jan. 29, 1863.

Washakie served as representative for both the Shoshoni and the Bannocks at the 1868 Ft. Bridger negotiations. As a result of these negotiations, Washakie's people surrendered the Green River Valley of eastern Utah and southern Wyoming to provide the right of way for the Union Pacific Railroad. During the Sioux War of 1876, Washakie sent many of his warriors to fight alongside U.S. government troops against the traditional enemies of the Shoshoni. In fact, the Chief himself frequently served as a scout during the U.S. Army's campaigns against the Cheyenne, Sioux, Arapaho, Ute, and other tribes hostile to the United States.

Washakie spent his last years on the Shoshoni reservation, where he continued to rule as absolute dictator. When younger aspirants sought to depose him, the 70-year-old chief disappeared for two months. Then, just as the tribal council met to select a new leader, in strode Washakie with six scalps collected on the warpath as proof of his undiminished prowess.



"The Infant Bacchus Entrusted to the Nymphs," pen and bistre wash drawing squared with red chalk by Nicolas Poussin, 1657; in the Fogg Art Museum, Harvard University, Cambridge, Mass.

By courtesy of the Fogg Art Museum, Harvard University, gift of Mr. and Mrs. Donald S. Stralem

Washburne, Carleton W(olsey) (b. Dec. 2, 1889, Chicago—d. Nov. 17, 1968, Okemos, Mich., U.S.), U.S. educator noted for his innovations in school programs known as the Winnetka Plan (*q.v.*).

Washburne attended Chicago schools administered by John Dewey and Francis Parker before earning his bachelor's degree at Stanford University (Stanford, Calif.) and earning a doctorate in education at the University of California.

After teaching in California schools (1912–14) and serving as head of the science department at San Francisco State Teachers College (1914–19), Washburne returned to Illinois to become superintendent of schools in Winnetka, Ill., where he promoted early childhood education, created middle schools, and instituted guidance programs in elementary schools. He stayed in Winnetka until 1945, simultaneously serving as chairman of the Winnetka Summer School for Teachers and, from 1932, the Winnetka Graduate Teachers College.

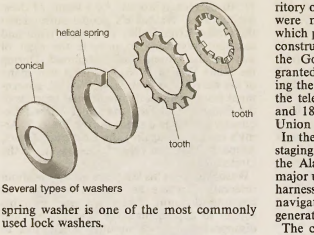
During and after World War II Washburne played an important role in reorganizing the public school system of Italy. He also directed the graduate division and the teacher education program at Brooklyn College in New York City (1949–60). He concluded his career as distinguished professor of education at Michigan State University in East Lansing (1961–67).

Among his writings were *New Schools in the Old World* (1926), *Adjusting the School to the Child* (1932), *A Living Philosophy of Education* (1940), *What Is Progressive Education?* (1952), *The History and Significance of an Educational Experiment* (1963), and *Window to Understanding* (1968).

washer, machine component that is used in conjunction with a screw fastener such as a bolt and nut and that usually serves either to keep the screw from loosening or to distribute the load from the nut or bolt head over a larger area. For load distribution, thin flat rings of soft steel are usual.

To prevent loosening, several other types of washers are used. All act as springs to compensate for any increase in the distance between the head of a bolt and the nut, or between the head of a screw and the object being clamped. In addition to the spring action, some of these washers have teeth that bite into the workpiece and the screwhead and provide a locking action. They are called tooth or shakeproof lock washers and have teeth that are bent and twisted out of the plane of the washer face.

The conical washer shown at the left in the drawing has spring action, but the only locking action is provided by friction. The helical



Several types of washers

spring washer is one of the most commonly used lock washers.

washing soda, sodium carbonate decahydrate, efflorescent crystals used for washing, especially textiles. It is a compound of sodium (*q.v.*).

Washington, town in Sunderland metropolitan borough, metropolitan county of Tyne and Wear, historic county of Durham, England. It lies along the north side of the River Wear below Chester-le-Street. The site was an area of early coal mining and industrial activity and was associated with the Wear coal trade to London from the 17th century. It includes the ancient village of Washington, together with its hall, which was the family seat of the forebears of the first U.S. president, George Washington. The coal industry collapsed in the late 20th century, and the town's economy subsequently diversified. The town has a wildfowl refuge and an arts centre. Pop. (1991) 56,848.

Washington, constituent state of the United States of America, lying at the northwest corner of the coterminous 48 states. The capital is Olympia. Area 68,126 square miles (176,446 square km). Pop. (2000) 5,894,121.

A brief treatment of Washington follows. For full treatment, *see* MACROPAEDIA: United States of America: *Washington.*

Facing the Pacific Ocean to the west, Washington is bounded on the south by Oregon, on the east by Idaho, and on the north by the Canadian province of British Columbia. Roughly rectangular in shape, the state extends about 350 miles (560 km) from east to west and 240 miles (386 km) from north to south. The Strait of Juan de Fuca and Puget Sound extend inland into the state about 200 miles (320 km) from the open Pacific, providing excellent harbours.

At the time of initial European exploration, the leading Native American peoples in the area were the Chinook, the Coast Salish, and the Nez Percé and Yakima. The first white men to see the Washington coast were Spanish sailors searching for a Northwest Passage to facilitate trade with the Orient. Bruno Heceta landed and claimed the Washington area for Spain in 1775. George Vancouver, an Englishman, and Robert Gray, an American, both sea captains, made claims for their respective countries in 1792. The Lewis and Clark expedition, traveling from the east, reached the mouth of the Columbia River in 1805, strengthening the United States' claim to the region. Protestant and Roman Catholic Indian missions had been established in eastern Washington by the 1830s. American and British fur trading was the predominant activity into the 1840s.

Spain surrendered to the United States its claims to the territories north of California in 1819. Until the 1840s international agreement permitted citizens of both the United States and Great Britain to settle and trade in what was still known as Oregon Country. In 1846 a treaty with Great Britain set its northern limit at the present Washington-Canada boundary, and the Oregon Country was formally added to the United States. It was renamed the Territory of Oregon in 1848. The first settlements were mainly logging camps and sawmills, which prospered by supplying the demand for construction materials in California following the Gold Rush. In 1853 Washington was granted separate territorial status, and, following the growth stimulated by the extension of the telegraph and railroads during the 1870s and 1880s, Washington was admitted to the Union as the 42nd state in 1889.

In the late 1890s Washington was the main staging point for gold miners who set out for the Alaskan and Yukon strikes. The state's major undertaking of the 20th century was the harnessing of the Columbia River basin for navigation, irrigation, hydroelectric-power generation, flood control, and recreation.

The climates of eastern and western Washington are dominated by the Pacific Ocean and are relatively milder than other states at the same latitudes. Seattle, on the west, has an average January temperature of 41° F (5° C) and a July temperature of 66° F (19° C), while Spokane, on the east, registers 25° F (−4° C) and 70° F (21° C).

Washington has seven distinct physiographic regions. The Olympic Mountains in the northwest reach 7,965 feet (2,428 m), and densely wooded rainforests extend along the western slopes. Annual precipitation in the region is extremely diverse, varying from more than 150 inches (3,810 mm) along the western coast to only 16 inches (406 mm) in the northeast. The Willapa Hills parallel the coast from Grays Harbor to the Columbia River. The Puget Sound Lowland, stretching from Canada to Oregon between the Olympic and the Cascade mountains, has a mild climate, relatively flat terrain, and excellent harbours. The Cascade Range has peaks ranging from 4,000 feet (1,220 m) in the south to 8,000 feet (2,440 m) in the north, as well as several higher peaks of volcanic origin such as Mount Rainier (14,410 feet [4,392 m]) and Mount St. Helens, which erupted in 1980 and again in 1981. The Columbia Basin is a basalt plateau cut with steep-walled gorges, called coulees, and covered with fertile, volcanic soils. In the northeastern corner of the state are the Okanogan Highlands, and in the extreme southeast is an extension of the Blue Mountains of Oregon.

Streams in the area east of the crest of the Cascade Mountains drain into the Columbia River and its major tributaries, the Snake, the Yakima, the Okanogan, the Pend Oreille, and the Spokane. Rivers west of the Cascade crest generally flow directly into the Pacific Ocean or Puget Sound.

The early settlement of Washington was primarily by Americans from the Midwest and by Canadian and Scandinavian immigrants. Roughly one-fifth of the state's population is nonwhite, the largest groups being Asians and Native Americans. Seattle, the largest city, is the focal point of a large urban conglomeration contained in five counties bordering on southern Puget Sound, which together contain about three-fifths of the state's population.

The economy of Washington is mixed, with growing service and technology sectors and a traditional dependence on water and forest resources, agriculture, and government. It leads all states in hydroelectric-power generation, with more than one-third of the national total. The state's most important manufactures are aircraft and aircraft parts, lumber and wood products, processed food, paper and allied products, primary metals (aluminum), and nonelectrical machinery. Relatively large agricultural crops include wheat, apples, and potatoes. Government controls almost half the land area, generates almost all the state's electrical power, and operates most irrigation projects and several military bases. Employment is heavily dependent on military contracts to the aircraft, aerospace, shipbuilding, and construction industries. Washington's role in interstate and international commerce is made most important by its strategic waterways and air links. A growing tourism industry is focused on the state's scenic mountains and water. The National Park Service operates Mount Rainier, North Cascades, and Olympic national parks and eight other national historic sites and recreation areas.

Washington retains a Western and pioneer flavour. However, growing cosmopolitanism, especially in the Puget Sound area, has developed particularly around festivals, sports, and the arts. The largest institutions of higher education are the University of Washington at Seattle and Washington State University at Pullman. Established by Congress in 1982, the Mount St. Helens National Volcanic Monument is administered by the U.S. Forest Service.

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Washington, in full WASHINGTON, D.C. ("District of Columbia"), city and capital of the United States of America. The city of Washington, which is coextensive with the District of Columbia, is situated at the navigational head of the Potomac River between Maryland to the northeast and Virginia to the southwest. District of Columbia, 68 square miles (176 square km); metropolitan area, 2,809 square miles (7,275 square km). Pop. (2000) District of Columbia, 572,059; Washington PMSA, 4,923,153; Washington–Baltimore CMSA, 7,608,070.

A brief treatment of Washington, D.C., follows. For full treatment, *see* MACROPAEDIA: Washington, D.C.

The District of Columbia was chosen by Congress in 1790 as the site for a permanent seat of government for the new nation. Washington thus became one of the few cities in the world that was planned expressly as a national capital; it contains many historical artifacts and revered monuments.

The site for the city of Washington was proposed by the city's namesake, the first U.S. president, George Washington. He negotiated a contract with the French military engineer Pierre-Charles L'Enfant to design a plan for the city. Influenced by Baroque landscape architecture, L'Enfant incorporated much of that style into his design. L'Enfant was dismissed from the project before the Capitol's cornerstone was laid, and his plan was never fully realized. His scheme for wide avenues radiating from the Capitol and the executive mansion, which later became known as the White House, through a grid of rectangularly drawn streets was adopted, however, and resulted in the interesting complex of circles and parks throughout the city. His vision of the Capitol's long vista westward down the Mall and of the executive mansion's similar vista southward across it were realized as well. Despite the changing styles of architecture over the years, the Capitol and White House remain the focal point for the city.

The Federal Triangle is a major complex of public buildings that joins the grounds of the White House to those of the Capitol. The triangle's base is the Mall and the Ellipse and its hypotenuse Pennsylvania Avenue between the Capitol and the White House. The buildings within it are occupied by various Cabinet departments and other government agencies. Several buildings of the Smithsonian Institution—including the National Gallery of Art and other museums—are on the Mall west of the Capitol. The House and Senate office buildings, the Supreme Court, and the Library of Congress surround the Capitol.

The Washington Monument's lofty obelisk stands on the Mall south of the White House and the Ellipse. Nearby, the elegant Jefferson

Memorial stands on the Tidal Basin, and the Lincoln Memorial frames the western end of the Mall. These three are the most famous of the city's more than 300 memorials and statues.

Much of the contrast evident within the Washington area stems from the diversity of its neighbourhoods. Stretching from the northwestern section of the city into the Maryland suburbs are the generally white middle-class neighbourhoods housing many of the city's civil servants. Overlooking the Potomac in the western part of the city is Georgetown, the oldest and most prestigious neighbourhood in Washington. Foreign embassies dot these two areas. From 16th Street northeastward, joining other Maryland suburbs, lies most of the city's African American community, whose dwellings range from homes for the conspicuously well-to-do to subsidized housing projects. To the southwest across the Potomac River in Virginia are Arlington National Cemetery, the Ronald Reagan Washington National Airport, and the Pentagon, headquarters of the military establishment. To the south and within the District, the area between the Anacostia and Potomac rivers has been the site of some of the newest government office buildings, and urban renewal has replaced slums there with upper middle-class apartments and townhouses. The southeast quarter of the city has a large African American population and many individual homes of middle- and high-ranking congressional staff members and other government employees.

Nine colleges and universities are located in the Washington area. Outstanding are Georgetown University, the area's oldest; Howard University, which opened in the 1860s; George Washington University; and American University. Washington has become a major cultural centre, especially since the opening in 1971 of the John F. Kennedy Center for the Performing Arts, with its three theatres for concerts, drama, and opera.

Washington, city, seat (1805) of Wilkes county, northeastern Georgia, U.S., roughly halfway between Athens and Augusta. First settled by the Stephen Heard family from Virginia in 1773, it was laid out in 1780 and was one of the first U.S. communities to be named in honour of George Washington. During the American Revolution the Battle of Kettle Creek (Feb. 14, 1779) was fought nearby. The last Cabinet meeting of the Confederacy was held there on May 5, 1865, at the end of the American Civil War. Local residents, who call the city Washington-Wilkes (to distinguish it from Washington, D.C.), perpetuate the legend that when Union troops seized the Confederate treasury (June 1865), they missed $100,000 in gold that remains buried in the vicinity. The Washington Historical Museum has a collection of Civil War artifacts.

The city has a mixed economy, and tourism is of growing importance. J. Strom Thurmond (Clark Hill) Dam and Lake and Elijah Clark Memorial State Park are nearby. Inc. 1804. Pop. (2000) 4,295.

Washington, city, seat of Beaufort county, eastern North Carolina, U.S. It lies along the Pamlico–Tar River estuary, just east of Greenville. Founded by Colonel James Bonner in 1771 and originally known as Forks of Tar River, it was one of the first places in the United States to be named (Dec. 7, 1776) for George Washington. During the American Civil War it was occupied by Union troops (1862–64), who burned it as they left. The city suffered another disastrous fire in 1900.

The city's economy is based on agriculture (tobacco, peanuts [groundnuts], vegetables, and cotton), light manufacturing, phosphate mining, and services. Beaufort County Community College (1967) is located there. Tourism and recreation are also important. Nearby are Lake Mattamuskeet and Swanquarter National Wildlife Refuge on Pamlico Sound (on the north-south Atlantic Flyway of migratory birds), Goose Creek State Park, and the historic town of Bath. Inc. 1782. Pop. (2000) 9,583.

Washington, city, seat (1781) of Washington county, southwestern Pennsylvania, U.S. It lies 28 miles (45 km) southwest of Pittsburgh.

The Virginia constitution of 1776 validated Pennsylvania's claim to the area. The town was laid out by David Hoge in 1781. It was early known as Catfish's Camp and then, for a short time, as Bassett-town until it was renamed for George Washington. The town was a hotbed of activity during the Whiskey Rebellion (1794). The nation's first crematory was opened there in 1876 by Francis Julius Le Moyne, who constructed the building at night because of popular opposition to cremation.

The city is a service point for an agricultural, light-industrial, and coal-mining area. Washington and Jefferson College was formed in 1865 by the merger of Washington Academy (1781) and Jefferson College (1802). The Pennsylvania Trolley Museum is also in the city. Inc. city, 1924. Pop. (2000) 15,268.

Washington, also called WASHINGTON-ON-THE-BRAZOS, historic town on the Brazos River, Washington County, southeastern Texas, U.S. The town lies 45 miles (72 km) northwest of Houston. It originated in 1821 as a ferry crossing. Washington is remembered as the birthplace of the Texas Republic. At a convention held there in an unfinished wooden building (reconstructed as Independence Hall), the Texas Declaration of Independence was issued (March 2, 1836) and the Constitution adopted (March 17); David G. Burnet was inaugurated as provisional president and Sam Houston as commander in chief of the Texas Army. Because the town was threatened at that time by General Santa Anna's Mexican forces, Burnet named Harrisburg on the Buffalo Bayou as temporary capital. Washington, however, did serve briefly as the capital in 1842. The community, incorporated in 1837, remained important until bypassed by the railroad in 1858, after which it rapidly declined. Washington-on-the-Brazos State Park, occupying 164 acres (66 hectares) along the river and deeded by private owners in 1916, has been the site of extensive restoration; it embraces the replica of Independence Hall, the Star of the Republic of Texas Museum, and the office and home of Anson Jones (last president of the republic).

Washington, Booker T(aliaferro) (b. April 5, 1856, Franklin County, Va., U.S.—d. Nov. 14, 1915, Tuskegee, Ala.), educator and reformer, first president and principal developer of Tuskegee Institute, and the most influential spokesman for black Americans between 1895 and 1915.



Booker T. Washington
By courtesy of the Library of Congress, Washington, D.C.

He was born in a slave hut but, after emancipation, moved with his family to Malden, W.Va. Dire poverty ruled out regular schooling; at age nine he began working, first in a salt furnace and later in a coal mine. Determined to get an education, he enrolled at the Hampton Normal and Agricultural Institute in Virginia (1872), working as a janitor to help pay expenses. He graduated in 1875 and returned to Malden, where for two years he taught children in a day school and adults at night. Following studies at Wayland Seminary, Washington, D.C. (1878–79), he joined the staff of Hampton.

In 1881 Washington was selected to head a newly established normal school for blacks at Tuskegee, an institution with two small, converted buildings, no equipment, and very little money. Tuskegee Normal and Industrial Institute became a monument to his life's work. At his death 34 years later, it had more than 100 well-equipped buildings, some 1,500 students, a faculty of nearly 200 teaching 38 trades and professions, and an endowment of approximately $2,000,000.

Washington believed that the best interests of black people in the post-Reconstruction era could be realized through education in the crafts and industrial skills and the cultivation of the virtues of patience, enterprise, and thrift. He urged his fellow blacks, most of whom were impoverished and illiterate farm labourers, to temporarily abandon their efforts to win full civil rights and political power and instead to cultivate their industrial and farming skills so as to attain economic security. Blacks would thus accept segregation and discrimination, but their eventual acquisition of wealth and culture would gradually win for them the respect and acceptance of the white community. This would break down the divisions between the two races and lead to equal citizenship for blacks in the end. In his epochal speech (Sept. 18, 1895) to a racially mixed audience at the Atlanta (Ga.) Exposition, Washington summed up his pragmatic approach in the famous phrase: "In all things that are purely social we can be separate as the fingers, yet one as the hand in all things essential to mutual progress."

These sentiments were called the Atlanta Compromise by such critics as the black intellectual W.E.B. Du Bois, who deplored Washington's emphasis on vocational skills to the detriment of academic development and civil rights. And indeed, it is true that during the period of Washington's ascendancy as national spokesman of U.S. blacks his race was systematically excluded both from the franchise and from any effective participation in national political life, and rigid patterns of segregation and discrimination became institutionalized in the Southern states. Even Washington's visit to the White House in 1901 was greeted with a storm of protest as a "breach of racial etiquette."

Most blacks felt comfortable with Washington's approach, however, and his influence among whites was such that he became an unofficial arbiter determining which black individuals and institutions were deemed worthy to benefit from government patronage and white philanthropic support. He went on to receive honorary degrees from Harvard University (1896) and Dartmouth College (1901). Among his dozen books is his autobiography, *Up from Slavery* (1901), translated into many languages.

Washington, Bushrod (b. June 5, 1762, Westmoreland County, Va.—d. Nov. 26, 1829, Philadelphia), associate justice of the

United States Supreme Court from 1798 to 1829.

A nephew of George Washington, he graduated in 1778 from the College of William and Mary in Williamsburg, Va., where he was one of the original members of the Phi Beta Kappa society. He served in the Continental Army until the end of the United States War of Independence. He then studied law at Philadelphia under James Wilson, practiced law in Alexandria, Va., and moved to Richmond in 1790. He served in the Virginia House of Delegates in 1787 and sat in the Virginia state convention that ratified the federal Constitution in 1788.

In 1798 he was appointed to the Supreme Court by President John Adams. In 1802 John Marshall became chief justice, and Washington thereafter generally agreed with the important opinions Marshall rendered as chief justice. After the deaths of George and Martha Washington, Bushrod inherited their home, Mount Vernon, and part of their estate. He served as George Washington's literary executor and supervised John Marshall's *Life of Washington,* 5 vol. (1804–07).

Washington, Dinah, original name RUTH (LEE) JONES, byname QUEEN OF THE BLUES (b. Aug. 29, 1924, Tuscaloosa, Ala., U.S.—d. Dec. 14, 1963, Detroit, Mich.), black American blues singer noted for excellent voice control and her unique gospel-influenced delivery.

As a child, Jones moved with her family to Chicago. She sang in and played the piano for her church choir and in 1939 began to sing and play piano in various Chicago nightclubs, in addition to touring with Sallie Martin's gospel group. About 1942–43 she adopted the stage name Dinah Washington. From 1943 to 1946 she sang with the Lionel Hampton band and in 1946 began a successful solo career. During the period from 1949 to 1955, her recordings were consistently among the top ten hits of the rhythm-and-blues charts. Even after she crossed over to the popular (pop) music market, in which she had her greatest commercial success, Washington retained many of her earlier fans because of her passionate, supple style.

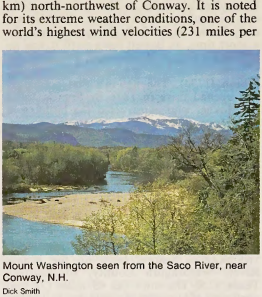
Washington, George, byname FATHER OF HIS COUNTRY (b. Feb. 22 [Feb. 11, Old Style], 1732, Westmoreland County, Va.—d. Dec. 14, 1799, Mt. Vernon, Va., U.S.), American general and commander in chief of the colonial armies in the American Revolution (1775–83) and subsequently first president of the United States (1789–97).

A brief account of the life and works of George Washington follows; for a full biography, *see* MACROPAEDIA: Washington, George.

Born into a wealthy family of Virginia planters, Washington had an irregular formal education. At the age of 14 he began work as a surveyor, making many trips into the wilderness areas of Virginia and Pennsylvania. In 1752 he inherited his brother's estate, one of the best in Virginia. His first military experience came in the French and Indian War (1754–63), when he was sent on two missions deep into the Ohio country.

After an interval of 15 years spent in managing his family estate at Mount Vernon, Va., he returned to arms as the commander for the American army that had gathered around Boston in 1775. By a vigorous siege he forced the British to give up the city and in the ensuing five years of war proved himself a capable commander and a stalwart leader of the War of Independence, which ended after his capture of Yorktown and the surrender of the British general Charles Cornwallis' army (1781). He was unanimously chosen president of the Constitutional Convention (1787) and overwhelmingly elected first president of the republic (1789), followed by reelection (1792). In his two terms he established innumerable precedents and left a permanent stamp on the office of the presidency.

Washington, Mount, mountain in the Presidential Range, the highest (6,288 feet [1,917 m]) peak of the White Mountains, New Hampshire, U.S. The peak is 23 miles (37 km) north-northwest of Conway. It is noted for its extreme weather conditions, one of the world's highest wind velocities (231 miles per



Mount Washington seen from the Saco River, near Conway, N.H.
Dick Smith

hour [372 kilometres per hour]) having been recorded there in 1934. The treeless summit, the state's highest point, is accessible by road from Pinkham Notch, by a cog railway (1869) located near Crawford Notch, and by marked hiking trails. Summit buildings, anchored against high winds, include Tip Top House and Summit House, open to the public in summer, and Mount Washington Observatory. The area is included in the White Mountain National Forest. Mount Washington is the watershed of the Androscoggin, the Connecticut, and the Saco rivers.

Washington Cathedral: *see* Washington National Cathedral.

Washington Conference, also called WASHINGTON NAVAL CONFERENCE, byname of INTERNATIONAL CONFERENCE ON NAVAL LIMITATION (1921–22), international conference called by the United States to limit the naval arms race and to work out security agreements in the Pacific area. Held in Washington, D.C., the conference resulted in the drafting and signing of several major and minor treaty agreements.

The Four-Power Pact, signed by the United States, Great Britain, Japan, and France on Dec. 13, 1921, stipulated that all the signatories would be consulted in the event of a controversy between two of them over "any Pacific question." An accompanying agreement stated they would respect one another's rights regarding the various Pacific islands and mandates that they possessed. These agreements ensured that a consultative framework existed between the United States, Great Britain, and Japan—*i.e.,* the three great powers whose interests in the Pacific were most likely to lead to a clash between them. But the agreements were too vaguely worded to have any binding effect, and their chief importance was that they abrogated the Anglo-Japanese Alliance of 1911, which had previously been one of the principal means of maintaining a balance of power in East Asia. Another supplementary document defined the "insular possessions and dominions" of Japan.

The Five-Power Naval Limitation Treaty, which was signed by the United States, Great Britain, Japan, France, and Italy on Feb. 6, 1922, grew out of the opening proposal at the conference by U.S. Secretary of State Charles Evans Hughes to scrap almost 1,900,000 tons of warships belonging to the Great Powers. This bold disarmament proposal astonished the assembled delegates, but it was indeed enacted in a modified form. A detailed agreement was reached that fixed the respective numbers and tonnages of capital ships to be possessed by the navies of each of the contracting nations. (Capital ships, defined as warships of more than 10,000 tons displacement or carrying guns with a calibre exceeding 8 inches, basically denoted battleships and aircraft carriers.) The respective ratios of capital ships to be held by each of the signatories was fixed at 5 each for the United States and Great Britain, 3 for Japan, and 1.67 each for France and Italy. The Five-Power Naval Limitation Treaty halted the post-World War I race in building warships and even reversed the trend; it necessitated the scrapping of 26 American, 24 British, and 16 Japanese warships that were either already built or under construction. The contracting nations also agreed to abandon their existing capital-ship building programs for a period of 10 years, subject to certain specified exceptions. Under another article in the treaty, the United States, Great Britain, and Japan agreed to maintain the status quo with regard to their fortifications and naval bases in the eastern Pacific. The Naval Limitation Treaty remained in force until the mid-1930s. At that time Japan demanded equality with the United States and Great Britain in regard to the size and number of its capital ships. When this demand was rejected by the other contracting nations, Japan gave advance notice of its intention to terminate the treaty, which thus expired at the end of 1936.

The same five powers signed another treaty regulating the use of submarines and outlawing the use of poison gas in warfare. A Nine-Power Pact signed by the above five powers plus The Netherlands, Portugal, Belgium, and China affirmed China's sovereignty, independence, and territorial integrity and gave all nations the right to do business with it on equal terms. In a related treaty the nine powers established an international commission to study Chinese tariff policies.

Washington Crossing State Park, two parks on the Pennsylvania and New Jersey shores of the Delaware River 8 miles (13 km) northwest of Trenton. The parks mark the site where, in a blinding snowstorm on the night of Dec. 25, 1776, General George Washington crossed the river with 2,400 colonial troops and captured 1,000 Hessian mercenaries. The Pennsylvania park has an area of 478 acres (193 hectares); the New Jersey park, 369 acres (149 hectares). A memorial building at the site houses the David Library of the American Revolution. Other historic landmarks are Bowman's Hill Observation Tower on the site of the Continental Army's lookout station; the Memorial Flagstaff, marking the graves of Continental troops who died there; and the Point of Embarkation.

Across the bridge in the New Jersey park are the Old Barracks, built in 1758 and successively occupied by British, Hessian, and colonial troops. Other features are the Trenton Monument, a 55-foot (47-metre) granite shaft marking the spot where the colonial artillery opened fire on Trenton, and McKonkey Ferry Museum, in a building that supposedly sheltered Washington and some of his men after the historic crossing.

Washington, D.C. (U.S. capital): *see* Washington.

Washington, D.C., International, United States flat horse race attracting leading horses from all over the world. Instituted in 1952, it was the first such event in North America. The race is a 1.5-mile (about 2,400-metre) event for horses three years old and over, held annually in November on a turf course at Laurel Racetrack in Maryland, near Washington, D.C.

Washington Island (Kiribati): *see* Teraina Atoll.

Washington Monument, in Washington, D.C., obelisk memorial to George Washington, the first American president. The monument, originally promoted by the Washington National Monument Society (founded 1838), was built between 1848 and 1884 from public subscriptions and federal appropriations and was dedicated in 1885. The structure, based on a design by Robert Mills, is a granite obelisk faced with Maryland marble 55 feet (16.8 m) square at the base, 555 feet 5.12 inches (169.3 m) high, and weighing about 91,000 tons. It is located in grounds (106 acres [43 hectares]) that are a westward extension of the Mall (the



Washington Monument, Washington, D.C.
Herbert Lanks—Black Star/EB inc

Capitol lying to its east), and just east of the Lincoln Memorial Reflecting Pool. It lies just north of the Tidal Basin and is separated from the White House on the north only by the Ellipse and Constitution Ave. It is supervised as a unit of the National Capital Parks. Inserted in the interior walls are 190 carved stones presented by various individuals, cities, states, and foreign nations. The top of the monument can be reached by an interior iron stairway comprising 50 landings and 898 steps; an elevator makes the ascent in about 70 seconds.

Washington National Cathedral, also called WASHINGTON CATHEDRAL, officially CATHEDRAL CHURCH OF ST. PETER AND ST. PAUL, in Washington, D.C., Episcopal cathedral chartered by the U.S. Congress in 1893 and established on Mount St. Alban (the highest point in the city) in 1907. Its cornerstone was laid by President Theodore Roosevelt. Although construction slowed during periods of economic hardship and stopped altogether during 1977–80, the building was completed in 1990.

Designed and constructed in the 14th-century English Gothic style, the edifice was also built without the use of steel support in a centuries-old manner—using artists, sculptors, and stone masons. Radiant heating in the stone floor is one of its few concessions to modernity. The cathedral is built in the shape of a cross, its length extending some 530 feet (160 m), and can seat about 4,000; in the United States it is second in size only to New York City's Cathedral of St. John the Divine (still uncompleted).

Washington Post, The, morning daily newspaper published in Washington, D.C., the dominant newspaper in the U.S. capital and usually counted as one of the greatest newspapers in that country, equaled or excelled only by *The New York Times*.

The *Post* was established in 1877 as a four-page organ of the Democratic Party. For more than half a century it faced economic problems, caused partly by the competition that it faced. The paper was sold in 1889, resulting in the abandonment of the Democratic Party allegiance, and it grew in size and reputation but came to be known as an extremely conservative publication. Sold again in 1905 to John R. McLean, the paper embraced sensationalism and society reporting, and in 1916 McLean's son succeeded to control. In the 1920s the paper lost stature, in part because its owner, Edward B. (Ned) McLean, was a close friend of President Warren G. Harding, whose policies were generally believed to be too much reflected in the *Post*. Ned McLean's management finally brought the paper from disrepute to bankruptcy, and in 1933 the financier Eugene Meyer purchased the paper out of receivership.

Meyer began to rebuild the *Post*'s character, emphasizing a sound and independent editorial stance and thorough, accurate, and well-written reporting. The *Post* became noted for its interpretative reporting, and the cartoons of Herbert L. Block (Herblock) gave the editorial page a cutting edge, drawing much applause (mixed with denunciation from Herblock's targets) and a wide readership. Meyer turned the paper over to his son-in-law, Philip L. Graham, in 1946, and Graham continued to expand and refine it.

The *Post* bought the *Washington Times-Herald* in 1954 and closed its former archconservative rival, acquiring in the process such circulation-building assets as the rights to Drew Pearson's column. "Washington Merry-Go-Round." Under Graham the *Post*, staunchly internationalist in outlook and thriving economically, bought *Newsweek* magazine in 1961. Graham built up the paper's foreign coverage and moved its reportage of the U.S. government consistently toward excellence. He took his own life in 1963 and was succeeded promptly and firmly by his wife, Katherine Meyer Graham. Her continuance and amplification of the progress that Philip Graham had made brought the *Post* new domestic and international prestige. She moved editor Ben Bradlee from *Newsweek* to the *Post* and firmly supported her staff in the discovery and disclosure of presidential complicity in the Watergate Scandal.

Washita River, also spelled OUACHITA, river rising in the Texas Panhandle, northwestern Texas, U.S., flows east across the Oklahoma boundary, then southeast to south-central Oklahoma, and south into Lake Texoma, formed by Denison Dam in the Red River, downstream from the former mouth of the Washita at Woodville, Okla. The river, 626 miles (1,007 km) long and draining 8,018 square miles (20,767 square km), flows past Cheyenne, Clinton, Mountain View, Anadarko, Chickasha, Pauls Valley, and Davis. Dams (the Foss, and the Fort Cobb on Pond Creek) have been built to create reservoirs along its course. For most of the year, except for some periods of rainfall in spring and early summer, the stream bed is dry. From Anadarko to Lake Texoma, increased rainfall has created a permanent winding stream that is sluggish and subject to severe floods. Southeast of Davis, the Washita has cut a gorge into the Arbuckle Mountains 350 feet (107 m) deep and 15 miles (24 km) long. The Battle of the Washita (November 1868), in which General George A. Custer attacked a Cheyenne Indian encampment, took place near Cheyenne. The river's name is from the Indian tribal name Wichita.

Washo, American Indian people of the Great Basin region of North America, who made their home around Lake Tahoe just east of the Sierra Nevada. Their peak numerical strength before contact with whites may have been 1,500, whereas today perhaps fewer than 600 remain in the original Washo territory. Linguistically isolated from the other Great Basin peoples, they have been placed in the Hokan stock.

The Washo were fishermen, hunters of small mammals, and gatherers of pine nuts, acorns, and various roots and berries. They depended on deer and antelope for some of their dress and for their cone-shaped dwellings. They were especially noted for their superb basketry.

The basic socioeconomic unit was the family and relatives of a single winter household. During other seasons the availability of food determined the location of the family; and the able-bodied members migrated each summer into the eastern valleys in search of roots, berries, and small game.

Goods and services were distributed in various ways: through familial sharing, gift and ceremonial exchange at feasts for motives of prestige and good relations, and in ritual gift-giving at important stages of the life cycle.

Until very recently shamanism was an important part of Washo life. The shamans, or medicine men, were believed to be able to cause and cure disease. Complex rituals celebrating important stages of the life cycle were also reported.

Wāṣil ibn ʿAṭāʾ, in full WĀṢIL IBN ʿAṬĀʾ AL-GHAZZĀL, also called ABŪ ḤUDHAYFAH (b. *c.* 700, Arabia—d. 748, Arabia), Muslim theologian considered the founder of the Muʿtazilah sect.

As a young man Wāṣil went to Basra, Iraq, where he studied under the celebrated ascetic Ḥasan al-Baṣrī and met other influential religious figures who lived there. In Wāṣil's time there began the discussions that led to the development of Islāmic speculative theology. At first theological controversies among Muslims were closely tied to political events, the principal issue being the legitimacy of the rule of the Umayyad house, which seized power after the death of the fourth caliph, ʿAlī.

Wāṣil's doctrinal formulations gave the Muʿtazilah faction coherence as a religious sect. At the same time, both Wāṣil and the Muʿtazilah became involved in a revolutionary movement led by the ʿAbbāsids that was to result in the overthrow of the Umayyads. Wāṣil gathered around himself many devoted believers and ascetics, whom he often sent out as missaries to spread his doctrines in distant provinces.

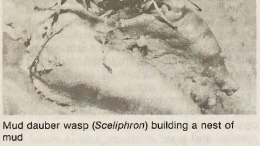
Wasilowska, Marja (Polish writer): *see* Konopnicka, Maria.

Wāsiṭ (Arabic: "medial"), military and commercial city of medieval Iraq, especially important during the Umayyad caliphate (661–750). Wāsiṭ was established as a military encampment in 702 on the Tigris River, between Basra and Kūfah, by al-Ḥajjāj, the Umayyad governor of Iraq. He built a palace and the chief mosque and encouraged irrigation and the cultivation of the region surrounding Wāsiṭ. Through its location on the Tigris, at the centre of a network of roads radiating to all parts of Iraq, Wāsiṭ became a great shipbuilding and commercial centre. Even after the caliphal capital was moved from Damascus to Baghdad, the city retained a strategic importance. Only with the shift in the course of the Tigris, sometime in the 15th century, did the city decline and eventually disappear. Thus, an early 17th-century Turkish geographer describes Wāsiṭ as lying in the middle of the desert. Modern scholars are not agreed as to the exact location of the medieval city.

wasp, any stinging member (formerly called Aculeata) of the insect suborder Apocrita (order Hymenoptera), other than bees and ants, as well as certain nonstinging insects of the suborder Symphyta: wood wasps, cedarwood wasps,

and parasitic wood wasps. (For the latter, *see* wood wasp.)

Wasps have biting mouthparts and antennae with 12 or 13 segments. They are normally winged, have the abdomen attached to the



Mud dauber wasp (*Sceliphron*) building a nest of mud
J.A.L. Cooke—Oxford Scientific Films Ltd

thorax by a slender petiole, or "waist," and, in the female, are provided with a formidable sting. Adult wasps feed primarily on nectar, but their larvae feed on insects provided by the female parent. There are more than 20,000 known species of wasps, the vast majority of which are solitary in habit. The social wasps are confined to about 1,000 species within the family Vespidae (superfamily Vespoidea) and include the hornets and yellow jackets. They and the Pompilidae, or spider wasps (also in the superfamily Vespoidea), differ from other wasp families in having their wings folded longitudinally when at rest.

Solitary wasps are distributed in the superfamilies Bethyloidea, Scolioidea, and Sphecoidea, along with the Pompilidae family. Most species build isolated nests, which they provision with permanently paralyzed insects or spiders. The female wasp deposits an egg in each cell of the nest, and the wasp larva hatching from that egg feeds to maturity upon the food with which its cell has been provisioned. The vast majority of solitary wasps nest in the ground, digging tunnels in the soil in which to lay their eggs. But the Sphecidae, or thread-waisted wasps (superfamily Sphecoidea), contain forms of more diverse habits, with some nesting in wood, pithy plant stems, or in nests made of mud. Spider wasps (Pompilidae) usually build nests in rotten wood or in rock crevices and provision them with spiders. The potter or mason wasps (subfamily Eumeninae) of the Vespidae build nests of mud, which are sometimes vaselike or juglike and may be found attached to twigs or other objects.

The social wasps within the family Vespidae are among the best-known species of



Paper wasps (*Polistes*)
Anthony Bannister from Natural History Photographic Agency

wasps. Most of them belong to the subfamilies Vespinae or Polistinae. In their societies they have a caste system consisting of one or several queens, a few drones (males), and sterile females called workers. The queen, a fertilized female, begins the colony in the spring by building a small nest and laying eggs that hatch into workers. The latter enlarge the paperlike nest, which is composed of chewed dry plant material, usually wood, that has been regurgitated and mixed with saliva. The nest consists of one or more layers of cells that are vertically arranged with the openings downward. Depending on the species, the nest may be found in cavities in the soil, in tree trunks, or hanging from leaves, branches, or the eaves of buildings.

The most familiar social wasps in northern temperate regions are species of the genera *Polistes*, *Vespa*, or *Vespula*; many are large and aggressive and are equipped with formidable stings. Some *Vespula* species are called yellow jackets owing to the black and yellow bands on their abdomen. Other species of both *Vespula* and *Vespa* are called hornets; these are mostly black, with yellowish markings on the face, thorax, and the tip of the abdomen.

Four major groups of solitary wasps are parasitic and do not construct nests. These are the cuckoo wasps (family Chrysididae) in the superfamily Bethyloidea and the tiphiid wasps (family Tiphiidae), scoliid wasps (family Scoliidae), and velvet ants (family Mutillidae) in the superfamily Scolioidea. Cuckoo wasps are mostly brilliant metallic green or blue in colour; they lay their eggs in the nests of solitary bees or wasps, and the larvae hatching from those eggs feed on the bee or wasp larvae or on the food provisioned by the latter's parents. The so-called velvet ants have bodies clothed with long thick hair of contrasting colours, often black and red, and the females are wingless and antlike in appearance. Most of them are parasitic on the larvae and pupae of solitary bees and wasps. Most species of tiphiid and scoliid wasps parasitize beetle grubs that live in the soil.

wasp moth: *see* clearwing moth.

Wassermann, August von (b. Feb. 21, 1866, Bamberg, Bavaria [Germany]—d. March 16, 1925, Berlin, Ger.), German bacteriologist whose discovery of a universal blood-serum test for syphilis helped extend the basic tenets of immunology to diagnosis. "The Wassermann reaction," in combination with other diagnostic procedures, is still employed as a reliable indicator for the disease.

Working at the Robert Koch Institute for Infectious Diseases in Berlin (1893–1913), Wassermann and the German dermatologist Albert Neisser developed (1906) a test for the antibody produced by persons infected with the protozoan *Spirochaeta pallida* (now known as *Treponema pallidum*), the causative agent of syphilis. In 1913 Wassermann became director of the department of experimental therapy at the Kaiser-Wilhelm Institute, Berlin-Dahlem, a position he held until his death. He is also noted for having devised diagnostic tests for tuberculosis and collaborated with the German bacteriologist Wilhelm Kolle in writing the *Handbuch der pathogenen Mikroorganismen*, 6 vol. (1903–09; "Handbook of Pathogenic Microorganisms").

Wassermann, Jakob (b. March 10, 1873, Fürth, Bavaria [Germany]—d. Jan. 1, 1934, Altaussee, Austria), German novelist who is frequently compared to Fyodor Dostoyevsky in both his moral fervour and his tendency toward sensationalism; his popularity was greatest in the 1920s and '30s.

After an unsettled youth, Wassermann achieved success with his second novel, *Die Juden von Zirndorf* (1897; "The Jews of Zirndorf"; Eng. trans. *The Dark Pilgrimage*), a study of Jews longing for the messiah. He established his reputation with *Caspar Hauser* (1908), the fact-based story of a strange boy, apparently unfamiliar with the ordinary world, who was found in Nürnberg in 1828 and whose identity and subsequent murder or suicide remained a mystery. Wassermann uses the story to castigate bourgeois numbness of heart and lack of imagination in dealing with anything out of the ordinary. In *Christian*



Jakob Wassermann
Bavaria-Verlag

Wahnschaffe (1919; *The World's Illusion*), one of his most popular works, a millionaire's son, after experiencing all that high life, love, travel, and art have to offer, dedicates himself to the service of humanity.

Perhaps Wassermann's most enduring work is *Der Fall Maurizius* (1928; *The Maurizius Case*), which treats the theme of justice with the carefully plotted suspense of a detective story. It introduced the character Etzel Andergast, whose questioning of the judgment of his cold-hearted jurist father and whose own detective work eventually prove the innocence of a man his father had condemned. Etzel became a symbol of post-World War I German youth by rejecting the authority of the past and finding his own truth by trial-and-error, doggedly following elusive clues. This work was extended into a trilogy including *Etzel Andergast* (1931) and *Joseph Kerkhovens dritte Existenz* (1934; *Kerkhoven's Third Existence*). Wassermann's autobiography is entitled *Mein Weg als Deutscher und Jude* (1921; *My Life as German and Jew*).

Wassukkani, capital of the Mitannian empire (*c.* 1500–*c.* 1340 BC) but, possibly located near the head of the Khabur River in northern Mesopotamia. Wassukkani was for many years the centre of a powerful threat to the Hittite empire, but it was finally plundered about 1355 by the Hittites under Suppiluliumas I, who made a new vassal kingdom of Mitanni. After the death of Suppiluliumas (*c.* 1336), however, Wassukkani proved to be too weak to resist the Assyrian forces and was soon incorporated into the Assyrian kingdom.

Wast, Hugo, pseudonym of GUSTAVO MARTÍNEZ ZUVIRÍA (b. Oct. 23, 1883, Córdoba, Arg.—d. March 28, 1962, Buenos Aires), Argentine novelist and short-story writer, probably his country's most popular and most widely translated novelist.

Wast, a lawyer by profession, served as a national deputy (1916–20), as director of the National Library in Buenos Aires (1931–54), and as minister of justice and public education (1943–44); his career also included newspaper editing and university teaching. Wast's most characteristic and most popular novels—such as *Flor de durazno* (1911; *Peach Blossom*), which established his literary reputation, and *Desierto de piedra* (1925; *A Stone Desert*)—portray rural people in their struggle against nature and adversity and their ability to endure personal hardship. In such novels as *La casa de los cuervos* (1916; *The House of Ravens*), he told tales of adventure set against historical backgrounds. At times he portrayed

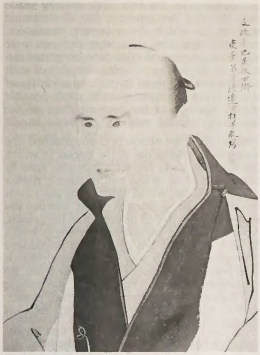
the modern urban environment, as in *Ciudad turbulenta, ciudad alegre* (1919; "Turbulent City, Lively City").

Wast's novels were widely translated into other languages, and some of his works were adapted for film. His reputation declined after his death, however.

waste disposal, the collection, processing, and recycling or deposition of the waste materials of human society. The term "waste" covers both solid wastes (refuse, or garbage) and sewage (wastewater). *See* materials salvage; refuse disposal system; sewage system.

Wat Tyler's Rebellion (England, 1381): *see* Peasants' Revolt.

Watanabe Kazan, original name WATANABE SADAYASU (b. Oct. 20, 1793, Edo [now Tokyo], Japan—d. Nov. 23, 1841, Tahara), Japanese scholar and painter noted for his character-revealing portraits and his pioneering efforts in adapting Western perspective to Japanese art.



Portrait of Satō Issai by Watanabe Kazan, hanging scroll, light colour on paper, with a colophon by the sitter (not reproduced here), 1821; in the Tokyo National Museum

By courtesy of A. Watanabe, Tokyo

The son of a poor retainer of a lesser lord, Watanabe studied painting to earn a living. In 1832 Watanabe, who was in the service of Lord Tawara of Mikawa, was sent to an important post at Edo (now Tokyo). He also was put in charge of coastal defense for his province. His opposition to the stringent antiforeigner policy of the ruling Tokugawa shogunate, however, brought him great suffering and a long term of house arrest. Later, when his pupils planned to hold a benefit exhibition for him in Edo, he feared it would create turmoil that might draw attention to his family and to his lord, and he chose, therefore, to commit suicide.

As a painter, Watanabe was a man of great originality whose talent was sustained by sound technique based on untiring sketching. He managed to add Western perspective to traditional Oriental techniques without producing a jarring effect. His forte was portrait drawing, which he carried out with profound insight into his models' characters and with unrelenting realism—traits that mark his portraits of the scholar Takami Senseki and the calligrapher Ichikawa Beian. His premature death retarded the integration of traditional Japanese and modern Western art.

Watanabe Osamu (b. Oct. 21, 1940, Asahikawa, Japan), Japanese freestyle featherweight wrestler who was the undefeated world champion in 1962 and 1963 and an Olympic gold medalist in 1964. He competed in more than 300 matches and never lost a bout in his career.

Watanabe won his first national championship at the age of 19 and defended this title four times (1960–64) while attending Chuo University in Tokyo. He startled observers in June 1962 by easily winning both the United States amateur title in New York City and the world championship in Toledo, Ohio. He retired after his 1964 Olympic victory in Tokyo to work for an advertising agency. Most of Watanabe's 186 victories for Japan were won by fall (*i.e.,* briefly pinning an opponent's shoulders to the mat), and none of his opponents in these matches scored a single point against him.

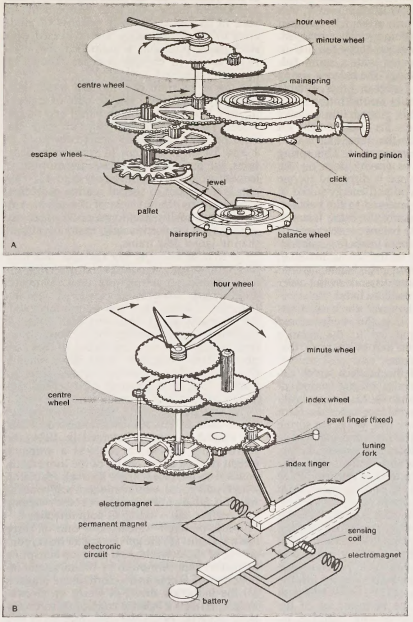
Watarai Shintō: *see* Ise Shintō.

watch, portable timepiece that has a movement driven in any of several ways and is designed to be worn (as on the wrist) or carried in the pocket. There can be little doubt that the first watches appeared shortly after 1500, when Peter Henlein, a locksmith in Nürnberg, Ger., introduced the mainspring as a replacement for weights in driving clocks. The escapement used in the early watches was the same as that used in the early clocks, the verge escapement (*see* escapement). Early watches were made in Germany and at Blois in France. These early timepieces measured some 4 to 5 inches (100 to 125 mm) in diameter and about 3 inches (75 mm) in depth. They were carried about in the hand.

A mainspring consists of a flat spring steel band stressed in bending or coiling; when the watch, or other spring-driven mechanism, is wound, the curvature of the spring is increased, and energy is thus stored. In a watch, this energy is transmitted to the oscillating section of the watch (called the balance) by the wheel train and escapement, the motion of the balance itself controlling the release of the escapement and consequently the timing of the maintaining impulse. A friction drive to the hands is provided from a wheel that rotates at a convenient rate, generally one time per hour. The friction drive permits the hands to be set.

In the first spring-driven timekeepers the mainspring was hooked to an arbor (small shaft) at its centre, or "eye," while its outer end was attached to the frame. A ratchet and click allowed the arbor to be rotated during winding without disturbing the first wheel, or "great wheel," of the train.

One of the main defects of the early watches was the variation in the torque exerted by the mainspring; that is, the force of the mainspring was greater when fully wound than when it was almost run down. Since the timekeeping of a watch fitted with a verge escapement is greatly influenced by the force driving it, this problem was quite serious. Solution of the problem was advanced between 1515 and 1540 by the invention, by Jacob the Czech of Prague, of the fusee, a cone-shaped grooved pulley used together with a barrel containing the mainspring. With this arrangement, the mainspring is made to rotate a barrel in which it is housed; a length of catgut, later replaced



Components of (A) mechanical watch and (B) electrical watch

by a chain, is wound on it, the other end being coiled around the fusee. When the mainspring is fully wound, the gut or chain pulls on the smallest radius of the cone-shaped fusee; as the mainspring runs down, the leverage is progressively increased as the gut or chain pulls on a larger radius. With correct proportioning of mainspring and fusee radii, an almost constant torque is maintained as the mainspring unwinds. A later invention, the going barrel, a device to keep the watch going during winding, is fitted to all modern watches and has superseded the fusee. By carefully proportioning the barrel arbor (the shaft of the barrel) and barrel diameters to the thickness of the mainspring, torque variations have been reduced to a minimum.

Up to about 1580, the mechanisms of watches were made wholly of iron; about this time, brass was introduced. After about 1625 brass was used for some parts of the watch, and steel for the more delicate pieces.

In the earliest timekeepers, a weighted crossbar (foliot) or a wheel with a heavy rim known as the balance was used to control the rate of going of the mechanism. It was subjected to no systematic constraint, and it was not possible to define its period of oscillation mathematically. Consequently, its period of oscillation, and, hence, the rate of the timekeeper, were dependent on the driving force; this explains the great importance of the fusee.

Controlling the oscillations of a balance with a spring was an important step in the history of timekeeping. Robert Hooke designed a watch with a balance spring in the late 1650s; there appears to be no evidence, however, that the spring was in the form of a spiral, a crucial element that would become widely employed. Christiaan Huygens was probably the first to design (1674–75) a watch with a spiral balance spring, or hairspring. The balance spring is a delicate ribbon of steel or other suitable spring material, generally wound into a spiral form. The inner end is pinned into a collet (a small collar), which fits friction-tight on the balance staff, while the outer end is held in a stud fixed to the movement. This spring acts on the balance as gravity does on the pendulum. If the balance is displaced to one side, the spring is wound and energy stored in it; this energy is then restored to the balance, causing it to swing nearly the same distance to the other side, if the balance is released.

If there were no frictional losses (*e.g.*, air friction, internal friction in the spring material, and friction at the pivots), the balance would swing precisely the same distance to the other side and continue to oscillate indefinitely; because of these losses, however, the oscillations in practice die away. It is the energy stored in the mainspring and fed to the balance through the wheel train and escapement that maintains the oscillations.

The performance of the modern watch depends on the uniformity of the period of oscillation of the balance—*i.e.*, the regularity of its movement. The balance takes the form of a wheel with a heavy rim, while the spring coupled to it provides the restoring torque (*see* Figure A). The balance possesses inertia, dependent on its mass and configuration. The spring should ideally provide a restoring force directly proportional to the displacement from its unstressed or zero position.

The balance is mounted on a staff or spindle with pivots, and, in watches of good quality, these run in jewels. Two jewels are used at each end of the balance staff, one pierced to provide a bearing, the other a flat end stone providing axial location by bearing against the domed end of the pivot. Frictional effects at the pivots influence the performance of the watch in various positions—for example, lying and hanging.

The balance and spring can be brought to time, or "regulated," by varying either the restoring couple provided by the spring or the inertia of the balance. In the first case (by far the more common), this is generally effected by providing a pair of curb pins mounted on a movable regulator index that lengthen or shorten the hairspring as needed.

In the second instance, screws are provided at one of two pairs of opposite points on the rim of the balance wheel: these screws are friction-tight in their holes and thus can be moved in or out so as to adjust the inertia of the balance. In "free-sprung" watches no regulator index is provided, and the only adjusters are the screws on the balance rim.

Many modern mechanical watches use a lever escapement (*see* Figure A), invented in 1765 by Thomas Mudge, that leaves the balance free to turn, coupling to it only while receiving the impulse from the mainspring via the wheel train and while unlocking. It was developed into its modern form with the club-toothed escape wheel at the beginning of the 19th century but was not universally adopted until the early 20th century.

In good-quality watches, the club-toothed wheel is made of hardened steel, with the acting surfaces ground and polished; its geometry reduces loss of motion between wheel and pallets. The lever escapement is also characterized by double-roller safety action in which the intersection between the guard pin and roller, which takes place underneath the roller, is much deeper than in early single rollers; thus, any friction caused by jolts encountered in wear causes less constraint on the balance and endangers less the timekeeping properties of the watch. By far the most important watch escapement today—the lever escapement—is used in its jeweled form in watches of moderate to excellent quality; and it is used with steel pallet pins and a simplified fork-and-roller action in cheaper watches (known as pin-pallet watches).

In the wheel train of a modern watch, it is necessary to achieve a step-up ratio of approximately 1 to 4,000 between barrel and escape wheel. This involves four pairs of gears, the ratio per pair commonly being between 6 to 1 and 10 to 1. Because of space considerations, the pinions must have a low number of leaves (projections), commonly 6 to 12. This entails a number of special gearing problems, aggravated by the fineness of the pitch. Any error in centre distance, form, or concentricity is therefore proportionately more important than in larger gear trains.

The first patent covering the application of jewels in watches was taken out in 1704; diamonds and sapphires were used. Synthetic jewels, made from fused powdered alumina (aluminum oxide), are now commonly used. Watch jewels are given a very high polish; a uniform pivot diameter for the jewel bearings is highly important, because they are pressed into accurately sized holes smaller than the jewels themselves and held there by friction. The hole diameter of a typical balance jewel is about 0.1 millimetre.

The first patent on the self-winding pocket watch was taken out in London in 1780. An English invention patented in 1924, the self-winding wristwatch contains a swinging weight pivoted at the centre of the movement, coupled to the barrel arbor through reduction wheels and gears. A more modern self-winding watch is fitted with a weight or rotor swinging 360 degrees and winding in both directions.

Electric-powered watches use one of three drive systems: (1) the galvanometer drive, consisting of the conventional balance-hairspring oscillator, kept in motion by the magnetic interaction of a coil and a permanent magnet; (2) the induction drive, in which an electromagnet attracts a balance containing soft magnetic material; or (3) the resonance drive (*see* Figure B), in which a tiny tuning fork (about 1 inch [25 mm] in length), driven electrically, provides the motive power. Both types (1) and (2) use a mechanical contact, actuated by the balance motion, to provide properly timed electric-drive pulses. Each oscillation of the balance operates a time-indicating gear train by advancing a toothed wheel one tooth. First produced in 1953, type (3), properly called an electronic watch, is inherently more accurate since it operates at a frequency higher than that customarily used with balance-type watches, and the tuning fork is a fairly stable source of frequency. The higher frequency requires the replacement of a mechanical contact by a transistor. The minute and rapid motion of the tuning fork moves forward an extremely fine-toothed ratchet wheel. There is very little friction in the electronic watch; only tiny amounts of oil are needed. When the battery is too weak to operate the tuning fork, the watch simply stops, without deterioration. Miniature high-energy-density batteries are used as power sources in all three types.

The progressive miniaturization of electronic components in the late 20th century made possible the development of all-electronic watches, in which the necessary transistors, resistors, capacitors, and other elements were all on one or several miniature integrated circuits, or chips. The complex circuitry of such watches enabled them to perform a variety of timekeeping functions and also made possible digital readouts of the time in place of the traditional second, minute, and hour hands.

watch fob, short ribbon or chain attached to a watch and hanging out of the pocket in which the watch is kept; the term can also refer to ornaments hung at the end of such a ribbon or chain. Until World War I and the development of the wristwatch, most watches designed for men had to be carried in the pocket. About 1772 the fashion of carrying a watch in each waistcoat fob pocket was introduced (though one watch was usually false); watch fobs consisted of chains supporting seals. By the beginning of the 19th century, the fashion for elaborate masculine jewelry had passed, and all that remained of the watch fob was usually a simple chain.

water, a substance composed of the chemical elements hydrogen and oxygen and existing in gaseous, liquid, and solid states. Water is one of the most plentiful and essential of compounds. It is vital to life, participating in virtually every process that occurs in plants and animals. Although the molecules of water are simple in structure (H_2O), the physical and chemical properties of the compound are extraordinarily complicated. *See also* ice; steam; water resource; precipitation.

A brief treatment of water follows. Water is treated fully in a number of articles in the MACROPAEDIA. For its chemical properties, *see* Chemical Compounds. For other major treatments, *see* Hydrosphere, The; Biosphere, The; Oceans; Rivers; Lakes; Climate and Weather: *Atmospheric Humidity and Precipitation*; Conservation of Natural Resources; and Energy Conversion.

Water is a colourless, tasteless, and odourless liquid at room temperature. One of its most important properties is its ability to dissolve many other substances. The versatility of water as a solvent is essential to living organisms. Life is believed to have originated in the world's oceans, which are complicated solutions. Living organisms use aqueous solutions—*e.g.*, blood and digestive juices—as mediums for carrying out biological processes.

The water molecule is composed of two hydrogen atoms, each linked by a single chemical bond to an oxygen atom. Most hydrogen atoms have a nucleus consisting solely of a proton. Two isotopic forms, deuterium and tritium, in which the atomic nuclei also contain one and two neutrons, respectively, are found to a small degree in water. Deuterium

oxide (D_2O), called heavy water, is important in chemical research and is also used as a neutron moderator in some nuclear reactors.

Although its formula (H_2O) seems simple, water exhibits very complex chemical and physical properties that are incompletely understood. For example, its melting point, 0° C (32° F), and boiling point, 100° C (212° F), are much higher than would be expected by comparison with analogous compounds, such as hydrogen sulfide and ammonia. In its solid form, ice, water is less dense than when it is liquid, another unusual property. The root of these anomalies lies in the electronic structure of the water molecule.

An oxygen atom has six electrons in its outer (valence) shell, which can hold a total of eight. When an oxygen atom forms a single chemical bond, it shares one of its own electrons with the nucleus of another atom and receives in return a share of an electron from that atom. When bonded to two hydrogen atoms, the outer electron shell of the oxygen atom is filled.

The water molecule is not linear but bent in a special way. As a result, part of the molecule is negatively charged and part positively charged. It is thus a highly polar molecule. Hydrogen atoms in water molecules are attracted to regions of high electron density and can form weak linkages, called hydrogen bonds, with those regions. This means that the hydrogen atoms in one water molecule are attracted to the non-bonding electron pairs of the oxygen atom on an adjacent water molecule. As a result, water molecules associate strongly. In an ice crystal, the association is a highly ordered but loose structure. When the ice melts, this orderly arrangement breaks down partially and the molecules pack more closely together. This makes the liquid denser than the solid, which is why ice forms on top of liquid water. The associative force, however, is still strong enough to prevent water molecules from separating completely even at room temperature. This continued association in the liquid state accounts for the high boiling point of water.

The structure of liquid water is believed to consist of aggregates of water molecules that form and re-form continually. This short-range order, as it is called, accounts for other unusual properties of water, such as its high viscosity and surface tension.

The polarity of the water molecule plays a major part in the formation of aqueous solutions. If an ionic compound such as sodium chloride is placed in water, the polar water molecules reduce the electrostatic attraction between the positively charged sodium and negatively charged chloride ions. This helps to pull the ions apart. They then become hydrated—*i.e.,* surrounded by water molecules. As a result, their charge is effectively dispersed over a larger structure, and this keeps the sodium and chloride from recombining.

To a limited extent, water dissociates into hydrogen (H^+) ions, which make a solution acidic, and hydroxyl (OH^-) ions, which make it alkaline (basic). Consequently, water can sometimes act as an acid or a base.

water, ground: *see* groundwater.

water ballet: *see* synchronized swimming.

water bear (invertebrate): *see* tardigrade.

Water Bearer (constellation): *see* Aquarius.

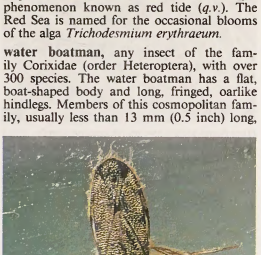
water beetle, any of several thousand species of aquatic beetles (order Coleoptera), including members of the families Haliplidae (crawling water beetles), Amphizoidae (troutstream beetles), Hygrobiidae (screech beetles), Gyrinidae (whirligig beetles), Noteridae (burrowing water beetles), Hydrophilidae (water scavenger beetles), Dryopidae (long-toed water beetles), and Dytiscidae (true water beetles, also known as diving beetles or predaceous diving beetles). For additional information on groups and species of water beetles, *see* predaceous diving beetle; water scavenger beetle; whirligig beetle.

water bloom, also called MARINE BLOOM, dense aquatic population of microscopic organisms produced by an abundance of nutrient salts in surface water, coupled with adequate sunlight for photosynthesis. The microorganisms or the toxic substances that they release may discolour the water, deplete its oxygen content, poison aquatic animals and waterfowl, and irritate the skin and respiratory tract of humans. Single species of algae, diatoms, or dinoflagellates, reproducing every few hours, may dominate a blooming population; the number of individuals per litre (quart) of water, normally about 1,000, can increase to 60 million.

In the oceans, annual blooms occur during the early spring in middle to high latitudes, especially in subpolar regions. In such localities phytoplankton do not flourish during the winter because of the short duration and low intensity of sunlight, and because they are preyed upon by grazing zooplankton. During the winter, upwelling restores the nutrient content near the surface, providing support for rapid growth as increased insolation promotes photosynthesis in the spring. In the Northern Hemisphere the bloom reaches its peak about April. By midsummer the surface waters are depleted of nutrients, and the population of phytoplankton becomes very small. A secondary bloom may occur in September, as autumnal storms destroy the summer stratification of the water and bring up fresh nutrients; photosynthesis diminishes, however, as solar radiation decreases with winter's approach.

Blooms are not restricted to high and middle latitudes, nor are they exclusively seasonal. For example, blooms of the dinoflagellate genus *Gymnodinium* take place along the U.S. Gulf Coast when abnormally heavy rains increase the runoff of agricultural and industrial wastes. The enormous numbers of these organisms impart a distinct red colour to the water, a phenomenon known as red tide (*q.v.*). The Red Sea is named for the occasional blooms of the alga *Trichodesmium erythraeum.*

water boatman, any insect of the family Corixidae (order Heteroptera), with over 300 species. The water boatman has a flat, boat-shaped body and long, fringed, oarlike hindlegs. Members of this cosmopolitan family, usually less than 13 mm (0.5 inch) long, occur as high as the Himalayas, as deep as Death Valley, and in fresh, brackish, and salt waters. The water boatman is lighter than water; it generally attaches itself to vegetation at the bottom of a pond or stream and breathes from an envelope of air stored around its body and under its wings. Oxygen inspired by the insect from the bubble is replaced by diffusion from the water; carbon dioxide expired into the bubble is extracted by dissolution in the water. The insect swims with rapid, jerking movements; unlike many other heteropterans, it has a soft beak and cannot bite. When feeding, it scoops up algae and other small organisms with its spoon-shaped, fringed front legs. Eggs are usually deposited on underwater vegetation. Most males have stridulatory organs, rough areas on the forelegs that make a chirping sound when rubbed together.



Water boatman
E.S. Ross

water buffalo (*Bubalus bubalis*), also called INDIAN BUFFALO, a ruminant mammal of the ox family (Bovidae). The water buffalo was domesticated in Asia from earliest recorded times. Large and massively built, the animal stands 1.5–1.8 m (5–6 feet) or more at the shoulder, reaches a length of 2.4–2.8 m, and weighs about 1,000 kg (2,200 pounds). It has a dull black or dark gray body with little hair and huge horns, which may measure 2 m across and spread outward and upward.

There are two main types of water buffalo. The swamp buffalo is the principal draft animal of southern China and the rice-growing countries of Southeast Asia; it is rarely milked but is usually eaten toward the end of its working life. The other type, the river buffalo, has been bred primarily for dairy production in India, Pakistan, southwest Asia, and Egypt and is also used for meat and draft work. The water buffalo is very suitable for work in humid climates and on waterlogged land.

water chestnut, any of several perennial water plants of the genus *Trapa* (family Trapaceae, order Myrtales), native to Europe, Asia, and Africa. The name is also applied to their edible, nutlike fruit.

The water caltrop (*T. natans*) has submerged leaves that are long, feathery, and rootlike, and floating leaves, in a loose rosette, that are attached to petioles, or leafstalks, 5 to 10 cm (2 to 4 inches) long. The fruit is 2.5 to 5 cm in diameter and usually has four spiny angles.

T. bispinosa, sometimes called Singhara nut, is native to India. The floating leaves, about 5 to 8 cm long, have hairy petioles 10 to 15 cm in length. The fruit is about 2 cm in diameter. *T. bicornis,* the ling nut, is cultivated in most of East Asia.

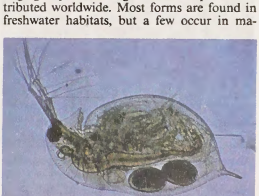
The Chinese water chestnut (*Eleocharis tuberosus*) is a member of the sedge family (Cyperaceae).

water clock: *see* clepsydra.

water cock (*Gallicrex cinerea*), marsh bird of the rail family, Rallidae (order Gruiformes). It occurs from India to Japan and throughout Southeast Asia to the Philippines. The male is blue-black with red legs, a strongly conical red bill, and a protruding red frontal shield. The female is mottled and barred yellowish brown. The water cock is troublesome in rice fields, where it likes to nest. It is hunted for its flesh and its eggs.

water dragon (plant): *see* lizard's tail.

water flea, any member of the crustacean order Anomopoda (class Branchiopoda), a large group containing about 450 species distributed worldwide. Most forms are found in freshwater habitats, but a few occur in ma-



Water flea of the genus *Daphnia* (magnified about 30×)
Eric V. Grave—Photo Researchers

rine environments. The best known genus is *Daphnia,* ubiquitous in ponds and streams in Europe and North America. The water flea is microscopic in size, measuring only about 0.5 to 3.0 millimetres (0.02 to 0.12 inch) long. It has a discrete head bearing large antennae and a bivalve carapace that encloses all or most of the trunk and abdomen. An exception is the predatory giant *Leptodora,* which grows as long as 18 mm and whose carapace is reduced to a small brood sac. Most species swim by means of powerful strokes of the antennae; the successive strokes produce a characteristic hopping and sinking motion. Apart from a few predatory forms, water fleas feed on microscopic particles of organic matter, which they filter from the water with specialized thoracic limbs. They in turn are eaten by fish. Certain water fleas provide, for example, the basic food of nearly all commercial fishes of the Great Lakes of North America.

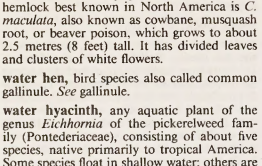
water glass, also called SODIUM SILICATE, or SOLUBLE GLASS, crystal-like lumps that range from colourless to white or grayish white and resemble glass but can be dissolved in water to form a syrupy liquid. Some forms are slightly soluble, and some are almost insoluble; they are best dissolved by heating with water under pressure. A little water dissolves water glass more readily than much water does. The solutions are strongly alkaline. The chemical formulas Na_2SiO_3, $Na_2Si_2O_5$, and $Na_2Si_3O_7$ describe the composition of various forms of water glass.

Water glass is used as a bonding agent in manufacturing grindstones and abrasive wheels. It is a cement for glass or porcelain and is used in various industrial and certain printing processes. It was formerly used as a household preservative for eggs.

water hemlock, any of about 10 species of poisonous plants of the genus *Cicuta,* in the parsley family (Apiaceae), common throughout the North Temperate Zone. In Europe, *Cicuta virosa* is the commonly known species. It is a tall perennial herb that grows in marshy areas and is deadly poisonous. The water hemlock best known in North America is *C. maculata,* also known as cowbane, musquash root, or beaver poison, which grows to about 2.5 metres (8 feet) tall. It has divided leaves and clusters of white flowers.

water hen, bird species also called common gallinule. *See* gallinule.

water hyacinth, any aquatic plant of the genus *Eichhornia* of the pickerelweed family (Pontederiaceae), consisting of about five species, native primarily to tropical America. Some species float in shallow water; others are rooted in muddy stream banks and lakeshores. All have slender rootstocks, feathery roots,

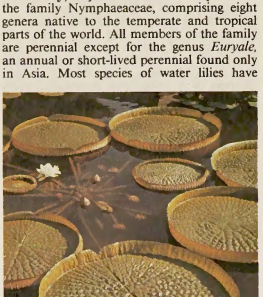


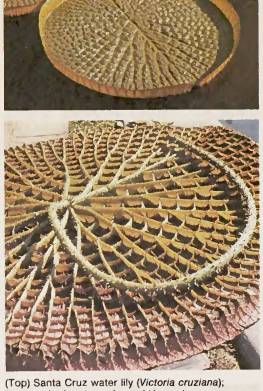
Common water hyacinth (*Eichhornia crassipes*)
W.H. Hodge

rosettes of stalked leaves, and few to many flowers arranged in spikes or clusters in the leaf axils.

The common water hyacinth (*E. crassipes*) is the most widely distributed species. Its leafstalk is spongy and inflated, and the upper lobes of the purple flowers have blue and yellow markings. It reproduces quickly and often clogs slow-flowing streams. It is used as an ornamental in outdoor pools and aquariums.

water lily, any of the freshwater plants of the family Nymphaeaceae, comprising eight genera native to the temperate and tropical parts of the world. All members of the family are perennial except for the genus *Euryale,* an annual or short-lived perennial found only in Asia. Most species of water lilies have





(Top) Santa Cruz water lily (*Victoria cruziana*); (bottom) leaf undersurface of *V. cruziana*
(Top) Gottlieb Hampfler, (bottom) Elliot Levine—Shostal/EB Inc.

rounded, floating, waxy-coated leaves on long stalks that contain many air spaces. The stalks arise from thick, fleshy, creeping underwater stems that are buried in the mud. Some water lilies also have submerged leaves.

The showy, solitary flowers are borne at or above the surface on long stalks that are attached to the underground stems. Each cuplike flower has a spiral arrangement of its numerous petals. The flowers of most species have many stamens (male reproductive structures). Some flowers open only in the morning or in the evening. The fruit is usually nutlike or berrylike. Some fruits ripen underwater until they rupture or decay, and the seeds then float away or sink.

The genus *Nymphaea* includes the water lilies proper, or water nymphs, about 35 species. The common North American white water lily, pond lily, or toad lily is *Nymphaea odorata.* The European white water lily is *N. alba,* also called platter dock. Both species have reddish leaves when young and large, fragrant flowers. The leaf blades of *N. alba* have a deep, narrow notch. The Egyptian lotus, *N. lotus,* has toothed leaves and long-stalked, white flowers, night-blooming and open until mid-day, that rise above the water's surface. Other species of *Nymphaea* have pink, yellow, red, or blue flowers; many kinds are of hybrid origin. The lotus of ancient Egyptian art was usually the blue lotus (*N. caerulea*).

The genus *Nuphar,* with about 25 species distributed throughout the Northern Hemisphere, includes the common yellow water lily, cow lily, or spatterdock (*Nuphar advena*) of eastern North America. The yellow water lily has submerged leaves that are thin and translucent and leathery floating leaves.

The largest water lilies are those of the tropical South American genus *Victoria,* comprising two species of giant water lilies. The leaf margins of both the Amazon, or royal, water lily (*V. amazonica*; formerly *V. regia*) and the Santa Cruz water lily (*V. cruziana*) have upturned edges, giving each thickly veined leaf the appearance of a large, shallow pan 60 to 180 centimetres (about 2 to 6 feet) across and accounting for its common name, water platter. The fragrant flowers of *Victoria* have 50 or more petals and are 18 to 46 centimetres (about 7 to 18 inches) wide. They open white toward evening and shade to pink or reddish two days later before they wither, to be replaced by a large berrylike fruit.

Water lilies provide food for fish and wildlife but sometimes cause drainage problems because of their rapid growth. Many varieties have been developed for ornamental use in garden pools and conservatories.

water mass, body of ocean water with a distinctive narrow range of temperature and salinity and a particular density resulting from these two parameters. Water masses are formed as the result of climatic effects in specific regions. Antarctic bottom water is an important water mass that forms on the Antarctic continental shelf as a cold, dense residual brine during the formation of sea ice. Its salinity of 34.62 parts per thousand and temperature of −1.9° C (28.6° F) result in a high density of 1.02789 grams per cubic centimetre, causing it to sink and flow northward along the bottom into the southern oceans. Mediterranean water is another example of a water mass. Excessive evaporation, low rainfall, and high temperatures continually generate large volumes of warm (11.9° C), salty (36.5 parts per thousand) water. Its density of 1.02778 causes it to sink to the bottom of the Mediterranean and overflow across the submarine sill at the Strait of Gibraltar, whence it sinks and spreads at a depth of about 1,000 metres (3,300 feet) in the Atlantic.

Plotted on temperature–salinity diagrams, samples from a single water mass tend to cluster in unique groups or elongate zones.

water measurer (insect): *see* marsh treader.

water milfoil, any member of the genus *Myriophyllum* (family Haloragaceae), about



Water milfoil (*Myriophyllum aquaticum*)
A to Z Botanical Collection—EB Inc.

45 widely distributed species of submerged freshwater plants with whorls of feathery leaves and emergent, wind-pollinated flowers. Some species are cultivated in pools and aquariums, especially the parrot's feather, or water feather, (*M. aquaticum*) and the myriad leaf (*M. verticillatum*).

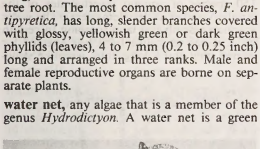
water mold, also spelled WATER MOULD, any of about 150 species of fungi belonging to the order Saprolegniales within the class Oomycetes. Many of them live in fresh or brackish water or wet soils. Most species are saprobic (*i.e.*, they live on dead or decaying organic matter), although some cause diseases in certain fishes, higher plants, algae, protozoans, and marine invertebrates. The mycelium (filaments composing the body of the fungus) is conspicuous around bits of decaying organic matter. Reproduction is by motile, asexual spores (zoospores), which may be of two types: pear-shaped with two apical whiplike structures (flagella) or kidney-shaped with two flagella on the concave side. Zoospores are used to classify different species of water molds. In sexual reproduction, fusion of gametes (sex cells) from differentiated sex organs takes place in an oogonium.



Water mold (*Saprolegnia*) covering fish
Runk/Schoenberger from Grant Heilman

water moss, also called BROOK MOSS, or FOUNTAIN MOSS (*Fontinalis*), genus of mosses belonging to the order Bryales, found in flowing freshwater streams and ponds in temperate regions. About 25 species are native to North America. A brook moss may have shoots 30 to 100 (rarely up to 200) cm (12 to 40 inches) long, and is usually attached to a stone or a tree root. The most common species, *F. antipyretica,* has long, slender branches covered with glossy, yellowish green or dark green phyllids (leaves), 4 to 7 mm (0.2 to 0.25 inch) long and arranged in three ranks. Male and female reproductive organs are borne on separate plants.

water net, any algae that is a member of the genus *Hydrodictyon.* A water net is a green algae found as a free-floating network of multinucleate cell masses arranged in hexagons or pentagons and up to 20 cm (7.9 inches) in total length. Water nets are usually found floating on the surface of quiet ponds. Sexual reproduction is by fusion of similar gametes (isogamy). Asexual reproduction is by motile zoospores, hundreds of them being contained in each cell and arranged in small netlike structures. When a mature *Hydrodictyon* net dissociates, each cell liberates a miniature net. Because of its reproductive efficiency, *Hydrodictyon* proliferates rapidly and is often a problem in ponds, recreational waters, and irrigation canals.



Water net (*Hydrodictyon reticulatum*) highly magnified
Robert W. Hoshaw

water ouzel (bird): *see* dipper.

water parsnip, any of several aromatic herbs of the genus *Sium,* especially *S. latifolium,* belonging to the parsley family (Apiaceae), distributed throughout the Northern Hemisphere and Africa. They grow in moist areas, and some species are even partially submerged. All are perennial herbs with divided leaves and clusters of white flowers. *S. sisarum,* known as skirret, is cultivated for its edible tuberous roots. The more common *S. latifolium,* however, is known to be poisonous to livestock.



Water parsnip (*Sium suave*)
Kitty Kohout from Root Resources

water plantain, any freshwater perennial herb of the genus *Alisma,* commonly found in lakes, ponds, and ditches. The three or four species are widely distributed throughout the North Temperate Zone and Australia. Waterplantain leaves float or extend out of the water. They are sometimes ribbonlike or grasslike, are without lobes, and are often heart-shaped or tapered at the base. Flowers have three green sepals and three white or pinkish petals.

A. triviale, regarded by some authorities as a New World variety of the European species *A. plantago-aquatica,* is common throughout North America. The plant grows to about 1 m (40 inches) in height and has ovate, slightly pointed leaves. The flowers are about 6 mm (0.25 inch) long and grow in whorls along a many-branched stalk. *A. subcordatum* has smaller flowers that are about 2 mm long.



European water plantain (*Alisma plantago-aquatica*)
A to Z Botanical Collection

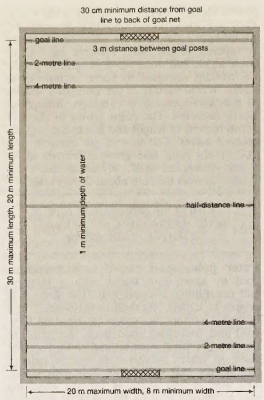
A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

water polo, sport played in a swimming pool by seven-man teams with a buoyant ball resembling a soccer ball. The game was originally called "football-in-the-water," and indeed it is more like soccer (association football) and basketball than polo, the name of the sport coming from an earlier form of the game in which players rode barrels painted like horses and struck the ball with sticks. The aim of the game is for the attacking side to score a goal by throwing or dribbling the ball between the goalposts and under the crossbar of the defenders' goal. The sport originated in Great Britain in the 1870s. The first rules were established in Scotland in 1877, when goalposts were suggested. When the first international water-polo match was held in London in 1890, Scotland won although the team was playing by British rules, which subsequently formed the basis of international regulations. The game was introduced to the United States in the 1880s. Great Britain was the first winner in Olympic Games at Paris in 1900 and also in the 1908, 1912, and 1920 games. Great Britain's early world domination was overtaken by Hungary, Italy, The Netherlands, and eastern European countries.

Before World War II, two kinds of water polo were played: the water-soccer type, which used a fully inflated ball, weighing between 400 and 450 g (14 and 16 ounces), and emphasized skillful passing; and the rugged body-contact style of play favoured in the United States, using a semi-inflated ball, with the premium placed on retaining possession. After 1937, however, only the game with the fully inflated ball has been officially recognized. Water polo is played in most parts of the world, and international competition is widespread.

A water-polo team consists of seven active players and four substitutes. Each team wears either blue or white caps (red for the goalkeepers, with a blue or white number one; other players are numbered from 2 through 11). No grease or oil is allowed on the body. The referee has final authority in each game; other officials include timekeepers; secretaries, who keep records of the many kinds of fouls, such as holding or hitting an opponent; and two goal judges. Water polo is regulated by the Fédération Internationale de Natation Amateur (FINA; founded 1908) through its International Water Polo Committee, which issues Rules of Water Polo.

Water polo is a rough and demanding sport. The minimum depth of the pool is 1 m (3 feet 3 inches), for Olympic events 1.8 m (5 feet 11 inches). The pool is from 30 to 20 m (98 to 65 feet) long between goals, and between 20 and 8 m (65 and 26 feet) wide. The width between goalposts is 3 m (9 feet 10 inches), the crossbar being at least 0.9 m (2 feet 11 inches) above the surface of the water. Nets are attached to the goalposts and crossbars. Pools for women's games are smaller, and there is



International water-polo pool

no international women's water-polo competition held.

See also Olympic Games.

water purification, treatment of water to make it safe and acceptable for human use. Such treatment has grown vastly in importance in the 20th century because of the growth of cities and development of industry and, consequently, of pollution.

A brief treatment of water purification follows. For full treatment, *see* MACROPAEDIA: Public Works.

The first treatment plant was built in 1829 to purify Thames River water by filtration. After the London cholera epidemic of 1854 was traced to a public well, the problem of water treatment received widespread attention. A dramatic proof of the value of treatment came in 1892, when a cholera epidemic that ravaged Hamburg was escaped by the neighbouring city of Altona, Ger., thanks to its filtration system. Cholera outbreaks soon led to development of filtration plants in most of the world's cities, beginning with western Europe and the United States.

Filtration is still the most widely used method of purification. In slow filtration, the water is allowed to pass through a deep layer of fine sand; most of the impurities are removed by the top inch or two of sand, which is removed and cleaned from time to time or, in modern plants, is washed in place by special wash water. In rapid-filtration plants, the water is treated with a coagulant, such as aluminum sulfate, ferric chloride, or ferric sulfate, which flocculates particles, carrying most suspended matter to the bottom in sedimentation tanks. After this preparation, the water is passed at a relatively rapid rate through small beds of coarse sand that are washed from time to time. Heavily polluted waters may be chlorinated both before and after filtration. Aeration (mixing air with the water) is carried out if undesirable amounts of iron and manganese are present; they are held in solution in water only in the absence of oxygen. *See also* water softener; desalination.

water rail (*Rallus aquaticus*), slender marsh bird of the family Rallidae (order Gruiformes), native to most of Europe and Asia. Its length is about 28 cm (11 inches), and it has a moderately long beak. The sides of the bird have black and white bands. The name water rail also is used as a general term for the larger group, or tribe, to which *R. aquaticus* belongs. *Rallus aquaticus* can be distinguished from the tribe Rallini by its relatively long beak. *See also* rail.

water rat, any of a number of rodents normally found in or near water. The term is often used collectively for about eight genera of Australian and Oriental rodents forming the subfamily Hydromyinae of the family Muridae (order Rodentia). It is also used for the muskrat (*q.v.*) and the water vole (*see* vole).

Among the hydromyine water rats are the Australian–New Guinean water rats, or beaver rats (*Hydromys*), three species of large, primarily carnivorous rodents found along streams, swamps, estuaries, and other aquatic habitats. From 20 to 35 cm (8 to 14 inches) long without the long tail, they have partly webbed hind feet and dense, seallike, gray or golden- to dark-brown fur. Their nostrils can be closed off, an adaptation to their semiaquatic life. They rest by day in burrows, hollow logs, or other cover and emerge in the evening to hunt for prey, such as mussels, snails, fishes, crabs, frogs, and crayfish; they also eat birds' eggs and plant matter. They breed in late winter or spring, the female bearing a litter of usually four or five young, which become fully adult before they are a year old.

Moncktón's water rat (*Crossomys moncktoni*) is still better adapted to its environment; it has convoluted external ears and a characteristic hairy tail with a bristly underseam that allows it rudderlike control of its movements in water.

Other genera of the subfamily include *Chrotomys, Paraleptomys,* and *Pseudohydromys.*

water resource, any of the entire range of natural waters that occur on the Earth, regardless of their state (*i.e.,* vapour, liquid, or solid) and that are of potential use to humans. Of these, the resources most available for use are the waters of the oceans, rivers, and lakes; other available water resources include groundwater and deep subsurface waters and glaciers and permanent snowfields.

Human use of natural waters, particularly of freshwater resources, has increased steadily over the centuries. It is unlikely that this trend will change given the continued growth of population and the ever-widening utilization of water for agricultural, industrial, and recreational purposes. This situation has given rise to growing concern over the availability of adequate water supplies to accommodate the future needs of society. Surface-water resources are already being used to their maximum capacity in various regions of the world, as, for example, in the southwestern United States.

Quantity of water is not the only concern. Overuse has resulted in the progressive deterioration of water quality. Seepage of mineral fertilizers (phosphates and nitrates), pesticides, and herbicides into surface and subsurface waters has not only rendered them unfit for human consumption but also disrupted aquatic ecosystems. Lakes and rivers also have been contaminated by the improper disposal of sewage, the discharge of untreated industrial wastes (including such toxicants as polychlorinated biphenyls, or PCBs), and the release of heated wastewater from nuclear-power plants and other industrial facilities, which results in thermal pollution and its attendant problems.

Efforts are being made to curb the contamination of water resources. For example, regulatory action by the U.S. government to reduce phosphorous input into the Great Lakes has had measurable results, as has the implementation of improved waste-purification technology by certain municipalities in the region. The latter not only helps to restore water resources but also conserves the water supply by effective recycling. Advanced sewage-treatment facilities have made it possible to obtain potable water purer than most stream water. Projects to remove salt and other dissolved solids from brackish surface water as well as from seawater have been undertaken in such countries as Australia, Kuwait, and the United States. Water from desalination plants is generally suitable for household use and for irrigation. Other procedures employed for relieving water shortages include control of runoff and the reduction of evaporation by means of agricultural-engineering measures.

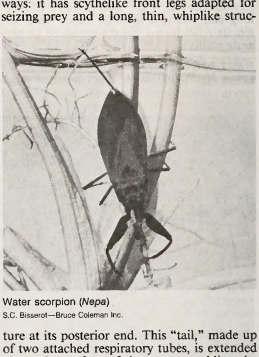
Consult the INDEX *first*

water scavenger beetle, any of the approximately 2,000 species of the predominately aquatic insect family Hydrophilidae (order Coleoptera). These beetles are found swimming in marshy freshwater ponds throughout the world, especially in warm regions. Water scavenger beetles have smooth, oval, dark-brown or black bodies and short, hairy, clubbed antennae. They range in length from several to about 4 cm (up to 1.6 inches). The water scavenger beetle swims by moving the middle and the hindlegs on each side together. Most adults (*e.g., Hydrophilus* and *Tropisternus*) feed on algae or decaying matter; a few species, however, are predators.

The female deposits about 100 eggs in a silklike, waterproof egg case, which she either attaches to underwater vegetation, floats on the water surface, or hangs on herself. The carnivorous larvae feed not only on insects that fall into the water but also on their own kind. Many larvae must come to the water surface for air, although a few (*e.g., Berosus*) breathe through the body wall and abdominal filaments.

The water scavenger beetle differs from most water insects in that it hangs suspended from the water surface by its head rather than by its abdomen. In order to replenish the layer of air surrounding the body, it extends its antennae through the surface film. When ready to dive, the water scavenger beetle folds back its antennae, capturing a bubble of air, which is stored as a silvery body covering.

water scorpion, any of the approximately 150 species of aquatic invertebrates of the family Nepidae (order Hemiptera). The water scorpion resembles a land scorpion in certain ways: it has scythelike front legs adapted for seizing prey and a long, thin, whiplike struc-



Water scorpion (*Nepa*)
S.C. Bisserot—Bruce Coleman Inc.

ture at its posterior end. This "tail," made up of two attached respiratory tubes, is extended above the surface of the water, enabling the animal to take in air. The bite of the water scorpion is painful but is far less harmful to humans than the sting of the true scorpion.

Water scorpions are blackish brown in colour and measure about 25 to 52 millimetres (1 to 2 inches) in length. The different species vary somewhat in shape. Those of the genus *Nepa*, for example, have a slightly elongated, oval-shaped body, whereas those of other genera tend to be longer and more cylindrical. Water scorpions are able to swim by moving their front legs up and down and kicking the middle and hind pairs. The latter two sets of legs are also used for crawling.

Found worldwide, water scorpions live primarily along the bottom edges of ditches and muddy ponds, where they hide among dead, water-logged leaves and other plant debris to ambush prey. They rarely move about in open water because they are poor swimmers. Adults lay their eggs in the crevices of debris and on the stalks of water plants.

water shield (*Brasenia schreberi*), small, purple-flowered aquatic plant of the fanwort family (Cabombaceae), found in northern ponds and still waters throughout the world, except in Europe. "Water shield" also refers to fanwort (*q.v.*; *Cabomba*), the only other genus in the family Cabombaceae.

Each oval, floating leaf of water shield is 5 to 10 centimetres (about 2 to 4 inches) long. A long, jelly-coated stem connects the middle of the leaf to rootstocks buried in mud.



Water shield (*Brasenia schreberi*)
Thase Daniel

Several leafstalks of varying lengths rise from the main stalk. The flowers are small, 1.3 to 2 centimetres wide, and have three or four narrow petals; the small fruit is club shaped.

water silk (algae): *see* Spirogyra.

water snake, any member of the genus *Natrix*, family Colubridae, and similar snakes. The 65 to 80 species of *Natrix* occur on all continents except South America. Some authorities place the New World species in several genera, the largest of which is *Nerodia*. Most water snakes have dark blotches or dorsal streaks on their stout bodies, and the scales are keeled. They are semiaquatic, preying on fish and amphibians, which they kill with a nonvenomous bite. American forms are always found in or near water, and they bear 30 to 75 living young; European forms are less water-dependent, and they lay eggs. All members of the genus are notably bad-tempered; besides inflating the head and striking in self-defense, they release a foul secretion from the anal gland.

In North America east of the Rockies, there are 11 species, typified by the widespread *Natrix sipedon*, the several races of which are given different common names. It is a blotched or banded brown snake about 90 centimetres (35 inches) long. It is often referred to as a moccasin because of its resemblance to the venomous, water-dwelling snake of that name.

The common European water, or grass, snake (*N.*, sometimes *Tropidonotus, natrix*) ranges from western Europe (including the British Isles) and North Africa to Central Asia. It is dark green to black, usually with small black dorsal spots, short bars on the sides, and a white, yellow, or orange mark on each side of the head or across the nape. Some specimens are nearly 1.8 metres (6 feet) long, but their average length is less than one metre. The checkered water snake (*N. tesselata*) of Europe to Central Asia is aquatic and a fish eater. The keelback (*N. piscator*) of India is named for its markedly keeled dorsal scales. The tiger grass snake (*N. tigrina*) of eastern Asia to Japan is mostly dark green or blue.



Common European water, or grass, snake (*Natrix natrix*)
Stephen Dalton—The National Audubon Society Collection/EB Inc.

water softener, device for removing calcium and magnesium from water; water so treated will not form insoluble scale in pipes and tanks and will not form a precipitate with soaps or interfere with other cleaners. Water softeners usually consist of zeolite or an ion-exchange resin (*q.v.*) in a tank connected directly into the water system. The zeolite or resin contains sodium ions that change places with the calcium and magnesium ions dissolved in the water. When the zeolite or resin becomes exhausted (when most of its exchangeable sodium is replaced with calcium and magnesium), it can be regenerated by washing with a strong solution of common salt, which removes the calcium and magnesium and replaces them once again by sodium. Indispensable in many industries, water-softening units are also used in homes in a number of countries.

water strider, also called POND SKATER, or SKIMMER, any insect of the family Gerridae



Water strider (Gerridae)
E.S. Ross

(order Heteroptera), which numbers about 350 species. Water striders, often seen running or skating in groups over the surface of a pond or stream, are slender, dark coloured, and generally more than 5 millimetres (⅕ inch) long.

With their short front legs they capture insects that fall onto the water surface. In crowded conditions water striders have been known to prey on each other. The middle and hind pairs of legs are long, sometimes more than twice the length of the body. The middle pair is used for propulsion, and the hind pair is used for steering. The feet (tarsi) are covered with fine, water-resistant hairs that enable the insect to remain on the water surface. Often two forms of the adult occur in the same species; one wingless, the other winged. Occasionally a third form with short wings appears.

Gerris is a cosmopolitan genus of this family. All water striders live in fresh water except those of the genus *Halobates*, which are considered the only true salt-water-inhabiting insects. They have been seen many miles from land on tropical and subtropical ocean surfaces, feeding on the fluids of dead, floating animals.

water supply, available water provided to fulfill a particular need; if the need is domestic, industrial, or agricultural, the water must fulfill both quality and quantity requirements. Water supplies can be obtained by numerous types of water resources projects, such as wells, dams, or reservoirs. *See* water resource.

water-supply system, arrangement for transporting water from areas of abundance to an area of shortage. This includes works for the collection, transmission, treatment, storage, and distribution of water for homes, commercial establishments, industry, and irrigation, as well as for such public needs as fire fighting and street flushing.

A brief treatment of water-supply systems follows. For full treatment, *see* MACROPAEDIA: Public Works.

There is much archaeological evidence to indicate that ancient peoples were concerned with their water supply. Wells were sufficient for small communities, and rivers provided enough water for civilizations along the Tigris and Euphrates, the Nile, and the Indus rivers; but as populations grew, wells had to be dug deeper, and water had to be brought in from more distant sources. These ancient systems included storage reservoirs at water sources, canals and aqueducts for water conveyance to points of use, and water-distribution systems. Highly advanced systems appeared about 2500 BC and reached their peak in the system supplying ancient Rome. The outstanding features of this system were the 11 aqueducts totalling 359 miles (578 kilometres) in length—of which 30 mi were supported on stone arches—that delivered some 50,000,000 gallons (189,000,000 litres) of water to the city daily. The water was distributed from large storage cisterns to public fountains and baths by an elaborate system of lead pipes.

During the Middle Ages, water supplies were largely neglected, and epidemics caused by waterborne organisms were common. In the 17th and 18th centuries, distribution systems utilizing cast-iron pipes, aqueducts, and pumps were installed in London and Paris. During the 19th century the pollution of most water supplies became so serious that slow-sand filtration was initiated; and by the end of the century the realization that diseases could be transmitted by water led to the use of sterilizing chemicals, usually chlorine compounds.

Water sources for modern supply systems include wells, rivers, lakes, and man-made reservoirs. When points of use are near sources, direct intake can be used. Offshore intakes are sometimes built in lakes to obtain water of better quality and to avoid freezing problems in winter. Reservoirs are formed usually by constructing dams near the collection point of mountain-water runoff or across rivers. Dams provide a way of regulating water collection and flow so that the supply remains constant.

Modern aqueducts—comprising canals, closed tunnels, and large pipelines—deliver water by means of gravity in some cases, but usually some method of pressurization is used. After the water reaches collection points it is normally given some kind of treatment to improve its quality to a usable level. Most important is the purification process, which destroys harmful bacteria and deactivates viruses. Liq-

uid chlorine is the most common chemical used in modern treatment plants and is usually applied before other treatment and as a final treatment before distribution. In some plants, ozone and ultraviolet light are used as disinfectants.

Water-treatment works employ a variety of other treatment processes, which include long-period storage, aeration, coagulation, sedimentation, softening, and filtration; these processes are used in varying combinations, depending primarily on the characteristics of the water but also on its intended use. Long-period storage, usually in reservoirs or setting basins, gives particulates a chance to settle out, and filtration through beds of fine sand or through crushed anthracite coal can trap the suspended matter. Different chemical additives cause particles to coagulate and thus to settle. Aeration mixes air with water either by spraying the water into the air or by forcing small air bubbles through the water and is used primarily to reduce unpleasant odours and tastes. Softening is the process of removing calcium and magnesium from the water either by chemical precipitation or by ion exchange.

In parts of the world where there is little or no fresh water, plants that desalt seawater, wastewater, and highly mineralized groundwater have been constructed. The methods used to remove salt from water include distillation, in which salt water is evaporated and fresh water is condensed; crystallization, where salt water is frozen in such a way that salt-free ice is formed and then thawed; and a membrane process, where the membrane filters the salt ions from the water. The first large desalting plant was built in Kuwait in 1949. Subsequent technological advances have allowed for larger, more efficient plants to be built. One plant near Tijuana, Mexico, has a daily capacity of 7,500,000 gal.

After treatment, water is pumped either directly into the distribution system or to an elevated storage location, such as a water tank. For adequate distribution, water systems must operate under pressure. In some cases, the gravity drop of water from its elevated storage location provides enough pressure; otherwise, it is supplied by a pumping station. Adequate pressures range between 30 and 100 pounds per square inch (2 and 7 kilograms per square centimetre). Many communities base water-pressure requirements on what is thought to be adequate to fight fires, where pressures of up to 75 pounds per square inch are sometimes necessary. Materials used in transporting water to homes and industries include pipes of cast iron, steel, concrete, and asbestos cement. Meters record water usage at the site of consumption, and charges are levied to help pay for operation and maintenance of the system.

water table, also called GROUNDWATER TABLE, hypothetical underground surface approximated by the water levels in wells that penetrate the zone of wholly saturated permeable rock. The water table separates the groundwater zone from the capillary fringe, or zone of aeration, that lies above it. The water table fluctuates both with the seasons and from year to year because it is affected by climatic variations and by the amount of precipitation used by vegetation. It also is affected by withdrawing excessive amounts of water from wells or by recharging them artificially. *See also* aquifer.

water treader, any insect of the approximately 30 species of the family Mesoveliidae (order Heteroptera). These small, slender insects are yellowish or greenish in colour and are 5 millimetres (0.2 inch) or less in length. Mesoveliids are predaceous and are usually seen on floating vegetation or on the water surface. One species, *Phrynovelia papua* of New Guinea, lives in leaves on the forest floor.

Water Witch incident (1855), brief military skirmish near the Paraguayan Ft. Itapirú, involving the USS "Water Witch," commanded by Lt. Thomas J. Page, and Paraguayan troops who fired as the vessel was exploring the Paraná River, in international waters.

In 1853 the "Water Witch" set out on a scientific study, organized by the U.S. government, of the Río de La Plata waterways. In 1854, after Page became involved in a controversy between the Paraguayan president Carlos Antonio López and a North American firm, Paraguay barred foreign war vessels from its waters. In the subsequent incident in 1855 on the Paraná River, one U.S. seaman was killed and several others were injured, and gunfire from the "Water Witch" killed a number of Paraguayan troops.

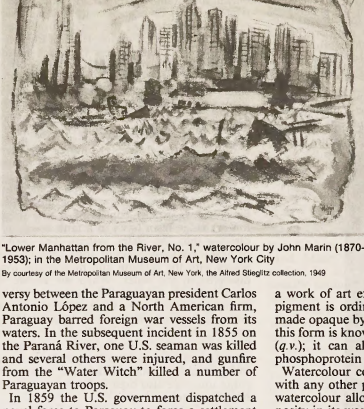
In 1859 the U.S. government dispatched a naval force to Paraguay to force a settlement of its claims involving the "Water Witch" incident and earlier disputes. The settlement included a formal apology to the U.S. government for the attack and an agreement by the Paraguayan government to pay the slain seaman's family an indemnity of $10,000.

Waterberg Series, also called WATERBERG SYSTEM, major division of rocks in southern Africa. The age of the Waterberg is in doubt; it is possible that the Waterberg is Late Precambrian or Early Paleozoic (older or younger than 570 million years, respectively). Waterberg rocks consist of several thousand feet of brown, red, and purple sandstones and some rather minor shales. Sedimentary structures such as ripple marks, desiccation cracks, and current bedding are prominent features in the almost flat-lying Waterberg rocks. As yet no evidence of fossilized organisms has been found in them.

waterbuck, antelope species of the genus *Kobus* (*q.v.*).

Waterbury, city, coextensive with the town (township) of Waterbury, New Haven County, western Connecticut, U.S., on the Naugatuck River. Thirty-one families established Mattatuck Plantation in 1674, which was incorporated (1686) as the town of Waterbury, so-named because of the abundant drainage of the locality. The city, incorporated in 1853, was consolidated with the town in 1902. In the 19th century industrialization stimulated growth of Waterbury, which became the nation's largest producer of brass products. Other manufactures include clocks and watches (made and marketed with great success by Robert H. Ingersoll), and chemicals. Mattatuck Community College (1967), Post College (1890), Waterbury State Technical College (1964), and an extension of the University of Connecticut are in the city. Pop. (1990) city, 108,961; Waterbury MSA, 221,-629.

watercolour, also spelled WATERCOLOR, pigment ground in gum, usually gum arabic, and applied with brush and water to a painting surface, usually paper; the term also denotes



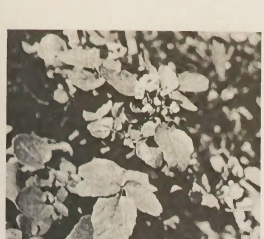
"Lower Manhattan from the River, No. 1," watercolour by John Marin (1870–1953); in the Metropolitan Museum of Art, New York City
By courtesy of the Metropolitan Museum of Art, New York, the Alfred Stieglitz collection, 1949

a work of art executed in this medium. The pigment is ordinarily transparent but can be made opaque by mixing with a whiting and in this form is known as body colour, or gouache (*q.v.*); it can also be mixed with casein, a phosphoprotein of milk.

Watercolour compares in range and variety with any other painting method. Transparent watercolour allows for a freshness and luminosity in its washes and for a deft calligraphic brushwork that makes it a most alluring medium. There is one basic difference between transparent watercolour and all other heavy painting mediums—its transparency. The oil painter can paint one opaque colour over another until he has achieved his desired result. The whites are created with opaque white. The watercolourist's approach is the opposite. In essence, instead of building up he leaves out. The white paper creates the whites. The darkest accents may be placed on the paper with the pigment as it comes out of the tube or with very little water mixed with it. Otherwise the colours are diluted with water. The more water in the wash, the more the paper affects the colours; for example, vermilion, a warm red, will gradually turn into a cool pink as it is thinned with more water.

The dry-brush technique—the use of the brush containing pigment but little water, dragged over the rough surface of the paper—creates various granular effects similar to those of crayon drawing. Whole compositions can be made in this way. This technique also may be used over dull washes to enliven them.

watercress, also called CRESS (*Nasturtium officinale*), perennial plant, of the mustard family (Brassicaceae), native to Eurasia and naturalized throughout North America in cool, flowing streams where it grows submerged, floating on the water, or spread over mud surfaces. Watercress often is cultivated in tanks for its young shoots, which are used in salads. The plant bears four-petalled, white flowers and delicate, light-green, peppery-flavoured



Watercress (*Nasturtium officinale*)
Grant Heilman—EB Inc

leaves rich in ascorbic acid (vitamin C). Seed-pods are small and beanlike, with two rows of seeds. Watercress roots freely from the stems.

waterfall, area where flowing river water drops abruptly and nearly vertically. Waterfalls represent major interruptions in river flow. Under most circumstances rivers tend to smooth out irregularities in their flow by processes of erosion and deposition. In time, the long profile of a river (the graph of its gradient) takes the form of a smooth curve, steepest toward the source, gentlest toward the mouth. Waterfalls interrupt this curve, and their presence is a measure of the progress of erosion. A waterfall may also be termed a falls or sometimes a cataract, the latter designation being most common when large volumes of water are involved. Waterfalls of small height and lesser steepness are called cascades; this term is often applied to a series of small falls along a river. Still gentler reaches of rivers that nonetheless exhibit turbulent flow and white water in response to a local increase in channel gradient are called rapids.

A brief treatment of waterfalls follows. For full treatment, *see* MACROPAEDIA: Rivers.

The highest waterfall in the world is the Angel Fall in Venezuela (807 m [2,650 feet]). Arguably the largest waterfall is the Chutes de Khone (Khone Falls) on the Mekong River in Laos: the volume of water passing over it has been estimated at 11,600 cubic m (410,000 cubic feet) per second, although its height is only 70 m (230 feet).

There are several conditions that give rise to waterfalls. One of the most common reasons for a falls' existence is difference in rock type. Rivers cross many lithological boundaries, and, if a river passes from a resistant rock bed to a softer one, it is likely to erode the soft rock more quickly and steepen its gradient at the junction between the rock types. This situation can occur as a river cuts and exhumes a junction between different rock beds. The riverbed of Niagara Falls, which forms part of the boundary between the United States and Canada, has a blocky dolomite cap overlying a series of weaker shales and sandstones.

A related cause of waterfalls is the presence of bars of hard rock in the riverbed. A series of cataracts has been created on the Nile where the river has worn its bed sufficiently to uncover the hard crystalline basement rock.

Other waterfalls are caused less by the character of rock formations and more by the structure or shape of the land. Uplifted plateau basalts, for example, may provide a resistant platform at the edge of which rivers produce waterfalls, as occurs on the Antrim basalts in Northern Ireland. On a much larger scale, the morphology of the southern half of Africa, a high plateau surrounded by a steep scarp slope, creates waterfalls and rapids on most of the area's major rivers. These include the Livingstone Falls on the Congo River and the Augrabies Falls on the Orange River. In general, the occurrence of waterfalls increases in mountainous terrain as slopes get steeper.

Erosion and geology are not the only factors that create waterfalls. Tectonic movement along a fault may bring hard and soft rocks together and encourage the establishment of a waterfall. A drop in sea level promotes increased down-cutting and the retreat upstream of a knickpoint (or sharp change of gradient indicating the change of a river's baselevel). Depending on the change of sea level, river flow, and geology (among other factors), falls or rapids may develop at the knickpoint. Many waterfalls have been created by glaciation where valleys have been over-deepened by ice and tributary valleys have been left high up on steep valley sides. In the glacially gouged Yosemite Valley in California, the Yosemite Upper Falls tumble 436 m (1,430 feet) from such a hanging valley.

Within a river's time scale, a waterfall is a temporary feature that is eventually worn away. The rapidity of erosion depends on the height of a given waterfall, its volume of flow, the type and structure of rocks involved, and other factors. In some cases the site of the waterfall migrates upstream by headward erosion of the cliff or scarp, while in others erosion may tend to act downward, to bevel the entire reach of the river containing the falls. With the passage of time, by either or both of these means, the inescapable tendency of rivers is to eliminate any waterfall that may have formed. The energy of rivers is directed toward the achievement of a relatively smooth, concave upward, longitudinal profile.

Even in the absence of entrained rock debris, which serve as an erosive tool of rivers, the energy available for erosion at the base of a waterfall is great. One of the characteristic features associated with waterfalls of any great magnitude, with respect to volume of flow as well as to height, is the presence of a plunge pool, a basin that is scoured out of the river channel beneath the falling water. In some instances the depth of a plunge pool may nearly equal the height of the cliff causing the falls. Plunge pools eventually cause the collapse of the cliff face and the retreat of the waterfall. Retreat of waterfalls is a pronounced feature in some places. At Niagara, for example, the falls have retreated 11 km (7 miles) from the face of the escarpment where they began. Today much of Niagara's water is diverted for hydroelectric power generation, but it has been estimated that with normal flow the rate of retreat would be about 1 m (3 feet) per year.

Waterford, Irish PORT LÁIRGE, county in the province of Munster, Ireland. With an area of 710 square miles (1,838 square km), it is bounded by the Atlantic Ocean on the south and from west to east by Counties Cork, Tipperary, Kilkenny, and Wexford. The county's northern boundary follows the River Suir through the city of Waterford. Included within the county are the lower reaches of the Rivers Blackwater and Bride. The upland areas of Waterford are mainly ridges 600–800 feet (180–240 m) high, grading into lowlands and marked by ranges of mountains, principally the Knockmealdowns, Comeraghs, and Monavullaghs, all reaching heights of about 2,300 feet (700 m). The Comeraghs and Monavullaghs comprise a single range that includes Coumshingaun, a steep-walled basin, or cirque, with sides 1,000 feet (300 m) high. To the east of the Comeraghs the older rocks form a lowland surrounded by sharp hills drained by the River Clodiagh. Most of the coast is cliff, though there are bays at Tramore, Dungarvan, and Ardmore.

Waterford city, of Norse foundation and an important port and centre of trade, was a bridgehead for the Anglo-Normans in the 12th century. The eastern part of the county came under the control of the Le Poers, or Powers, family, and the western part, called the Decies, came under a branch of the Fitzgeralds. The city had a period of prosperity in the 18th century, and some of the smaller towns were improved. The native Irish character of the population was never wholly obliterated; and in the west, near Dungarvan, Gaelic continued to be spoken into the 20th century.

The county council meets in Dungarvan, and there is a county manager. Dungarvan is an urban district and Waterford a county borough. Two-thirds of the county is under crops and pasture, with most of the remainder in rough pasture, though there are some fine woods on the hill slopes and on estates. Permanent grass covers seven-tenths of the total farmed area in the county, hay nearly one-tenth, and crops more than one-fifth, with oats as the main cereal crop. Farming is mixed, though dairying is important; and cattle are exported. Waterford is important for its coasting trade, its agricultural industries, and its traditional glassmaking industry. Pop. (1986) excluding Waterford county borough, 51,622.

Waterford, Irish PORT LÁIRGE, city, port, and county borough of County Waterford, and the major town of southeastern Ireland. It is on the south bank of the River Suir, 4 miles (6 km) above the latter's junction with the Barrow at the head of Waterford Harbour. Waterford became a cathedral city in 1096. The 2nd Earl of Pembroke, known as Strongbow, captured the place in 1170; and Henry II landed there in 1171. Waterford received a charter from King John, who also defined the shire (county). In the later Middle Ages the city was virtually an independent commune. Waterford's Roman Catholic cathedral was completed in 1796, and its Church of Ireland (Anglican) cathedral was built in 1773–79 on the site of a church founded in about 1050. Other significant buildings include the remains of a Dominican friary and Reginald's Tower. The Normans enclosed some 15 acres (6 hectares) of the city with walls and fortifications that were rebuilt by the Normans. The city received its first charter in 1205. In 1603 it took a prominent part in opposition to the government and the Anglican church but submitted on the approach of the forces of Baron Mountjoy, lord deputy of Ireland. It resisted Oliver Cromwell in 1649 but surrendered to his son-in-law Henry Ireton in 1650. The city sent two members to Parliament from 1374 to 1885, when the number was reduced to one. In 1898 it became a county borough.

Waterford is now an important export centre for fruit and meat, notably for containerized goods. The main industries are food processing, brewing, papermaking, and glassmaking; its crystal is world famous (*see* Waterford glass). A modern industrial estate has chemical, pharmaceutical, and light manufacturing plants. The city is the headquarters of extensive salmon and sea fisheries and the most important port on the south coast after Cork. Waterford Harbour is a winding and well-sheltered bay formed by the estuary of the Suir and the joint estuary of the Nore and Barrow. The Suir is navigable to Waterford for vessels drawing 22 feet (6.7 m). The city is also the site of a regional technical college. Pop. (1986) 39,529.

Waterford, town (township), New London county, eastern Connecticut, U.S., on Long Island Sound, just west of the city of New London. The area, settled in about 1653, was set off from New London and incorporated as a town in 1801. Drained by the Thames and Niantic rivers, it has a name descriptive of local fordable shallows. It remained a rural residential suburb until after 1950, when several industrial parks were established (mainly

for offices, warehouses, and light engineering plants), including the Industrial Triangle. The Millstone Point Nuclear Power Station (completed 1969) is part of the New England Big 11 power loop. Waterford is the home of the Eugene O'Neill Memorial Theater Foundation (1963) and its annual National Playwrights' Conference. Pop. (1990) 17,930.

Waterford glass, heavy cut glassware produced in Waterford, Ire., from 1729. Waterford glass, particularly the early variety, is characterized by thick walls, deeply incised geometric cutting, and brilliant polish. The smoky, bluish gray colour of early Waterford glass was considered a drawback, and a clear crystal was produced after 1830. It is the darkened glass, however, that is most prized by modern collectors. Characteristic Waterford products include Rococo chandeliers with diamond-cut or scalloped branches, wall lamps, sconces, bowls, and vases.

Waterford glass spans two stylistic periods. Rococo shapes and cutting continued to be manufactured by Waterford glassmakers after 1770, when thinner, more restrained Neoclassic—or Adam style—pieces were being made in England. The Adam style, however, was gradually adopted. The Waterford glasshouse ceased production in 1851 largely owing to heavy British excise taxes on glass that drained profits. A new glassworks was opened in the town in 1951 by the Irish Glass Bottle Company with the express intention of reviving the patterns associated with Waterford glass.

waterfowl, in the United States, all varieties of ducks, geese, and swans; the term is sometimes expanded to include some unrelated aquatic birds such as coots, grebes, and loons. In Britain the term refers only to domesticated swans, geese, and ducks kept for ornamental purposes, wildfowl being the term used for wild birds of this group, especially in the context of shooting for sport. *See also* duck; goose; swan.

Watergate Scandal (1972–75), U.S. political scandal surrounding the revelation of illegal activities on the part of the incumbent Republican administration of President Richard M. Nixon during the 1972 presidential election campaign.

The matter was first brought to public attention by the arrest of five men who, on June 17, 1972, broke into the headquarters of the Democratic National Committee at the Watergate, an office–apartment–hotel complex in Washington, D.C. Within a few days of their arrest at the Watergate, charges of burglary and wiretapping were brought against the five and against E. Howard Hunt, Jr., a former White House aide, and G. Gordon Liddy, general counsel for the Committee for the Re-election of the President. All seven were tried before Judge John J. Sirica, chief judge of the U.S. District Court for the District of Columbia, in January 1973. During the months between their arrest and their trial, President Nixon and his aides had denied that anyone in the administration had been involved, despite persistent press reports to the contrary, especially in *The Washington Post.*

Of the seven, five pleaded guilty and two were convicted by a jury. At sentencing on March 23, 1973, Sirica read a letter from one of the defendants, James W. McCord, Jr., which charged that the White House had been conducting a "cover-up" to conceal its connection with the break-in. McCord also charged that the seven defendants had been pressured by the White House to plead guilty and remain silent. And, according to McCord, witnesses had perjured themselves during the trial. Before the reconvened grand jury, Jeb Stuart Magruder (assistant to the reelection committee director, former Attorney General John N. Mitchell) changed his earlier testimony (*i.e.,* that the break-in had not been approved by the committee) and said he had perjured himself at the instigation of Mitchell and John W. Dean III, counsel to the president.

With the White House now clearly implicated, President Nixon on April 17, 1973, announced that he had begun a new investigation. White House press secretary Ronald L. Ziegler said that all previous statements issued by the executive branch regarding Watergate were "inoperative." On April 30 Nixon stated publicly that he took responsibility for the actions of staff members implicated in the case, and he accepted the resignations of advisers H.R. Haldeman, John Ehrlichman, and Dean and of Attorney General Richard G. Kleindienst. Nixon, however, denied any personal knowledge of either the campaign of political espionage or the attempts to conceal any wrongdoing.

The same day Elliot L. Richardson was appointed attorney general to replace Kleindienst. Richardson then selected Harvard law professor Archibald Cox as special Watergate prosecutor. But in May the focus of the investigation shifted to the Senate, where the Select Committee on Presidential Campaign Activities (established in February 1973 under the chairmanship of Senator Sam J. Ervin, Jr., Democrat from North Carolina) began televised public hearings.

The Ervin Committee elicited testimony establishing the culpability of White House and campaign committee personnel. Dean, however, was the only witness to accuse President Nixon of direct involvement in the cover-up. On July 16, 1973, Alexander P. Butterfield, formerly of the White House staff, disclosed that conversations in the president's offices had secretly been recorded on tape.

Both Cox and the Ervin Committee promptly (July 23) subpoenaed the tapes. Nixon refused on the grounds of executive privilege and national security. When Judge Sirica ordered Nixon to turn over the tapes and that order was upheld by the U.S. Court of Appeals in October, Nixon offered instead to provide written summaries of the tapes in question in return for an agreement that no further presidential documents would be sought.

Cox rejected the proposal, and on October 20 the president ordered Attorney General Richardson to fire the special prosecutor. Both Richardson and William D. Ruckelshaus, deputy attorney general, resigned rather than carry out the order, and Cox was finally dismissed by a compliant solicitor general, Robert Bork.

A storm of public protest pressured Nixon into releasing the tapes on December 8, but of the nine tapes specified in Sirica's order, only seven were delivered (the White House claimed the other two had never existed); and one of the seven contained a gap that, according to a later report by a panel of experts, could not have been made accidentally.

By the beginning of 1974, several former White House aides were either under indictment or had pleaded guilty to charges stemming from Watergate. The term itself had come to denote not merely the original break-in but also more or less related allegations of misconduct, including the purchase of governmental favours with campaign contributions, "dirty tricks" in the 1972 campaign, and an extralegal intelligence unit set up in the White House. This unit was alleged to have burglarized a psychiatrist's office to obtain the records of Daniel Ellsberg, a former employee of the Department of Defense, who had released the classified Pentagon Papers on the Vietnamese War.

The combined weight of these charges led to the initiation of a formal impeachment inquiry by the House Judiciary Committee in May 1974. On May 20 Judge Sirica ordered Nixon to turn over additional tapes to Cox's successor as special prosecutor, Leon Jaworski. On July 24 the Supreme Court ruled unanimously that Nixon must provide transcripts of the tapes.

Between July 27 and 30 the House Judiciary Committee passed three articles of impeachment. On August 5 the President supplied transcripts of three tapes that clearly implicated him in the cover-up. With these revelations, Nixon's last support in Congress evaporated. He announced his resignation on August 8, stating that he "no longer had a strong enough political base" with which to govern. He left office at 11:35 AM the following day, August 9.

In 1975 Haldeman, Ehrlichman, and Mitchell were convicted of conspiracy, obstruction of justice, and perjury; they were sentenced to 2½ to 8 years in prison. Former President Nixon was spared any further punishment when his successor, Gerald R. Ford, granted an unconditional pardon on Sept. 8, 1974.

Waterhouse, Alfred (b. July 19, 1830, Liverpool—d. Aug. 22, 1905, Yattendon, Berkshire, Eng.), English architect who worked in the style of High Victorian medieval eclecticism, principally remembered for his elaborately planned complexes of educational and civic buildings.

Waterhouse was a pupil of Richard Lane in Manchester. His position as a designer of public buildings was assured as early as 1859, when his Gothic Revival design won the open competition for the Manchester Assize Courts.

In 1868 he won the competition for the Manchester Town Hall, which showed a firmer and perhaps more original handling of the Gothic manner. The same year he began the rebuilding of Gonville and Caius College, Cambridge. This was not his first university work, for he had designed Balliol College, Oxford (1867–69), and Pembroke College, Cambridge (1871). Among his other important educational commissions were Owens College (1870–98; now Victoria University of Manchester) and St. Paul's School (1881), Hammersmith, London. Many of his buildings (*e.g.,* the Romanesque-inspired Natural History Museum, 1873–81, London) are characteristically built with brick (often burnt) and terra-cotta, with extensive use of decorative ironwork and exposed metal structure. Waterhouse also designed a few churches and country houses; *e.g.,* Lyndhurst Road Congregational Church (1883) in Camden, London, and Hutton Hall (1865) at Guisborough, North Yorkshire.

Waterhouse, Benjamin (b. March 4, 1754, Newport, R.I. [U.S.]—d. Oct. 2, 1846 Cambridge, Mass., U.S.), American physician and scientist, a pioneer in smallpox vaccination.

Upon reading in 1799 of the work of Edward Jenner, the British surgeon who discovered vaccination, Waterhouse began a lifelong crusade for vaccination in the United States, beginning with his five-year-old son. Waterhouse was in his day perhaps the best-educated physician in North America, having studied for seven years in London, Edinburgh, and Leiden. In 1783 he formed, with John Warren and Aaron Dexter, the first faculty of the Harvard Medical School.

Waterhouse, George Marsden (b. April 6, 1824, Penzance, Cornwall, Eng.—d. Aug. 6, 1906, Torquay, Devon) businessman, politician, prime minister of South Australia (1861–63), and prime minister of New Zealand (1872–73), the only man ever to be premier of two British colonies.

Waterhouse went with his Wesleyan missionary father to Tasmania, set up a business with his brother in South Australia (1843), became financially successful, and retired by 1853. His first political experience was as an

elected member of the South Australian Legislative Council (1851). He was elected to the first Legislative Assembly (1857) and again to the Council (1860), where he joined the ministry of Reynolds, and finally became prime minister (1861–63) of the colony of South Australia. As prime minister Waterhouse concerned himself with economic development and constitutional reforms for the newly self-governing colony. He also played an important role in the implementation of pieces of Council-passed legislation, such as the Real Property Act. When he resigned and left Australia to pursue his business interests, he purchased sizable holdings in New Zealand and accepted a seat on that Legislative Council (1870). In 1872 Sir Julius Vogel invited Waterhouse to head a new ministry. He accepted but the following year found that his strict Methodist principles conflicted with Vogel's financial policies. Waterhouse submitted his resignation to the governor, who refused to accept it until pressure from Waterhouse compelled him to capitulate.

Waterhouse remained active on the Legislative Council until he retired to England in 1889. When he was later recommended for knighthood, it was refused by the Colonial office because of his treatment of the governor. So, although he had been premier of two colonies, he was never knighted.

Waterhouse, Keith (Spencer) (b. Feb. 6, 1929, Hunslet, Leeds, Yorkshire, Eng.), English novelist, playwright, and screenwriter noted for his ability to create comedy and satire out of depressing human predicaments.

Waterhouse left school at the age of 15 and worked at various odd jobs before becoming a newspaperman first in Yorkshire and then in London, remaining a columnist (for the *Daily Mirror* and *Punch*) for most of his life. His first novel, *There Is a Happy Land* (1957), was followed by the best-selling *Billy Liar* (1959). The public easily identified with its hero, a young man who compensates for his mundane, tawdry existence by a series of fantastic daydreams. *Billy Liar* was turned into a successful play in 1960, a film in 1963, and a musical in 1974. Together with Willis Hall, Waterhouse wrote several plays and revues, among them *Celebration* (performed 1961), *All Things Bright and Beautiful* (1962), *They Called the Bastard Stephen* (1964), *Whoops-a-Daisy* (1968), and *Who's Who* (1971). Other novels include *The Bucket Shop* (1968; also published as *Everything Must Go*), *Billy Liar on the Moon* (1975), *Office Life* (1978), *Maggie Muggins* (1981), and *In the Mood* (1983). He was also the author of several television series.

Waterhouse-Friderichsen syndrome, a rare type of septicemia (blood poisoning) of rapid and severe onset, marked by fever, collapse and sometimes coma, hemorrhage from skin and mucous membranes, and severe bilateral hemorrhage of the adrenal cortical tissue. The syndrome is most common in children under five and may last only a few hours; resulting adrenal apoplexy is the immediate cause of death.

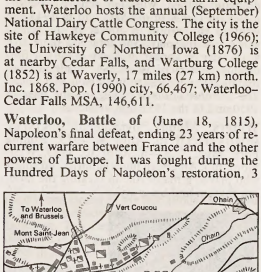
Treatment, which must be immediate, is by large doses of antibiotics to combat the septicemia and of adrenal hormones, especially glucocorticoids. Though the meningococci of cerebrospinal fever are the typical pathogens involved, other organisms, such as streptococci and pneumococci, may be involved. The syndrome is named after the British physician Rupert Waterhouse and the Danish physician Carl Friderichsen, who independently described it in the early 1900s.

waterleaf, any of about eight species of herbaceous plants constituting a genus (*Hydrophyllum*) in the waterleaf family (Hydrophyllaceae) and native to damp woodlands of North America. Light-greenish mottling on the leaves, suggesting watermarks on paper, gives the genus its name. Notable members of the genus are the 75-centimetre- (2.5-foot-) tall Virginia waterleaf (*Hydrophyllum virginianum*), with five- to seven-lobed leaves; it is also called Shawnee salad and John's cabbage in reference to the edible tender young shoots. The large-leaved waterleaf (*H. macrophyllum*) is similar to the Virginia waterleaf but is rough and hairy and about 60 cm tall. The broad-leaved waterleaf (*H. canadense*), also 60 cm tall, has maplelike leaves. Some species are used in wildflower gardens; they are valued for their attractive leaves and clusters of small white to purplish flowers with stamens that extend beyond the petals.

Waterloo, city, regional municipality of Waterloo, southeastern Ontario, Canada. Its settlement dates from the early 1800s, when a group of Pennsylvania Mennonites led by Abraham Erb settled along the Grand River. The community was named for the Battle of Waterloo (1815). Part of the Guelph-Cambridge-Kitchener metropolitan complex, Waterloo is the headquarters of several national insurance companies and has diversified industries. The University of Waterloo (1957) and the Wilfrid Laurier University (1911) are there. Inc. village, 1857; town, 1876; city, 1948. Pop. (1991) 71,181.

Waterloo, city, seat (1855) of Black Hawk county, northeastern Iowa, U.S. It lies along the Cedar River, 108 miles (174 km) northeast of Des Moines. The site was first settled in 1845 as Prairie Rapids, and the name Waterloo was adopted in 1851. The town grew as a railroad division point and a regional trade centre. Its industries include meat-packing and the manufacture of tractors and farm equipment. Waterloo hosts the annual (September) National Dairy Cattle Congress. The city is the site of Hawkeye Community College (1966); the University of Northern Iowa (1876) is at nearby Cedar Falls, and Wartburg College (1852) is at Waverly, 17 miles (27 km) north. Inc. 1868. Pop. (1990) city, 66,467; Waterloo–Cedar Falls MSA, 146,611.

Waterloo, Battle of (June 18, 1815), Napoleon's final defeat, ending 23 years of recurrent warfare between France and the other powers of Europe. It was fought during the Hundred Days of Napoleon's restoration, 3



The Battle of Waterloo, positions at 11:00 AM on June 18, 1815

miles (5 km) south of Waterloo village (which is 9 miles [14.5 km] south of Brussels), between Napoleon's 72,000 troops and the combined forces of the Duke of Wellington's Allied army of 68,000 (with British, Dutch, Belgian, and German units) and about 45,000 Prussians, the main force of Gebhard Leberecht von Blücher's command. After defeating the Prussians at Ligny and holding Wellington at Quatre-Bras in secondary battles south of Waterloo on June 16, Napoleon's marshals, Michel Ney and Emmanuel de Grouchy, failed to attack and annihilate either enemy while their armies were separated. Grouchy, with 33,000 men, nearly one-third of Napoleon's total strength of 105,000, led a dilatory pursuit of Blücher. On the 18th he was tied down at Wavre by 17,000 troops of Blücher's rear guard, while Blücher's main force escaped him, rejoined Wellington, and turned the tide of battle at Waterloo, 8 miles (13 km) to the southwest. At Waterloo, Napoleon made a major blunder in delaying the opening of his attack on Wellington from morning until midday, to allow the ground to dry; this delay gave Blücher's troops exactly the time they needed to reach Waterloo and support Wellington.

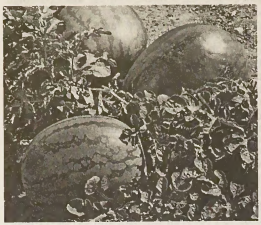
The four main French attacks against Wellington's army prior to 6:00 PM on June 18 all failed in their object—to decisively weaken the Allied centre to permit a French breakthrough—because they all lacked coordination between infantry and cavalry. Meanwhile, a secondary battle developed, in which the French were on the defensive against the 30,000 Prussian troops of Karl von Bülow's corps of Blücher's army. The Prussians arrived at Waterloo gradually and put pressure on Napoleon's eastern flank. To prevent the Prussians from advancing into his rear, Napoleon was forced to shift a corps under Georges Mouton, Count de Lobau, and to move several Imperial Guard battalions from his main battle against Wellington.

Finally, at 6:00 PM, Ney employed his infantry, cavalry, and artillery in a coordinated attack and captured La Haye Sainte, a farmhouse in the centre of the Allied line. The French artillery then began blasting holes in the Allied centre. The decisive hour had arrived: Wellington's heavy losses left him vulnerable to any intensification of the French attack. But Ney's request for infantry reinforcements was refused because Napoleon was preoccupied with the Prussian flank attack. Only after 7:00 PM, with his flank secured, did he release several battalions of the Imperial Guard to Ney; but by then Wellington had reorganized his defenses, aided by the arrival of a Prussian corps under H.E.K. von Zieten. Ney led part of the guard and other units in the final assault on the Allies. The firepower of the Allied infantry shattered the tightly packed guard infantry. The repulse of the guard at 8:00 PM, followed in 15 minutes by the beginning of the general Allied advance and further Prussian attacks in the east, threw the French army into a panic; a disorganized retreat began. The pursuit of the French was taken up by the Prussians. Napoleon lost 25,000 men killed and wounded and 9,000 captured. Wellington's casualties were 15,000 and Blücher's were about 8,000. Four days later Napoleon abdicated for the second time.

watermark, design produced by creating a variation in the thickness of paper fibre during the wet-paper phase of papermaking. This design is clearly visible when the paper is held up to a light source.

Watermarks are known to have existed in Italy before the end of the 13th century. Two types of watermark have been produced. The more common type, which produces a translucent design when held up to a light, is produced by a wire design laid over and sewn onto the sheet mold wire (for handmade paper) or attached to the "dandy roll" (for machine-made paper). The rarer "shaded" watermark is produced by a depression in the sheet mold wire, which results in a greater density of fibres—hence, a shaded, or darker, design when held up to a light. Watermarks are often used commercially to identify the manufacturer or the grade of paper. They have also been used to detect and prevent counterfeiting and forgery.

watermelon (*Citrullus lanatus,* formerly *C. vulgaris*), succulent fruit of the gourd family (Cucurbitaceae), native to tropical Africa, but



Watermelon (*Citrullus lanatus*)
Grant Heilman

under cultivation on every continent except Antarctica. Its vines grow prostrate, with branched tendrils, deeply cut leaves, and flowers borne singly in the axil of a leaf. Each light yellow flower produces either pollen or fruit. The sweet, juicy flesh may be reddish, white, or yellow. Flesh colour, shape of the fruit, and thickness of the rind depend on the variety. Weight varies from 1 to 2 kg (2.5 to 5 pounds) to 20 kg or more. The number of fruits per vine varies from 2 or 3 to 15.

Watermelon contains vitamin A and some vitamin C. It is usually eaten raw. The rind is sometimes preserved as a pickle.

waterpower, power produced by a stream of water as it turns a wheel or similar device. The waterwheel was probably invented in the 1st century BC, and it was widely used throughout the Middle Ages and into modern times for grinding grain, operating bellows for furnaces, and other purposes. The more compact water turbine, which passes water through a series of fixed and rotating blades, was introduced in 1827 by Benoît Fourneyron, a French experimenter, whose first turbine developed about six horsepower. By 1832 he had perfected a turbine capable of developing 50 horsepower. Various modifications followed Fourneyron's design, notably those of James Thomson (about 1851) and James B. Francis (1855), using radial flow inward. Water turbines, used originally for direct mechanical drive for irrigation, now are used almost exclusively to generate electric power. *See also* hydroelectric power.

Waters, Ethel (b. Oct. 31, 1896/1900, Chester, Pa., U.S.—d. Sept. 1, 1977, Chatsworth, Calif.), American blues and jazz singer and dramatic actress, associated with songs she made famous, particularly "Dinah," "Heat Wave," and "Stormy Weather."

In her autobiography, *His Eye Is on the Sparrow* (1951), Waters said of her early years of extreme poverty, "I stole food to live," and she described her marriage at the age of 12 while still attending convent school. At 13 she became a chambermaid in a Philadelphia hotel, and the same year she sang in public for the first time in a local nightclub. By the time she was 17 she was singing professionally in Baltimore at a weekly salary of $9. It was there that she became the first woman to sing the W.C. Handy classic "St. Louis Blues" on the stage.

Her professional rise was rapid, and she moved to New York City. In 1925 she appeared at the Plantation Club in Harlem. Her Broadway debut came in 1927 in the all-black revue *Africana,* but it was not for another three years, when she starred in the *Blackbirds* revue, that she became fully established. In



Ethel Waters in *Pinky,* 1949
By courtesy of Twentieth Century Fox, Copyright © 1949 Twentieth Century Fox Film Corp., all rights reserved; photograph, from the Museum of Modern Art Film Stills Archive, New York

1933 she scored a notable success in Irving Berlin's *As Thousands Cheer,* in which she sang "Heat Wave," one of the songs later to become identified with her.

In 1940 came the transition from singer to dramatic actress, with her sensitive performance in *Cabin in the Sky,* and in 1943 she went to Hollywood to appear in the screen version of the play. She returned there five years later to appear in *Pinky* (1949), a film dealing with racial issues. She made another remarkable appearance in Carson McCullers' *The Member of the Wedding,* on the stage in 1950 and in the 1952 film version.

Waters, Muddy, byname of MCKINLEY MORGANFIELD (b. April 4, 1915, Rolling Fork, Miss., U.S.—d. April 30, 1983, Westmont, Ill.), American blues guitarist and singer who played a major role in creating the modern rhythm-and-blues style.



Muddy Waters, 1971
By courtesy of Willard Alexander, Inc.

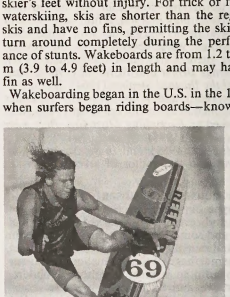
Waters grew up in the cotton country of Mississippi and taught himself to play harmonica as a child. He took up the guitar and absorbed the classic delta blues styles of Robert Johnson, Son House, and others. He evolved a style of his own, aggressive and less purely lyrical, and won a reputation as a worthy successor to the legendary generation of bluesmen. He was discovered and first recorded in 1941 by archivist Alan Lomax, and in 1943 he moved to Chicago, where already there were a remarkable number of great blues musicians. He formed a small group and began playing clubs on the South Side and recording occasionally for a local studio. He broke with the country blues style by playing over a heavy dance rhythm, adopting the electric guitar, and adding piano and drums; he retained the moan-and-shout vocal style and lyrics that were by turns mournful, boastful, and frankly sensual. The result was the music that came to be known as urban blues in its characteristic Chicago form. From that music, of which Waters remained the foremost exponent, sprang in large part such later forms as rock and roll and soul. Waters himself was unknown to the wider audience until interest in the roots of popular music led to its discovery of him in the early 1960s. Thereafter he played locally and internationally and participated in festivals and special events in the late 1970s.

waterskiing, originally, planing over the surface of the water on broad ski-like runners while being towed by a motorboat moving at least 24 km (15 miles) per hour. The skier holds a handle on a rope attached to the rear of the boat and leans slightly backward. In contemporary skiing, the rider may be on a board that resembles a snowboard and may be pulled by an overhead cable rather than a boat.

Water skis derive from the aquaplane, a wide riding board towed by a motorboat. Aquaplanes were most popular in the United States, France, and Switzerland, the areas in which waterskiing first became popular. Ralph Samuelson, considered the "father" of the sport, was first to waterski in 1922 at Lake Pepin, Minn. Fred Waller of Long Island, N.Y., received the first patent (1925) on a design for water skis.

Water skis were once made of wood or aluminum. Most modern skis and wakeboards are now usually made of a foam core, wrapped by fibreglass or a fibreglass-and-graphite composite. General-purpose skis are usually about 1.7 m (5.57 feet) long and about 15 cm (6 inches) wide. Ski sizes increase for heavier skiers. Many skis have a stabilizing fin on the bottom near the heel. Tight-fitting rubber foot bindings stretch in case of a fall, releasing the skier's feet without injury. For trick or figure waterskiing, skis are shorter than the regular skis and have no fins, permitting the skier to turn around completely during the performance of stunts. Wakeboards are from 1.2 to 1.5 m (3.9 to 4.9 feet) in length and may have a fin as well.

Wakeboarding began in the U.S. in the 1980s when surfers began riding boards—known as



Professional wakeboarder Eric Lutgert jumps the wake and grabs the rail of his board
Rick Doyle/Corbis



Skis for the various types of waterskiing

skurfers—as they were pulled behind boats. Surfboards, however, are designed to be difficult to submerge and are hyper-buoyant; this made control of these adapted surfboards difficult in a skiing environment. Subsequent modifications made the board neutrally buoyant, making it easier for riders to get up on the board when starting and easier to stay balanced when moving. The addition of foot bindings also helped the sport become easier to learn. Soon, riders were performing spins and flips on the boards, using the wake created by the boat to achieve the lift necessary for the maneuvers. Since the mid-1990s, wakeboarding has been an event at both the Gravity Games and the X Games. Wakeboarding's hip image, like that of surfing—with participants wearing large, baggy shorts and rash vests (tightly fitted protective shirts)—appeals to younger skiers; thus, wakeboarding is the fastest-growing water sport worldwide.

Types of waterskiing competitions include trick waterskiing, which features turns and stunts; jumps, with the skier towed up a 7.3-m- (24-foot-) long ramp and where judges score both for distance and for style; and slalom, held on a course consisting of a specified number of buoys, between which the skier must negotiate a path at increasingly higher speeds. Wakeboard competitions usually consist of aerials—jumps, flips, "grabs" (of the board), and turns; some of these moves were originally performed on snowboards or surfboards. The sport is governed by the International Water Ski Federation (IWSF), which was originally known as the World Water Ski Union (WWSU). Formed in 1946, the group held its first world championships in 1949.

In Europe, where the environmental impact of speedboats in densely populated urban areas is of more concern, cable skiing, which was invented in the 1960s, has grown in popularity. In this variant skiers are hooked onto a circular overhead cable, which is pulled by an engine; skiers are able to reach speeds between 25 to 58 km/h (15.5 to 36 miles/h). A number of competitive events are held with skiers pulled via cables instead of behind boats.

Ski kite-flying became a popular waterskiing activity in the 1960s, both for recreation and competition. The skier, wearing either one or two skis, is attached to a large lightweight kite by a body harness. In a good wind, the skier is lifted off the water and glides in the air behind the towboat, sometimes at heights of 30 m (100 feet) above the water.

Watertown, town (township), Litchfield county, western Connecticut, U.S., on the Naugatuck River, immediately northwest of Waterbury. The site was first settled in 1701, and in 1738 the community was organized as Westbury, an ecclesiastical society of Waterbury. It was separated and incorporated as Watertown in 1780 and includes the village of Oakville. Several 18th-century houses are clustered around the town's central green. Diversified industrial development began with sawmills, gristmills, and pin firms. In the late 1970s manufacturing had become fairly diversified and included electronics, mattresses, and watches. The Taft School (1890) and parts of the Mattatuck State Forest and Black Rock State Park are in the town. Pop. (2000) 21,661.

Watertown, urban town (township), Middlesex county, eastern Massachusetts, U.S., on the Charles River, just west of Boston. One of the four earliest Massachusetts Bay settlements, it was founded by a group led by Sir Richard Saltonstall and was incorporated in 1630; it was the first inland farming town. Its name may have derived from the fact that the area was well watered and abounded with fish. Construction of gristmills (1630s) and a clothfulling mill (1660s) were antecedents of a manufacturing economy. In 1631 the freemen of Watertown displayed an early independent spirit by refusing to pay a tax of £60 levied for fortifications at New Towne (Cambridge). The town claims to be "the cradle of the town meeting," as the first board of selectmen was elected there in August 1634. During the American Revolution, the Massachusetts Provisional Assembly and the General Court met at Watertown, where Boston town meetings were also held during the siege of Boston.

The Watertown Arsenal (established in 1816) was a major manufactory of heavy ordnance until it was closed in the late 1960s. The town is primarily residential with some light manufacturing. The Perkins School for the Blind (founded in Boston in 1829) moved to Watertown in 1912. Pop. (2000) 32,986.

Watertown, city, seat (1805) of Jefferson county, northern New York, U.S., at the falls (112 feet [34 m]) of the Black River. The area was first organized as the Township of Watertown in 1801. Lumber, paper, and potash industries were developed, and the village of Watertown was separately incorporated in 1816. During a county fair, held there in 1878, F.W. Woolworth originated the idea of selling a fixed-price line of merchandise. When local timber resources were depleted, the community, with ample waterpower, acquired other industries. It continued to serve as a trade and distribution point for surrounding dairy farms. Tourism (based on the Thousand Island resort region, the St. Lawrence Seaway projects) and nearby Fort Drum Military Reservation are additional economic factors. The city is the site of Jefferson Community College (1961). Another notable institution is the Jefferson County Historical Museum, which contains relics of French émigrés who settled there after 1802. Inc. city, 1869. Pop. (2000) 26,705.

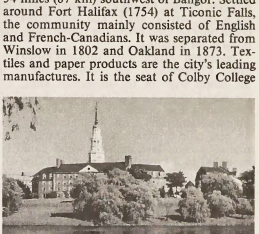
Watertown, city, seat of Codington county, northeastern South Dakota, U.S., on the Big Sioux River, between Lakes Kampeska and Pelican. It was laid out in 1878 and was named for Watertown, N.Y. An earlier settlement, called Kampeska City, was abandoned in 1874 after grasshoppers destroyed the crops.



Mellette House, Watertown, S.D.
Mitt and Joan Mann from CameraMann

The economy depends on agriculture (livestock and grain), tourism (based in part on sport fishing), and some light-industrial activities. Inc. 1885. Pop. (2000) 20,237.

Waterville, city, Kennebec county, south-central Maine, U.S., on the Kennebec River, 54 miles (87 km) southwest of Bangor. Settled around Fort Halifax (1754) at Ticonic Falls, the community mainly consisted of English and French-Canadians. It was separated from Winslow in 1802 and Oakland in 1873. Textiles and paper products are the city's leading manufactures. It is the seat of Colby College



Colby College, Waterville, Maine
By courtesy of the Maine Department of Economic Development

(1813) and Thomas College (1894). Inc. town, 1802; city, 1888. Pop. (2000) 15,605.

waterwheel, mechanical device for tapping the energy of running or falling water by means of a set of paddles mounted around a wheel. The force of the moving water is exerted against the paddles, and the consequent rotation of the wheel is transmitted to machinery via the shaft of the wheel. The waterwheel was perhaps the earliest source of mechanical energy to replace that of humans and animals, and it was first exploited for such tasks as raising water, fulling cloth, and grinding grain.

A brief treatment of waterwheels follows. For full treatment, *see* MACROPAEDIA: Energy Conversion.

The combination of waterwheel and transmission linkage, often including gearing, was from the Middle Ages usually designated a mill. Of the three distinct types of water mills, the simplest and probably the earliest was a vertical wheel with paddles on which the force of the stream acted. Next was the horizontal wheel used for driving a millstone through a vertical shaft attached directly to the wheel. Third was the geared mill driven by a vertical waterwheel with a horizontal shaft. This re-

quired more knowledge and engineering skill than the first two, but it had much greater potential. Vertical waterwheels were also distinguished by the location of water contact with the wheel; first, the undershot wheel; second, the breast wheel; and third, the overshot wheel. These waterwheels generally used the energy of moving streams, but tidal mills also appeared in the 11th century.

Each type of mill had its particular advantages and disadvantages. Relatively little is known of their development before the Middle Ages, but certain of their characteristics suggest an order of appearance within the context of the complexity of construction and the possibilities for utilization.

The simple vertical wheel required little extra structure, but the force and rate of power takeoff were dependent upon stream characteristics and wheel diameter. Since change of power direction was not involved, this wheel proved most useful in raising water, utilizing, for instance, a string of pots worked by a chain drive.

The horizontal-wheel mill (sometimes called a Norse or Greek mill) also required little auxiliary construction, but it was suited for grinding because the upper millstone was fixed upon the vertical shaft. The mill, however, could only be used where the current flow was suitable for grinding.

The geared vertical-wheel mill was more versatile. Construction was relatively simple if the wheel were of the undershot kind, for the wheel paddles could be simply dipped in the stream flow, whether it was river, tide, or man-built millrace. A millwright could choose his gear ratio to match power utilization with rate of stream flow, and the wheel could be mounted in a bridge arch or on a barge anchored in midstream. Vitruvius described the first geared vertical wheel for which we have good evidence. This mill is also of major significance because it was the first application of gearing to utilize other than muscle power. This mill had an undershot wheel and, unlike the breast or overshot wheels, did not make use of the weight of falling water.

Mills with geared breast and overshot wheels required more auxiliary construction, but they allowed the most generalized exploitation of available water power. A major construction problem was locating a mill where the fall of water would be suited to the desired diameter of the wheel. Either a long millrace from upstream or a dam could be used.

Little is known of the details of geared-mill development between the time of Vitruvius and the 12th century. An outstanding installation was the grain mill at Barbegal, near Arles, Fr., which had 16 cascaded overshot wheels, each 7 feet (2 metres) in diameter, with wooden gearing. It is estimated that this mill could meet the needs of a population of 80,000.

Even though the highly adaptable, geared mill, with its widely diversified stream-flow conditions, was used in the Roman Empire, historical evidence suggests that its most dramatic industrial consequences occurred during the Middle Ages in Western Europe. After the 13th century the overshot waterwheel appears to have become more common than the undershot wheel.

The geared mill of the Middle Ages was actually a general mechanism for the utilization of power. The power from a horse- or cattle-powered mill was small compared to that from overshot water-wheels, which usually generated two to five horsepower.

Watford, district (borough), county of Hertfordshire, England, situated on the northwest periphery of London and on the Rivers Colne and Gade,and on the Grand Union Canal. Its area is 8 sq mi (21 sq km). It is primarily a residential town for London commuters and a shopping and educational centre. The main industry is printing; there are also breweries and engineering chemical works. Pop. (1983 est.) 75,900.

Consult the INDEX *first*

Watie, Stand, also called DE GATA GA (b. Dec. 12, 1806, Rome, Ga., U.S.—d. Sept. 9, 1871), Cherokee chief who signed the treaty forcing tribal removal of the Cherokees from Georgia and who later served as brigadier general in the Confederate Army during the U.S. Civil War. Watie learned to speak English when, at the age of 12, he was sent to a mission school. He later helped an older brother publish the *Cherokee Phoenix,* a tribal newspaper.

In 1835 Watie joined three other Cherokee leaders in signing the treaty of New Echota, surrendering Cherokee lands in Georgia and forcing the tribe to move westward into Indian Territory (now Oklahoma). On the same day in 1839, all three other signers were murdered, but Watie escaped death and remained leader of the minority favouring the treaty.

In 1861 Watie raised and commanded the first volunteer Cherokee regiment—the Cherokee Mounted Rifles—mustered into the Confederate Army. Appointed a colonel by the Confederacy, he was promoted in 1864 to brigadier general after many engagements as a raider and cavalry commander in and around Indian Territory. He was especially active in destroying the fields and other property of Indians backing the Union. Watie remained loyal even after the majority party of the Cherokee in 1863 repudiated the 1861 alliance with the Confederacy. In fact, he was among the last of all Confederate officers to surrender, not doing so until June 23, 1865.

After the Civil War, Watie went to Washington, D.C., as a representative of the southern Cherokee. He spent his final years as a planter and businessman and in assisting in the collection of Cherokee tales and legends.

Watkins, Vernon Phillips (b. June 27, 1906, Maesteg, Glamorgan,Wales—d. Oct. 8, 1967, near Swansea, Glamorgan), English-language Welsh poet who drew from Welsh material and legend.

Watkins steeped himself in the study of French and German and developed a deep understanding of the poetry of both those countries while he was a student at Cambridge University. After graduation he became a bank clerk and wrote poetry. Watkins' work includes *Ballad of Mari Lwyd* (1941), *The Lamp and the Veil* (1945), *The Lady with the Unicorn* (1948), *The Death Bell* (1954), *Cypress and Acacia* (1959), and *Affinities* (1962). *Selected Poems* was published in 1967. Also of considerable interest is his edition of *Letters to Vernon Watkins by Dylan Thomas* (1957).

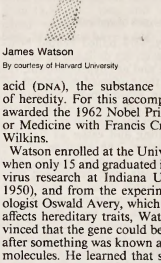
Watkins Glen, village, seat (1854) of Schuyler County, central New York, U.S., at the south end of Seneca Lake, in the heart of the Finger Lake region, 20 mi (32 km) north of Elmira. Settled in 1791, it was incorporated (1842) as Jefferson and was renamed Watkins (1852) to honour Samuel Watkins, an early promoter. "Glen" was added to its name in 1926. A spectacular gorge, emerging in the centre of the village, has been set aside as Watkins Glen State Park. A creek descends 700 ft (213 m) through the gorge, forming rapids, pools, and cascades. Salt production from brine wells is an important industry, and the village is a tourist base for the Seneca Lake district and a trade centre for surrounding farm and orchard lands. The Watkins Glen Grand Prix automobile race was an annual event until 1981, when the International Auto Sports Federation removed the race from its schedule for failure to pay debts. Pop. (1990) 2,207.

Watling Island (The Bahamas): *see* San Salvador Island.

Watling Street, the Roman road from London northwest via St. Albans (Verulamium) to Wroxeter (Viroconium). It was one of the great arterial roads of Roman and post-Roman Britain. The name came from a group of Anglo-Saxon settlers who called Verulamium by the name of Waetlingaceaster. This local name passed to the whole of the Roman road by the 9th century. The tendency to give the name to other main roads is postmedieval and is often mere antiquarianism. Thus, the Watling Street in Northumberland was earlier Dere Street, and the London–Dover road via Canterbury was Casinge Street.

Watling's Island (The Bahamas): *see* San Salvador Island.

Watson, James Dewey (b. April 6, 1928, Chicago), U.S. geneticist and biophysicist who played a crucial role in the discovery of the molecular structure of deoxyribonucleic



James Watson
By courtesy of Harvard University

acid (DNA), the substance that is the basis of heredity. For this accomplishment he was awarded the 1962 Nobel Prize for Physiology or Medicine with Francis Crick and Maurice Wilkins.

Watson enrolled at the University of Chicago when only 15 and graduated in 1947. From his virus research at Indiana University (Ph.D., 1950), and from the experiments of microbiologist Oswald Avery, which proved that DNA affects hereditary traits, Watson became convinced that the gene could be understood only after something was known about nucleic acid molecules. He learned that scientists working in the Cavendish Laboratories at Cambridge University were using photographic patterns made by X-rays that had been shot through protein crystals to study the structure of protein molecules.

After working at the University of Copenhagen, where he first determined to investigate DNA, he did research at the Cavendish Laboratories (1951–53).There Watson learned X-ray diffraction techniques and worked with Crick on the problem of DNA structure. In 1952 he determined the structure of the protein coat surrounding the tobacco mosaic virus but made no dramatic progress with DNA. Suddenly, in the spring of 1953, Watson saw that the essential DNA components—four organic bases—must be linked in definite pairs. This discovery was the key factor that enabled Watson and Crick to formulate a molecular model for DNA—a double helix, which can be likened to a double staircase of intertwined spirals.The DNA double helix consists of two intertwined sugar-phosphate chains, with the flat base pairs forming the steps between them. Watson and Crick's model also showed how the DNA molecule could duplicate itself. Thus

it became known how genes, and eventually chromosomes, duplicate themselves. Watson and Crick published their epochal discovery in two papers in the British journal *Nature* in April–May 1953.

Watson subsequently taught at Harvard University (1955–76), where he served as professor of biology (1961–76). He conducted research on nucleic acids' role in the synthesis of proteins. In 1965 he published *Molecular Biology of the Gene,* one of the most extensively used modern biology texts. He later wrote *The Double Helix* (1968), an informal and personal account of the DNA discovery and the roles of the people involved in it, which aroused some controversy. In 1968 Watson assumed the leadership of the Laboratory of Quantitative Biology at Cold Spring Harbor, Long Island, N.Y., and made it a world centre for research in molecular biology. He concentrated its efforts on cancer research. In 1981 his *The DNA Story* (written with John Tooze) was published. From 1988 to 1992 at the National Institutes of Health, Watson helped direct a project to map and decipher all of the genes in the human chromosomes, but he eventually resigned because of alleged conflicts of interests involving his investments in private biotechnology companies.

Watson, John B., in full JOHN BROADUS WATSON (b. Jan. 9, 1878, Greenville, S.C., U.S.—d. Sept. 25, 1958, New York, N.Y.), American psychologist who codified and publicized behaviourism, an approach to psychology that, in his view, was restricted to the objective, experimental study of the relations between environmental events and human behaviour. Watsonian behaviourism became the dominant psychology in the United States during the 1920s and '30s.

Watson received his Ph.D. in psychology from the University of Chicago (1903), where he then taught. In 1908 he became professor of psychology at Johns Hopkins University, Baltimore, Md., and immediately established a laboratory for research in comparative, or animal, psychology. About this time he articulated his first statements on behaviourist psychology, and in the epoch-making article "Psychology as a Behaviorist Views It" (1913) he asserted that psychology is the science of human behaviour, which, like animal behaviour, should be studied under exacting laboratory conditions.

His first major work, *Behavior: An Introduction to Comparative Psychology,* was published in 1914. In it he argued forcefully for the use of animal subjects in psychological study and described instinct as a series of reflexes that are activated by heredity. He also promoted conditioned responses as the ideal experimental tool. In 1918 Watson ventured into the relatively unexplored field of infant study. In one of his classic experiments, he conditioned fear of white rats and other furry objects in an 11-month old boy.

The definitive statement of Watson's position appears in another major work, *Psychology from the Standpoint of a Behaviorist* (1919), in which he sought to extend the principles and methods of comparative psychology to the study of human beings and staunchly advocated the use of conditioning in research. His association with professional psychology ended abruptly. In 1920, in the wake of sensational publicity surrounding his divorce from his first wife, Watson resigned from Johns Hopkins.

Watson entered the advertising business in 1921. His book *Behaviorism* (1925), for the general reader, is credited with interesting many in entering professional psychology. Following *Psychological Care of Infant and Child* (1928) and his revision (1930) of *Behaviorism,* he devoted himself exclusively to business until his retirement (1946). *See also* behaviourism.

Watson, John Christian (b. April 9, 1867, Valparaiso, Chile—d. Nov. 18, 1941, Sydney, N.S.W., Australia), politician and the first Labour prime minister of Australia (1904).

Educated in New Zealand, Watson moved to Sydney to work as a typographer. He became involved in the labour movement and was elected president of the Sydney Trades and Labour Council and president of the Australia Labour Federation (1893). He was a member of the Legislative Assembly of New South Wales (1894–1901) until he entered federal politics and became the leader of the Labour Party. Although his party did not have a majority in either house, Watson formed the first Commonwealth Labour ministry (1904) but resigned in the same year after only four months and continued a coalition with the Liberal leader Alfred Deakin. He retired from politics in 1910 and became a director of several companies, including the daily Labour newspaper, which he helped found in Sydney.

Watson, Thomas Augustus (b. Jan. 18, 1854, Salem, Mass., U.S.—d. Dec. 13, 1934, Passagrille Key, Fla.), American telephone pioneer and shipbuilder, one of the original organizers of the Bell Telephone Company, who later turned to shipbuilding and constructed a number of vessels for the United States government.

Leaving school at the age of 14, Watson began work in an electrical shop in Boston, where he met Alexander Graham Bell. He worked with Bell on his telephone experiments, and in 1877, when the Bell Telephone Company was formed, he received a share in the business and became its head of research and technical development.

After leaving Bell in 1881, Watson started a new business in partnership with Frank O. Wellington. The two partners constructed engines and ships, receiving their first government contract in 1896 for two destroyers. During the eight years that followed until his retirement in 1904, Watson's shipyard at Quincy, Mass., incorporated as the Fore River Ship & Engine Company, built lightships, cruisers, battleships, schooners, and other vessels.

Watson, Thomas J., Sr., in full THOMAS JOHN WATSON, SR. (b. Feb. 17, 1874, Campbell, N.Y., U.S.—d. June 19, 1956, New York, N.Y.), American industrialist who built the International Business Machines Corporation (IBM) into the largest manufacturer of electric typewriters and data-processing equipment in the world.

The son of a lumber dealer, Watson studied at the Elmira (N.Y.) School of Commerce and then worked as a salesman first in a retail store and then for a small cash register company. In 1895 Watson joined the sales staff of the National Cash Register Company in Dayton, Ohio, and he eventually rose to the post of general sales manager of the company under the tutelage of its president, John H. Patterson. In 1912 Patterson involved Watson in an illegal antitrust scheme that resulted in convictions for both men, later overturned. Leaving National Cash Register in 1913, Watson in 1914 became president of the Computing-Tabulating-Recording Co., a maker of electrical punch-card computing systems and other products (the company changed its name to International Business Machines Corporation in 1924).

An exceptional salesman and organizer, Watson assembled a highly motivated, well-trained, and well-paid staff. He gave pep talks, enforced a strict dress code, and posted the now famous slogan "Think" in company offices. Coupled with an aggressive research and development program, these efforts enabled IBM to dominate its market. Watson aggressively pursued international trade in the 1930s and '40s, extending IBM's virtual monopoly of the business-machines industry worldwide.

In 1952 he turned the IBM presidency over to his son, Thomas, Jr., while retaining the post of chairman. By the time of Watson's death four years later, the company (which had 235 employees in 1914) employed 60,000 people and had 200 offices throughout the country, with factories and assembly plants around the world.

Watson was active in civic affairs and was noted for his efforts on behalf of the arts and world peace.

Watson, William (b. April 23, 1559?—d. Dec. 9, 1603, Winchester, Hampshire, Eng.), English Roman Catholic priest who was executed for his part in the "Bye Plot" against King James I.

At the age of 16 Watson left England for France, where he was ordained priest in April 1586. Returning to England in June of that year, he spent the next 16 years in and out of prisons because of his illegal missionary activities. Although he was occasionally severely tortured, he always managed to escape or obtain release. During that period Watson became a prominent spokesman for the secular priests in their struggle with the Jesuits. He claimed that the political intrigues of the Jesuits with foreign countries, particularly Spain, were responsible for much of the persecution of English Catholics.

When Queen Elizabeth I died in 1603, Watson obtained from her successor, King James I, what he thought was a pledge of religious toleration for Roman Catholics. James's failure to carry out this promise, however, prompted Watson to initiate a plot against the crown. Joined by a small group made up of Catholics and disgruntled Protestants, he made plans to seize the king at Greenwich and hold him until he acquiesced in their demands. Some Jesuit leaders revealed the scheme to the government, the plotters were immediately apprehended, and Watson was executed for treason. The episode was called the Bye Plot to distinguish it from another intrigue of the day, the Main Plot.

Watson, Sir William, in full SIR JOHN WILLIAM WATSON (b. Aug. 2, 1858, Burley in Wharfedale, Yorkshire, Eng.—d. Aug. 11, 1935, Ditchling, Sussex), English author of lyrical and political verse, with a special gift for occasional poems.



Sir William Watson, oil painting by R.G. Eves; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

Watson's *Wordsworth's Grave* (1890), his *Lachrymae Musarum* (1892; on the death of Alfred, Lord Tennyson, the poet laureate), and his coronation ode for King Edward VII contributed to his reputation. He had strong political views and attacked the government on a number of issues. His first collection, *The Prince's Quest,* appeared in 1880; from that time he wrote prolifically. He was knighted in 1917. His work was influenced by that of Tennyson and also by that of Matthew Arnold.

Watson's later poetry, appearing in an edition of 1936, remained firmly Victorian in idea and idiom.

Watson Lake, community, southern Yukon Territory, Canada. It lies along a small lake on the border with British Columbia. It originated as a 19th-century trading post and was named after Frank Watson, a pioneer trapper-miner. It is now a key communications and distribution point for the southern part of the territory. The community has road connections to Whitehorse (220 miles [354 km] west-northwest) and to Canadian cities to the south. It is also an important base for prospectors, hunters, trappers, and fishermen and is the site of Yukon's largest lumbering and sawmilling operation. The "Sign Forest" at Milepost 634.3, just east of Watson Lake, is an unusual collection of signposts that originated in 1942 with homesick Alaska Highway construction workers who erected signs bearing the names of and distances to their hometowns; the practice was carried on by tourists and created an unusual highway landmark. Pop. (1991) 912.

Watson-Watt, Sir Robert Alexander (b. April 13, 1892, Brechin, Forfarshire [Angus], Scot.—d. Dec. 5, 1973, Inverness, Invernessshire), Scottish physicist credited with the development of radar in England.

Watson-Watt attended the University of St. Andrews and later taught at University College, Dundee. From 1915 to 1952 he held a number of government positions, beginning as a meteorologist working on devices for locating thunderstorms. In 1935, while heading the radio department of the National Physical Laboratory, he began work on aircraft radiolocation. By late 1935 he was able to locate planes at a distance of 110 km (70 miles) by beaming radio waves at them, receiving their reflections from the airplanes, and calculating distance by elapsed time. This work led to the design of the world's first practical radar system, which was a vital element in the defense of Britain against German air raids in 1940. He was knighted in 1942.

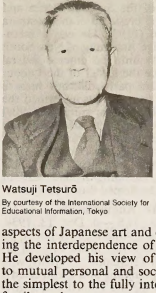
Watson-Watt's other contributions include a cathode-ray direction finder used to study atmospheric phenomena, research in electromagnetic radiation, and inventions used for flight safety.

Watson-Wentworth, Charles: *see* Rockingham, Charles Watson-Wentworth, 2nd Marquess of.

Watsuji Tetsurō (b. March 1, 1889, Himeji, Japan—d. Dec. 26, 1960, Tokyo), Japanese moral philosopher and historian of ideas, outstanding among modern Japanese thinkers who have tried to combine the Eastern moral spirit with Western ethical ideas.

Watsuji studied philosophy at Tokyo University and became professor of ethics at the universities of Kyōto (1931–34) and Tokyo (1934–49). His earliest writings include the two notable works *A Study of Nietzsche* (1913) and *Søren Kierkegaard* (1915), by which he paved the way for the introduction of existentialism into Japan decades later. Then he turned to the study of the spirit of ancient Japanese culture and of Japanese Buddhism, writing books and essays treating various aspects of Japanese culture. He extended his research farther afield, into early Buddhism in India and its subsequent developments. His major writings, however, belong in the field of ethics: *Ethics as a Philosophy of Man* (1934), *Ethics,* 3 vol. (1937–49), and *History of Ethical Thought in Japan,* 2 vol. (1952).

Watsuji tried to create a systematic Japanese ethics using Western categories. In contrast to what he saw as Western ethics' overemphasis on the private individual, Watsuji emphasized man both as an individual and as a social being who is deeply involved with his society. Watsuji introduced certain Buddhist dialectic elements in order to show how the individual is absorbed into society, and he cited various



Watsuji Tetsurō
By courtesy of the International Society for Educational Information, Tokyo

aspects of Japanese art and culture as expressing the interdependence of man and society. He developed his view of life as it applies to mutual personal and social relations, from the simplest to the fully integrated—from the family to the state.

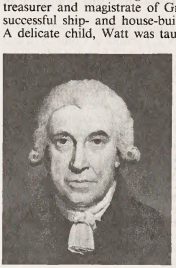
Only one of Watsuji's works is available in English translation: *A Climate: A Philosophical Study,* translated by Geoffrey Bownas (1961, reprinted as *Climate and Culture,* 1988).

Consult the INDEX *first*

watt, unit of power in the International System of Units (SI) equal to one joule of work performed per second, or to $^1/_{746}$ horsepower. An equivalent is the power dissipated in an electrical conductor carrying one ampere current between points at one volt potential difference. It is named in honour of James Watt, British engineer and inventor. One thousand watts equal one kilowatt. Most electrical devices are rated in watts.

Watt, James (b. Jan. 19, 1736, Greenock, Renfrewshire, Scot.—d. Aug. 25, 1819, Heathfield Hall, near Birmingham, Warwick, Eng.), Scottish instrument maker and inventor whose steam engine contributed substantially to the Industrial Revolution. He was elected fellow of the Royal Society of London in 1785.

Education and training. Watt's father, the treasurer and magistrate of Greenock, ran a successful ship- and house-building business. A delicate child, Watt was taught for a time



Watt, oil painting by H. Howard; in the National Portrait Gallery, London
By courtesy of the National Portrait Gallery, London

at home by his mother; later, in grammar school, he learned Latin, Greek, and mathematics. The source for an important part of his education was his father's workshops, where, with his own tools, bench, and forge, he made models (*e.g.,* of cranes and barrel organs) and grew familiar with ships' instruments.

Deciding at age 17 to be a mathematical-instrument maker, Watt first went to Glasgow, where one of his mother's relatives taught at the university, then, in 1755, to London, where he found a master to train him. Although his health broke down within a year, he had learned enough in that time "to work as well as most journeymen." Returning to Glasgow, he opened a shop in 1757 at the university and made mathematical instruments (*e.g.,* quadrants, compasses, scales). He met many scientists and became a friend of Joseph Black, who developed the concept of latent heat. In 1764 he married his cousin Margaret Miller, who, before she died nine years later, bore him six children.

The Watt engine. While repairing a model Newcomen steam engine in 1764 Watt was impressed by its waste of steam. In May 1765, after wrestling with the problem of improving it, he suddenly came upon a solution—the separate condenser, his first and greatest invention. Watt had realized that the loss of latent heat (the heat involved in changing the state of a substance—*e.g.,* solid or liquid) was the worst defect of the Newcomen engine and that therefore condensation must be effected in a chamber distinct from the cylinder but connected to it. Shortly afterward, he met John Roebuck, the founder of the Carron Works, who urged him to make an engine. He entered into partnership with him in 1768, after having made a small test engine with the help of loans from Joseph Black. The following year Watt took out the famous patent for "A New Invented Method of Lessening the Consumption of Steam and Fuel in Fire Engines."

Meanwhile, Watt in 1766 became a land surveyor; for the next eight years he was continuously busy marking out routes for canals in Scotland, work that prevented his making further progress with the steam engine. After Roebuck went bankrupt in 1772, Matthew Boulton, the manufacturer of the Soho Works in Birmingham, took over a share in Watt's patent. Bored with surveying and with Scotland, Watt immigrated to Birmingham in 1774.

After Watt's patent was extended by an act of Parliament, he and Boulton in 1775 began a partnership that lasted 25 years. Boulton's financial support made possible rapid progress with the engine. In 1776 two engines were installed, one for pumping water in a Staffordshire colliery, the other for blowing air into the furnaces of John Wilkinson, the famous ironmaster. That year Watt married again—his second wife, Ann MacGregor, bore him two more children.

During the next five years, until 1781, Watt spent long periods in Cornwall, where he installed and supervised numerous pumping engines for the copper and tin mines, the managers of which wanted to reduce fuel costs. Watt, who was no businessman, was obliged to endure keen bargaining in order to obtain adequate royalties on the new engines. By 1780 he was doing well financially, though Boulton still had problems raising capital. In the following year Boulton, foreseeing a new market in the corn, malt, and cotton mills, urged Watt to invent a rotary motion for the steam engine, to replace the reciprocating action of the original. He did this in 1781 with his so-called sun-and-planet gear, by means of which a shaft produced two revolutions for each cycle of the engine. In 1782, at the height of his inventive powers, he patented the double-acting engine, in which the piston pushed as well as pulled. The engine required a new method of rigidly connecting the piston to the beam. He solved this problem in 1784 with his invention of the parallel motion—an arrangement of connected rods that guided the piston rod in a perpendicular motion—which he described as "one of the most ingenious, simple pieces of mechanism I have

contrived." Four years later his application of the centrifugal governor for automatic control of the speed of the engine, at Boulton's suggestion, and in 1790 his invention of a pressure gauge, virtually completed the Watt engine.

Later years. Demands for his engine came quickly from paper mills, flour mills, cotton mills, iron mills, distilleries, and canals and waterworks. By 1790 Watt was a wealthy man, having received £76,000 in royalties on his patents in 11 years. The steam engine did not absorb all his attention, however. He was a member of the Lunar Society in Birmingham, a group of writers and scientists who wished to advance the sciences and the arts. Watt experimented on the strength of materials, and he was often involved in legal proceedings to protect his patents. In 1785 he and Boulton were elected fellows of the Royal Society of London. Watt then began to take holidays, bought an estate at Doldowlod, Radnorshire, and from 1795 onward gradually withdrew from business.

With the approach of his retirement in 1800 and because that was also the year in which his patents and partnership would expire, Watt established in 1794 the new firm of Boulton & Watt, which built the Soho Foundry to manufacture steam engines more competitively. During this time Watt's son by his first marriage, James, gave him anxiety. A youthful sympathizer with the French Revolution, he had been criticized in Parliament for presenting in 1792 an address from the Manchester Constitutional Society to the Société des Amis de la Constitution in Paris. After being cleared of political suspicion on his return home two years later, however, he and Boulton's son, Matthew, took over the management of the new firm.

Watt's long retirement was saddened by the deaths of a son by his second marriage, Gregory, and of many of his close friends. Nevertheless, he travelled with his wife to Scotland and to France and Germany when the Peace of Amiens was signed in 1802 and continued to work in the garret of his house, which he had equipped as a workshop. There he invented a sculpturing machine with which he reproduced original busts and figures for his friends. He also acted as consultant to the Glasgow Water Company. His achievements were amply recognized in his lifetime: he was made doctor of laws of the University of Glasgow in 1806 and a foreign associate of the French Academy of Sciences in 1814 and was offered a baronetcy, which he declined.

(P.W.K.)

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Watt, Joachim von: *see* Vadianus, Joachim.

watt-hour meter, device that measures and records over time the electric power flowing through a circuit. Although there are several different types of watt-hour meters, each consists essentially of a small electric motor and a counter. A precise fraction of the current flowing in the circuit is diverted to operate the motor. The speed at which the motor turns is proportional to the current in the circuit, and, therefore, each revolution of the motor's rotor corresponds to a given amount of current flowing through the circuit. The counter is connected to the rotor and adds and displays the amount of power the circuit has carried based on the number of revolutions of the rotor. The counter is usually marked in kilowatt-hours (1,000 watt-hours).

Mercury-type and commutator-type watt-hour meters measure power in direct-current circuits. Induction-type meters measure power in alternating-current circuits and are the type commonly seen on the outside of houses. Specialized watt-hour meters include totalizing meters, which record the power used in more than one circuit, and highly accurate portable meters, which are used for testing installed watt-hour meters.

Watteau, (Jean-)Antoine (b. Oct. 10, 1684, Valenciennes, Fr.—d. July 18, 1721, Nogent-sur-Marne), French painter who typified the lyrically charming and graceful style of the Rococo. Much of his work reflects the influence of the commedia dell'arte and the opéra ballet (*e.g.*, "The French Comedy," 1716).

Early life and training. Antoine Watteau was the son of a roof tiler. According to early biographers his childhood was an unhappy one. As a boy he was sensitive and susceptible to quick changes of mood, a voracious reader of novels, and an avid music lover. He showed a penchant for making life studies of mountebanks performing on the public square, and his parents placed him in the workshop of a local painter. At about the age of 18, Watteau decided to go to Paris, where he arrived penniless and apprenticed himself to an old painter, Métayer. Work was scarce, however, so young Watteau moved on to a position in a workshop specializing in votive paintings. Meanwhile, he made countless sketches from life, which were to be a source of thematic inspiration to him for the rest of his life. It was at this time that he made the acquaintance of the art dealers Jean and Pierre-Jean Mariette, whose shop he admired a precious collection of drawings and engravings, including some by the etcher Jacques Callot. There, in about 1703, he also met his new teacher, Claude Gillot.

Gillot was a decorator of theatrical scenery, with a great talent for painting grotesques, fauns, satyrs, and *scènes d'opéra.* He detested the grandiose official art of his own time, preferring to work in the style of the 16th-century school of Fontainebleau, with its free feminine grace. Gillot also painted subjects from the Italian commedia dell'arte, whose actors had been expelled from France only a few years before. Gillot's taste for these subjects, as well as some features of his drawing style, are reflected in Watteau's work. He began to observe the theatre from the wings: the makeup, the machines, the settings—all that serves to create scenic illusion. He discovered a new sense of light in the colourful reflections of artificial illumination on deep shadows, on made-up faces, on the brilliant costumes, and on the painted backdrops. The spectacle being staged was born of the equilibrium established among these elements; natural reality could scarcely have taught the young Watteau more.

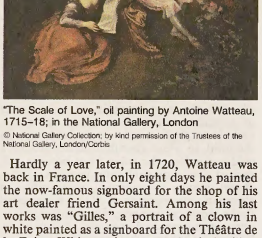
In 1708 Watteau entered the studio of Claude Audran III, then curator of the Medici Gallery in the Palais du Luxembourg, in Paris. Now his experience of Paris was virtually complete—the world of the theatre, the grand gardens of the Luxembourg, the study of art collections. Watteau's Paris is a combination of ceremonies and illusions, a miracle of civilization that reveals itself in its avenues and fountains, with their marvellous play of water amid the gardens. At the Luxembourg he studied the triumphant cycle of paintings that Rubens had dedicated to Marie de Médicis about 30 years earlier. These huge works, vibrant with life and pleasure, exerted a deep influence upon him. Watteau assisted Audran, who was the most famous decorator in Paris, but he also looked to other worlds. In 1709 he was accepted as a student at the Académie Royale of painting and entered the competition for the Prix de Rome, but he failed to win the scholarship to Rome and decided to return to Valenciennes. A friend sold a painting of his so that Watteau could pay for the return journey. He was to paint others at Valenciennes for one of his admirers, a wounded officer in convalescence there. These subjects ("Les Fatigues de la guerre," "Les Délassements de la guerre") found favour with the public. In 1710 Watteau returned to Paris as the guest of the art dealer Pierre Sirois, who, together with Sirois's son-in-law Gersaint, was to be his faithful friend for the rest of his life. Watteau introduced members of the Sirois family into his paintings. He was not a portrait painter, however. His subjects do not seem to have names: they are at times friends who masquerade and pose for the groups of Italian actors.

Watteau's Cythera. In 1712 Watteau tried once more to go to Italy. He did not succeed, but he was accepted by the Académie as a painter of *fêtes galantes*—outdoor entertainments in which the courtiers often dressed in rural costumes—for his presentation of a scene depicting actors in a garden. Between 1710 and 1712 he had painted the first of his three versions of the "L'Embarquement pour l'île de Cythère." The myth of the island of Cythera, or of love, has distant roots in French and Italian culture, in which the journey is depicted as a difficult quest. Watteau's Cythera, by comparison, is a paradise wavering in the ephemeral and in artifice; it represents an invitation to delights amid the enchantment of nature. It is an island toward which the pilgrims embark but never arrive, preserving it preserves its light only if it remains far on the horizon.

Watteau's first version of the subject is anecdotal: it illustrates a comedy motif in a vaguely Venetian ambience. The second—which is the most beautiful—has the aspect of a profane ritual in an unreal, immense, and almost frighteningly empty landscape. In the third, in which cherubim flutter around a golden gondola, the subject has become vulgarized. Common to all three versions is a theatrical, almost scenographic, composition, a chromatic transposition of all that is suggested in the theatrical universe. The wonderlands of opera, romance, and epic are all evoked by Watteau's Cythera, which represents the country of the impossible dream, the revenge of madness on reason, and of freedom on rules and morality. According to one hypothesis, the theme was suggested to Watteau by a prose play, *Les Trois Cousines* (1700), by Florent Dancourt, in the finale of which a group of country youths, disguised as pilgrims of love, prepare to embark on the voyage to the island of Cythera. Since this story of rustic millers is paroditic in intent and quite different from the refined scene that Watteau set in an unreal Venice, it is more probable that Watteau was inspired by an opéra ballet of Houdar de la Motte, *La Vénitienne* (1705), in which the invitation to the island of love includes not only the pilgrims of Cythera but also the stock characters of the commedia dell'arte—that is, both of the great themes that Watteau pursued all his life.

Period of his major works. Despite his growing fame, Watteau remained shy, misanthropic, dissatisfied with himself, "libertine in spirit, but prudent in morals." There is little information concerning him from 1712 until 1715, when he was introduced to the very rich financier Pierre Crozat, who had just returned from Italy. There, on behalf of the Regent, Crozat had been negotiating for the acquisition of Queen Christina's art collection. A Watteau enthusiast, Crozat invited the painter to take up quarters in his residence, as was the custom among wealthy art lovers. Crozat had a great collection of Italian and Flemish paintings and drawings, including Correggio, the Venetian masters, and Van Dyck, and as Crozat's guest, Watteau profitably applied the lessons of the Italian masters. He also painted the gardens and the countrysides surrounding the villa at Montmorency. Watteau left his rich

patron out of a desire for freedom, although he remained his friend. Thenceforth he lived in seclusion and solitude. This was the period of the birth of his masterpieces: the "Conversations," the "Divertissements champêtres," the "Fêtes galantes." In 1717 he presented to the Académie, of which he had become a member, the second version of "L'Embarquement pour l'Île de Cythère." Two years later Watteau was in London, where his works were in great demand and where he also wanted to consult a famous physician about his health, which had been failing for some time. In London he limited himself to executing very few paintings, one of which was for his doctor on a subject that was very dear to him, "Italian Comedians."



"The Scale of Love," oil painting by Antoine Watteau, 1715–18; in the National Gallery, London

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Hardly a year later, in 1720, Watteau was back in France. In only eight days he painted the now-famous signboard for the shop of his art dealer friend Gersaint. Among his last works was "Gilles," a portrait of a clown in white painted as a signboard for the Théâtre de la Foire. White as innocence (or imbecility) and roseate in complexion, "Gilles" is the image of the actor during intermission—the actor who offers himself every day to the laughter of his fellows, the uncomprehending victim of a ceremony the full meaning of which seems to evade him. He is represented in a grandness that recalls Rembrandt's "Christ Presented to the People" ("Ecce Homo"). At the other extreme is the signboard that Watteau painted for Gersaint: it portrays an art dealer's shop in which a morose painting of Louis XIV is being symbolically stored away, as if to mark the end of his great reign. Although there are a number of figures, the protagonist of the picture is painting itself, as if Watteau at the end of his life were consecrating his art to eternity. By now Watteau was worn down by tuberculosis, and he died at the age of 37.

Themes and influences. Watteau's art exemplifies the profound influence of the theatre as a motif of inspiration on the painting of the 18th century. The strongest influence on his work was exercised not by solemn tragedy but by the most ephemeral theatrical forms. One major influence was the commedia dell'arte, in which words count significantly less than gestures, a theatre linked to the actor, who brings his own routines with him. Another influence was the opéra ballet, with its grand display of fleeting images embodied by the dance, the singing, the costumes, and the decorations. Watteau belonged to a period of reaction against the classicism of the preceding era, in which division of the arts and separation of styles had been strictly observed. An attempt was thus made to ennoble the genres previously considered inferior (farce, improvised comedy, the novel), and bold transpositions from one form of art to the other were ventured, as in the fusion of poetry, music, painting, and dance into the new genre of opera. In many cases Watteau's painting is a chromatic transposition of the world of the opera.

Watteau interpreted his era in forms so delicate and evanescent that they seem to suggest the illnesses of the culture. In the quarrel that raged between ancients and moderns, Watteau seems instinctively to have sided with the moderns. For him antiquity and its great heroes were dead. His adoration of the present and its refined modernity, and fashion bordered on frivolousness. On the other hand, he rejected every form of picturesque realism. His conception of Parnassus, the home of the gods of ancient Greece, resembles the Paris of his time, which he often reduced to the dimensions of a stage. Watteau was immersed in the ephemeral. Women reign in his paintings. Men—cavaliers or clowns—are there to please the women who glide by, enfolded in their splendid silken raiments. The statues in the parks are almost always statues of women. And even nature is feminine: trees with slender trunks, rich with a soft and uncertain foliage.

Posthumous reputation. Watteau's circle of admirers dissolved shortly after his death, and his reputation began to wane. Watteau, who had interpreted the deepest aspirations of his own time, was found pleasing by few later in the 18th century as the Age of Reason developed. Painting then passed to the observation of reality and, finally, to social protest. It was natural that an artist, such as Watteau, who exalted the free reign of fantasy was set aside during this period. Critics later, during the French Revolution, accused Watteau of "having infected the dwellings of his time with bad taste."

The 19th century marked a certain resurgence of interest in Watteau, especially in England and among some French poets, namely, Victor Hugo, Gérard de Nerval, and Théophile Gautier. Gradually, his fortunes revived: Baudelaire presented a profound and precise interpretation of the artist, placing him among the "beacons" of mankind in one of his most famous poems ("Les Phares," 1855). He too saw Watteau's art against the background of the *comédie-ballet* as a whirling and weightless dance among popular stock characters or aristocratic cavaliers under the artificial lights of chandeliers.

In 1856 the Goncourt brothers published "Philosophie de Watteau," in which they compared him to Rubens. Marcel Proust, at the end of the century, was among those who best sensed Watteau's greatness. Eventually the esteem Watteau enjoyed in the circle of art lovers, poets, and novelists extended to the broad public.

(Gi.M.)

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wattle and daub, in building construction, method of constructing walls in which vertical wooden stakes, or wattles, are woven with horizontal twigs and branches, and then daubed with clay or mud. This method is one of the oldest known for making a weatherproof structure. In England, Iron Age sites have been discovered with remains of circular dwellings constructed in this way, the staves being driven into the earth.

When this method is used as filling-in for a timber-framed structure the wattles are set into holes bored in a horizontal timber above and fitted into a groove in a corresponding timber below. Then the staves are woven with twigs and plastered with clay. The half-timbered houses constructed in medieval Europe were frequently finished in this manner. The lath-and-plaster method of building up interior walls, which was common before the introduction of plasterboard and Sheetrock, is a more modern evolution of the wattle and daub technique, using standardized materials.

wattle-eye, also called PUFFBACK FLYCATCHER, any of a number of small, stubby



Wattle-eye *(Dyaphorophyia jamesoni)*

Painting by Murrell Butler

African songbirds of the subfamily Platysteirinae, family Muscicapidae (*q.v.*); some authorities retain them in the flycatcher subfamily, Muscicapinae. Most species have bright, fleshy eye ornaments, or wattles: in the genus *Platysteira* they are found above the eyes in both sexes, while in *Dyaphorophyia* they are above and below the eyes in males and sometimes in females also. In *Batis*, however, the wattles are lacking. The plumage typically is black and white, and there is often a chest band; females have, additionally, reddish brown touches. All species have long rump feathers, which are raised in moments of excitement. Wattle-eyes, catching insects in forests and gardens, audibly flick their wings and snap their beaks. Examples are the scarlet-spectacled wattle-eye (*P. cyanea*) of transequatorial distribution; the chestnut wattle-eye (*D. castanea*), of west central Africa; and the Cape puffback flycatcher (*B. capensis*), a familiar garden bird of the east and south.

wattlebird, any of several New Zealand birds of the family Callaeidae (*q.v.*); also, a particular name for any honeyeater (*q.v.*) of the genus *Anthochaera*.

wattled crow: *see* kokako.

Wattrelos, town, Nord *département*, Nord-Pas-de-Calais region, northern France, on the Belgian-French border. A northeastern suburb of Roubaix, it has textile, chemical, and metallurgical industries. The community was known as Waterloz in 1030, and the discovery of a golden effigy of Nero in 1864 indicated Roman occupation of the area. Pop. (1999) 42,753.

Watts, southwestern district of Los Angeles, California, U.S. It gained widespread notoriety Aug. 11–16, 1965, as the scene of racial disturbances. Provoked by long-standing social injustices, thousands of blacks rioted, burned stores, and pillaged the area. Before order was restored 34 people were killed and more than 1,000 injured. The district, originally called Mud Town, was renamed in 1900 for C.H. Watts, a Pasadena realtor who owned a ranch there. It was annexed to Los Angeles in 1926. Pop. (1990) 32,145.

Watts, George Frederick (b. Feb. 23, 1817, London—d. July 1, 1904, Compton, Surrey, Eng.), English painter and sculptor of grandiose allegorical themes. Watts believed that art should preach a universal message, but his subject matter, conceived in terms of vague abstract ideals, is full of symbolism that is often obscure and today seems superficial.

Watts attended the Royal Academy sporadically between 1835 and 1837, exhibiting among other works "The Wounded Heron" (1837; Watts Gallery, Compton). He twice won competitions for the decoration of the Houses of Parliament, and although neither design was ever carried out in fresco, the prize money enabled him to go to Florence in 1843 and to visit Rome and Naples between 1843 and 1847; the most obvious Italian influence in his work is that of Titian.

The most famous of his later works, "Hope" (1886; version in the Tate Gallery, London), is ambiguous and may be ironic in meaning. Although he tended to despise portrait painting, Watts completed many shrewdly observed portraits of his famous contemporaries, notably that of Cardinal Manning (1882; National Portrait Gallery, London). The house in which he died now contains a permanent collection of his works.

Watts, Isaac (b. July 17, 1674, Southampton, Hampshire, Eng.—d. Nov. 25, 1748, Stoke Newington, London), English Nonconformist minister, regarded as the father of English hymnody.

Watts studied at the Dissenting Academy at Stoke Newington, London, which he left in 1694. In 1696 he became tutor to the family of Sir John Hartopp of Stoke Newington and of Freeby, Leicestershire, and preached his first sermons in the family chapel at Freeby. He was appointed assistant to the minister of Mark Lane Independent (*i.e.*, Congregational) Chapel, London, in 1699 and in March 1702 became full pastor. Because of a breakdown in health (1712) he went to stay, intending a week's visit, with Sir Thomas Abney in Hertfordshire; he remained with the Abneys for the rest of his life.

The famous hymns were written during Watts's Mark Lane ministry. His first collection of hymns and sacred lyrics was *Horae Lyricae* (1706), quickly followed by *Hymns and Spiritual Songs* (1707), which included "When I Survey the Wondrous Cross," "There is a Land of Pure Delight," and others that have become known throughout Protestant Christendom. The most famous of all his hymns, "Our God, Our Help in Ages Past" (from his paraphrase of Ps. 90), and "Jesus Shall Reign" (part of his version of Ps. 72), almost equally well known, were published in *The Psalms of David Imitated in the Language of the New Testament* . . . (1719).

During the latter part of his life, Watts devoted much time to writing and published a work that had occupied him for many years, *Logic, or the Right Use of Reason in the Enquiry After Truth* (1725), which was for several generations a standard textbook.

Watts-Dunton, (Walter) Theodore (b. Oct. 12, 1832, St. Ives, Huntingdonshire, Eng.—d. June 6, 1914, London), English critic and man of letters, who was the friend and self-appointed protector of the poet Algernon Charles Swinburne.

Watts-Dunton studied law and practiced for some time in London, but his real interest was literature, and he eventually became an important literary critic. He contributed regularly to the *Examiner* and the *Athenaeum* and wrote the article on poetry for the 9th edition of *Encyclopædia Britannica* (1885).

With considerable persistence he formed the friendships that are the real basis of his reputation—particularly with notable writers of the period, such as Dante Gabriel Rossetti and Algernon Swinburne. Swinburne, who had been in poor health, collapsed completely in 1879 but recovered under Watts-Dunton's devoted care. For the next 30 years the strict regimen and enthusiastic encouragement of Watts-Dunton made possible Swinburne's enormous productivity.

Watts-Dunton's published works include two novels, *Alwin* (1898) and *Vesprie Towers* (1916; posthumous), and a book of poems, *The Coming of Love* (1897). His memoirs, *Old Familiar Faces* (1916), are a valuable record of his life and times.

Watusi, also spelled WATUTSI (people): *see* Tutsi.

Wau, town, eastern Papua New Guinea, at the junction of Edie Creek and Bulolo River, in a mountainous region accessible by road from Lae and by air from Port Moresby. Gold was first discovered (1921) at Koranga Creek, followed by further strikes on Edie Creek flats. Wau was the scene of World War II battles (1943), especially around its hillside airstrip. The town was rebuilt after the war, but not on its former scale. Gold, although still significant, has been replaced in economic importance by coffee and timber, which are exported through Lae. Because of its elevation (3,300 ft [1,000 m]) it is promoted as a "hill station" for Europeans. Nearby is McAdam National Park. Pop. (1990 prelim.) 4,268.

Wau (The Sudan): *see* Wāw.

Wauchope, town, north coastal New South Wales, Australia, 12 mi (19 km) above the mouth of the Hastings River, just west of Port Macquarie. Named after a Captain Wauch, an early settler, the town serves a district of mixed farming including the raising of beef cattle and pigs, dairying, and beekeeping. Local forests supply timber to boatyards and to factories manufacturing sawmills, plywood, veneer, and boxes. Arsenic, tin, manganese, copper, and gold deposits are worked in the area. Wauchope is on the Oxley Highway near the Pacific Highway junction and connected to Sydney, 193 mi (311 km) southwest, and Brisbane by rail. Pop. (1981) 3,645.

Waucoban Series, lowermost Cambrian rocks (the Cambrian Period began about 570 million years ago and lasted about 65 million years); the name is derived from exposures found at Waucoba Springs, Calif. The period of time corresponding to the rocks of the Waucoban Series is known as the Waucoban Epoch.

The Waucoban is characterized by a distinct faunal assemblage, especially typified by the trilobite genus *Olenellus*. As yet, no clear-cut, universally applicable definition that would demarcate the base of the lowermost Cambrian strata has been agreed upon.

Waugh, Alec, byname of ALEXANDER RABAN WAUGH (b. July 8, 1898, Hampstead, London—d. Sept. 3, 1981, Tampa, Fla., U.S.), English popular novelist and travel writer, older brother of the writer Evelyn Waugh.

Waugh was educated at Sherborne, from which he was expelled, and the Royal Military Academy at Sandhurst. While only 17, he wrote *The Loom of Youth* (1917), a novel about public school life that created a considerable stir and was responsible for his brother Evelyn's being sent to Lancing rather than following him to Sherborne. During World War I he served in France and was taken prisoner. After the war he worked as a publisher's reader until 1926, when he went to Tahiti. His love for tropical countries left its stamp on many of his novels. *Island in the Sun* (1956) explores the emotional and political problems between blacks and whites on a West Indian island. *The Mule on the Minaret* (1965) was based on the activities of British counterintelligence in the Middle East. *My Brother Evelyn and Other Profiles* (1967) is largely autobiographical. Waugh's later novels include *A Spy in the Family* (1970), *The Fatal Gift* (1973), and *A Year to Remember* (1975). He married three times, the last to U.S. novelist and prize-winning children's author Virginia Sorenson.

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Waugh, Evelyn (Arthur St. John) (b. Oct. 28, 1903, London—d. April 10, 1966, Combe Florey, near Taunton, Somerset, Eng.), English writer regarded by many as the most brilliant satirical novelist of his day.

Waugh was educated at Lancing College, Sussex, and at Hertford College, Oxford. After short periods as an art student and schoolmaster, he devoted himself to solitary observant travel and to the writing of novels, soon earning a wide reputation for sardonic wit and technical brilliance. During World War II he served in the Royal Marines and the Royal Horse Guards; in 1944 he joined the British military mission to the Yugoslav Partisans. After the war he led a retired life in the west of England.

Waugh's novels, although their material is nearly always derived from firsthand experience, are unusually highly wrought and precisely written. Those written before 1939 may

be described as satirical. The most noteworthy are *Decline and Fall* (1928), *Vile Bodies* (1930), *Black Mischief* (1932), *A Handful of Dust* (1934), and *Scoop* (1938). A later work



Evelyn Waugh, photograph by Mark Gerson, 1964
Camera Press

in that vein is *The Loved One* (1948), a satire on the morticians' industry in California.

During the war Waugh's writing took a more serious and ambitious turn. In *Brideshead Revisited* (1945) he studied the workings of providence and the recovery of faith among the members of a Catholic landed family. (Waugh was received into the Roman Catholic Church in 1930.) *Helena*, published in 1950, is a novel about the mother of Constantine the Great, in which Waugh re-created one moment in Christian history to assert a particular theological point. In a trilogy—*Men at Arms* (1952), *Officers and Gentlemen* (1955), and *Unconditional Surrender* (1961)—he analyzed the character of World War II, in particular its relationship with the eternal struggle between good and evil and the temporal struggle between civilization and barbarism.

Waugh also wrote travel books; lives of Dante Gabriel Rossetti (1928), Edmund Campion (1935), and Ronald Knox (1959); and the first part of an autobiography, *A Little Learning* (1964).

Christopher Sykes's biography was published in 1975 and Waugh's letters in 1980.

Waukegan, city, seat (1841) of Lake County, northeastern Illinois, U.S., on a high bluff above Lake Michigan. The site was called Little Fort on 18th-century maps, a stockade probably established by French voyageurs who visited the area in 1695. The first white settler arrived in 1825. In 1849 the settlement was incorporated as a village and renamed Waukegan, Potawatomi Indian for "Little Fort." The first port of call in Illinois for ships plying the St. Lawrence Seaway, Waukegan is part of the Milwaukee–Chicago urban–industrial complex. To the north is Illinois Beach State Park. Comedian Jack Benny (1894–1974) was a native son. Inc. city, 1859. Pop. (1990) 69,392.

Waukesha, city, seat (1847) of Waukesha County, southeastern Wisconsin, U.S., on the Fox River, immediately west of Milwaukee. Settled in 1834 as Prairieville, it was renamed Waukesha (Potawatomi for "By the Little Fox"). A station on the Underground Railroad for runaway slaves, it was an Abolitionist centre before the Civil War, publishing the anti-slavery *American Freeman*. From 1870 to 1915 it was a health resort known for its mud baths and mineral springs. Limestone quarrying and diversified industries, including machine shops and foundries and food processing, are economic mainstays. It is the seat of Carroll College (1846) and of a University of Wisconsin centre (1966). Inc. village, 1852; city, 1896. Pop. (1990) 56,958.

Wausau, city, seat (1850) of Marathon County, north central Wisconsin, U.S., on the Wisconsin River, 93 mi (150 km) west-northwest of Green Bay. Settled in 1839 as a sawmill town, it was first called Big Bull Falls but in 1872 was renamed Wausau, Chippewa Indian for "Faraway Place." An agricultural (dairying) and distribution centre, it is headquarters of the Wisconsin Valley Improvement Company, a state-regulated enterprise that stores and releases river water to plants, which pay a toll for its use. Varied manufactures include wood and paper products, electric motors, construction equipment, and plastics. North Central Technical Institute was established in 1912 in Wausau. The city is also a vacation base with Rib Mountain State Park nearby. Inc. 1872. Pop. (1990) city, 37,060; Wausau MSA, 115,400.

wave: *see under* descriptive word (*e.g.*, transverse wave), except as below.

wave, on a body of water, a ridge or swell on the surface, normally having a forward motion distinct from the oscillatory motion of the particles that successively compose it. The undulations and oscillations may be chaotic and random, or they may be regular, with an identifiable wavelength between adjacent crests and with a definite frequency of oscillation. In the latter case, the waves may be progressive, in which the crests and troughs appear to travel at a steady speed in a direction at right angles to themselves. Alternatively, they may be standing waves, in which there is no progression. In this case, there is no rise and fall at all in some places, the nodes, while elsewhere the surface rises to a crest and then falls to a trough at a regular frequency.

A brief treatment of water waves follows. For full treatment, *see* MACROPAEDIA: Oceans.

There are two physical mechanisms that control and maintain wave motion. For most waves, gravity is the restoring force that causes any displacements of the surface to be accelerated back toward the mean surface level. The kinetic energy gained by the fluid returning to its rest position causes it to overshoot, resulting in the oscillating wave motion. In the case of very short wavelength disturbances of the surface, *i.e.*, ripples, the restoring force is surface tension, wherin the surface acts like a stretched membrane. If the wavelength is less than a few millimetres, surface tension dominates the motion, which is described as a capillary wave. Surface gravity waves in which gravity is the dominant force have wavelengths greater than approximately 10 cm (4 in.). In the intermediate length range, both restoring mechanisms are important.

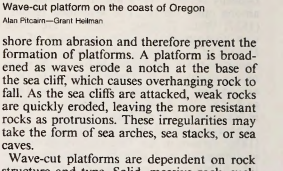
The mathematical theory of water wave propagation shows that for waves whose amplitude is small compared to their length, the wave profile can be sinusoidal, and there is a definite relationship between the wavelength and the wave period, which also controls the speed of wave propagation. Longer waves travel faster than shorter ones, a phenomenon known as dispersion. If the water depth is less than one-twentieth of the wavelength, the waves are known as long gravity waves, and their wavelength is directly proportional to their period. The deeper the water, the faster they travel. For capillary waves, shorter wavelengths travel faster than longer ones.

The energy of the waves is proportional to the square of the amplitude, *i.e.*, the maximum displacement of the surface above or below its rest position. Mathematical analysis shows that a distinction must be made between the speed of the troughs and crests, called the phase speed, and the speed and direction of the transport of energy or information associated with the wave, termed the group velocity. For non-dispersive long waves the two are equal, whereas for surface gravity waves in deep water the group velocity is only half the phase speed. Thus, in a train of waves spreading out over a pond after a sudden disturbance at a point, the wave front travels at only half the speed of the crests, which appear to run through the packet of waves and disappear at the front. For capillary waves, the group velocity is one and one-half times the phase speed.

Waves whose amplitude is large compared to their length cannot be so readily described by mathematical theory, and their form is distorted from a sinusoidal shape. The troughs tend to flatten and the crests sharpen toward a point, a shape known as a conoidal wave. In deeper water the limiting height of a wave is one-seventh of its length. As it approaches this height the pointed crests break to form whitecaps. In shallow water the long-amplitude waves distort, because crests travel faster than troughs to form a profile with a steep rise and slow fall. As such waves travel into shallower water on a beach, they steepen until breaking occurs.

Waves on the sea surface are generated by the action of the wind. During generation the disturbed sea surface is not regular and contains many different oscillatory motions at different frequencies. Wave spectra are used by oceanographers to describe the distribution of energy at different frequencies. The form of the spectrum can be related to wind speed and direction and the duration of the storm and the fetch (or distance upwind) over which it has blown, and this information is used for wave prediction. After the storm has passed, the waves disperse, the longer-period waves (about 8 to 20 seconds) propagating long distances as well, while the shorter-period waves are damped out by internal friction.

wave-cut platform, also called ABRASION PLATFORM, gently sloping rock ledge that extends from the high-tide level at the steep-cliff base to below the low-tide level. It develops as a result of wave abrasion; beaches protect the



Wave-cut platform on the coast of Oregon
Alan Pitcairn—Grant Heilman

shore from abrasion and therefore prevent the formation of platforms. A platform is broadened as waves erode a notch at the base of the sea cliff, which causes overhanging rock to fall. As the sea cliffs are attacked, weak rocks are quickly eroded, leaving the more resistant rocks as protrusions. These irregularities may take the form of sea arches, sea stacks, or sea caves.

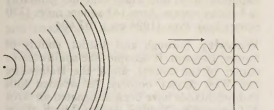
Wave-cut platforms are dependent on rock structure and type. Solid, massive rock, such as granite, is resistant to abrasion and may modify or even prevent platform formation. In a few cases cliffs plunge down directly into deep water. This is usually the result of recent faulting or volcanic activity. Plunging cliffs are only slightly affected by wave erosion, therefore the formation of abrasion platforms is inhibited.

With a change in sea level, platforms may be submerged or raised, ending the processes of formation. Raised platforms are referred to as marine terraces. These can be used to calculate coastal uplift or the lowering of sea level through time, particularly where intermediate

stillstands of sea level have produced a series of terraces along a coast.

wave cyclone: *see* extratropical cyclone.

wave front, imaginary surface representing corresponding points of a wave that vibrate in unison. When identical waves having a common origin travel through a homogeneous medium, the corresponding crests and troughs



Wave front

at any instant are in phase; *i.e.*, they have completed identical fractions of their cyclic motion, and any surface drawn through all the points of the same phase will constitute a wave front.

The Figure shows a spherical wave front (W_s) for a sound wave spreading out from a point source and a plane wave front (W_p) for a parallel beam of light, such as that emitted from a laser. Wave fronts for longitudinal and transverse waves may be surfaces of any configuration depending on the source, the medium, and the obstructions encountered. *See also* Huygens' principle.

wave function, in quantum mechanics, variable quantity that mathematically describes the wave characteristics of a particle. The value of the wave function of a particle at a given point of space and time is related to the likelihood of the particle's being there at the time. By analogy with waves such as those of sound, a wave function, designated by the Greek letter psi, Ψ, may be thought of as an expression for the amplitude of the particle wave (or de Broglie wave), although for such waves amplitude has no physical significance. The square of the wave function, Ψ^2, however, does have physical significance: the probability of finding the particle described by a specific wave function Ψ at a given point and time is proportional to the value of Ψ^2.

wave mechanics, quantum mechanics, especially that version originally developed (1926) by the Austrian physicist Erwin Schrödinger. *See* Schrödinger equation.

wave motion, propagation of disturbances—that is, deviations from a state of rest or equilibrium—from place to place in a regular and organized way. Most familiar are surface waves on water, but both sound and light travel as wavelike disturbances, and the motion of all subatomic particles exhibits wavelike properties. The study of waves therefore forms a topic of central importance in all physical science and engineering.

The simplest types of wave motion are undulations of elastic media, such as air, crystalline solids, or stretched strings. If, for example, the surface of a metal block is struck a sharp blow, the deformation of the surface material compresses the metal in the vicinity of the surface, and this transmits the disturbance to the layers beneath. The surface relaxes back to its initial configuration, and the compression propagates on into the body of the material at a speed determined by the stiffness of the material. This is an example of a compression wave. The steady transmission of a localized disturbance through an elastic medium is common to many forms of wave motion.

In most systems of interest, two or more disturbances of small amplitude may be superimposed without modifying one another. Conversely, a complicated disturbance may be analyzed into several simple components. In radio transmission, for example, a high-frequency signal can be superimposed on a low-frequency carrier wave and then filtered out intact on reception.

In the simplest waves, the disturbance oscillates periodically with a fixed frequency and wavelength. These sinusoidal oscillations form the basis for the study of almost all forms of linear wave motion. In sound, for instance, a single sine wave produces a pure tone, and the distinctive timbre of different musical instruments playing the same note results from the admixture of sine waves of different frequencies. In electronics, the natural rhythmic oscillations of electric currents in tuned circuits are used to produce sinusoidal radio waves.

Although the mathematical properties of all linear waves are common, the waves exhibit various physical manifestations. One important class—electromagnetic waves—represent oscillations of the electromagnetic field. These include radiant heat, light, radio, microwave, ultraviolet, and X rays. Electromagnetic waves are produced by moving electric charges and varying currents, and they can travel through a vacuum. Unlike sound waves, they are not, therefore, disturbances in any medium. Another difference between electromagnetic and sound waves is that the former are transverse, that is, the disturbance occurs in a direction perpendicular to that in which the wave is propagating. Sound waves are longitudinal: they vibrate along the path of their propagation.

The propagation of a wave through a medium will depend on the properties of the medium. For example, waves of different frequencies may travel at different speeds, an effect known as dispersion. In the case of light, dispersion leads to the unscrambling of colours and is the mechanism whereby a prism of glass can produce a spectrum. In geophysics, the dispersive propagation of seismic waves can provide information about the constitution of the Earth's interior.

Two important characteristics of all waves are the phenomena of diffraction and interference. When a wave disturbance is directed toward a small aperture in a screen or other obstacle, it emerges traveling in a range of directions. Thus, light rays, which normally follow straight paths, can bend upon passing through a small hole: this is the phenomenon known as diffraction.

Interference occurs when two waves are combined and the disturbances overlap. If the waves arrive at a point in step, enhancement occurs and the disturbance is large. Where the waves are out of step, their opposing motions cancel and the disturbance is small or nonexistent. The net effect is therefore a distinctive interference pattern of large and small disturbances.

Mathematically less tractable is the study of nonlinear waves, which can be very important in many applications. These usually display a more complicated structure and behaviour; for example, water waves in a shallow channel can develop a humplike formation known as a soliton, which propagates as a coherent entity. Nonlinear waves are important in systems as diverse as nerve networks and the spiral arms of galaxies.

wave number, a unit of frequency in atomic, molecular, and nuclear spectroscopy equal to the true frequency divided by the speed of light and thus equal to the number of waves in a unit distance. The frequency, symbolized by the Greek letter nu (ν), of any wave equals the speed of light, c, divided by the wavelength λ: thus $\nu = c/\lambda$. A typical spectral line in the visible region of the spectrum has a wavelength of 5.8×10^{-5} cm; this wavelength corresponds to a frequency (ν) of 5.17×10^{14} Hz (hertz equals one cycle per second) obtained from the equation. Because this frequency and others like it are so extremely large, it is convenient to divide the number by the speed of light and hence reduce its size. Frequency divided by the speed of light is ν/c, which from the above equation is $1/\lambda$. When wavelength is measured in metres, $1/\lambda$ represents the number of waves of the wave train to be found in a length of one metre or, if measured in centimetres, the number in one centimetre. This number is called the wave number of the spectrum line. Wave numbers are usually measured in units of reciprocal metres (1/m, or m^{-1}) and reciprocal centimetres (1/cm, or cm^{-1}).

wave-particle duality, possession by physical entities (such as light and electrons) of both wavelike and particle-like characteristics. On the basis of experimental evidence, the German physicist Albert Einstein first showed (1905) that light, which had been considered a form of electromagnetic waves, must also be thought of as particle-like, or localized in packets of discrete energy. The French physicist Louis de Broglie proposed (1924) that electrons and other discrete bits of matter, which until then had been conceived only as material particles, also have wave properties such as wavelength and frequency. Later (1927) the wave nature of electrons was experimentally established. An understanding of the complementary relation between the wave aspects and the particle aspects of the same phenomenon was announced in 1928 (*see* complementarity principle).

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wave velocity, distance traversed by a periodic, or cyclic, motion per unit time (in any direction). Wave velocity in common usage refers to speed, although, properly, velocity implies both speed and direction. The velocity of a wave is equal to the product of its wavelength and frequency (number of vibrations per second) and is independent of its intensity.

If a point vibrates within a rigid solid, both transverse waves (those with points oscillating at right angles to the direction of their advance) and longitudinal waves (those with points vibrating the same direction as their advance) of the same frequency are sent out, and, because the longitudinal waves happen to have longer wavelengths, they will move faster. Thus, seismic waves, being composed of both longitudinal waves (*P*, primary) and transverse waves (*S*, secondary), move with two velocities through the Earth.

Longitudinal waves, such as sound, are transmitted through media with velocities depending on the density and elasticity of the substance. Sound has a velocity of about 0.33 km per second (0.2 mile per second) in air, 1.5 km per second in water, and 5 km per second in steel. All sound waves travel with the same speed in air regardless of their frequency. The velocity of light *in vacuo* is also independent of frequency; in a transparent medium, however, the velocity of light depends on the effect of dispersion in the material, varying slightly more than 1 percent from blue to red.

waveguide, any of a class of devices that confines and directs the propagation of electromagnetic waves, such as radio waves, infrared rays, and visible light. Waveguides take many shapes and forms. Typical examples include hollow metallic tubes, coaxial cables, and optical fibres.

Hollow metallic tubes or ducts of rectangular cross section are among the simplest

and most commonly used waveguides. They are employed, for example, between a radio transmitter (or receiver) and its antenna. Circular metallic tubes are appropriate for such applications as radar in which two sections of the waveguide must rotate with respect to one another. In either type of configuration, radio waves are confined to the interior of the tube so as to minimize the loss of the radio-frequency power passing through it.

The coaxial cable, which consists of a tubular conductor surrounding a central conductor held in place by an insulating sheath, is widely employed for very high and very low frequencies. Such cables are used as a transmission line for transoceanic telephone communications and for closed-circuit television (*e.g.*, cable television). Coaxial cables are well suited for such long-distance transmission because the central conductor is shielded from external electrical noise (*i.e.*, interference) by the outer conducting material.

Since the late 1970s optical fibres have found increasing application in relatively long distance telephone circuits. Such waveguides transmit information in the form of infrared or light signals produced by semiconductor lasers. An optical fibre typically consists of a glass core region that is surrounded by glass cladding. The core region has a larger refractive index than the cladding so that the light is confined to the core as it propagates along the fibre.

Optical fibres have several advantages over coaxial cables. They can carry information at a considerably higher rate, occupy less space (the diameter of an optical fibre is only a small fraction of that of a human hair), and are insensitive to electrical noise. Because of these factors, optical fibres are now widely used to transmit data, sound, and images over long-distance telephone lines. Optical fibres also provide an excellent high-speed communication link between computers interconnected in networks.

wavelength, distance between corresponding points of two consecutive waves. "Corresponding points" refers to two points or particles in the same phase—*i.e.*, points that have completed identical fractions of their periodic motion. Usually, in transverse waves (waves with points oscillating at right angles to the direction of their advance), wavelength is measured from crest to crest or trough to trough; in longitudinal waves (waves with points vibrating in the same direction as their advance), it is measured from compression to compression or rarefaction to rarefaction. Wavelength is usually denoted by the Greek letter lambda (λ); it is equal to the speed (v) of a wave train in a medium divided by its frequency (f): $\lambda = v/f$.

Wavell (of Eritrea and of Winchester), Archibald Percival Wavell, 1st Earl, Viscount Wavell of Cyrenaica and of Winchester, Viscount Keren of Eritrea and of Winchester (b. May 5, 1883, Colchester, Essex, Eng.—d. May 24, 1950, London), British field marshal whose victories against the Italians in North Africa during the early part of World War II were offset by his inability to defeat the German Afrika Korps under General Erwin Rommel (1941) and his failure to stop the Japanese in Malaya and Burma (Myanmar) in 1942.

After serving in World War I, Wavell, who was recognized as an excellent trainer of troops, became British commander in chief for the Middle East (1939). At the high point of his career he destroyed the numerically vastly superior Italian armies in North Africa (December 1940–February 1941). In February 1941, however, Wavell had to send almost 60,000 of his troops overseas to try to prevent



Wavell
By courtesy of the Imperial War Museum, London

the German conquest of Greece and Crete. With his remaining forces he undertook a victorious offensive against the Italians in East Africa in January–May 1941. Wavell proved to be no match for the weak German forces in North Africa under Rommel, however, and he was replaced in July 1941. Moving to Southeast Asia as commander in chief, he lost Malaya and Singapore (December 1941–February 1942) and Burma (January–May 1942) to the Japanese. Again replaced in June 1943, Wavell was promoted to field marshal, raised to the peerage as Viscount Wavell of Cyrenaica and of Winchester, and appointed viceroy of India, a post that he held until 1947. In 1947 he was created an earl. Upon his death, his only son, Archibald John Arthur Wavell (1916–53), succeeded to the titles, which became extinct when he was killed in Kenya in a Mau Mau raid.

wavellite, hydrated aluminum phosphate $[Al_3(PO_4)_2(OH)_3 \cdot 5H_2O]$, a common phosphate mineral that typically occurs as translucent, greenish, globular masses in crevices in aluminous metamorphic rocks, in limonite and phosphate-rock deposits, and in hydrothermal veins. Occurrences include Zbiroh, Czech Republic; Montebras, France; Barnstaple, Devon, Eng., where it was first found; Llallagua, Bolivia; and Dunnellon, Fla., U.S. For detailed physical properties, *see* phosphate mineral (table).

wavemeter, device for determining the distance between successive wavefronts of equal phase along an electromagnetic wave. The determination is often made indirectly, by measuring the frequency of the wave. Although electromagnetic wavelengths are different in different propagation media, wavemeters are conventionally calibrated on the assumption that the wave is moving in free space—*i.e.*, at 299,792,458 metres per second. Wavelength can then be determined according to an equation in which wavelength (λ) is equal to the speed of propagation (c) divided by the frequency of vibration (f), given in hertz.

Frequencies of between 50 kHz and 1,000 MHz are usually measured by means of a tuned inductance-capacitance circuit. Values of inductance (L) and capacitance (C) being calibrated, frequency can be determined using the formula $1/2\pi\sqrt{LC}$.

For measuring higher frequencies, wavemeters make use of such devices as coaxial lines or cavity resonators as tuned elements. One of the simplest is the Lecher wire wavemeter, a circuit containing a sliding (moving) short circuit. By finding two points at which the short circuit gives maximum absorption of the signal, it is possible to measure directly a distance equal to one-half of a wavelength.

Waveney, district, county of Suffolk, England. It is bounded on the east by the North Sea and on the northwest by the River Waveney. The interior is rich farmland. Along the river are the small industrial communities of Beccles and Bungay, and near its mouth is Lowestoft, the main population and service centre in the district. Erosion by the sea has for centuries been eating away the land from the Waveney section of the Suffolk coastline. Of several small former ports, only Lowestoft has survived into the modern era, to become a major fishing port and a producer of prepared frozen foods. The other old settlements, if not washed away by the sea, have lost their harbours to silt and today function primarily as holiday resorts. Area 143 square miles (370 square km). Pop. (1994 est.) 107,604.

Waverley, borough and district, county of Surrey, England. It occupies the southwestern corner of the county, along the Hampshire and West Sussex borders. Its wooded hills and heathlands have been designated an Area of Outstanding Natural Beauty. Much of the district is drained by the River Wey. In the north are the medieval market towns of Farnham, surrounding a Norman castle, and Godalming, once known for leather tanning and the cloth trade. Area 133 square miles (345 square km). Pop. (1994 est.) 114,758.

Wavre (French), Flemish WAVER, capital of Walloon Brabant province, central Belgium. It lies along the Dijle (Dyle) River about 14 miles (22 km) southeast of Brussels. The town began as a trading centre at a river crossing and was chartered in 1222. Wavre was burned in 1489 for revolting against the rule of the Holy Roman emperor Maximilian I, and it was burned again by the Spanish in 1604. A battle was fought at Wavre between the French and Prussians in 1815 on the same day as the nearby Battle of Waterloo. Much of the town was destroyed by German bombing in May 1940. Wavre became the capital of newly created Walloon Brabant province in 1995.

The Town Hall occupies the rebuilt church of a Carmelite friary dating from 1662. The Gothic-style Church of Saint John the Baptist was completed in 1480. Modern Wavre is primarily a commercial centre with some metal and plastics manufacturing. One of the popular Walibi amusement parks is nearby. Pop. (2000 est.) 31,033.

Wāw, also spelled WAU, town, southwestern Sudan. It lies on the western bank of the Jūr River (a tributary of Al-Ghazāl River), about 140 miles (220 km) northwest of Rumbek. Wāw serves as a trading centre for the cotton, tobacco, peanuts (groundnuts), cereals, fruits, and vegetables grown in the irrigated area to the north and in the unirrigated south. Industrial products include processed and canned food, as well as wood and wooden products.

Wāw is a centre of internal navigation on the Jūr River with routes emanating toward Bentiu and Malakāl. Pop. (1983 est.) 58,000.

wax, any of a class of pliable substances of animal, plant, mineral, or synthetic origin that differ from fats in being less greasy, harder, and more brittle and in containing principally compounds of high molecular weight (*e.g.*, fatty acids, alcohols, and saturated hydrocarbons). Waxes share certain characteristic physical properties. Many of them melt at moderate temperatures (*i.e.*, between about 35° and 100° C, or 95° and 212° F) and form hard films that can be polished to a high gloss, making them ideal for use in a wide array of polishes. They do share some of the same properties as fats. Waxes and fats, for example, are soluble in the same solvents and both leave grease spots on paper.

Notwithstanding such physical similarities, animal and plant waxes differ chemically from petroleum, or hydrocarbon, waxes and synthetic waxes. They are esters that result from a reaction between fatty acids and certain alcohols other than glycerol, either of a group called sterols (*e.g.*, cholesterol) or an alcohol containing 12 or a larger even number of

carbon atoms in a straight chain (*e.g.*, cetyl alcohol). The fatty acids found in animal and vegetable waxes are almost always saturated. They vary from lauric to octatriacontanoic acid ($C_{37}H_{75}COOH$). Saturated alcohols from C_{12} to C_{36} have been identified in various waxes. Several dihydric (two hydroxyl groups) alcohols have been separated, but they do not form a large proportion of any wax. Also, several unidentified branched-chain fatty acids and alcohols have been found in minor quantities. Several cyclic sterols (*e.g.*, cholesterol and analogues) make up major portions of wool wax.

Only a few vegetable waxes are produced in commercial quantities. Carnauba wax, which is very hard and is used in some high-gloss polishes, is probably the most important of these. It is obtained from the surface of the fronds of a species of palm tree native to Brazil. A similar wax, candelilla wax, is obtained commercially from the surface of the candelilla plant, which grows wild in Texas and Mexico. Sugarcane wax, which occurs on the surface of sugarcane leaves and stalks, is obtainable from the sludges of cane-juice processing. Its properties and uses are similar to those of carnauba wax, but it is normally dark in colour and contains more impurities. Other cuticle waxes occur in trace quantities in such vegetable oils as linseed, soybean, corn (maize), and sesame. They are undesirable because they may precipitate when the oil stands at room temperature, but they can be removed by cooling and filtering. Cuticle wax accounts for the beautiful gloss of polished apples.

Beeswax, the most widely distributed and important animal wax, is softer than the waxes mentioned and finds little use in gloss polishes. It is used, however, for its gliding and lubricating properties as well as in waterproofing formulations. Wool wax, the main constituent of the fat that covers the wool of sheep, is obtained as a by-product in scouring raw wool. Its purified form, called lanolin, is used as a pharmaceutical or cosmetic base because it is easily assimilated by the human skin. Sperm oil and spermaceti, both obtained from sperm whales, are liquid at ordinary temperatures and are used mainly as lubricants.

About 90 percent of the wax used for commercial purposes is recovered from petroleum by dewaxing lubricating-oil stocks. Petroleum wax is generally classified into three principal types: paraffin (*q.v.*), microcrystalline, and petrolatum. Paraffin is widely used in candles, crayons, and industrial polishes. It is also employed for insulating components of electrical equipment and for waterproofing wood and certain other materials. Microcrystalline wax is used chiefly for coating paper for packaging, and petrolatum is employed in the manufacture of medicinal ointments and cosmetics. Synthetic wax is derived from ethylene glycol, an organic compound commercially produced from ethylene gas. It is commonly blended with petroleum waxes to manufacture a variety of products.

wax gourd, also called CHINESE WATERMELON (*Benincasa hispida*), trailing fleshy vine, of the gourd family (Cucurbitaceae), native to tropical Asia but grown in many warm countries for its edible fruits. A wax gourd has solitary yellow flowers 8 to 10 centimetres (3 to 4 inches) wide, hairy oval leaves that are heart-shaped at the base, and a melon-shaped or cucumber-shaped fruit up to 40 cm long. Each hairy green fruit has a whitish, waxy covering and contains flat, white seeds about 1 cm long.



Wax gourd (*Benincasa hispida*)
Shunji Watari—EB Inc.

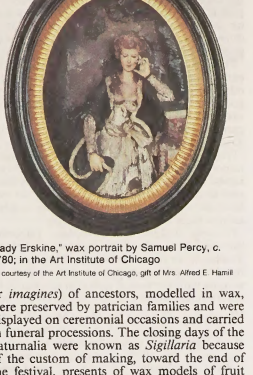
wax sculpture, the preparation of finished figures in beeswax by modelling or molding or the use of such figures as a form for casting metal or creating preliminary models. At ordinary temperatures beeswax can be cut and shaped with facility; it melts to a limpid fluid at a low heat; it mixes with any colouring matter and takes surface tints well; and its texture and consistency may be modified by a number of earthy matters as well as by the addition of oils or fats.

Wax figures of deities were used in the funeral rites of the ancient Egyptians and deposited in their graves; many of these are now in museums. Among the ancient Greeks wax figures were used largely as dolls for children. Statuettes of deities were also modelled for votive offerings and religious ceremonies, and wax images to which magical properties were attributed were treasured by the people. Wax figures and models held a still more important place among the Romans. The masks (effigies, or *imagines*) of ancestors, modelled in wax, were preserved by patrician families and were displayed on ceremonial occasions and carried in funeral processions. The closing days of the Saturnalia were known as *Sigillaria* because of the custom of making, toward the end of the festival, presents of wax models of fruit and waxen statuettes that were fashioned by the *sigillarii,* manufacturers of small figures in wax and other media. The practice of wax modelling can be traced through the Middle Ages, when votive offerings of wax figures were made to churches, and the memories of monarchs and great personages were preserved by wax masks. Malice and superstition were also expressed in the formation of wax images of hated persons, into the bodies of which long pins were thrust in the hope that deadly injury would be induced in the person represented. Belief in this form of black magic never died out completely.

With the Renaissance in Italy, modelling in wax took a position of high importance, and it was practiced by some of the greatest of the early masters. The bronze medals of Pisanello and other famous medallists owe their value to the art qualities of the wax models from which they were cast by the cire-perdue (lost-wax) process. Wax models were also used by such great sculptors as Michelangelo and Giovanni da Bologna in making preliminary sketches for their statues. Wax medallion portraits were popular during the 16th century, and Antonio Abondio earned considerable celebrity as a practitioner of this form of art, working principally in Vienna and Prague at the imperial court.

During the 17th century the polychromatic wax relief came into favour, especially in Spain and Italy. The most ambitious and successful sculptor to make reliefs of this type was Gaetano Giulio Zumbo, a Sicilian. In addition to artistic and religious works, he produced, in collaboration with the French surgeon Desnoues, anatomical models in wax—a new invention for which both men subsequently claimed the credit.

During the 18th century wax portrait medallions enjoyed renewed popularity. The foremost English practitioner was Isaac Gosset. Toward the end of the 18th century John Flaxman executed in wax many portraits and other relief figures, which Josiah Wedgwood translated into pottery for his jasperware. Exhibitions of waxworks were popular in the 18th century and have continued to be so. An exhibition of waxworks with mechanical motions was shown in Germany early in the 18th century and is described by Sir Richard Steele in the *Tatler.* The most famous permanent exhibition is that of (Mme) Marie Tussaud in London.



"Lady Erskine," wax portrait by Samuel Percy, *c.* 1780; in the Art Institute of Chicago
By courtesy of the Art Institute of Chicago, gift of Mrs. Alfred E. Harrill

waxbill, any of several Old World tropical birds named for the prominent red (the colour of sealing wax) of their conical bills. The name is used generally for birds of the family Estrildidae (order Passeriformes); less broadly for those of the tribe Estrildini of that family; and particularly for the 28 species of the genus *Estrilda,* which includes some popular domesticated birds. Waxbills are seedeaters that go about in compact flocks and nest in tall grass. Individuals of most species are brown or grayish, with touches of red, yellow, or black; most have fine barring. The 10-centimetre (4-inch) common waxbill (*E. astrild*) is brown above and pinkish below; it is common in Africa—the home of most species of the genus—and has been introduced into Brazil. The lavender waxbill (*E. coerulescens*) has a wine red bill and tail. Certain other waxbill species are known by the name cordon bleu (*q.v.*).



Lavender waxbill (*Estrilda coerulescens*)
John Markham

Waxman, Meyer (b. 1887, Slutzk, Russia—d. March 7, 1969, Miami Beach, Fla., U.S.), Jewish literary historian, rabbi, educator, and scholar.

Trained in Ḥasidic seminaries in Mir and Slutzk, Waxman continued his studies, after emigrating to the United States in 1905, at New York University, Columbia University, and at the Jewish Theological Seminary, where he was ordained in 1913. In 1917 he founded the Teachers Institute of Mizrachi,

later affiliated with Yeshiva College (renamed Yeshiva University), New York City. In 1925 he was appointed professor of Hebrew literature and philosophy at Hebrew Theological College, Skokie, Ill., where he remained until 1955, when he retired to New York City.

Waxman's principal work, *History of Jewish Literature,* 4 vol. (1930–41; 2nd ed., 5 vol., 1938–60), summarizes and evaluates the various fields of Jewish literature from the end of biblical times to the mid-20th century. His religious studies include the *Handbook of Judaism* (1947) and *Judaism—Religion and Ethics* (1958), which were regarded as standard works. Many of his hundreds of articles in English, Hebrew, and Yiddish on the history of Jewish thought and the history of Jewish literature are in *Ketavim nivḥarim,* 2 vol. (1943–44; "Special Masterpieces"), *Galut ve-Ge'ullah* (1952; "Diaspora and Return"), and *More hadorot* (1963; "Teacher of the Generations"). Among his early works are *Philosophy of Don Hasdai Crescas* (1920) and a translation of Moses Hess's *Rome and Jerusalem* (1918).

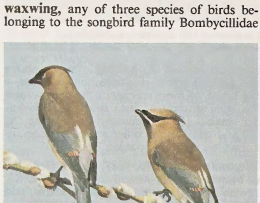
waxplant, also spelled WAX PLANT, any of a number of unrelated plants that are waxy in some respect. Most popular as greenhouse plants or window plants are several species of *Hoya,* called wax plants, or wax vines, especially *H. carnosa* and *H. bella,* of the milkweed family (Asclepiadaceae). Both are slow-growing, twining, leathery-leaved plants with small, stiff, waxy, long-lasting, star-shaped flowers in showy clusters.

H. carnosa has several cultivated varieties with white to rosy-pink flowers; one such variety, the Hindu rope vine, has twisted, distorted leaves that may be variegated cream, yellow, and pink. The miniature wax plant (*H. bella*) is more compact and has smaller leaves and purple-centred white flowers.

The wax begonia (*see* begonia) is a waxy-leaved bedding and pot plant. The wax-leaved privet, or white wax tree, is a landscape plant used in warm climates. The wax tree (*Rhus succedanea*) is a Japanese tree grown for its waxy berries and stem juices that yield a natural lacquer. The wax vine, or cape ivy (*Senecio macroglossus*), which has thick waxy succulent leaves, is used as a ground cover in warm regions and as a basket plant indoors, especially in its variegated form. A succulent, the green Mexican rose (*Echeveria gilva*), is called wax-rosette for its cluster of waxy leaves.

The Geraldton wax plant (*Chamelaucium uncinatum*), in the myrtle family (Myrtaceae), from Australia, is a heathlike shrub with waxy white, pink, or lilac flowers. Plants sometimes called wax flower include *Anthurium (q.v.)* and *Stephanotis.*

waxwing, any of three species of birds belonging to the songbird family Bombycillidae (order Passeriformes). They are elegant-looking birds named for beads of shiny red material on the tips of the secondary wing feathers. All species are gray-brown, with tapering crest. The common, or Bohemian, waxwing (*Bombycilla garrulus*) is 20 cm (8 inches) long and has yellow and white wing markings in addition to red. It breeds in northern forests of Eurasia and America and every few years irrupts far southward in winter. The cedar waxwing (*B. cedrorum*), smaller and less colourful, breeds in Canada and the northern United States. Flocks of waxwings may invade city parks and gardens in winter, searching for berries.



Cedar waxwings (*Bombycilla cedrorum*)
Karl H. Maslowski

wayang, also spelled WAJANG (Javanese: "shadow"), classical Javanese puppet drama that uses the shadows thrown by puppets manipulated by rods against a translucent screen lit from behind. Developed before the 10th century, the form had origins in the *thalubomalata,* the leather puppets of southern India. The art of shadow puppetry probably spread to Java with the spread of Hinduism.

The prototype of the wayang figures is the *wayang kulit,* or shadow puppet made of perforated, elaborately painted leather. The plays utilizing wayang puppets are set in mythological times and dramatize episodes from the Hindu epics *Rāmāyaṇa* and *Mahābhārata.* Some are of Javanese creation, being further elaborations of the *Mahābhārata* legends of the five heroic Pāṇḍava brothers. These highly ritualized midnight-to-dawn performances may be viewed from either side of the screen, some of the audience sitting behind the *dalang* (puppeteer), but most connoisseurs prefer to watch the figures as shadows cast on the screen. When the characters are introduced, the figures representing the forces of good are on the right, the evil ones on the left.

The stylized shapes and movements of the early *wayang kulit* puppets are imitated by other forms of wayang, notably the *wayang golek,* or three-dimensional wooden figures manipulated by rods; the *wayang wong,* a pantomime by live actors; and the *wayang Krunchil,* wooden puppets in low relief.

Wayang plays are usually viewed on such important occasions as birthdays and anniversaries. Though they are also found in China and throughout Southeast Asia, they do not have the same mystical and religious connotations there that they have in Java.

Wayang influenced European puppetry through the work of the puppeteer Richard Teschner, who, in the early 20th century, fused the artistic quality and simplicity of wayang with Germanic technical excellence in his Viennese puppet theatre, *Figuren Spiegel.*

Waycross, city, seat (1824) of Ware county, southeastern Georgia, U.S., on the coastal plain. Early white settlers built blockhouses in the area in the 1820s as a protection against Indians. Originally the hub of stagecoach and pioneer trails, Waycross developed as a sawmill, turpentine, and farming community. The city's name signifies its location at the junction of roads and rail lines. The economy is based on tobacco and light industry. Waycross State Forest and the northern entrance to the Okefenokee Swamp Park and Okefenokee National Wildlife Refuge are a few miles south. Inc. 1874. Pop. (1991 est.) 16,776.

Wayland THE SMITH, Wayland also spelled WELAND, in Scandinavian, German, and Anglo-Saxon legend, a smith of outstanding skill. He was, according to some legends, a lord of the elves. His story is told in the *Vǫlundarkvida,* one of the poems in the 13th-century Icelandic *Elder,* or *Poetic, Edda,* and, with variations, in the mid-13th-century Icelandic prose *Thidriks saga.* He is also mentioned in the Anglo-Saxon poems *Waldere* and "Deor," in *Beowulf* (all from the 6th to the 9th century), and in a note inserted by Alfred the Great into his 9th-century translation of Boëthius.

Wayland was captured by the Swedish king Níduð (Nithad, or Níduth), lamed to prevent his escape, and forced to work in the king's smithy. In revenge, he killed Níduð's two young sons and made drinking bowls from their skulls, which he sent to their father. He also raped their sister, Bǫdvild, when she brought a gold ring to be mended, and then he escaped by magical flight through the air.

An English tradition connects Wayland with a stone burial chamber near White Horse Hill, Berkshire, known as Wayland's Smithy. A local legend says the chamber is haunted by an invisible smith who will shoe a horse for a traveler, provided that a coin is left on a stone and that the traveler absents himself while the work is in progress. If he tries to watch or if he looks toward the smithy, the charm will fail. Similar stories have been recorded in Germany, Denmark, and Belgium. Some large stones at Sisebeck in Sweden and a site at Vellerby in Jutland are traditionally said to be Wayland's burial places.

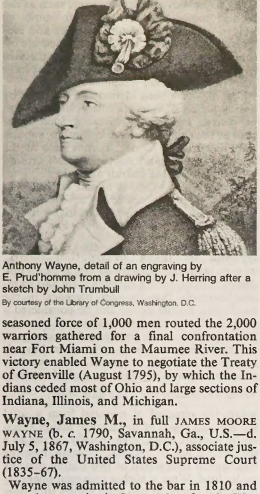
Wayne, township, Passaic county, northern New Jersey, U.S., just west of Paterson. The site, first settled in 1695, was originally part of New Barbadoes Township in Essex county, which was incorporated into Bergen county. The Theunis Dey Mansion (1740s) in Wayne served as George Washington's headquarters in 1780. After the American Revolutionary War the Wayne area was separated into the Saddle River Township and in 1837 became Manchester Township. In 1847 the present township was incorporated and named in honour of Major General Anthony Wayne. Mainly residential with light industries, it is the seat of William Paterson College of New Jersey (1855). Pop. (1991 est.) 47,206.

Wayne, Anthony, byname MAD ANTHONY WAYNE (b. Jan. 1, 1745, near Paoli, Pa. [U.S.]—d. Dec. 15, 1796, Presque Isle, Pa., U.S.), prominent American general during the Revolutionary War, who later destroyed the Northwest Indian Confederation at the Battle of Fallen Timbers in Ohio (Aug. 20, 1794).

The owner of a tannery and extensive property in Pennsylvania, Wayne was commissioned a colonel in the Continental Army in January 1776. That spring his regiment was sent to reinforce American forces retreating from the disastrous Canadian expedition, after which he was put in command of Fort Ticonderoga, N.Y. Promoted to the rank of brigadier general in early 1777, he played a prominent role that fall in the battles of Brandywine, Paoli, and Germantown, Pa. After spending the winter at the Valley Forge encampment, he led an attack on the British at the indecisive Battle of Monmouth, N.J., the following June.

His most brilliant exploit of the war was the successful storming of the British fort at Stony Point, N.Y. (July 16, 1779). This feat gave a huge boost in morale to the American armies. Wayne earned the name "Mad Anthony" because of his tactical boldness and his personal courage in the field. In 1781 he was sent with 1,000 men to join in the successful siege of Yorktown, Va. He was then dispatched to join the Continental Army in the South. He served largely in Georgia, recovering that state and defeating the Indians allied to the British. Elected in 1790 to the Georgia House of Representatives, he served nearly two years before his seat was declared vacant because of election frauds.

In 1792 Wayne was appointed by President George Washington to serve as commander in chief of the modest U.S. Army, which had suffered several defeats at the hands of the intertribal Indian Confederation formed to resist the white man's incursions into the Midwest. At the Battle of Fallen Timbers, Wayne effectively ended Indian resistance when his



Anthony Wayne, detail of an engraving by E. Prud'homme from a drawing by J. Herring after a sketch by John Trumbull
By courtesy of the Library of Congress, Washington, D.C.

seasoned force of 1,000 men routed the 2,000 warriors gathered for a final confrontation near Fort Miami on the Maumee River. This victory enabled Wayne to negotiate the Treaty of Greenville (August 1795), by which the Indians ceded most of Ohio and large sections of Indiana, Illinois, and Michigan.

Wayne, James M., in full JAMES MOORE WAYNE (b. *c.* 1790, Savannah, Ga., U.S.—d. July 5, 1867, Washington, D.C.), associate justice of the United States Supreme Court (1835–67).

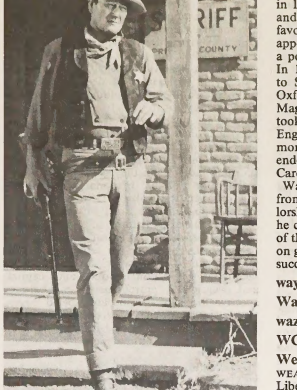
Wayne was admitted to the bar in 1810 and started to practice in Savannah. After the War of 1812 he was elected to the legislature for his opposition to an act suspending the collection of debts; he then served as mayor of Savannah and as a judge of the Court of Common Pleas. In 1822 he was named judge of the Superior Court and in 1828 was elected to the U.S. Congress, in which he served three terms. He was a strong supporter of President Andrew Jackson's administration in almost all its major measures and was appointed to the U.S. Supreme Court by Jackson in 1835. Although a Southerner, he remained loyal to the Union and kept his seat during the Civil War. His most memorable opinions concerned admiralty law and questions regarding land acquired from foreign countries.

Wayne, John, byname DUKE, original name MARION MICHAEL MORRISON (b. May 26, 1907, Winterset, Iowa, U.S.—d. June 11, 1979, Los Angeles, Calif.), American motion-picture actor who embodied the image of the strong, taciturn cowboy or soldier.

In 1925 he enrolled at the University of Southern California (Los Angeles), where he played football. He worked summers at the Fox Film Corporation as a propman and developed a friendship with director John Ford, who cast him in some small film roles starting in 1928. He had his first leading role in director Raoul Walsh's *The Big Trail* (1930), and over the next eight years he starred in more than 80 low-budget motion pictures. He reached genuine star stature when cast by Ford in *Stagecoach* (1939). From that film his place in American cinema was assured and grew with each successive year.

Wayne starred in many of Ford's westerns, including *Fort Apache* (1948), *She Wore a Yellow Ribbon* (1949), *Rio Grande* (1950), *The Searchers* (1956), and *The Man Who Shot Liberty Valance* (1962). His roles in westerns by Howard Hawks, *Red River* (1948) and *Rio Bravo* (1959), were among his finest. His war films included *Sands of Iwo Jima* (1949) and Ford's *The Wings of Eagles* (1957). Among Wayne's other notable film roles were those in Ford's *The Quiet Man* (1952), Hawks' *Hatari!* (1962) and *El Dorado* (1967), and *True Grit* (1969), in which his performance as the drunken, one-eyed marshal Rooster Cogburn won him an Academy Award for best actor.

Wayne's career in films spanned 40 years and more than 250 films. He was one of the



John Wayne in *Rio Bravo,* 1959
Culver Pictures, Inc.

greatest box-office attractions in film history. Following his death, a Congressional Medal of Freedom was struck in his honour.

Waynesboro, city, administratively independent of, but located in, Augusta county, north-central Virginia, U.S. It lies in the Shenandoah Valley along the South River, near the junction of Skyline Drive and the Blue Ridge Parkway, 28 miles (45 km) west of Charlottesville. The original settlement of Teesville, named for Joseph Tees, an early landowner, was established in 1739, based on a land grant (1736) from King George II of England. The name was changed in 1797 to honour the American Revolutionary War general Anthony Wayne. The Waynesboro Academy (1832) closed during the American Civil War when the entire student body enlisted in the Confederate army; it was reopened in 1879 as Fishburne Military School. An important battle occurred (March 2, 1865) nearby when the Confederate troops of General Jubal Early were defeated by General Philip Sheridan's Union troops. Basic City (charted 1889), named for the "basic" steel manufacturing process, developed as an industrial site at the eastern edge of Waynesboro. The two communities were united in 1923 as Waynesboro-Basic; the name Basic was dropped the following year.

The city's economy rests on diverse manufacturing (stoves, pencils, food products, textiles, metal products, and plastics) and tourism, the latter based on nearby Shenandoah National Park, George Washington National Forest, Sherando Lake Recreation Area, and Grand Caverns. Inc. town, 1797; city, 1948. Pop. (2003 est.) 20,388.

Waynflete, William of, also spelled WAINFLEET, original name WILLIAM PATYN (b. 1395?, Wainfleet-All-Saints, Lincolnshire, Eng.—d. Aug. 11, 1486, Bishop's Waltham, Hampshire), English lord chancellor and bishop of Winchester who founded Magdalen College of the University of Oxford.

Little is known of his early years, but he evidently earned a reputation as a scholar before becoming master of Winchester College in 1429. He became a fellow at Eton in 1440 and was provost there in 1443. He was a great favourite of King Henry VI, who secured his appointment in 1447 as bishop of Winchester, a post that Waynflete retained until he died. In 1448 Waynflete founded a hall dedicated to St. Mary Magdalen at the University of Oxford, and in 1458 he was able to convert Magdalen Hall into a college. The new college took a leading part in Renaissance studies in England. Waynflete's suppression of several monasteries in order to obtain revenues for the endowment of his college set an example for Cardinal Wolsey in the next century.

Waynflete was lord chancellor of England from 1456 to 1460. He resigned the chancellorship upon the Yorkist success in 1460, but he came to no harm in the changing fortunes of the Wars of the Roses and ended his career on good terms with Edward IV and the latter's successor, Richard III.

wayno (folk dance): *see* huayño.

Waziba (people): *see* Haya.

wazīr (title): *see* vizier.

WCC: *see* World Council of Churches.

Weah, George, in full GEORGE OPPONG WEAH (b. Oct. 1, 1966, Monrovia, Liberia), Liberian football (soccer) player, who was named African, European, and World Player of the Year in 1995—an unprecedented achievement. He won his first African Player of the Year award in 1989.

Weah learned his football on the dusty streets of Monrovia before playing for local clubs. He signed a semiprofessional contract with top Cameroonian club Tonnerre of Yaoundé, which won its league in his first season (1987) with the team. Shortly thereafter, the promising striker was signed by AS Monaco of the French first division. In his five seasons with Monaco (1987–92), he proved himself a hard-working and talented scorer, and a lucrative contract with Paris Saint-Germain (PSG) soon followed. In his most acclaimed season, he led PSG to the French Cup, to the league title, and to the semifinals of the 1995 European Champions League. Subsequently, he transferred to AC Milan (1995–2000) in Italy's Serie A, helping the club win league titles in 1996 and 1999. Later in his career, he played briefly with Chelsea and Manchester City in England and Marseille in France.

Though Weah had a new home for his family in New York City, he maintained close ties to Liberia. Wracked by poverty and civil war in the 1990s, Liberia was able to sustain the Lone Star—the national team—only with the assistance of Weah, who played for, coached, and to a large extent financed the team. In 2002 he retired from football.

weak nuclear force, a fundamental force of nature that underlies some forms of radioactivity and certain interactions between subatomic particles. The weak force acts upon all known fermions—*i.e.,* elementary particles with an intrinsic angular momentum, or spin, of half a unit. Particles interact through the weak force by exchanging bosons (particles with integer spin) that are known as W and Z particles (*qq.v.*). These bosons are heavy, with masses about 100 times the mass of a proton, and it is their heaviness that makes the weak force appear weak at the low energies associated with radioactivity. In radioac-

tive decays, the strength of the weak force is about 100,000 times less than the strength of the electromagnetic force. However, it is now known that the weak force has intrinsically the same strength as the electromagnetic force, and these two apparently distinct forces are believed to be different manifestations of a single "electroweak" force.

Most subatomic particles are unstable and decay by the weak force, even if they cannot decay by the electromagnetic force or the strong force. The lifetimes for particles that decay via the weak force vary from as little as 10^{-15} second to 896 seconds, the mean life of the free neutron. Neutrons bound in atomic nuclei can be stable, as they are when they occur in the familiar elements, but they can also give rise through weak decays to the type of radioactivity known as beta decay. In this case, the lifetimes of the nuclei can vary from a thousandth of a second to millions of years. Although low-energy weak interactions are feeble, they occur frequently at the heart of the Sun and other stars where both the temperature and the density of matter are high. They are responsible for the initial reactions between protons that lead to the conversion of hydrogen to helium and the resultant release of energy. (Ch.Su.)

weakfish, also called SEA TROUT (genus *Cynoscion*), any member of a group of fishes in the croaker family, Sciaenidae (order Perciformes). A half dozen species inhabit the coastal regions of North America.

The weakfish (*Cynoscion regalis*) is a marine sport fish but is usually less than 60 cm (2 feet) long. Much larger specimens have been caught on occasion. The term weakfish refers to their delicate mouths, which are easily torn by fishhooks. Weakfish are also caught commercially along the Middle Atlantic coastal states and are considered to be the most economically important species in the croaker family.

The spotted sea trout (*C. nebulosus*), found along the Atlantic and Gulf of Mexico coasts of Florida, is slightly smaller than the weakfish. Although the sea trouts are similar to the true trouts (order Salmoniformes) in appearance, the two groups are not related.

Weald, The, ancient raised tract of forest nearly 40 miles (64 km) wide in southeastern England, separating the London basin from the English Channel coast. The Weald (Saxon: Andredsweald) is developed on an eroded dome of varied rock strata, and the chalk Downs (both North and South) compose a horseshoe-shaped rim around the area. Rivers drain both north and south through the rim, reflecting that the general drainage pattern predates the erosion of the Wealden dome. Much forest has been cleared, but the area remains one of the most heavily wooded parts of England.

Wealden, district, administrative county of East Sussex, historic county of Sussex, England. The district is named for The Weald, a region of forested ridges between the chalk hills of the North and South Downs. Wealden is bordered to the north by Kent and to the south by the English Channel coast, where the borough of Eastbourne forms an urban enclave in what is otherwise still a rural district. In the northwest is Ashdown Forest, an area of natural woodland and heath. In Wealden district's southeast corner is Herstmonceux, which has a moated castle that was the site of the Royal Greenwich Observatory from 1948 to 1990. Area 323 square miles (837 square km). Pop. (2001) 140,021.

wealth and income, distribution of, the way in which the wealth and income of a nation are divided among its population or the way in which the wealth and income of the world are divided among nations. Such patterns of distribution are discerned and studied by various statistical means, based on data of varying degrees of reliability.

A brief treatment of the distribution of wealth and income follows. For full treatment, *see* MACROPAEDIA: Economic Theory.

Wealth is an accumulated store of possessions and financial claims. It may be given a monetary value if prices can be determined for each of the possessions; this process can be difficult when the possessions are such that they are not likely to be offered for sale. Income is a net total of the flow of payments received in a given time period. Some countries collect statistics on wealth from legally required evaluations of the estates of deceased persons, which may or may not be indicative of what is possessed by the living. In many countries, annual tax statements that measure income provide more or less reliable information. Differences in definitions of income—whether income should include payments that are transfers rather than the result of productive activity, for example, or capital gains or losses that change the value of an individual's wealth—make comparisons difficult.

In order to classify patterns of national wealth and income, a basis of classification must be determined. Factor shares categorize wealth and income on the basis of the ownership of factors of production: labour, land, capital, and, occasionally, entrepreneurship, whose respective forms of income are labeled wages, rent, interest, and profit. Personal distribution statistics, usually developed from tax reports, categorize wealth and income on a per capita basis.

Gross national income (GNI) per capita provides a rough measure of annual national income per person in different countries. Countries that have a sizable modern industrial sector have a much higher GNI per capita than countries that are less-developed. In 2000, for example, the World Bank estimated that the GNI per capita for the most-developed countries was $9,266 and above but was less than $755 for the least-developed countries. Income also varies greatly within countries. In the United States there is considerable variation between industries, regions, rural and urban areas, females and males, and nonwhites and whites. While the bulk of the U.S. population has a middle income that is derived largely from earnings, wages can vary considerably among occupations.

A considerable proportion of high incomes derives from investment, and the higher the income, the higher the investment-derived portion tends to be. Because most fortunes require long periods to accumulate, the continuing existence of a class of very wealthy persons depends on their ability to keep their fortunes large and to pass them on to descendants. Earned incomes are also influenced by a different kind of inheritance. Access to well-paid jobs and social status is largely the product of education and opportunity. Typically, therefore, well-educated children of wealthier parents tend to retain the status and earning power of their parents. A dynamic and market-oriented economy, however, increases the likelihood of attaining wealth and influence through individual effort.

weapon, an instrument used in combat for the purpose of killing, injuring, or defeating an enemy. A weapon may be a shock weapon, held in the hands, such as the club, mace, or sword. It may also be a missile weapon, operated by muscle power (as with the javelin, sling, and bow and arrow), mechanical power (as with the crossbow and catapult), or chemical power (as with the rocket and missile and such guns as the cannon, rifle, and pistol). Weapons may also be classified as conventional, destroying by kinetic energy (as with the bullet) or by chemical energy (as with the bomb and grenade). The nonconventional category comprises nuclear weapons, such as the atomic bomb and thermonuclear bomb, as well as weapons of chemical warfare and biological warfare. All the aforementioned are offensive weapons, but such defensive measures as fortification, armour, and the helmet have also been considered weapons.

Weapons have been carried and delivered by a wide variety of vehicles, often called weapon platforms. These have included such naval craft as the ship of the line, battleship, submarine, and aircraft carrier; aircraft such as the fighter, bomber, and helicopter; and ground vehicles such as the chariot and tank.

The history of weapons of war is treated in the MACROPAEDIA article: War, Technology of. For a list of MICROPAEDIA articles related to the subject, *see* PROPAEDIA: Part Seven, Division III.

weapon of mass destruction (WMD), weapon with the capacity to inflict death and destruction on such a massive scale and so indiscriminately that its very presence in the hands of a hostile power can be considered a grievous threat. Modern weapons of mass destruction are either nuclear, biological, or chemical weapons—frequently referred to collectively as NBC weapons. *See* nuclear weapon; chemical warfare; biological warfare.

Wear (England): *see* Tyne and Wear.

wear, the removal of material from a solid surface as a result of mechanical action exerted by another solid. Wear chiefly occurs as a progressive loss of material resulting from the mechanical interaction of two sliding surfaces under load. Wear is such a universal phenomenon that rarely do two solid bodies slide over each other or even touch each other without a measurable material transfer or material loss. Thus, coins become worn as a result of continued contact with fabrics and human fingers; pencils become worn after sliding over paper; and rails become worn as a result of the continued rolling of train wheels over them. Only living things (such as bone joints) are in some sense immune to the permanent damage caused by wear, since they have the property of regrowth and healing.

There are four basic types of wear: adhesive, abrasive, corrosive, and surface-fatigue.

The most common type, adhesive wear, arises from the strong adhesive forces that are generated at the interface of two solid materials. When solid surfaces are pressed together, intimate contact is made over a number of small patches or junctions. During sliding, these junctions continue to be made and broken, and, if a junction does not break along the original interface, a wear particle is formed. These particles eventually break away. Adhesive wear is undesirable for two reasons: first, the loss of material will eventually lead to a deterioration in the performance of the mechanism; and second, the formation of large wear particles in closely fitted sliding members may cause the mechanism to seize at an early stage in its productive life. Adhesive wear is many times greater for unlubricated than for effectively lubricated metal surfaces.

Abrasive wear occurs when a hard, rough surface slides over a softer one, producing grooves on the latter. It also can be caused by loose, abrasive particles rolling between two soft sliding surfaces or by particles embedded in one of the opposing surfaces. Abrasive fragments borne by a stream of liquid or gas may wear down a surface if they strike the surface at high speeds. Since abrasive wear takes place when the abrading material is rough and harder than the surface to be abraded, it can be prevented either by eliminating the hard, rough constituent or by making the surface to be protected harder still.

Corrosive wear occurs whenever a gas or liq-

uid chemically attacks a surface left exposed by the sliding process. Normally, when a surface corrodes, the products of corrosion (such as patina) tend to stay on the surface, thus slowing down further corrosion. But, if continuous sliding takes place, the sliding action removes the surface deposits that would otherwise protect against further corrosion, which thus takes place more rapidly. A surface that has experienced corrosive wear generally has a matte, relatively smooth appearance.

Surface-fatigue wear is produced by repeated high stress attendant on a rolling motion, such as that of metal wheels on tracks or a ball bearing rolling in a machine. The stress causes subsurface cracks to form in either the moving or the stationary component. As these cracks grow, large particles separate from the surface and pitting ensues. Surface-fatigue wear is the most common form of wear affecting rolling elements such as bearings or gears. For sliding surfaces, adhesive wear usually proceeds sufficiently rapidly that there is no time for surface-fatigue wear to occur.

Though the wear process is generally thought of as harmful, and in most practical situations is so, it has some practical uses as well. For example, many methods of producing a surface on a manufactured object depend on abrasive wear, among them filing, sanding, lapping, and polishing. Many writing instruments, principally the pencil, crayon, and chalk, depend for their effect on adhesive wear. Another use is seen in the wear of the incisor teeth of rodents. These teeth have a hard enamel covering along the outer curved surface but only soft dentine on the inner surface. Hence, abrasive and adhesive wear, which occurs more rapidly on the softer side, acts to maintain a sharp cutting edge on the teeth.

Wear River, river that rises near Wearhead, in the county of Durham, England, and enters the North Sea at Sunderland in the metropolitan area of Tyne and Wear. With headwaters in the Pennines, it flows through Weardale and once entered the sea in the vicinity of Hartlepool but was subsequently diverted northward. Durham city is built along the Wear, and its castle and cathedral stand 100 feet (30 m) above the river on an incised meander (loop). From Bishop Auckland the river flows across coalfields, and collieries are still active along it.

Wear Valley, district, county of Durham, northeastern England, occupying an area of 195 square miles (505 square km) in the northwestern part of the county. Lying mostly within a section of the Pennines, Wear Valley district is predominantly a high, bleak limestone upland, 1,000 to 2,300 feet (305 to 700 m) in elevation, that descends gradually to the east and is drained from west to east by the Wear River. The upper Wear Valley, called the Weardale, is confined by steep walls; at the district's eastern edge the river emerges from the Pennines onto a less-restricted arable plain 200 to 400 feet (60 to 120 m) high, where most of the district's population is concentrated.

Wear Valley was historically important as a lead-, ironstone-, limestone-, and especially a coal-mining area of Great Britain. Many villages in the eastern part of the district were established in the 19th century adjacent to the hillside locales of the coalpits, which were then extensively worked (mostly for coking). The district suffered severe unemployment during the Great Depression, and coal production has continued to decline. Many of the district's inhabitants are now employed at light-industrial estates near the locales of Bishop Auckland, Crook, and Willington. There are steelworks at Wolsingham. Fluorspar and limestone deposits are worked in Weardale, but the greatly prized, gray-black Frosterley marble is now quarried only for special orders. Weardale is popular with campers, hikers, and trout fishermen. Hardy breeds of sheep (particularly Swaledale) rough graze the uplands, and dairy cattle, cereals, potatoes, and fodder crops are raised in the lower Wear Valley. Attempts to remove the many heaps of residue left over from the coal-mining era have been made. District offices are located at Crook. Pop. (1987 est.) 64,700.

weasel, any of a number of small carnivores belonging to several genera of the family Mustelidae. Weasels have a very elongated, slender body; small, flattened head; long, flexible neck; short limbs; five toes on each foot, with sharp, curved claws; dense, short fur; and a slim tail, pointed at the tip. The different species vary in size and in the relative lengths of their tails.

About 10 species of the genus *Mustela* are found from North through South America and in Eurasia. These species are usually reddish brown with white or yellowish underparts; in winter the coats of those living in cold regions turn white, and their pelts, especially of the stoat (*q.v.; M. erminea*) are known as ermine in the fur trade. The kolinsky (kolinski), also called the yellow weasel, China mink, red sable, or tatar sable (*M. sibirica* and other Asian *Mustela* species), is another weasel bearing valuable fur. In China the tail hairs are used to make artists' brushes.

A North American form of *M. nivalis,* known as the least weasel and frequently separated as *M. rixosa,* is about 15–20 cm (6–8 inches)



Long-tailed weasel (*Mustela longicauda*)
John H. Gerard—EB Inc.

long, exclusive of the 2–4-centimetre (1–1.5-inch) tail, and weighs 30–70 g (1–2.5 ounces). Other species, such as the long-tailed weasel (*M. longicauda,* or sometimes *M. frenata*) and the large, South American *M. africana* are about 25–30 cm (10–12 inches) long, excluding the 10–20-centimetre (4–8-inch) tail, and weigh 85–350 g (3–12 ounces).

Weasels possess an active, courageous, and bloodthirsty disposition. They are voracious predators and generally hunt alone and at night, feeding principally on mice, rats, and other rodents, as well as on fish, frogs, and birds' eggs. Weasels are valuable rodent controls and can pursue their prey through holes and crevices, under dense herbage, up trees, or into water. Depending on the species, one or two yearly litters of 3 to 13 young are born after a gestation period of 35 to 337 days (the extended gestation period is due to a delay in implantation of the fertilized egg in the wall of the uterus). *M. nivalis* constructs a nest of dried leaves in a hole in the ground or in a hollow tree and rears its litter of young there.

The Patagonian weasel (*Lyncodon patagonicus*) is a South American mustelid of the Argentinean and Chilean pampas. About 30–35 cm (12–14 inches) long, excluding the 6–9-centimetre (2.5–3.5-inch) tail, it is grayish with dark brown underparts and a white stripe running across the forehead onto the sides of the neck.

The North African spotted weasel (*Poecilictis libyca*) is often found in agricultural areas. Its black-and-white, spotted body is about 23–29 cm (9–11.5 inches) long, exclusive of the 13–18-centimetre (5–7-inch) tail, which is striped, as are its face and back. It bears litters of one to three young. Its food habits are unstudied, but it is probably carnivorous. The African striped, or cape, weasel (*Poecilogale albinucha*) is found south of the Congo. Similar in habit to weasels of the genus *Mustela,* it is 25–35 cm (10–14 inches) long, excluding the 15–23-centimetre (6–9-inch) tail, and is striped yellowish and black with black underparts and a white tail.

weather, state of the atmosphere at a particular place during a short period of time. It involves such atmospheric phenomena as temperature, humidity, precipitation (type and amount), air pressure, wind, and cloud cover. Weather differs from climate in that the latter is the synthesis of weather conditions that have prevailed over a given area during a long time period—generally 30 years.

A brief treatment of weather follows. For full treatment, *see* MACROPAEDIA: Climate and Weather.

Weather occurs in the troposphere, the lowest region of the atmosphere that extends from the Earth's surface to 6–8 km (4–5 miles) at the poles and to about 17 km (11 miles) at the Equator. Although weather is largely confined to the troposphere, phenomena of the higher regions of the atmosphere such as jet streams and upper-air waves significantly affect sea-level atmospheric-pressure patterns—the so-called highs and lows—and thereby the weather conditions at the terrestrial surface. Geographic features, most notably mountains and large bodies of water (*e.g.,* lakes and oceans), also affect weather. Recent research, for example, has revealed that ocean-surface temperature anomalies are a potential cause of atmospheric temperature anomalies in successive seasons and at distant locations. One manifestation of such weather-affecting interactions between the ocean and the atmosphere is what scientists call the El Niño/Southern Oscillation (ENSO). It is believed that ENSO is responsible not only for unusual weather events in the equatorial Pacific region (*e.g.,* the exceedingly severe drought in Australia and the torrential rains in western South America in 1982–83) but also for those that periodically occur in the mid-latitudes (as, for example, the record-high summer temperatures in western Europe and unusually heavy spring rains in the central United States in 1982–83). The ENSO phenomenon appears to influence mid-latitude weather conditions by modulating the position and intensity of the polar-front jet stream (*see* jet stream).

Generally speaking, the changeability of weather varies widely in different parts of the world. It is most pronounced in the mid-latitude belts of the westerly winds, where a continuous procession of traveling high- and low-pressure centres produces a constantly shifting weather pattern. In tropical regions, by contrast, weather varies little from day to day or from month to month.

Weather has a tremendous influence on human settlement patterns, food production, and personal comfort. Extremes of temperature and humidity cause discomfort and may lead to the transmission of disease; heavy rain can cause flooding, displacing people and interrupting economic activities; thunderstorms, tornadoes, hail, and sleet storms may damage or destroy crops, buildings, and transportation routes and vehicles. Storms may even kill or injure people and livestock. At sea and along adjacent coastal areas, tropical cyclones (hurricanes, typhoons, and willy-willies) can cause great damage through excessive rainfall and flooding, winds, and wave action to ships, buildings, trees, crops, roads, and railways, and they may interrupt air service and communications. Heavy snowfall and icy conditions can impede transportation and increase

the frequency of accidents. The long absence of rainfall, by contrast, can cause droughts and severe dust storms when winds blow over parched farmland, as with the "dustbowl" conditions of the U.S. plains states in the 1930s.

The variability of weather phenomena has resulted in a long-standing human concern with forecasts and predictions of future weather conditions. In early historical times, severe weather was ascribed to annoyed or malevolent divinities. Since the mid-19th century, scientific weather forecasting has evolved, using the precise measurement of air pressure, temperature, humidity, and wind direction and speed to predict changing weather. The development of radar has enabled meteorologists to track the movement of cyclones and anticyclones (depressions and highs) and their associated fronts and storms. The use of advanced radar and computers in the second half of the 20th century has enabled weather patterns to be tracked worldwide. These developments have improved the accuracy of local forecasts and have led to extended and long-range forecasts, although the high variability of weather in the mid-latitudes makes these longer-range forecasts less accurate. In tropical regions, by contrast, daily weather variations are minor, with regularly occurring phenomena and perceptible change associated more with seasonal cycles (dry weather and monsoons); tropical cyclones are the main variable.

weather bureau, agency established by many nations to observe and report the weather and to issue forecasts and warnings of weather and flood conditions affecting national safety, welfare, and economy. In each country the national weather bureau strongly affects almost every citizen's life, both through its public weather services and through its specialized services to aviation, space operations, agriculture, maritime operations, and other weather-sensitive activities. In the United States, for example, the National Meteorological Center, near Washington, D.C., is the keystone of the National Weather Service, preparing most of the synoptic-scale guidance material and long-range forecasts used by local and regional Weather Service offices; it has been designated by the World Meteorological Organization as the analysis and forecast branch of the World Meteorological Center, which has global responsibilities as part of the World Weather Watch (*q.v.*).

weather forecasting, the prognostication of the weather through application of the principles of physics, supplemented by a variety of statistical and empirical techniques. In addition to predictions of atmospheric phenomena themselves, weather forecasting includes predictions of changes on the Earth's surface caused by atmospheric conditions—*e.g.,* snow and ice cover, storm tides, and floods.

A brief treatment of weather forecasting follows. For full treatment, *see* MACROPAEDIA: Climate and Weather.

Scientific weather forecasting developed only after instruments for measuring atmospheric temperature, pressure, and humidity became available. The invention in the 17th century of the thermometer and the barometer, along with improvements of the hygrometer, permitted the measurement of these three basic elements of the atmosphere. Correlations were made between such measurements and those of other aspects of local weather, such as wind speed and precipitation. Initially, however, the number of observations were too small and the variety in observational techniques too great to allow accurate patterns of atmospheric conditions to be developed. Furthermore, the study of such patterns depends on a rapid exchange of data between many observing stations over a large area, and this was impossible before the development of the electric telegraph in the late 1830s. From this time on, networks of weather stations on land increased rapidly, although the development of oceanic stations lagged behind for many decades. National and international organizations were established by the late 19th century to standardize the recording of weather and to oversee the first attempts at forecasting, initially largely for ocean shipping. In recent years, advances in observational apparatus and techniques—most notably the use of radiosondes carried by weather balloons, radar, and Earth-orbiting satellites and high-altitude aircraft equipped with special sensors—have helped to revolutionize weather forecasting. Another major breakthrough has been the generation of numerical weather prediction (NWP) models, made possible by the development of electronic digital computers. These NWP models consist of mathematical representations of the physical conservation laws of motion, mass, heat, and moisture in the form of nonlinear, partial differential equations, which enable weather forecasters to approximate relations for solution on a three-dimensional grid mesh and integrate them forward in time. This grid mesh corresponds to the area for which future weather is to be extrapolated; it may represent a specific region, such as western North America, or the entire Earth. The integration of such atmospheric models with high-speed supercomputers has made it possible to predict temperature anomalies and pressure fields and, to a lesser degree, precipitation about five to seven days in advance. Public weather forecasts beyond 12 hours are virtually all based on these highly complex mathematical models. For prognostications of a shorter period, a method known as "nowcasting" is frequently employed. In this technique, satellite and radar observations of local atmospheric conditions are processed by computers in order to project the details of future weather within a limited area.

Consult the INDEX *first*

weather map, any map or chart that shows the meteorological elements at a given time over an extended area. The earliest weather charts were made well before 1835 by collecting synchronous weather reports by mail. The first telegraphic collection of synoptic meteorological reports and their mapping for forecasting was accomplished by Urbain-J.-J. Le Verrier during the mid-1800s.

The most common type of weather map, normally issued by a central weather office, shows the distribution of surface isobars (lines of constant pressure) and the location of fronts and severe weather areas such as hurricanes and other storms. At many locations on the map, a standard plotting code indicates wind direction and speed, air temperature and dew point, barometric pressure and its change during the preceding hours, the amount and types of clouds, the weather type, including restrictions to visibility, and the amount and type of precipitation. In the United States, weather maps are issued every three hours by the National Weather Service. When used in conjunction with charts showing the upper-air flow pattern at 6,000 to 12,000 m (20,000 to 40,000 feet) and with satellite photographs of the distribution of clouds, these maps are a valuable forecasting tool.

weather modification, the deliberate or inadvertent alteration of atmospheric conditions by human activity, sufficient to modify the weather on local or regional scales.

Day-to-day weather constitutes a major element of the environment and an important factor in human well-being and activity. Agriculture, animal husbandry, transportation, and public health and safety are all greatly influenced by weather. It is not, therefore, surprising that one of humanity's oldest environment-related interests has been to manage the weather purposefully. Technically uncomplicated measures to improve the nighttime microclimate of plants by temporary covers (orchard heaters), large-vaned fans to mix the cold air that clings to the ground with the warmer air a few metres above, and water sprays to release latent heat into the air when the water droplets freeze and thereby limit the fall of temperature are just a few of the methods of weather control that have met with some success. Since 1946 a technique known as cloud seeding has been employed to augment precipitation. It involves the use of aircraft or ground generators to introduce condensation nuclei (usually silver iodide particles) into clouds. Sometimes the condensation is induced by cooling the cloud with solid carbon dioxide particles dropped from aircraft. Both of these techniques attempt to promote the natural process of rain formation, but they are more complicated and less effective than was thought in the early years of rainmaking that followed World War II. Modest increases of precipitation have been widely reported from operations in various parts of the world, but several experiments designed to increase rainfall have actually resulted in reduced fall, indicating that unknown factors are involved in rain formation.

The knowledge gained from cloud-seeding projects, however, has proved valuable in other applications. One example is the suppression or mitigation of hail with silver iodide particles. Rockets or artillery shells are used to disperse the silver iodide in the central parts of cumulonimbus clouds, where the supercooled droplets necessary for hail formation predominate. By increasing the number of hail embryos, their size—and hence their destructiveness—is reduced. The introduction of silver iodide into subfreezing levels of a cloud of liquid water is also used to disperse fog at airports.

Industrialization and the rapid growth of large cities have produced measurable changes in local climate and may give rise to more widespread effects in the future. Cities warm the atmosphere over them, affect wind flow, and release pollutants into the air. The resultant updrafts and abundance of condensation nuclei may increase rainfall and winter fog. Moreover, the introduction of billions of tons of carbon dioxide into the atmosphere each year from the burning of fossil fuels (*e.g.,* oil, natural gas, and coal) may in time raise the Earth's average temperature, causing the greenhouse effect (*q.v.*). It is thought that this potentially troublesome buildup of carbon dioxide in the atmosphere is intensified by the deforestation of the Amazon Basin and various other areas, since substantial photosynthetic biomass is lost by such activity.

weather satellite, any of a class of Earth satellites designed to monitor meteorological conditions (*see* Earth satellite).

weatherboard: *see* clapboard.

weatherfish, any of certain fishes of the loach (*q.v.*) group.

Weatherford, city, Parker County, north-central Texas, U.S. It lies 30 miles (48 km) west of Fort Worth. It originated in 1855 as the county seat and was incorporated in 1858 and named for Senator Jefferson Weatherford. The Knights of Pythias Children's Home is in the city. The Texas Railroad Museum is at the city's old Santa Fe Depot. Lake Weatherford on the Clear Fork of the Trinity River is 7 miles (11 km) east. The city's economic activities, although basically agricultural, include the manufacture of oil-field and electronic

equipment. Weatherford College originated in 1869 as a branch of Southwestern University. Pop. (1990) 14,804.

weathering, disintegration or alteration of rock in its natural or original position at or near the Earth's surface through physical, chemical, and biological processes induced or modified by wind, water, and climate.

A brief treatment of weathering follows. For full treatment, *see* MACROPAEDIA: Geomorphic Processes.

During the weathering process the translocation of disintegrated or altered material occurs within the immediate vicinity of the rock exposure, but the rock mass remains in situ. Weathering is distinguished from erosion by the fact that the latter usually includes the transportation of the disintegrated rock and soil away from the site of the degradation. A broader application of erosion, however, includes weathering as a component of the general denudation of all landforms along with wind action and fluvial, marine and glacial processes. The occurrence of weathering at or near the Earth's surface also distinguishes it from the physical and chemical alteration of rock through metamorphism, which usually takes place deep in the crust at much higher temperatures.

Weathering involves physical, chemical, and biological processes acting separately or, more often, together to achieve the disintegration and decay of rock material. Physical weathering causes the disintegration of rock by mechanical processes and therefore depends on the application of force. Disintegration involves the breakdown of rock into its constituent minerals or particles with no decay of any rock-forming minerals. The principal sources of physical weathering are thermal expansion and contraction of rock, pressure release upon rock by erosion of overlaying materials, the alternate freezing and thawing of water between cracks and fissures within rock, crystal growth within rock, and the growth of plants and living organisms in rock. Rock alteration usually involves chemical weathering in which the mineral composition of the rock is changed, reorganized, or redistributed. The rock minerals are exposed to solution, carbonation, hydration, and oxidation by circulating waters. These effects on the mineral decomposition are added to the effects of living organisms and plants as nutrient extraction to alter rock.

Several factors control the type of weathering and the rate at which rock weathers. The mineralogical composition of a rock will determine the rate of alteration or disintegration. The texture of the rock will affect the type of weathering that is most likely to occur. Fine-grain rock will usually be more susceptible to chemical alteration but less susceptible to physical disintegration. The pattern of joints, fractures, and fissures within rock may provide an avenue for water to penetrate. Thus, shattered and fractured rock masses are more likely to undergo weathering than are monolithic structures. Climate will also control the type and rate of weathering by affecting the likelihood of freeze–thaw cycles and chemical reactions. Chemical weathering is more likely to occur and to be more effective in humid tropical climates, and disintegration of rock from freeze–thaw cycles is more likely to take place and to be more effective in sub-Arctic climates.

weaver, also called WEAVERBIRD, any of a number of small finchlike birds of the Old World, or any of several related birds that are noted for their nest-building techniques using grass stems and other plant fibres. They are particularly well-known for their roofed nests, which in some African species form complex, hanging woven chambers. Many species of weavers are highly gregarious.

In the true weaver family, Ploceidae (order Passeriformes), are the 57 species of the genus *Ploceus,* which are often divided under group names, such as masked weavers and golden weavers. All are small insectivores that breed colonially; most inhabit hot, dry country. The breeding male ploceine typically has bright yellow markings, is polygynous, and makes a nest that resembles an upside-down flask, with a bottom entrance, which may be a sort of tube. He attracts females by hanging upside down from the nest while calling and fluttering his wings. A familiar ploceine species in Africa is the village weaver (*P.,* formerly *Textor, cucullatus*). The baya weaver (*P. philippinus*) is abundant from Pakistan to Sumatra.

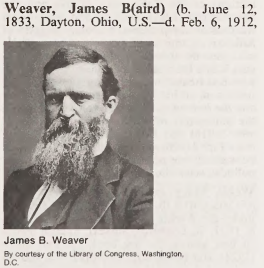


Village weaver (*Ploceus cucullatus*)
K.B. Newman from the Natural History Photographic Agency—EB Inc.

The giant communal nest of the sociable weavers (*Philetairus socius*) of southwestern Africa often reaches a height of 10 feet (3 m); the nest is usually situated in a large acacia tree and may contain more than 100 separate nest chambers, with openings at the nest's bottom. Cassin's weaver (*Malimbus cassini*) of the lowland rain forests of central Africa builds a hanging nest of long palm-leaf strips that has a wide entrance extending down more than two feet. The red-billed weaver (*Quelea quelea*) of the African savannas can sometimes become an agricultural pest; it has been reported nesting in colonies covering several square miles of trees and harbouring millions of birds. Bishop birds (*Euplectes*) weave nests with a side entrance, generally in wet grassy areas. (*See* bishop.) Whydahs (*Vidua*) are social parasites that lay their eggs in the nests of other species of weavers, which then raise the whydahs' young.

Other birds of the family Ploceidae, subfamily Passerinae, are called social weaver (*q.v.*). Birds called the buffalo weaver (*q.v.*) comprise another ploceid subfamily, Bubalornithinae. For the hooded weaver, an estrildid, *see* mannikin.

Weaver, James B(aird) (b. June 12, 1833, Dayton, Ohio, U.S.—d. Feb. 6, 1912, Des Moines, Iowa), American politician who leaned toward agrarian radicalism; he twice ran unsuccessfully for the U.S. presidency, as the Greenback candidate (1880) and as the Populist candidate (1892).



James B. Weaver
By courtesy of the Library of Congress, Washington, D.C.

Admitted to the bar in 1856, Weaver practiced law in Bloomfield, Iowa, and entered politics, changing affiliation successively from Democrat to Free-Soiler to Republican. He served with distinction in the Civil War (1861–65), enlisting as a private in the Union army and rising through the ranks until he was mustered out with the rank of brevet brigadier general. After the war he antagonized Iowa Republican leaders by his reformist temperament, his Methodist-inspired Prohibitionism, criticism of the railroads, and advocacy of easy money. Deprived of the Republican nomination for Congress (1874) and for governor (1875), Weaver gradually moved into the Greenback Party, which advocated the continued wide circulation of paper money. As a Greenbacker he served six years in the U.S. House of Representatives (1879–81, 1885–89), though he was defeated for that office in 1882 as well as for the presidency in 1880.

In the 1880s Weaver played a leading role in the evolution of the People's Party (*see* Populist Movement), which had succeeded the Farmers' Alliances as the main advocate of soft money after the Greenback Party had dissolved. He was the party's natural choice for president in 1892, when his patriarchal appearance and commanding presence helped him win more than 1,000,000 popular and 22 electoral votes.

In 1896 Weaver exerted his influence to give the Populist presidential nomination to William Jennings Bryan, the Democratic candidate. The Populist merger with the Democrats spelled the effective dissolution of the Populist Party and the waning of Weaver's political career. He served as a small-town Iowa mayor and local historian in his later years.

Weaver, John (b. July 21, 1673, Shrewsbury, Shropshire, Eng.—d. Sept. 24, 1760, Shrewsbury), dancer and ballet master known as the father of English pantomime.

Like his father, a dance teacher at Shrewsbury, Weaver went to London in 1700 and became a specialist in comic parts. He adopted such Italian commedia dell'arte characters as Harlequin and Scaramouche for the first English pantomime ballet, the burlesque *Tavern Bilkers* (1702). Weaver's libretto for *The Loves of Mars and Venus* (1717) was the first formal libretto published for a dance drama. Originally performed with Louis Dupré as Mars, Hester Santlow (Weaver's favourite ballerina) as Venus, and Weaver as Vulcan, it is his outstanding serious work. Weaver performed, choreographed, and produced his dance dramas at Drury Lane and Lincoln's Inn Fields theatres, in London (1700–36), and later in Shrewsbury. Because his best productions featured plots and acting instead of the then-popular displays of technical virtuosity, Weaver was an important precursor of Jean-Georges Noverre and Gasparo Anglioni, innovative choreographers who demanded unity of plot, choreography, and decor in their *ballets d'action.*

His writings on the dance are of major significance. His *Orchesography* (1706) was the first English version of R.A. Feuillet's *Chorégraphie. A Small Treatise of Time and Cadence in Dancing* (1706) and *An Essay Towards the History of Dancing* (1712) were followed by *Anatomical and Mechanical Lectures upon Dancing* (1721), a work that anticipated the studies of Carlo Blàsis by over a century in its attempt to relate human anatomy to dance technique.

Weaver, River, river rising on the boundary between the counties of Shropshire and Cheshire, England, and then flowing 45 miles (72 km) north to reach the Irish Sea estuary of the River Mersey to the west of Runcorn. In its upper reaches it passes through dairy farming country, but major industrial development is found near its confluence with the Mersey. The Trent and Mersey Canal runs parallel to the River Weaver for some way.

Weaver, Robert C., in full ROBERT CLIFTON WEAVER (b. Dec. 29, 1907, Washington, D.C.—d. July 17, 1997, New York, N.Y.), noted economist who was the first African American to serve in the U.S. cabinet.

Weaver, the great-grandson of a slave, was educated (B.S., 1929; M.A., 1931; and Ph.D., 1934) at Harvard University. He held several positions in the U.S. government for the next 10 years, starting as the first African American adviser on racial problems in the Department of the Interior. After World War II he served for a time in Chicago as executive director of the Mayor's Committee on Race Relations, taught briefly at several universities, and wrote *Negro Labor, a National Problem* (1946) and *The Negro Ghetto* (1948). From 1949 to 1955 he directed the fellowship program of the John Hay Whitney Foundation, after which he became rent commissioner in New York state and, as such, a member of the governor's cabinet. He was active in the civil rights movement and served for a year as national chairman of the National Association for the Advancement of Colored People. In 1960 President John F. Kennedy appointed Weaver to head the federal Housing and Home Finance Agency. In 1966 President Lyndon B. Johnson named him head of the new Department of Housing and Urban Development.

Weaver left the government in 1969 to become president of Bernard Baruch College of the City University of New York and from 1970 to 1978 was professor of urban affairs at Hunter College. His other publications include *The Urban Complex* (1964) and *Dilemmas of Urban America* (1965).

weaver-finch, any of numerous songbirds belonging to the family Estrildidae (order Passeriformes), individually called grass finch, mannikin, and waxbill (*qq.v.*). They are finch-like Old World birds. Most of the 107 species are small or tiny seed-eaters with short conical bills. They occur in flocks in open country and woodland borders in warm regions. Some are favourite cage birds.

weaving, production of fabric by interlacing two sets of yarns so that they cross each other, normally at right angles, usually accomplished with a hand- or power-operated loom.

A brief treatment of weaving follows. For full treatment, *see* MACROPAEDIA: Industries, Textile.

In weaving, lengthwise yarns are called warp; crosswise yarns are called weft, or filling. Most woven fabrics are made with their outer edges finished in a manner that avoids raveling; these are called selvages. They run lengthwise, parallel to the warp yarns. The three basic weaves are plain, twill, and satin. Fancy weaves—such as pile, Jacquard, dobby, and leno—require more complicated looms or special loom attachments for their construction.

The manner in which the yarns are interlaced determines the type of weave. The yarn count and number of warp and filling yarns to the square inch determine the closeness or looseness of a weave. Woven fabrics may also be varied by the proportion of warp yarns to filling yarns. Some effects are achieved by the selection of yarns or of combinations of yarns.

In the plain weave each filling yarn passes over and under the warp yarns, with the order reversed in alternating rows. Fabrics made in the plain weave include percale, muslin, and taffeta. Ribbed effects in such fabrics as faille and bengaline are produced by employing heavier yarns for either the warp or the filling. In the basket weave one or more filling yarns are passed alternately over and under two or more warp yarns, as seen in monk's cloth.

Twill weaves are made by interlacing the yarns in a manner producing diagonal ribs, ridges, or wales across the fabric. Wales may run from the upper right to the lower left of the fabric, or the reverse. The herringbone weave has wales running both ways. Twill fabrics include denim, gabardine, and flannel.

Satin weaves have a sheen produced by exposing more warps than fillings on the right side of the fabric. The exposed warps are called floats. In the sateen weave the process is reversed, and the exposed fillings form the floats. The amount of twist in the yarns and the length of the floats produce variations. Fabrics made in these weaves include slipper satin, satin crepe, and various sateen types.

Pile weaves produce fabrics with raised, dense surfaces. They can be made by weaving extra warp yarns over wires, producing loops that are cut as the wires are withdrawn; by adjusting loom tension to produce loops that are frequently left uncut; by using extra filling yarns to produce floats that are cut after weaving; or by weaving two cloths face to face, binding them together with an extra set of warps that form the pile when the fabrics are cut apart. Examples of woven pile fabrics include velvet, plush, terry cloth, and many synthetic furs.

Jacquard weaves, produced on a special loom, are characterized by complex woven-in designs, often with large design repeats or tapestry effects. Fabrics made by this method include brocade, damask, and brocatelle. Dobby weaves, requiring a special loom attachment, have small, geometric, textured, frequently repeated woven-in designs, as seen in bird's-eye piqué. Leno weaves, also made with a special attachment, are usually lightweight and open, giving a lacelike appearance, and are made by twisting adjacent warp yarns around each other, then passing the filling yarn through the twisted warps. Marquisette, casement cloth, and mosquito netting are produced by this method.

Webb, Beatrice: *see* Webb, Sidney and Beatrice.

Webb, Clement Charles Julian (b. June 25, 1865, London, Eng.—d. Oct. 5, 1954, Pitchcott, Buckinghamshire), English scholar and philosopher remembered for his contribution to the study of the societal aspects of religion.

A fellow and tutor in philosophy at Magdalen College, Oxford, from 1889 to 1922, Webb served as the first Oriel Professor of the Philosophy of the Christian Religion at Oriel College, Oxford, from 1920 to 1930. Most important among his scholarly works are his editions of the *Policraticus* (1909) and the *Metalogicon* (1929), political and educational treatises by the medieval philosopher John of Salisbury. Cautious of extreme claims, Webb criticized the theories of the pioneer sociologists Émile Durkheim and Lucien Lévy-Bruhl, who had treated religion as only a social phenomenon, in his *Group Theories of Religion and the Individual* (1916). Two of his works in the philosophy of religion—*God and Personality* (1918) and *Divine Personality and Human Life* (1920)—discussed the relationship between divine personality and man's social, political, scientific, and religious activities.

Webb, Mary, in full MARY GLADYS WEBB, *née* MEREDITH (b. March 25, 1881, Leighton-under-the-Wrekin, Shropshire, Eng.—d. Oct. 8, 1927, St. Leonards, Sussex), English novelist best known for her book *Precious Bane* (1924). Her lyrical style conveys a rich and intense impression of the Shropshire countryside and its people. Her love of nature and a sense of impending doom within her novels invite comparison to the works of Thomas Hardy.

Educated in a school in Southport, she married Henry Webb, a schoolteacher, in 1912. Except for her last six years (which were spent in London), the Webbs lived in Shropshire, the locale of her novels. Her other works include *The Golden Arrow* (1916), *Gone to Earth* (1917), *The House in Dormer Forest* (1920),



Mary Webb
The Mansell Collection

Seven for a Secret (1922), and the unfinished historical novel *Armour Wherein He Trusted* (1929). Her *Fifty-One Poems* appeared posthumously in 1946.

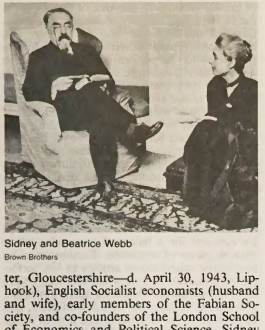
BIBLIOGRAPHY. Gladys Mary Coles, *The Flower of Light* (1978), is a biography. Michele Aina Barale, *Daughters and Lovers* (1986), examines her life and writing.

Webb, Philip Speakman (b. Jan. 12, 1831, Oxford, Eng.—d. April 17, 1915, Worth, Sussex), architect and designer especially known for his unconventional country houses, who was a pioneer figure in the English domestic revival movement.

Webb completed his training in G.E. Street's Oxford office, where he became a close friend of William Morris. They founded the celebrated Morris, Marshall, Faulkner & Company in 1861 and the Society for the Protection of Ancient Buildings in 1877. Webb's first commission, the famous Red House, Bexleyheath, Kent, was designed for Morris in 1859; it is characteristically unpretentious and informal. Webb was a proponent of the picturesque exterior using contrasted materials; for example, his dark-paneled and white-painted interiors were enlivened by bare brickwork or exposed ventilator grilles. Nonetheless, his approach was fundamentally practical, demanding respect for site, for local traditions, and for the client's needs. His highly original designs, although influenced by vernacular medieval styles, pointed toward 20th-century Functionalism in their bold and frank use of materials and exposure of structural elements. Most of his buildings are country houses, such as Clouds, Wiltshire (completed 1886 but badly damaged by fire 1889), and Standen, Sussex (1891); but he also designed London town houses such as those at No. 1, Palace Green (1868), and No. 19, Lincoln's Inn Fields (1868–69).

Webb also designed household furnishings and decorative accessories in metal, glass, wood, and embroidery for Morris' firm. He is particularly famous for his table glassware, stained glass, jewelry, and his rustic adaptations of Stuart period furniture.

Webb, Sidney and Beatrice, in full respectively SIDNEY JAMES WEBB, BARON PASSFIELD OF PASSFIELD CORNER, and MARTHA BEATRICE WEBB, *née* POTTER (respectively b. July 13, 1859, London, Eng.—d. Oct. 13, 1947, Liphook, Hampshire; b. Jan. 22, 1858, Glouces-



Sidney and Beatrice Webb
Brown Brothers

ter, Gloucestershire—d. April 30, 1943, Liphook), English Socialist economists (husband and wife), early members of the Fabian Society, and co-founders of the London School of Economics and Political Science. Sidney Webb also helped reorganize the University of London into a federation of teaching institutions and served in the government as a Labour Party member. Pioneers in social and economic reforms as well as distinguished historians, the Webbs deeply affected social thought and institutions in England.

Early life of Beatrice Potter Webb. Beatrice Potter was born in Gloucester, into a class which, to use her own words, "habitually gave orders." She was the eighth daughter of Richard Potter, a businessman, at whose death she inherited a private income of £1,000 a year, and Laurencina Heyworth, daughter of a Liverpool merchant. She grew up a rather lonely and sickly girl, educating herself by extensive reading and discussions with her father's visitors, of whom the philosopher Herbert Spencer exerted the greatest intellectual influence on her. Her elder sisters made conventional marriages, and she herself might have become the third wife of the much older Liberal statesman Joseph Chamberlain had not incompatibility of temperament caused a break between them. Even before that, however, she had begun to question the assumptions of her father's business world. While staying with distant relatives in a small Lancashire town, she became acquainted with the world of the members of the working class cooperative movement.

Following the disappointing outcome of her relationship with Chamberlain, she took up social work in London but soon became critical of the failure of the inadequate measures of charitable organizations to attack the root problems of poverty. She learned more of the realities of lower class life while helping her cousin Charles Booth, the shipowner and social reformer, to research his monumental study of *The Life and Labour of the People in London.* In 1891 she published *The Co-operative Movement in Great Britain,* a small book based on her experiences in Lancashire, which later became a classic. It was not long before she realized that in order to find any solution to the problem of poverty she would have to learn more about the organizations that the working class had created for itself; *i.e.,* the labour unions. While collecting information about earlier economic conditions, she was advised to apply to a "mine of information," Sidney Webb, whose acquaintance she made in 1890.

Early life of Sidney Webb. Sidney James Webb was born in London into a lower middle-class family; his father was a free-lance accountant and his mother was a shopkeeper. He left school before he was 16, but after attending evening classes he secured admission to the civil service and three years later (1884) passed his bar examinations. For some time he had been the close friend of the young journalist Bernard Shaw, who in 1885 induced him to join a very small, newly founded Socialist body called the Fabian Society. Shaw believed that Webb's extensive factual knowledge was exactly what the society needed as a foundation for its theoretical advocacy of Socialism. In 1887 Webb justified Shaw's choice by writing for the society the first edition of the Fabian Tract *Facts for Socialists,* revised editions of which were published until the end of World War II. The tract was the first concise expression of the Fabian conviction that public knowledge of the facts of industrial society was the essential first step toward the reform of that society.

As executive member of the Fabian Society, Webb, in 1889, delivered one of the public lectures that made up *Fabian Essays* and put the society on the map. The following year he met Beatrice Potter, who was making her own way to a belief in Socialism and had been greatly impressed by Webb's contribution to *Fabian Essays.* Webb at once fell in love with the handsome, intellectual young woman. She took longer to adjust her sights to the scruffy, rather ugly little man in the shiny suits, though he had already made a name for himself as a lecturer and writer on economics. They were married in 1892 and by way of honeymoon set off to investigate trade union records in Glasgow and Dublin.

Their work after marriage. Shortly after returning to London they set up house there. Sidney left the civil service, and they decided to live on Beatrice's inheritance and what they could make from books and journalism in order to devote more time to social research and political work. Sidney retained only his position on the London County Council, to which he was first elected in 1892, and his association with the Fabian Society. The first fruits, and the first success, of their collaborative effort were the great twin volumes *The History of Trade Unionism* (1894) and *Industrial Democracy* (1897). In these books the Webbs, in effect, induced the economists and social historians of Britain to a part of British social life of which they had hitherto been unaware. The work that followed extended into areas of historical and social research, educational and political reform, and journalism.

Among their writings was the prodigious enterprise—which again broke new ground—of the history of English local government from the 17th to the 20th century. This work, published over a period of 25 years, firmly established the Webbs as historical researchers of the first rank. They produced also a great number of books, large and small, and pamphlets, some of short-lived, others of permanent interest. Their literary output, however, important as it was, takes second place to their work in creating and developing institutions.

Sidney served from 1892 to 1910 on the London County Council; he is best remembered for his creation of the system of secondary state schools and the scholarship system for elementary school pupils. He was also instrumental in the establishment of technical and other postschool education in London. Concurrently, he and Beatrice founded the London School of Economics; with R.B. (later Lord) Haldane, Liberal statesman, Sidney reorganized the University of London into a federation of teaching institutions; and with the educator Robert Morant he provided the blueprint for the Education Acts of 1902 and 1903, which set the pattern of English public education for generations to come. In this last effort, Sidney and Beatrice employed the tactic that became known as "permeation," that is, attempting to push through Fabian policies or parts of policies by converting persons of power and influence irrespective of their political affiliations. At that time, for instance, both Lord Balfour, the Conservative prime minister, and his Liberal rival Lord Rosebery were approached for political support. With the advent of the huge Liberal majority in 1906 this strategy became ineffective, and the Webbs were eventually forced to "permeate" the fledgling Labour Party. Before that, however, Beatrice, as a member from 1905 to 1909 of the Royal Commission on the Poor Laws, had produced her remarkable *Minority Report,* which 35 years before the "Beveridge Report" advocating universal social insurance, clearly spelled out the outlines of the welfare state. The nationwide agitation that the Webbs organized in favour of social security was only quelled in 1911 by Lloyd George's hasty improvisation of a scheme of contributory insurance.

Association with the Labour Party. When the Webbs, in late 1914, became members of the Labour Party, they rapidly rose high in its counsels. (Their leadership in the Fabian Society had been shaken by the opposition, first of H.G. Wells and later of the Guild Socialists, who advocated self-government in industry, and other left-wing rebels led by a historian and economist G.D.H. Cole. In the meantime they had established a new forum for themselves by founding the *New Statesman* as an independent journal.) Through friendship with Arthur Henderson, the party's wartime leader, and through his constant supply of disinterested advice, Sidney became a member of the executive committee and drafted the party's first and, for a long time, its most important policy statement, *Labour and the New Social Order* (1918). Shortly afterward he consolidated his position by serving as one of the experts chosen by the Miners' Federation to sit on the Sankey Commission on the Coal Mines (1919). One result of his activity on the commission was that in the election of 1922 he won the constituency of Seaham Harbour in Durham with an enormous majority, thereby securing for himself Cabinet office in both Labour governments, in 1924 as president of the Board of Trade, and as Colonial Secretary in 1929, with a seat in the House of Lords as Baron Passfield.

Beatrice collaborated with him wholeheartedly in all these tasks; but in fact he had come to politics rather late in life. He was not a great success, particularly at the Colonial Office, troubled as it was by the Palestinian situation; and in 1932 he and Beatrice, thoroughly disillusioned with Labour prospects in Britain, went to the U.S.S.R. and "fell in love," as they said, with what they found there. The next three years were spent writing their last big book, *Soviet Communism: A New Civilisation?* (1935), in which they seemed to abandon their belief in gradual social and political evolution. In 1928 they had already retired to their Hampshire home where they both died, Beatrice in 1943 and Sidney in 1947.

Assessment. The Webbs, and their Fabian Socialism, very deeply influenced British radical thought and British institutions during the first half of the 20th century. The exact extent of their influence will always be a matter of dispute, partly because once they had founded an institution (such as the London School of Economics) they were uninterested in directing its development, and partly because many of their ideas were taken up by others, and they were never concerned with demanding credit for them. Some of their effectiveness as a partnership can be attributed to the fact that their gifts were remarkably complementary—Sidney supplying the mastery of facts and publications, and Beatrice the flashes of insight. Of immense importance, too, was their complete contentment with each other and with the pattern of life they had chosen. This sublime satisfaction sometimes caused irritation to those who disagreed with their values and found them impervious to criticism. But

no one ever doubted either their ability or their record of completely disinterested public service. (M.I.C.)

BIBLIOGRAPHY. M.A. Hamilton, *Sidney and Beatrice Webb* (1933), is the only authorized biography, written by a personal acquaintance who was Labour MP for Blackburn, 1929–31. Margaret Cole, *Beatrice Webb* (1945), written with Sidney Webb's approval immediately after the subject's death, made use of the Webb diaries, available then for the first time. Margaret Cole (ed.), *The Webbs and Their Work* (1949), includes essays by Bernard Shaw and 17 other contemporaries on various aspects of the Webbs' work.

Webb, William Henry (b. June 19, 1816, New York, N.Y., U.S.—d. Oct. 30, 1899, New York, N.Y.), American naval architect, one of the most versatile and successful shipbuilders of his day, who in 1889 established and endowed the Webb Institute of Naval Architecture at Glen Cove, N.Y. Webb began shipbuilding in 1836 and by 1869 had more tonnage to his credit than any other American builder. Innovative and varied in his designs, he constructed packets, clippers, side-wheelers, sailing vessels, steamships, wooden ships, and ironclads. He also built war vessels for Russia, Italy, and France. Webb closed his shipyard in 1869 because of the shift from wood to iron construction but maintained his shipping interests until 1872, when he retired because of ill health.

Webber, Andrew Lloyd (English composer): *see* Lloyd Webber, Andrew.

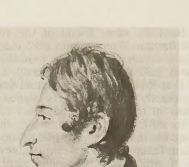
weber, unit of magnetic flux in the International System of Units (SI), defined as the amount of flux that, linking an electrical circuit of one turn (one loop of wire), produces in it an electromotive force of one volt as the flux is reduced to zero at a uniform rate in one second. It was named in honour of the 19th-century German physicist Wilhelm Eduard Weber and equals 10^8 maxwells, the unit used in the centimetre–gram–second system.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Weber, Carl Maria von, in full CARL MARIA FRIEDRICH ERNST, FREIHERR (baron) VON WEBER (b. Nov. 18, 1786, Eutin, Holstein [now in Germany]—d. June 5, 1826, London, Eng.), German composer and opera director during the transition from Classical to Romantic music, noted especially for his operas *Der Freischütz* (*The Freeshooter,* 1821), *Euryanthe* (1823), and *Oberon* (1826). *Der Freischütz,* the most immediately and widely popular German opera that had then been written, established German Romantic opera.

Weber was born into a musical and theatrical family. His father, Franz Anton, who seems to have wished upon the family the baronial *von* to which it had in fact no title, was a musician and soldier of fortune who had formed a small traveling theatre company. His mother, Genovefa, was a singer; his uncles, aunts, and brothers were to some degree involved in music and the stage. Carl Maria was a sickly child, having been born with a diseased hip that caused him to limp throughout his life. When he began to show signs of musical talent, his ambitious father set him to work under various teachers in towns visited by the family troupe in the hope that he might prove a Mozartean prodigy. Among these instructors was Michael Haydn, the younger brother of the composer Joseph Haydn. Under Haydn, Weber wrote and published his Opus 1, *Sechs Fughetten* (1798).

The troupe paused briefly in Munich, where Weber learned the art of lithography under



Carl Maria von Weber, drawing by Christian Hornemann, 1820; in the Deutsche Staatsbibliothek, Berlin

By courtesy of the Deutsche Staatsbibliothek, Musikabteilung, Berlin

its inventor, Aloys Senefelder. Moving on to Freiberg, the Webers planned to set up a lithographic works in order to propagate the young composer's music. The scheme fell through; but meanwhile Weber had composed *Das Waldmädchen* (*The Forest Maiden*), the first of his operas, which partially survives. Staged at Freiberg in 1800, it was a failure. On a return visit to Salzburg, Weber completed his first wholly surviving opera, *Peter Schmoll und seine Nachbarn,* which also failed when it was produced in Augsburg in 1803. Weber resumed his studies under the influential Abbé Vogler, through whom he was appointed musical director at Breslau (now Wrocław, Pol.) in 1804. After many difficulties, occasioned by the inexperience of a young director in putting through reforms, and a near-fatal accident in which he permanently impaired his voice when he swallowed some engraving acid, Weber was forced to resign. He was rescued by an appointment as director of music to Duke Eugen of Württemberg, for whose private orchestra he wrote two symphonies. They are attractive, inventive works, but the symphony, with its dependence on established forms, was not the natural medium of a composer who sought to bring Romantic music to a freer form derived from literary, poetic, and pictorial ideas.

Weber was next a secretary in the court of King Frederick I of Württemberg. Here he lived so carelessly and ran up so many debts that, after a brief imprisonment, he was banished. The principal fruits of these years (1807–10) were his Romantic opera *Silvana* (Frankfurt, 1810), songs, and piano pieces. Weber and his father fled to Mannheim, where he was, in his own words, "born for the second time." He made friends with an influential circle of artists, from whom he stood out as a talented pianist and guitarist; he was also remarkable for his theories on the Romantic movement. Moving on to Darmstadt, he met Vogler again, as well as the German opera composer Giacomo Meyerbeer. From this period came principally the *Grand Concerto No. 1 in C Major,* Opus 11, for piano, and the delightful one-act opera *Abu Hassan* (Munich, 1811).

Disappointed in not winning a post in Darmstadt, Weber traveled on to Munich, where his friendship with the clarinet virtuoso Heinrich Bärmann led to the writing of the *Concertino,* Opus 26, and two brilliant, inventive clarinet concerti. In all, he was to write six clarinet works for Bärmann, with whom he also toured. The clarinet remained, with the horn, one of the favourite instruments of a composer whose ear for new sounds and new combinations of instruments was to make him one of the greatest orchestrators in the history of music. Weber was also one of music's great piano virtuosos; his own music reflects something of the brilliance and melancholy and exhibitionist charm described by his contemporaries when he performed it. From 1809 to 1818 Weber also wrote a considerable number of reviews, poems, and uncompromising, stringent music criticisms. All his work, music, and critical writings furthered the ideals of Romanticism as an art in which feeling took precedence over form and heart over head.

Appointed conductor of the opera at Prague in 1813, after a period in Berlin during which he caught the patriotic fervour of the day in some stirring choruses and songs, Weber was at last able to put his theories into full practice. His choice of works showed his care for Romantic ideals, and his choice of artists showed his concern for a balanced ensemble, rather than a group of virtuosos. Furthermore, by publishing introductory articles to his performances, he saw to it that his audiences were carefully prepared. Obstacles again appeared: a stormy love affair left him disconsolate, and opposition to his reforms forced him to resign in 1816. His reputation by now, however, was such that he was able to secure an appointment as director of the German opera at Dresden, beginning in 1817. The same year he married one of his former singers, Caroline Brandt.

In Dresden, a city more backward than most in Germany and one with a flourishing rival Italian opera, Weber (as the prophet of a German national opera) was faced with even greater difficulties. Happily married, he applied himself energetically to his work, assuming full control over all aspects of the operatic production. No detail escaped him: he supervised repertory, recruitment, casting, scenery, lighting, and production, as well as the orchestra and the singers, taking care to see that every performer fully understood the words and plot of each opera. These tasks left him little time for writing operas himself, however, especially in view of the inexorable advance of his tuberculosis. He nevertheless produced several works during this period, including the last of his four piano sonatas, many songs and shorter piano solos, such as the famous *Invitation to the Dance* (1819), and the *Konzertstück,* Opus 79 (1821), for piano and orchestra.

It was also in Dresden that Weber began to work on *Der Freischütz,* which was an immediate success when it was performed in Berlin in 1821. The story, deriving from folklore, concerns a man who has sold his soul to the devil for some magic bullets that will enable him to win a marksmanship contest and with it the hand of the lady he loves. The opera presented, for the first time, things familiar to every German: the simple village life, with its rough humour and sentimental affections, and the surrounding forest, with its smiling appearance concealing supernatural horror. Above all, the characters, from the cheerful huntsmen and village girls to the simple, valiant hero and the prince who rules over them, were all—with the tuneful, sensational music—a mirror in which every German could find his reflection. In *Der Freischütz* Weber not only helped liberate German opera from French and Italian influences, but, in his novel orchestrations and in his choice of a subject matter containing strong supernatural elements, he laid the foundations of one of the principal forms of 19th-century opera. *Der Freischütz* made Weber a national hero.

His next opera, *Euryanthe,* a more ambitious work and a larger achievement, anticipating Wagner as his piano music does Chopin and Liszt, foundered on its clumsy, though not intolerable, libretto. When Covent Garden in London commissioned a new opera, Weber took on the task of learning English and working with a librettist, James Robinson Planché, by correspondence. His motive was to earn

enough money to support his family after his death, which he knew to be not far off. In form, *Oberon* was little to his taste, having too many spoken scenes and elaborate stage devices for a composer who had always worked for the unification of the theatrical arts in opera. But into it he poured some of his most exquisite music, and he traveled to London for the premiere in 1826. Barely able to walk, he was sustained by the kindness of his host, Sir George Smart, and by the longing to get home again to his family. *Oberon* was a success, and Weber was feted; but his health was declining fast, and shortly before he was due to start the journey back to Germany, he was found dead in his room.

MAJOR WORKS. *Operas.* Nine operas, including *Der Freischütz* (first performed 1821); *Euryanthe* (1823); *Oberon* (1826).

Orchestral works. Konzertstück in F minor, op. 79 (1821); two piano concerti; two clarinet concerti: *No. 1 in F Minor,* op. 73 (1811), and *No. 2 in E Flat Major,* op. 74 (1811); *Bassoon Concerto in F Major,* op. 75 (1811).

Piano music. Four sonatas; 10 sets of variations; 3 sets of pieces for piano duet.

Chamber music. Grand Quatuor for piano and strings, op. 18 (1809); *Grosses Quintett* for clarinet and strings, op. 34 (1815).

Vocal works. Seven concert arias; 95 solo songs.

Church music. Mass in E Flat Major (1918); *Mass in G Major,* op. 76 (1818–19).

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Weber, Ernst (b. Sept. 6, 1901, Vienna, Austria—d. Feb. 15, 1996, Columbus, N.C., U.S.), Austrian-born American engineer who was a pioneer in the development of microwave communications equipment and who oversaw the growth of the Polytechnic Institute in New York City.

Weber was educated in Austria and worked in Vienna and Berlin as a research engineer (1924–30) before visiting the United States, where he decided to remain. In 1930 he became a visiting professor at the Polytechnic Institute of Brooklyn (now Polytechnic University) in New York City, where he rose through various academic posts to become head of research and graduate study in electrical engineering (1942–45). He was afterward director of the Microwave Research Institute (1945–57) and its vice president for research (1957–63). He served as president of the Polytechnic Institute from 1958 to 1969 and president emeritus from 1969. He helped transform the Polytechnic Institute into one of the nation's leading science and engineering centres.

Invited to join the government-sponsored Office of Scientific Research and Development at the beginning of World War II, Weber chose to study the little-explored but highly important field of microwave technology. With his associates, he developed a device for precise control of microwaves that proved useful in field tests of radar and built microwave measuring equipment.

Weber, Ernst Heinrich (b. June 24, 1795, Wittenberg [Germany]—d. Jan. 26, 1878, Leipzig, Ger.), German anatomist and physiologist whose fundamental studies of the sense of touch introduced a concept—that of the just-noticeable difference, the smallest difference perceivable between two similar stimuli—that is important to psychology and sensory physiology.

The eldest of three brothers, all of whom achieved scientific distinction, Weber was a professor at the University of Leipzig from 1818 until 1871. Though he conducted many anatomical investigations, he is known chiefly for his work on sensory response to weight, temperature, and pressure; he described a number of his experiments in this area in *De Tactu* (1834; "Concerning Touch"). Weber determined that there was a threshold of sensation that must be passed before an increase in the intensity of any stimulus could be detected; the amount of increase necessary to create sensation was the just-noticeable difference. He further observed that the difference was a ratio of the total intensity of sensation, rather than an absolute figure; thus, a greater weight must be added to a 100-pound load than to a 10-pound load for a man carrying the load to notice the change. Similar observations were made on other senses, including sight and hearing. Weber also described a terminal threshold for all senses, the maximum stimulus beyond which no further sensation could be registered.

Weber's findings were elaborated in *Der Tastsinn und das Gemeingefühl* (1851; "The Sense of Touch and the Common Sensibility"), which was considered by the English psychologist E.B. Titchener to be "the foundation stone of experimental psychology." Weber's empirical observations were expressed mathematically by Gustav Theodor Fechner, who called his formulation Weber's law (*q.v.*).

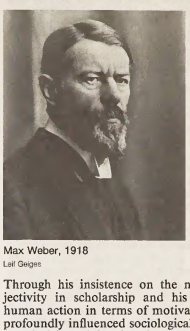
Weber, Joe; and Fields, Lew, bynames of JOSEPH WEBER and LEWIS MAURICE FIELDS (respectively b. Aug. 11, 1867, New York, N.Y., U.S.—d. May 10, 1942, Hollywood, Calif.; b. Jan. 1, 1867, New York, N.Y.—d. July 20, 1941, Beverly Hills, Calif.), American comedy team that was popular at the turn of the 20th century. They were known for broad slapstick sketches in "Dutch" dialect that had undertones of sharp satire.

Sons of Polish immigrants, they first appeared together in the Bowery in New York City at the age of nine. Over the next eight years they perfected their comedy teamwork. In 1885 they formed their own company and 20 years later took over the Broadway Music Hall, which was thereafter popularly called "the Weber and Fields." Their musical shows, such as *Twirly Whirly, The Geezer, Whoop-Dee-Doo,* and *Hoity Toity,* consisted of songs, dance, comedy skits, and burlesques of popular plays and were as sprightly as their titles. In 1904 Fields left the partnership and opened Fields' Theatre in New York City. They became theatrical producers and made solo stage appearances until 1912, when they were briefly reunited to produce *Hokey-Pokey* at the Broadway Music Hall, which Weber had continued to manage; and in 1918 in Philadelphia in *Back Again.* Weber appeared in solo performances until 1927, and Fields until 1930. Of Fields's children Dorothy (1905–74) was a writer of song lyrics and a librettist, as was Herbert (1897–1958), with whom she wrote the librettos of *Let's Face It* (1941; music by Cole Porter) and *Annie Get Your Gun* (1946; music by Irving Berlin).



Joe Weber (left) and Lew Fields
Culver Pictures

Weber, Max (b. April 21, 1864, Erfurt, Prussia [Germany]—d. June 14, 1920, Munich, Ger.), German sociologist and political economist best known for his thesis of the "Protestant Ethic," relating Protestantism to capitalism, and for his ideas on bureaucracy.



Max Weber, 1918
Lail Geiges

Through his insistence on the need for objectivity in scholarship and his analysis of human action in terms of motivation, Weber profoundly influenced sociological theory.

Early life and family relationships. Weber was born in Erfurt, the eldest son of an aspiring liberal politician whose family had become wealthy in the German linen industry. The father soon joined the more compliant, pro-Bismarckian "National-Liberals" and moved to Berlin, where he became a member of the Prussian House of Deputies (1868–97) and the Reichstag (1872–84). As such he became part of the Berlin social milieu and entertained in his house men prominent in politics.

Helene Weber, the sociologist's mother, was raised in Calvinist orthodoxy. Though she gradually accepted a more tolerant theology, the Puritan morality of her mother remained intact within her. As a result of the social activities of her husband she came to feel increasingly estranged from him, and, after the deaths of two of her children, she was aghast at her husband's inability to share her prolonged grief. He, in turn, tended to adopt a traditionally authoritarian manner at home and to demand absolute obedience from wife and children.

Weber left home to enroll at the University of Heidelberg in 1882, interrupting his studies after two years to fulfill his year of military service at Strassburg (Strasbourg). During this time he became very close to the family of his mother's sister, Ida Baumgarten, and her husband, the historian Hermann Baumgarten, whose influence on Weber's intellectual development was profound.

After his release from the military, Weber was asked by his father to finish his studies at the University of Berlin, where he could live at home. This was perhaps because his father considered the influence of the Baumgartens subversive of his son's character. From 1884 until his marriage in 1893, Weber left his father's house only for a semester of study at Göttingen in 1885, and for some brief periods of military manoeuvres with his reserve unit.

Early career. During most of his formative years as a scholar in legal and economic history, Weber was thus continually subject to his parents' conflicting and unanswerable claims on his loyalty. Since he spent his mid- and late-20s working simultaneously in two totally unremunerative apprenticeships—as a lawyer's assistant and as a university assistant—he was financially unable to leave home until the autumn of 1893. At that time he received a temporary position in jurisprudence at the University of Berlin and married Marianne Schnitger, a second cousin.

After his marriage, Weber paid unwitting homage to his Calvinist forebears by continuing a compulsive work regimen that he had begun after his return to Berlin in 1884. Only through such bondage to his labour, believed Weber, could he stave off a natural tendency to self-indulgence and laziness, which, if tolerated, would lead to an emotional and spiritual crisis.

Weber's great capacity for disciplined intellectual effort, together with his unquestionable brilliance, brought the reward of meteoric professional advance. Only a year after his appointment at Berlin, he became a full professor in political economy at Freiburg, and then, in the following year (1896), at Heidelberg. Following his doctoral and postdoctoral theses on the agrarian history of ancient Rome and the evolution of medieval trading societies, Weber wrote a comprehensive analysis of the agrarian problems of the German east for one of Germany's most important academic societies, the Union for Social Policy (1890), and important essays on the German stock exchange and the social basis of the decline of Latin antiquity. He was also politically active in these years, working with the left-liberal Protestant Social Union (Evangelisch-Soziale Verein).

The Freiburg address. The high point of his early scholarly career was his inaugural address at Freiburg in 1895, in which he pulled together some five years of study on the agrarian problems of Germany east of the Elbe into a devastating indictment of the ruling Junker aristocracy as historically obsolete. In Weber's view, the existing liberal parties were in no position to challenge and replace the Junkers. Nor was the working class ready to accept the responsibilities of power. Only the nation as a whole, educated to political maturity by a conscious policy of overseas imperial expansion, could bring Germany to the level of political maturity attained by the French in the revolutionary and Napoleonic eras and by English in the course of their imperial expansion in the 19th century. Weber's Freiburg address thus advanced an ideology of "liberal imperialism," attracting to its support such important liberal publicists as Friedrich Naumann and Hans Delbrück.

In the months following his father's death in August 1897, an increasing nervousness plagued the young scholar. His return to teaching in the autumn brought a brief respite, which ended in the first months of 1898 with the first signs of the nervous collapse that was to prostrate him between mid-1898 and 1903. For five years he was intermittently institutionalized, suffering sudden relapses after slow recoveries and vain efforts to break such cycles by travelling.

Later works. In 1903 Weber was able to resume scholarly work, though he did not teach again until after World War I. Although he had resigned his professorship at Heidelberg at the height of his illness, he came into an inheritance in 1907 that made him financially independent. The nature of his most important work after his partial recovery suggests that his prolonged agony had led him to develop brilliant insights into the relationship of Calvinist morality and compulsive labour, into the relationship between various religious ethics and social and economic processes, and into many other questions of lasting importance. Indeed, all of Weber's most important work appeared in the 17 years between the worst part of his illness and his death.

A brief glance at *The Protestant Ethic and the Spirit of Capitalism,* Weber's best known and most controversial work, illustrates the general trend of his thinking. Weber noted the statistical correlation in Germany between interest and success in capitalist ventures on the one hand, and Protestant background on the other. He then went on to attribute the relationship to certain accidental psychological consequences of the notions of predestination and the calling in Puritan theology, notions that were deduced with the greatest logical severity by Calvin and his followers.

In Calvin's formulation, the doctrine of predestination invested God with such omnipotence and omniscience that sinful humanity could know neither why nor to whom God had extended the grace of salvation. The psychological insecurity that this doctrine imposed on Calvin's followers, stern believers in hellfire, was too great, and they began to look for loopholes that would indicate the direction of divine will. The consequence was an ethic of unceasing commitment to one's worldly calling (any lapse would indicate that one's state of grace was in doubt) and ascetic abstinence from any enjoyment of the profit reaped from such labours. The practical result of such beliefs and practices was, in Weber's estimation, the most rapid possible accumulation of capital.

Weber never denied the claim of his critics that highly developed capitalist enterprises existed centuries before Calvin, and he was well aware that there were other preconditions, material and psychological, for the development of capitalism. In response to these criticisms Weber argued that, before Calvinism, capitalist enterprise was always fettered by the passive or active hostility of the prevalent religious order. If some capitalists were, by virtue of their skepticism, able to escape the guilt feelings that conventional morality dictated, it was nevertheless a fact that never before had religious convictions enabled people to conceive of their success in the accumulation of capital as a sign of God's everlasting grace. The Puritans, Weber argued, had accepted the cloak of worldly asceticism voluntarily, as a means of alleviating otherwise unbearable spiritual burdens. In so doing, however, they helped to create the enormous structure of modern economic life, which came irresistibly to determine the life and values of everyone born into it. Thus "fate decreed that the cloak should become an iron cage."

Weber published *Die protestantische Ethik und der Geist des Kapitalismus* (1904–05; *The Protestant Ethic and the Spirit of Capitalism,* 1930) in the journal he had just begun to edit, *Archiv für Sozialwissenschaft und Sozialpolitik.* In 1905–10, he published a number of exchanges in his *Archiv* between himself and critics of his thesis. During these years, however, which he spent in Heidelberg when he was not on one of his numerous journeys through Europe, the middle-class German culture in which he had been nurtured experienced its first spasms of disintegration. The Protestant morality that he had come to accept as inescapable destiny came under attack from the youth movement, from avant-garde literary circles such as the one centred on the poet Stefan George, from Nonromantics influenced by Nietzsche and Freud, and from Slavic cultural ideals, exemplified in Tolstoy and Dostoyevsky.

Weber's political sociology is concerned with the distinction between charismatic, traditional, and legal forms of authority. Charisma refers to the gift of spiritual inspiration underlying the power of religious prophecy and political leadership. In many of these later concerns, Weber touched, sometimes explicitly, on themes that had first been broached by Nietzsche.

His acute interest in social phenomena such as mysticism, which are antithetical to the modern world and its underlying process of rationalization, paralleled a late awakening of Weber's aesthetic and erotic faculties. In 1910, amid the crumbling social order of European middle-class society, Weber began a series of important discussions with Stefan George and his close disciple, the poet Friedrich Gundolf. At roughly the same time, he embarked on an extramarital affair, probably his first experience of sexual intimacy; one of his most brilliant later essays contains a penetrating analysis of the conflicting relationships between eroticism, ascetic and mystical modes of religiosity, and the general process of rationalization ("*Theorie der Stufen und Richtungen religioser Weltablehnung,*" 1916; "Religious Rejections of the World and Their Directions").

During this same period Weber was engaged in efforts to gain respect for sociology as a discipline by defining a value-free methodology for it, and in his analysis of the religious cultures of India and China for purposes of comparison with the Western religious tradition. Also of critical importance in his last decade was his stoical examination of the conditions and consequences of the rationalization of political and economic life in *Wirtschaft und Gesellschaft* (1922; *Economy and Society,* 1968) and journal articles.

Indeed, Weber's most powerful impact on his contemporaries came in the last years of his life, when, from 1916 to 1918, he argued powerfully against Germany's annexationist war goals and in favour of a strengthened parliament. He stood bravely for sobriety in politics and scholarship against the apocalyptic mood of right-wing students in the months following Germany's defeat. After assisting in the drafting of the new constitution and in the founding of the German Democratic Party, Weber died of a lung infection in June 1920.

Assessment. Weber's significance during his lifetime was considerable among German social scientists, many of whom were his personal friends in Heidelberg or Berlin; but because of the fact that little of his work was published in book form during his lifetime and because most of the journals in which he published had restricted audiences of scholarly specialists, his major impact was felt after his death. The only exceptions were his formulation of "liberal imperialism" in 1895, his widely discussed thesis on Protestantism and capitalism, and his extensive attack on German foreign and domestic policies during World War I in the pages of the *Frankfurter Zeitung,* which stimulated liberal sentiment against the government's war aims and led Gen. Erich Ludendorff to view him as a traitor.

In general, it may be said that Weber's greatest merit as a thinker was that he brought the social sciences in Germany, hitherto preoccupied largely with national problems, into direct critical confrontation with the international giants of 19th-century European thought—Marx and Nietzsche—and that through this confrontation he helped create a methodology and a body of literature dealing with the sociology of religion, the sociology of polit-

ical parties, small group behaviour, and the philosophy of history. His work continues to stimulate scholarship. (Ar.M./Ed.)

MAJOR WORKS. *Die römische Agrargeschichte in ihrer Bedeutung für das Staats- und Privatrecht* (1891); *Wirtschaftsgeschichte* (1923; *General Economic History*, trans. by Frank H. Knight, 1927; paperback 1961). After the death of Max Weber, his widow, Marianne Weber, collected and edited his other writings as follows: *Gesammelte Aufsätze zur Religionssoziologie*, 3 vol. (1920), containing vol. 1, *Die protestantische Ethik und der Geist des Kapitalismus. Die protestantischen Sekten und der Geist des Kapitalismus. Die Wirtschaftsethik der Weltreligionen*; vol. 2, *Hinduismus und Buddhismus*, and vol. 3, *Das antike Judentum*; trans. (from vol. 1) *The Protestant Ethic and the Spirit of Capitalism*, by Talcott Parsons (1930, paperback 1958), and *The Religion of China, Confucianism and Taoism* (1951); (from vol. 2) *The Religion of India: The Sociology of Hinduism and Buddhism*, trans. and ed. by Hans H. Gerth and Don Martindale (1958); (from vol. 3) *Ancient Judaism* (1952); *Gesammelte politische Schriften* (1921); *Die rationalen und soziologischen Grundlagen der Musik* (1921; *The Rational and Social Foundations of Music*, 1958); *Wirtschaft und Gesellschaft* (1922, 2 vol. 1925), part one *The Theory of Social and Economic Organization*, trans. by A.R. Henderson and Talcott Parsons (1947, paperback 1964); *Max Weber on Law in Economy and Society*, trans. of selected passages ed. by Max Rheinstein; *The Sociology of Religion*, trans. of vol. 2, ch. 4 (1963, paperback 1964); from *W. und G., Basic Concepts in Sociology*, trans. by H.P. Secher (1962); *Economy and Society: An Outline of Interpretative Sociology*, a new and complete translation of *W. und G.*, ed. by Guenther Roth and Claus Wittich (1968); *Gesammelte Aufsätzw zur Wissenschaftslehre* (1922); *Gesammelte Aufsätze zur Soziologie und Sozialpolitik* (1924); *Gesammelte Aufsätze zur Sozial- und Wirtschaftsgeschichte* (1924); *Schriften zur theoretischen Soziologie, zur Soziologie der Politik und Verfassung* (1947); *Aus den Schriften zur Religionssoziologie* (1948). Other translations: *From Max Weber: Essays in Sociology*, trans. and ed. by H.H. Gerth and C. Wright Mills (1947, paperback 1958), containing essays first written or published between 1906 and 1924; *Max Weber on the Methodology of the Social Sciences*, trans. and ed. by Edward A. Shils and Henry A. Finch (1949), containing three essays, two of which were published in the *Archiv für Sozialwissenschaft und Sozialpolitik* (1904 and 1905), and a third essay first published in *Logos* (1917); *The City*, trans. of *Die Stadt*, ed. by Don Martindale and Getrud Neuwirth (1958); *On Charisma and Institution Building*, selected papers, ed. by S.N. Eisenstadt (1968).

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Weber, Max (b. April 18, 1881, Białystok, Russia—d. Oct. 4, 1961, Great Neck, N.Y., U.S.), Russian-born U.S. painter, printmaker, and sculptor who, through his early abstract works, helped to introduce in the U.S. such avant-garde movements of European art as Fauvism and Cubism.

He moved to New York City in 1891 from Białystok, Russia, and studied from 1898 to 1900 at Pratt Institute in Brooklyn. From 1905 to 1908 he was in Paris where he studied at the Académie Julian and with Henri Matisse. He was one of the exhibitors at Alfred Stieglitz' "291" gallery. Between 1909 and 1917 he painted many of his best known pictures including the Fauvist-inspired "The Geranium" (1911; Museum of Modern Art, New York City) and "Chinese Restaurant" (1915; Whitney Museum of American Art, New York City), a work in the synthetic Cubist manner. After 1917 his work became more representational and Weber became concerned with the poetry of colour and form. During the last 20 years of his career many of his paintings were based on Jewish subject matter, especially on Hasidic themes.



"Chinese Restaurant," oil on canvas by Max Weber, 1915; in the Whitney Museum of American Art, New York City

By courtesy of the Whitney Museum of American Art, New York City

Weber taught at the Art Students League, New York City, where he had Mark Rothko among his pupils. His publications include *Essays on Art* (1916) and *Primitives* (1926).

Weber, Wilhelm Eduard (b. Oct. 24, 1804, Wittenberg, Ger.—d. June 23, 1891, Göttingen), German physicist who, with his friend Carl Friedrich Gauss, investigated terrestrial magnetism and in 1833 devised an electromagnetic telegraph. The magnetic unit, termed a weber, formerly the coulomb, is named after him.

Weber was educated at Halle and later at Göttingen, where he was appointed professor of physics in 1831. He was professor at the University of Leipzig from 1843 to 1849, and he then returned to Göttingen and became director of the astronomical observatory there. He played an important role in the development of electrical science, particularly by his work to establish a system of absolute electrical units. Gauss had introduced a logical arrangement of units for magnetism involving the basic units of mass, length, and time. Weber repeated this for electricity in 1846. Occasionally he collaborated with his brothers, the physiologists Ernst Heinrich Weber (1795–1878) and Eduard Friedrich Weber (1806–71). During his final years at Göttingen, Weber studied electrodynamics and the electrical structure of matter.

He received many honours from England, France, and Germany, among which were the title of *Geheimrat* (privy councillor) and the Copley Medal of the Royal Society. Many of his extensive articles are in the six volumes of *Resultate aus den Beobachtungen des magnetischen Vereins* (1837–43), edited by himself and Gauss.

Weber–Fechner law (psychology): *see* Weber's law.

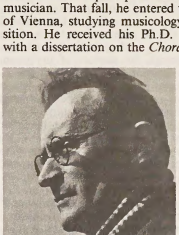
Weberian apparatus, distinctive chain of small bones characteristic of fish of the superorder Ostariophysi (carps, characins, minnows, suckers, loaches, catfish, and others). The Weberian apparatus consists of four pairs of bones, called ossicles, derived from the vertebrae immediately following the skull. The bones link the swim bladder and inner ear and serve to enhance hearing by conducting pressure changes produced by externally originating sound waves from the swim bladder to the ear.

Webern, Anton (Friedrich Ernst) von (b. Dec. 3, 1883, Vienna—d. Sept. 15, 1945, Mittersill, near Salzburg, Austria), Austrian composer of the 12-tone Viennese school (*see* atonality). He is known especially for his passacaglia for orchestra, his chamber music, and various songs (*Lieder*).

Life and works. Webern's father, a mining engineer, rose to the highest rank of his profession, becoming chief of mining in the Habsburg government. Nobility had been conferred upon the family as early as 1574 by Emperor Maximilian II. Although the predicate *von* was outlawed in Austria after the 1918 revolution, and the composer's music had to be published under the name Anton Webern, he upheld his aristocratic heritage throughout his life.

The father's career caused the family to move to two provincial capitals, Graz and Klagenfurt, and then back to Vienna. Webern received his first musical instruction from his mother, an amateur pianist. In Klagenfurt, Edwin Komauer instructed him in the rudiments of musical theory, as well as in piano. Webern also learned to play the cello and participated in the local orchestra.

His first compositions, two pieces for cello and piano (1899) and several songs, date from the Klagenfurt period. In 1902, after graduation from the Klagenfurt Humanistisches Gymnasium, he attended performances of Wagner operas at the Bayreuth Festival, and these left a deep impression on the young musician. That fall, he entered the University of Vienna, studying musicology and composition. He received his Ph.D. degree (1906) with a dissertation on the *Choralis Constanti-*



Webern, 1940

Moldenhauer Archives, Spokane, Wash.

nus II of the Dutch composer Heinrich Isaac (*c.* 1450–1517). Meanwhile, in the autumn of 1904, Webern had become a private pupil of the composer Arnold Schoenberg. The association proved to be a decisive influence. With Schoenberg, and soon also his friend the young composer Alban Berg, Webern explored new dimensions of musical expression, leading to the breakthrough that established "atonality"—a revolutionary concept abnegating the necessity of a governing tonal centre. But from the start Webern created a style distinctly his own.

Schoenberg's direction of Webern's musical development ended in 1908. By then, Webern had already written many works, including the orchestral idyll *Im Sommerwind* (antedating his study with Schoenberg), several string quartets, the songs based on poems of Richard Dehmel, the orchestral *Passacaglia*, Opus 1, and the choral canon *Entflieht auf leichten Kähnen*, Opus 2. These still adhere to traditional tonality, but, with the Stefan George songs (1908–09), Webern entered the realm of music no longer based on a fixed tonal centre.

In 1911, Webern married Wilhelmine Mörtl, the daughter of his mother's sister. Because of the Roman Catholic prohibition of the union of first cousins, the marriage was solemnized only in 1915, after three of the couple's

four children had already been born. Webern, while deeply religious in a pantheistic sense, was averse to church dogma, rejecting the priest's role as intermediary between God and man. During the years 1908 to 1913 he held posts as coach and conductor in Vienna, Ischl, Innsbruck, Teplitz, Danzig, and Stettin. These engagements proved to be short lived since he loathed theatre routine, aspiring instead to free creative work. His compositions of that period reveal a growing tendency to compress the highest intensity of expression within the greatest formal brevity, characteristics that mark opuses 5 through 11. The *Cello Sonata* (1914) marks his first effort to return to more expanded forms following his "aphoristic" period. Opuses 12 through 19 (composed between 1914 and 1926) are vocal compositions; except Opus 12, which employs piano accompaniment, these works are distinguished by highly original instrumental combinations.

In 1915, during World War I, Webern enlisted for army service but was discharged at the end of 1916 because of poor eyesight. After a last theatre season in Prague (1917–18), he settled in Mödling, near Vienna, teaching privately and acting as supervisor for the Schoenbergfounded Society for Private Musical Performances (1918–22). In 1924 Schoenberg formulated the 12-tone method of composition—the system in which a basic "row," formed from the 12 independent tones of the chromatic scale, is used melodically and harmonically through the devices of inversion, retrograde progression, and transposition, allowing for a total of 48 possibilities in which the chosen row may appear. Webern adopted this system first in his *Kinderstück* for piano, employing the serial technique thereafter for all further compositions (opuses 17–31) and developing it with severe consistency to its most extreme potential. The instrumental works during that period (opuses 20, 21, 22, 24, 27, 28, 30) are governed by rigorous formal discipline. In the vocal realm, the lyrics of Hildegard Jone, a painter and poet, inspired all of Webern's later works (opuses 23, 25, 26, 29, 31). Always professing his ties with tradition, Webern was a foremost exponent of the genre of the German *Lied.* He also was a skillful arranger, notable among his orchestrations of classic works is the *Ricercata* from J.S. Bach's *Musical Offering.*

After the Society for Private Musical Performances was dissolved, he conducted several choirs, notably the "Singverein," a lay group especially organized to perform masterworks, such as Mahler's *Symphony No. 8,* in conjunction with the Workers' Symphony Concerts. Both organizations, sponsored by the Social Democratic Party, were dissolved after the "Dollfuss Revolution" (February 1934). As guest conductor, Webern occasionally appeared with the Austrian Radio Orchestra and was invited to conduct in Switzerland, Germany, Spain, and England.

Although an outstanding teacher, Webern never received an appointment at the University of Vienna or the music academy. He held a minor position at the Israelitic Institute for the Blind (1925–31) and from 1932 on gave private lecture courses. Public recognition at home remained limited to the Vienna Music Prize, awarded to him twice (1924, 1932) under the Socialist regime. Politically never active, Webern yet fell victim to the rising tide of right-wing nationalism. Schoenberg left Europe soon after Hitler came to power in 1933. The Nazis branded the music of the "New Vienna school" as "cultural Bolshevism" and "degenerate art" and banned performance of this type of music. Webern's artistic isolation grew complete with Berg's death in 1935, and his economic plight became desperate after the Nazi annexation of Austria in 1938. The political upheaval brought to a halt the publication of his works. With almost no private pupils left, Webern had to resort to accepting such tasks as piano arrangements of works by lesser composers. Always of a retiring disposition, he fell into total obscurity with the outbreak of World War II. Webern's disillusionment with the Hitler regime was deepened by increasing bombing raids. In February 1945 his only son, Peter, was killed in a strafing attack on a train. When the Russian Army neared Vienna, the composer and his wife fled to Mittersill near Salzburg, where their three daughters and grandchildren had sought refuge. Webern was accidentally shot and killed there by a soldier in the U.S. occupation forces.

Assessment. Inherently poetic, Webern's music mirrors his remarkable sensibility. Nature worship, from mountain grandeur to the microcosmos of flowers, influenced his creative thinking. His uncompromising championship of a new aesthetic led him to pursue his path relentlessly, bringing to fruition a musical syntax entirely his own. Webern's expressionistic, while aphoristic and pointillistic, is distinguished by extraordinary sensitivity of diction and colouring, encompassing the gamut from atmospheric suspense to explosive vehemence. Many of his works reflect concrete personal experiences and in that sense are even "programmatic," such as the *Six Pieces for Orchestra,* Opus 6, which, according to the composer himself, describe episodes connected with his mother's death. Formal plans, revealing definite extramusical associations, preface sketches to various instrumental compositions, even in the later period. Similarly, literary affinities result in a preponderance of vocal works.

The novel aspects of his style (melodic and harmonic fragmentation, wide intervallic leaps, unusual use of dissonance and timbres, ascetic sparseness of texture, and extreme conciseness of form) at first disconcerted those conditioned to the opulence of the late Romantic era (*e.g.,* Wagner operas, Bruckner and Mahler symphonies, and Richard Strauss tone poems). Beginning with the 1950s, however, Webern's music was acclaimed by a young generation of composers, among them Pierre Boulez and Karlheinz Stockhausen, as the "cornerstone" and model for a new epoch, and acknowledged masters such as Igor Stravinsky joined in the accolade. Knowledge of Webern and his extraordinary repertoire was substantially enlarged during the 1960s by posthumous discoveries of many important manuscripts by the musicologist Hans Moldenhauer. (Ha.M.)

MAJOR WORKS. *Instrumental compositions.* Orchestra: *Im Sommerwind* (1904); *Passacaglia,* op. 1 (1908); *Six Pieces for Orchestra,* op. 6 (1909); *Five Pieces for Orchestra,* op. 10 (1911–13); *Orchestra Pieces* (1913), *Symphonie,* op. 21 (1928); *Variations for Orchestra,* op. 30 (1940). Chamber ensembles: *Two Pieces for Cello and Piano* (1899); *Langsamer Satz* for string quartet (1905); *String Quartet* (1905); *Rondo* for string quartet (*c.* 1906); *Quintet* for string quartet and piano (1907); *Five Movements for String Quartet,* op. 5 (1909); *Four Pieces for Violin and Piano,* op. 7 (1910); *Six Bagatelles for String Quartet,* op. 9 (1911–13); *Sonata for Cello and Piano* (1914); *Three Small Pieces for Cello and Piano,* op. 11 (1914); *Trio Movement for Clarinet, Trumpet, and Violin* (1920); 2 string trio movements (1925); *String Trio,* op. 20 (1927); *Quartet for Violin, Clarinet, Tenor Saxophone and Piano,* op. 22 (1930); *Concerto for Nine Instruments,* op. 24 (1934); *String Quartet,* op. 28 (1937–38). Piano solo: *Sonatensatz* (*Rondo*) (*c.* 1906); *Satz* (*c.* 1906); *Kinderstück* (1924); *Klavierstück* (1925); *Variations,* op. 27 (1936).

Vocal compositions. Choral: *Entflieht auf leichten Kähnen,* op. 2 (1908); *Two Songs,* op. 19 (1926); *Das Augenlicht,* op. 26 (1935); *First Cantata,* op. 29 (1938–39); *Second Cantata,* op. 31 (1941–43). Voice with instrumental ensembles: *Two Songs,* op. 8 (1910); *Three Orchestral Songs* (1913–14); *Four Songs,* op. 13 (1914–18); *Six Songs,* op. 14 (1917–21); *Five Sacred Songs,* op. 15 (1917–22); *Five Canons on Latin Texts,* op. 16 (1923–24); *Three Folktexts,* op. 17 (1924); *Three Songs,* op. 18 (1925). Voice with piano: *Three Poems* (1899–1903); *Three Avenarius Songs* (1903–04); *Eight Early Songs* (1901–04); *Five Songs After Poems by Richard Dehmel* (1906–08); 3 groups of George songs, op. 3, 4 and op. posth. (1908–09); *Four Songs,* op. 12 (1915–17); *Three Songs,* op. 23 (1933–34); *Three Songs,* op. 25 (1934).

Arrangements (selected). Schoenberg, *Five Orchestral Pieces,* op. 16, for two pianos (1912); Schoenberg, *Kammersymphonie,* op. 9, arranged for flute (or violin), clarinet in A (or viola), violin, cello, and piano (1922); Liszt, *Arbeiterchor* (*Workmen's Chorus*) for bass solo, mixed chorus, and orchestra (1924); Webern, *Five Movements,* op. 5, transcribed for string orchestra (1929); Schubert, *German Dances,* arranged for orchestra (1931); Bach, *Ricercata* (*Ricercata*), *Musical Offering,* transcribed for orchestra (1935).

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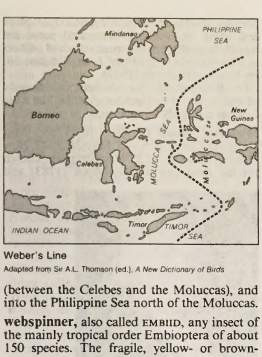
Weber's law, also called **WEBER–FECHNER LAW,** historically important psychological law quantifying the perception of change in a given stimulus. The law states that the change in a stimulus that will be just perceptible is a constant ratio of the original stimulus. It has been shown not to hold for extremes of stimulation.

The law was originally postulated to describe researches on weight lifting by the German physiologist Ernst Heinrich Weber in 1834 and was later applied to the measurement of sensation by Weber's student Gustav Theodor Fechner, who went on to develop from the law the science of psychophysics. By stating a relationship between the spiritual and physical worlds, the law indicated to Fechner that there is really only one world, the spiritual. To others, the law meant the possibility of a scientific, quantitative psychology. The combined work of Weber and Fechner has been useful, especially in hearing and vision research, and has had an impact on attitude scaling and other testing and theoretical developments.

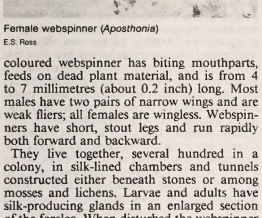
Weber's Line, hypothetical boundary between the Oriental and Australasian faunal regions, representing the apparent midline in the mixing of the two faunas. First proposed in 1902 as a replacement for Wallace's Line (*q.v.*) and modified by many subsequent investigators, Weber's Line extends from the Indian Ocean through the Timor Sea east of Timor, northward through the Molucca Sea



Weber's Line
Adapted from Sir A.L. Thomson (ed.), *A New Dictionary of Birds*

(between the Celebes and the Moluccas), and into the Philippine Sea north of the Moluccas.

webspinner, also called EMBIID, any insect of the mainly tropical order Embioptera of about 150 species. The fragile, yellow- or brown-



Female webspinner (*Aposthonia*)
E.S. Ross

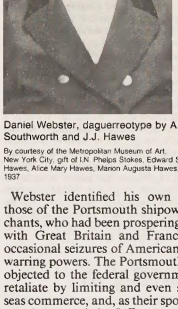
coloured webspinner has biting mouthparts, feeds on dead plant material, and is from 4 to 7 millimetres (about 0.2 inch) long. Most males have two pairs of narrow wings and are weak fliers; all females are wingless. Webspinners have short, stout legs and run rapidly both forward and backward.

They live together, several hundred in a colony, in silk-lined chambers and tunnels constructed either beneath stones or among mosses and lichens. Larvae and adults have silk-producing glands in an enlarged section of the foreleg. When disturbed the webspinner either retreats through its tunnels or pretends to be dead. The female cares for the large cylindrical eggs she lays, often covering them with particles of chewed food.

Webster, urban town (township), Worcester County, central Massachusetts, U.S., on the French River, 18 mi (29 km) south of Worcester city. Nearby, to the southeast, is Lake Chaubunagungamaug, a boundary fishing place (now usually called Lake Webster), 3 mi long, on the Connecticut line and the focus of a resort area. The lake's full name, Chargoggagoggmauchauggagoggchaubunagungamaugg, reportedly is Nipmuc Indian for "You fish your side of the lake; I fish my side; nobody fish in the middle." The town was settled around 1713 and named (1832) for the U.S. statesman and orator Daniel Webster. It was noted for its early textile mills, established in 1811. The arrival of the Norwich and Worcester Railroad in 1840 spurred further industrial development. The manufacture of textiles and shoes remains the economic mainstay. Nichols College (1815) is in nearby Dudley. Inc. 1832. Pop. (1990) 16,196.

Webster, Daniel (b. Jan. 18, 1782, Salisbury, N.H., U.S.—d. Oct. 24, 1852, Marshfield, Mass.), American orator and politician who practiced prominently as a lawyer before the U.S. Supreme Court and served as a U.S. congressman (1813–17, 1823–27), a U.S. senator (1827–41, 1845–50), and U.S. secretary of state (1841–43, 1850–52). He is best known as an enthusiastic nationalist and as an advocate of business interests during the period of the Jacksonian agrarianism.

Youth and early career. Born on the New Hampshire frontier in the town of Salisbury, Daniel was the ninth of 10 children of Ebenezer Webster, a Revolutionary War veteran, farmer and tavern-keeper, and leading townsman. Dark-complexioned "little Black Dan," a rather frail boy, became the pet of his parents and older brothers and sisters, some of whom taught him to read at an early age. He often entertained the family and the tavern guests with readings and recitations. As he grew older he attended classes at the various houses where the schoolmaster boarded in succession around the township. At 14 he spent part of a year at Phillips Academy in Exeter, and at 15 he entered Dartmouth College, where he excelled at public speaking. After graduation he taught school and read law, going to Boston and studying in the office of a prominent lawyer. He began his own practice near home but moved to Portsmouth in 1807, married Grace Fletcher, a clergyman's daughter, and soon became a prominent member of the thriving seaport's distinguished bar.



Daniel Webster, daguerreotype by A.S. Southworth and J.J. Hawes
By courtesy of the Metropolitan Museum of Art, New York City, gift of I.N. Phelps Stokes, Edward S. Hawes, Alice Mary Hawes, Manon Augusta Hawes, 1937

Webster identified his own interests with those of the Portsmouth shipowners and merchants, who had been prospering through trade with Great Britain and France, despite the occasional seizures of American ships by both warring powers. The Portsmouth businessmen objected to the federal government's effort to retaliate by limiting and even stopping overseas commerce, and, as their spokesman, Webster denounced the Jefferson administration's embargo as unconstitutional; he also opposed the declaration of war against Great Britain in 1812. That same year he was elected to the national House of Representatives as a member of the conservative pro-British Federalist Party, which favoured a strong, centralized government and encouragement of industries. He was twice reelected (1814, 1816). In Congress he resisted the passage of practically all war measures, including a conscription bill, which was voted down. Against conscription he took an extreme states-rights position, even hinting at nullification of federal laws when he said the state governments had a solemn duty to "interpose between their citizens and arbitrary power."

Rising lawyer and orator. In 1816 Webster moved with his wife and two children to the more promising metropolis of Boston. Thereafter, he represented the city's leading businessmen in the law courts and, from 1823 to 1827, again in the national House of Representatives. He became one of the most highly paid lawyers, if not the most highly paid lawyer, in the entire country.

Arguing a series of important cases before the Supreme Court, he influenced a number of Chief Justice John Marshall's opinions and, through them, the development of constitutional law. In *Dartmouth College* v. *Woodward* (1819) he maintained that a state's grant of a charter to do business was a contract that the state could not impair. In *McCulloch* v. *Maryland* (1819) he contended that a state could not tax a federal agency (a branch of the Bank of the United States), for the power to tax was a "power to destroy." In *Gibbons* v. *Ogden* (1824) he argued that a state could not encroach upon the congressional power to regulate interstate commerce. In arguing these and other cases—which had the effect of enlarging the authority of the federal government while encouraging corporate enterprise—Webster appears to have forgotten his recent states-rights arguments in opposition to the War of 1812.

Defense of the Constitution. He nevertheless remained a strict constructionist of the Constitution on the tariff question, opposing the protective tariffs of 1816 and 1824, which were harmful to the dominant commercial interests of New England. He reasoned that such a stimulus to manufacturers was both unconstitutional and inexpedient, for Congress had been given the power to levy duties only for raising revenue, and the growth of factories would create a propertyless working class that would threaten society. Inspired by political theorists, ancient and modern, he declared that "power *naturally* and *necessarily* follows property," adding that property must remain diffused if widespread suffrage is to be safely maintained. These ideas Webster expressed on various occasions, including, in 1820, the bicentennial celebration of the landing at Plymouth of the "Mayflower" carrying the first permanent settlers in North America, where he gave the first of several occasional addresses that were to bring him fame as America's peerless orator.

In 1827, now a senator from Massachusetts, Webster started for Washington with his wife, but she died on the way. Rather shy and plain, she had usually remained at home to look after her five children, only three of whom survived her (and only one of whom was to survive Webster himself). After two years, at 47, he married Caroline Le Roy, 31, the pretty and vivacious daughter of a New York merchant. His second wife was less inclined than the first to restrain her husband's propensities for high living and careless spending.

With the rise of textile mills, Massachusetts had acquired a large and powerful manufacturing interest, and Webster voted for the Tariff of 1828. Then and thereafter, as a leading protectionist, he refuted his former arguments against the tariff. He now found a constitutional sanction for it in the congressional power to regulate commerce and a social justification for it in the claim that it would diffuse property by stimulating a general prosperity. But South Carolinians blamed the tariff for their economic difficulties, and in 1830 a South Carolina senator, Robert Y. Hayne, presented the theory postulated by Vice Pres. John C. Calhoun that a state could nullify such an obnoxious and unconstitutional law and, as a last resort, could secede from the Union. In his second reply to Hayne, Webster eloquently defended the powers of the federal government as opposed to the alleged rights of the states. He concluded with the appeal: "Liberty *and* Union, now and forever, one and inseparable!" The speech made him a hero of nationalists throughout the North. In 1832–33, when South Carolina, under the leadership

of the nullification theory's author, John C. Calhoun, now a senator from South Carolina, undertook to put the theory into practice, Webster, though an opponent of Pres. Andrew Jackson, supported him in resisting the attempt.

Whig leadership. After the nullification crisis had been settled, Webster made overtures for a political alliance with Jackson, an alliance that presumably would have brought Webster to the presidency as Jackson's successor. But the two men disagreed on many issues, especially on the question of the Bank of the United States, which Jackson attacked as a dangerous and undemocratic monopoly and which Webster served in the capacities of legal counsel, director of the Boston branch, and Senate champion, along with Henry Clay of Kentucky. Clay and Webster emerged as leaders of the Whig Party, a rather heterogeneous group opposed to Jackson and the Democrats. The Whigs failed to get the bank rechartered and thus lost the "Bank War."

Identified with the unpopular bank and stigmatized as a friend of the rich, Webster carried only his own state when he ran as one of three Whig presidential candidates in 1836. In 1841, however, he was appointed secretary of state after the Whigs had won the election with an Ohio war hero, William Henry Harrison, and a renegade Virginia Democrat, John Tyler, as vice president. After Harrison's death, Webster remained in Tyler's Cabinet, even though Clay induced the other members to resign in protest against Tyler's antibank and antitariff stand.

Webster again had hopes of forming a new political combination, this time with Tyler. He also hoped to arrange a settlement of the Maine boundary dispute and other controversies with Great Britain. This he succeeded in doing by means of the Webster–Ashburton Treaty (1842), for which he gained popular approval with newspaper propaganda he paid for with secret State Department funds. But he had no chance to realize the dream of a Tyler–Webster party, and he left the Cabinet in 1843.

To persuade Webster to go back to the Senate in 1845, the businessmen of Boston and New York raised a fund to supplement his income, as they had done on previous occasions. House Democrats charged that he was "the pensioned agent of the manufacturing interest." Along with other Whigs in Congress, he accused Pres. James K. Polk of manoeuvring the country into war with Mexico, and he demanded that the war (in which one of his sons died) be brought to an early end. Some of his colleagues supported the Wilmot Proviso—to prohibit slavery in all lands acquired from Mexico—but he went even further and opposed the acquistion of any territory.

Advocate of sectional compromise. During the postwar sectional crisis he nevertheless spoke out, March 7, 1850, in favour of Clay's compromise proposals, one of which would organize territories in the Mexican cession with no prohibition of slavery. His argument that such a prohibition was unnecessary because the West was geographically unsuitable for the plantation system pleased businessmen but infuriated anti-slavery Whigs. As secretary of state in Pres. Millard Fillmore's Cabinet, 1850–52, he used all the influence at his disposal in trying to enforce the provision of the Compromise of 1850 that was most unpopular in the North—the new law for the return of fugitive slaves. He was prompted by the belief that conservatives in both the North and the South might combine in a "Union" Party to make him president in 1852, and he could not restrain his bitterness when his presidential ambition was again thwarted.

For years it had been his custom, when frustrated in politics, to seek refuge in the avocation of gentleman farmer, an expensive hobby that helped to keep his personal finances precarious. He owned farms in several states, but his favourite was the one located at Marshfield on the Massachusetts coast. And there, in 1852, he died.

Assessment. During the first generation after his death, former Abolitionists and their sympathizers, remembering Webster's support of the Compromise of 1850, often pictured him as a man whose career had come to ruin because of his character defects. The memoirs of Pres. John Quincy Adams, published in the 1870s, contained a reference to "the gigantic intellect, the envious temper, the ravenous ambition, and the rotten heart of Daniel Webster." Meanwhile, his former intimates recalled him as the "godlike Daniel," a man of irresistible charm as well as surpassing statesmanship. Some writers said his patriotic phrases inspirited the Union during the Civil War, and certainly Abraham Lincoln echoed a number of those phrases.

During the second generation after Webster's death, his fame as a nationalist came to prevail over his disrepute as a compromiser. School-children recited his second reply to Hayne, and most Americans considered him the greatest of the "great triumvirate"—Webster, Calhoun, and Clay.

By the second half of the 20th century Webster had ceased to be as well known or as highly rated. Still, he remained a timely figure on account of his conservative philosophy. Like him, the later spokesmen for business assumed that government could promote the general welfare by aiding corporate enterprise. They could have invoked his authority, but they seldom quoted or even mentioned him. (R.N.C.)

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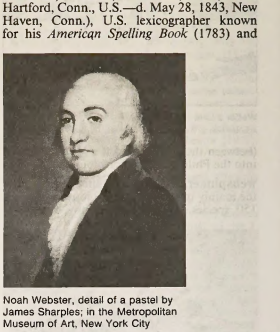
Articles are alphabetized word by word, not letter by letter

Webster, John (b. *c.* 1580—d. *c.* 1625), English dramatist whose *The White Divel* and *The Duchess of Malfi* are generally regarded as the paramount 17th-century English tragedies apart from those of Shakespeare.

Little is known of Webster's life. His preface to *Monuments of Honor,* his Lord Mayor's Show for 1624, says he was born a freeman of the Merchant Taylors Company. Possibly he was an actor who became a playwright later in life. He may be the John Webster mentioned among the English Comedians under Robert Browne in the service (1595) of the German landgrave Maurice of Hesse-Kassel, or the John Webster who was admitted to the Middle Temple in 1598. He was probably dead by 1634. Apart from his two major plays and *Appius and Virginia* (*c.* 1608) and *The Devils Law-case* (*c.* 1620; published 1623), his dramatic work consists of collaborations (not all extant) with leading writers, including Thomas Dekker (chiefly), Thomas Middleton, Michael Drayton, John Ford, and perhaps Phillip Massinger. Eight extant plays and some nondramatic verse and prose are wholly or partly his; the most standard edition is *The Complete Works of John Webster,* ed. by F.L. Lucas, 4 vol. (1927).

The White Divel, like *Macbeth,* is a tragedy of action; and *The Duchess of Malfi,* like *King Lear,* is a tragedy of suffering.

Webster, Noah (b. Oct. 16, 1758, West Hartford, Conn., U.S.—d. May 28, 1843, New Haven, Conn.), U.S. lexicographer known for his *American Spelling Book* (1783) and



Noah Webster, detail of a pastel by James Sharples; in the Metropolitan Museum of Art, New York City

By courtesy of the Metropolitan Museum of Art, New York City; bequest of Charles Allen Munn, 1924

his *American Dictionary of the English Language,* 2 vol. (1828; 2nd ed. 1840). Webster was instrumental in giving American English a dignity and vitality of its own. Both his speller and dictionary reflected his principle that spelling, grammar, and usage should be based upon the living, spoken language rather than on artificial rules. He also made useful contributions as a teacher, grammarian, journalist, essayist, lecturer, and lobbyist.

Noah Webster was born at West Hartford, Conn., in 1758. He entered Yale in 1774, interrupted his studies to serve briefly in the U.S. War of Independence, and was graduated in 1778. He taught school, did clerical work, and studied law, being admitted to the bar in 1781.

While teaching in Goshen, N.Y., in 1782, Webster became dissatisfied with texts for children that ignored the American culture, and he began his lifelong efforts to promote a distinctively American education. His first step in this direction was preparation of *A Grammatical Institute of the English Language,* the first part being *The American Spelling Book* (1783), the famed "Blue-Backed Speller," which has never been out of print. The spelling book provided much of Webster's income for the rest of his life, and its total sales have been estimated as high as 100,000,000 copies or more.

A grammar (1784) and a reader (1785) completed the *Institute.* The grammar was based on Webster's principle (enunciated later in his dictionary) that "grammar is formed on language, and not language on grammar." Although he did not always follow this principle and often relied on analogy, reason, and true or fanciful etymology, his inconsistencies were no greater than those of his English contemporaries. He spoke of American English as "Federal English," always contrasting the superior usage of the yeoman of America with the alleged affectations of London. The reader consisted mainly of American selections chosen to promote democratic ideals and responsible moral and political conduct.

The absence of a federal copyright law until 1790 and discrepancies among the state laws left the author of a popular book open

to piracy unless he exerted strenuous efforts. Webster's letters to various state legislatures reflect his activity on his own behalf, and he travelled widely, lobbying for uniform copyright laws and teaching, lecturing, and giving singing lessons to help support himself. In 1787 he founded the short-lived *American Magazine* in New York City. This publication combined literary criticism with essays on education, government, agriculture, and a variety of other subjects. After his marriage in 1789, Webster practiced law in Hartford until 1793, when he founded in New York a pro-Federalist daily newspaper, *The American Minerva,* and a semi-weekly paper, *The Herald,* which was made up of reprinted selections from the daily. He sold both papers in 1803.

Webster wrote on many subjects: politics ("Sketches of American Policy," 1785, sometimes called the first statement of the U.S. Constitution), economics, medicine, physical science, and language. He noted the living language as he travelled but with varying degrees of approbation, according to the degree of correspondence between what he heard and what he himself used. His early enthusiasm for spelling reform abated in his later works, but he is largely responsible for the differences that exist today between British and U.S. spelling. Although he was himself assailed for including slang and jargon in his dictionary, Webster was extremely touchy about the common taboo words. He commented often on the vulgarity of some of the words and citations in Samuel Johnson's *Dictionary* (1755), and in later life he published an expurgated version of the Bible in which euphemism replaced the franker statements of the Authorized Version.

Webster moved in 1798 to New Haven, where he was elected to the Common Council and remained active in local politics for the rest of his life. He was a founder of the Connecticut Academy of Arts and Sciences, a member of the Massachusetts legislature, and a participant in founding Amherst Academy and Amherst College.

In 1806 Webster published his *Compendious Dictionary of the English Language.* Though it was no more than a preparation for his later dictionary, it contained not only about 5,000 more words than Johnson's dictionary but also a number of innovations, including perhaps the first separation of *i* and *j,* and of *u* and *v,* as alphabetical entities. He started work on the *American Dictionary* in 1807, acquiring at least a nodding acquaintance with about 20 languages and travelling in France and England in 1824–25 in search of materials unavailable to him in the United States. His attempts to find plausible etymologies, however, were not supported by investigation of the actual state of linguistic knowledge.

The first edition of *An American Dictionary of the English Language* was published in two volumes in 1828, when Webster was 70 years old. It comprised 2,500 copies in the U.S. and 3,000 in England, and it sold out in little more than a year, despite harsh attacks on its "Americanisms," its unconventional preferences in spelling, its tendency to advocate U.S. rather than British usage and spelling, and its inclusion of nonliterary words, particularly technical terms from the arts and sciences. The dictionary contained about 70,000 entries and between 30,000 and 40,000 definitions that had not appeared in any earlier dictionary. Despite his frequent disparagement of Johnson, his indebtedness to Johnson's literary vocabulary is apparent in both definitions and citations. The *American Dictionary* was relatively unprofitable, and the 1841 revision was not successful. The rights were purchased from Webster's estate by George and Charles Merriam.

Webster died in 1843 and was buried in a cemetery adjacent to the Yale campus. A controversialist in his youth—quick to defend his literary efforts and to demolish his critics—and a conservative in religion and in politics in his later years, he was the last lexicographer of the English language to be remembered for his personality and as a public figure as well as for his work. (R.McD.)

BIBLIOGRAPHY. Biographies of Webster are few; best known is Harry R. Warfel's flamboyant *Noah Webster, Schoolmaster to America* (1936, reprinted 1966). More limited in scope and more accurate in its judgments is Ervin E. Shoemaker's dissertation *Noah Webster: Pioneer of Learning* (1936). Less a biography than raw material for one is the two-volume *Notes on the Life of Noah Webster* (1912, reprinted 1971), compiled by Emily Ellsworth Fowler Ford (Webster's granddaughter) and edited by her daughter Emily Ellsworth Ford Skeel; it contains many letters and diary entries (a selection of Webster's letters, ed. by Harry R. Warfel, was published in 1953). Horace E. Scudder, *Noah Webster* (1882; 6th ed., 1971), is relatively superficial. The exhaustive *Bibliography of the Writings of Noah Webster* (1958), including unfinished and unpublished work, was compiled by Skeel and edited by Edwin H. Carpenter, Jr. The evolution of the Webster dictionaries is surveyed (admittedly with some corporate bias) by Robert Keith Leavitt, *Noah's Ark, New England Yankees, and the Endless Quest* (1947), a volume celebrating the 100th anniversary of the Merriam dictionaries. Treatments of Webster's work and influence appear in almost every work on American English and on lexicography. For shorter studies, see the standard bibliographies, especially those in *American Speech* (quarterly).

Webster–Ashburton Treaty (1842), treaty between the U.S. and Great Britain establishing the northeastern boundary of the U.S. and providing for Anglo–U.S. cooperation in the suppression of the slave trade. The treaty established the present boundary between Maine and New Brunswick, granted the U.S. navigation rights on the St. John River, provided for extradition in enumerated nonpolitical criminal cases, and established a joint naval system for suppressing the slave trade off the African coast. The treaty was negotiated by Daniel Webster, at that time secretary of state, and Alexander Baring, 1st Baron Ashburton.

Webster City, city, seat of Hamilton County, central Iowa, U.S., on the Boone River. It was settled in 1850 by Wilson C. Brewer and known as Newcastle until 1856, when it became the county seat and was named after the owner of a stagecoach line between Belmont, Wis., and Fort Dodge, Iowa. The city is both a rail junction and trading centre. Manufactures include washing machines, frozen foods, farm equipment, and metal castings. It is the seat of Iowa Central Community College (founded 1966). Inc. 1874. Pop. (1990) 7,894.

Wechsler, David (b. Jan. 12, 1896, Lespedi, Rom.—d. May 2, 1981, New York City), U.S. psychologist and inventor of several widely used intelligence tests for adults and children.

Wechsler studied at the City College of New York and Columbia University, receiving his doctorate in 1925, and then began a long association with Bellevue Psychiatric Hospital in New York City, serving as chief psychologist from 1932 to 1967. In 1939 he produced a battery of intelligence tests known as the Wechsler–Bellevue Intelligence Scale. The original battery was geared specifically to the measurement of adult intelligence, for clinical use. He rejected the idea that there is an ideal mental age against which individual performance can be measured, and he defined normal intelligence as the mean test score for all members of an age group; the mean could then be represented by 100 on a standard scale. The Wechsler–Bellevue test quickly became the most widely used adult-intelligence test in the United States, and in 1942, Wechsler issued his first revision. The Wechsler Intelligence Scale for Children was published in 1949 and updated in 1974. In 1955 Wechsler developed yet another adult-intelligence test, the Wechsler Adult Intelligence Scale (WAIS), with the same structure as his earlier scale but standardized against a different population, including 10 percent nonwhites to reflect the general population. The earlier test had been standardized for an all-white population. The WAIS was revised in 1981, shortly before Wechsler's death. The last of his intelligence tests, the Wechsler Preschool and Primary Scale of Intelligence, was issued in 1967 as an adaptation of the children's scale for use with very young children.

Weddell, James (b. Aug. 24, 1787, Ostend, Austrian Netherlands—d. Sept. 9, 1834, London), British explorer and seal hunter who set a record for navigation into the Antarctic and for whom the Weddell Sea is named.

Weddell commanded the sealing brig "Jane" on three Antarctic voyages, the success of the first (1819–21) permitting him to buy a share in the vessel. On the second voyage (1821–22) he visited the island of South Georgia, east of the tip of South America, as well as the South Shetland Islands. In February 1822 he visited and named the South Orkney Islands. On his third voyage (1822–24) he surveyed the South Shetlands and the South Orkneys and then sailed southward in search of new land. Aided by unusually open ice conditions, he reached 74°15′ S in the sea that was later named for him, exceeding Capt. James Cook's record of southernmost exploration by more than three degrees. He left a record of his exploration in *A Voyage Towards the South Pole* (1825).

Weddell Sea, deep embayment of the Antarctic coastline that forms the southernmost tip of the Atlantic Ocean. Centring at about 73° S, 45° W, the Weddell Sea is bounded on the west by the Antarctic Peninsula of West Antarctica, on the east by Coats Land of East Antarctica, and on the extreme south by frontal barriers of the Filchner and Ronne ice shelves. It has an area of about 1,080,000 sq mi (2,800,000 sq km).

The Weddell Sea is usually heavily iced, the pack generally extending north to about 60° S in the western and central sectors in early summer, a factor that severely hindered early ship exploration. On Feb. 23, 1820, the British brig "Williams," on one of the first attempts at penetration, was stopped by ice off the coast of northeastern Graham Land. In the same year pack ice stopped the Russian ship "Vostok" just south of the South Sandwich Islands. On Feb. 20, 1823, a British explorer and sealer, James Weddell, on the brig "Jane," found an unusually open route southeastward from the South Orkney Islands and reached a farthest south position of 74°15′ S, 34°17′ W. The name bestowed by Weddell, George IV Sea, was abandoned when, in 1900, it was proposed that the sea be named after its discoverer.

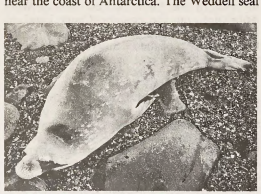
Few attempts to penetrate the pack's fringes followed, until 1903 and 1904 when William S. Bruce in the ship "Scotia," of the Scottish National Antarctic Expedition (1902–04), undertook the first oceanographic exploration of the Weddell Sea. Luitpold Coast of western Coats Land was charted by the "Deutschland" on the German South Polar Expedition of 1910–12 under Wilhelm Filchner, and the ice shelf was seen but now bears his name. While attempting to leave a party off for a first crossing of Antarctica, the "Endurance" of the British Imperial Trans-Antarctic Expedition (1914–17) under Ernest Shackleton was trapped in pack ice off Luitpold Coast on Jan. 18, 1915, and eventually crushed. Although the ship was destroyed, its entire crew escaped to be later rescued from Elephant Island. During 1956–58, a number of bases for the International Geophysical Year were established along the southern and southeast coast.

Severe weather and icing conditions still restrict oceanographic exploration of this region, and much less is therefore known of the floor and water masses of the Weddell Sea than of most other Antarctic seas. Modern icebreakers now support increasing exploration of the region.

The generally narrow Antarctic continental shelf widens to more than 150 miles (240 km) along the Antarctic Peninsula and up to about 300 miles (480 km) along the southern edge of the Weddell Sea. Marking the edge of the continent, the break between shelf and continental slope lies at a depth of about 1,600 feet (500 m). This unusually great depth for a continental margin may result from the tremendous ice load imposed on the Antarctic crust. The Luitpold Coast shelf is much narrower, its floor dropping sharply off into a deep channel that extends southwestward to and beneath the Filchner Ice Shelf and probably onward to a deep glacier-filled valley along the west side of the Pensacola Mountains.

Since the Weddell Sea is well within the Antarctic climatic zone, its fauna is that typical of other Antarctic regions—penguins, Weddell seals, petrels, and the like. Far more than half of the cold oceanic bottom waters of the world are of Antarctic origin, and most are produced in the depths of the Weddell Sea. Surface-water currents move generally clockwise around the sea, southwestward along Coats Land and thence northward along the Antarctic Peninsula, eventually to meet the prevailing West Wind Drift.

Weddell seal (species *Leptonychotes weddelli*), nonmigratory, earless seal (family Phocidae) found around the South Pole, on or near the coast of Antarctica. The Weddell seal



Weddell seal (*Leptonychotes weddelli*)
George Holton—Photo Researchers

is a rotund animal growing to about 3 m (10 feet) in length and about 400 kg (880 pounds) in weight; the female is larger than the male. It is gray-coated as a pup and as an adult is dark gray above, lighter below, and marked with pale blotches. The Weddell seal lives alone or in groups and feeds on fish, cephalopods, and other marine animals. An accomplished diver, it has been known to remain submerged for 43 minutes, 20 seconds and to descend to 600 m. It winters under the ice, keeping breathing holes open by gnawing with its canine and incisor teeth.

Weddigen, Otto (b. Sept. 15, 1882, Herford, Westphalia, Ger.—d. March 18, 1915, at sea off the Moray Firth, Scotland), German submarine commander whose feat of sinking three British armoured cruisers in about an hour, during the second month of World War I, made him one of the most famous of submarine heroes.

Weddigen entered the German navy in 1901 and participated from the beginning in the development of the U-boat force, which he led by the beginning of the war in August 1914. Off the Dutch coast on Sept. 22, 1914, Weddigen's U-9 torpedoed first the *Aboukir* and then, when they stopped to rescue survivors,



Weddigen
Ullstein Bilderdienst, Berlin

the *Hogue* and the *Cressy,* with a combined loss of 1,400 men. On Oct. 15, 1914, the U-9 sank the cruiser *Hawke* off Scotland, costing the British 500 more lives. Afterward, Weddigen commanded a more modern submarine, the U-29, which was lost with all hands when it was rammed by the British battleship *Dreadnought* off the Moray Firth, Scotland, in March 1915.

Wedekind, Frank, original name BENJAMIN FRANKLIN WEDEKIND (b. July 24, 1864, Hannover, Hanover [Germany]—d. March 9, 1918, Munich, Ger.), German actor and dramatist who became an intense personal force in the German artistic world on the eve of World War I. A direct forebear of the modern Theatre of the Absurd, Wedekind employed episodic scenes, fragmented dialogue, distortion, and caricature in his dramas, which formed the transition from the realism of his age to the Expressionism of the following generation.

The son of a German-American father and a Swiss mother, Wedekind lived in Switzerland from 1872 to 1884, when he moved to Munich, where he remained until his death. He was successively an advertising manager, a secretary of a circus, a journalist for the satirical weekly *Simplicissimus,* a cabaret performer, and the producer of his plays. The electric quality of his personality has been attested by his contemporaries.

Wedekind's characteristic theme in his dramas was the antagonism of the elemental force of sex to the philistinism of society. In 1891 the publication of his tragedy *Frühlings Erwachen* (*The Awakening of Spring*) created a scandal. Successfully produced by Max Reinhardt in 1905, the play is a series of brief scenes, some poetic and tender, others harsh and frank, dealing with the awakening



Wedekind, 1918
Bavaria-Verlag

of sexuality in three adolescents. In the "Lulu" cycle, *Erdgeist* (1895; *Earth Spirit*) and *Die Büchse der Pandora* (1904; *Pandora's Box*), he extended the theme of sex to the underworld of society and introduced the eternal, amoral femme fatale Lulu, who is destroyed in the tragic conflict of sexual freedom with hypocritical bourgeois morality. These two tragedies inspired Alban Berg's opera *Lulu.*

Wedekind's other plays include Der *Kammersänger* (1899; "The Court Singer"), *Der Marquis von Keith* (1900; *The Marquis of Keith*), *König Nicolo oder So ist das Leben* (1901; *Such Is Life*), *Hidalla* (1904), and *Franziska* (1912). He also wrote poetry, novels, songs, and essays. His diary was posthumously published as *Die Tagebücher: ein erotisches Leben* (1986; *Diary of an Erotic Life*).

Wedel-Jarlsberg, (Johan Caspar) Herman, Count (Landgreve) (b. Sept. 2, 1779, Montpellier, Fr.—d. Aug. 27, 1840, Christiania, Nor.), Norwegian patriot and statesman. He was the leading advocate of Norwegian-Swedish union in the last years of the Danish-Norwegian state and the first Norwegian governor (statholder) in the Norwegian-Swedish union (1814–1905).

Early in the 19th century, as the Danish-Norwegian state was disintegrating under the strains of the Napoleonic Wars, Wedel-Jarlsberg served with distinction on a special Norwegian commission set up to sustain the nation while it was cut off by the British naval blockade from the vital services and supplies of Denmark. Successfully supplying food for the country in these years was his most notable feat. His experience convinced him that Norway's interests could best be secured in union with Sweden.

When Denmark ceded Norway to Sweden by the terms of the Treaty of Kiel (January 1814), Wedel headed the "Union party," which favoured some sort of affiliation with the Swedes. The majority "Independent party," however, was established to defy the Kiel treaty and to achieve complete independence for Norway. Wedel's group joined the majority at the April 10, 1814, constituent assembly at Eidsvold, and he sat on the "Committee of Fifteen," which drafted the constitution. Military resistance to the Swedes in the summer of 1814 proved futile; and a compromise was reached, resulting in a personal union of the two states that lasted until 1905.

After the formation of the union, Wedel served as finance minister in the Norwegian government, always vigilant of Norway's status in the dual state. In 1836 he was the first Norwegian to become governor of Norway within the union.

Consult the INDEX *first*

wedge, in mechanics, device that tapers to a thin edge, usually made of metal or wood, and used for splitting, lifting, or tightening, as to secure a hammer head onto its handle. Along with the lever, wheel and axle, pulley, and screw, the wedge is considered one of the five simple machines.

The wedge was used in prehistoric times to split logs and rocks; for rocks, wooden wedges, caused to swell by wetting, were employed. In terms of its mechanical function, the screw may be thought of as a wedge wrapped around a cylinder.

Wedgwood, Josiah (baptized July 12, 1730, Burslem, Staffordshire, Eng.—d. Jan. 3, 1795, Etruria, Staffordshire), English pottery designer and manufacturer, outstanding in his scientific approach to pottery making and known for his exhaustive researches into materials, logical deployment of labour, and sense of business organization.

The youngest child of the potter Thomas Wedgwood, Josiah came from a family whose members had been potters since the 17th century. After his father's death in 1739, he worked in the family business at Church-

yard Works, Burslem, becoming exceptionally skillful at the potter's wheel and, in 1744, an apprentice to his elder brother Thomas. An attack of smallpox seriously curtailed his work (the disease later affected his right leg, which was then amputated); the consequent inactivity, however, enabled him to read, research, and experiment in his craft. After Thomas refused his proposal for partnership *c.* 1749, Josiah, after a brief partnership (1752–53) with John Harrison at Stoke-on-Trent, Staffordshire, joined, in 1754, with Thomas Whieldon of Fenton Low, Staffordshire, probably the leading potter of his day. This became a fruitful partnership, enabling Wedgwood to become a master of current pottery techniques. He then began what he called his "experiment book," an invaluable source on Staffordshire pottery.

After inventing the improved green glaze still popular today, Wedgwood terminated his partnership with Whieldon and went into business for himself at Burslem, first at the Ivy House factory, where he perfected cream-coloured earthenware that, because of Queen Charlotte's patronage in 1765, was called Queen's ware. Well finished and clean in appearance with simple decoration, Queen's ware became, by virtue of its durable material and serviceable forms, the standard domestic pottery and enjoyed a worldwide market. On one of his frequent visits to Liverpool, he met the merchant Thomas Bentley in 1762. Because his enterprise had spread from the British Isles to the Continent, Wedgwood expanded his business to the nearby Brick House (or Bell Works) factory. In 1768 Bentley became his partner in the manufacture of ornamental items that were primarily unglazed stonewares in various colours, formed and decorated in the popular style of Neoclassicism, to which Josiah lent great impetus. Chief among these wares were black basaltes, which by the addition of red encaustic painting could be used to imitate Greek red-figure vases; and jasper, a fine-grained vitreous body resulting from the high firing of paste containing barium sulphate (cauk). For his ornamental vases, Wedgwood built a factory called Etruria, to which the manufacture of useful wares was also transferred *c.* 1771–73 (there his descendants carried on the business until 1940, when the factory was relocated at Barlaston, Staffordshire). The most famous artist he employed at Etruria was the sculptor John Flaxman, whose wax portraits and other relief figures he translated into jasperware.

Wedgwood's accomplishments were enormous and diversified. His wares appealed particularly to the rising European bourgeois class, and porcelain and faience factories suffered severely from competition with him. Surviving factories switched to the manufacture of creamware (called on the Continent *faience fine* or *faience anglaise*), and the use of tin enamel abated. Even the great factories at Sèvres, Fr., and at Meissen, Ger., found their trade affected. Jasperwares were imitated in biscuit porcelain at Sèvres, and Meissen produced a glazed version called Wedgwoodarbeit. Evidence of the popularity of Wedgwood's creamware is found in the gargantuan service of 952 pieces made in 1774 for Empress Catherine the Great of Russia. Other wares followed jasper's introduction in 1775—rosso antico (red porcelain), cane, drab, chocolate, and olive wares—created by adding colouring oxides. Every kind of shape and function Wedgwood explored. His invention of the pyrometer, a device for measuring high temperatures (invaluable for gauging oven heats for firings), earned him commendation as a fellow of the Royal Society. Among the many brilliant scientists with whom he was friends or collaborated was Erasmus Darwin, who encouraged him to invest in steam-powered engines; thus in 1782 Etruria was the first factory to install such an engine. Wedgwood's daughter Susannah was the mother of Charles Darwin.

Wedgwood ware, English stoneware, including creamware, black basaltes, and jasperware, made by the Staffordshire factories originally established by Josiah Wedgwood at Burslem, at Etruria, and finally at Barlaston, all in Staffordshire. In the decade of its first production, the 1760s, Wedgwood ware attained



Wedgwood jasperware vase, Staffordshire, England, *c.* 1785; in the Victoria and Albert Museum, London

By courtesy of the Victoria and Albert Museum, London; photograph, Wilfrid Walter—EB Inc.

a world market, which it continues to hold. Wedgwood perfected cream-coloured earthenware (which had been improved earlier in the century by other potters) called creamware, or Queen's ware in consequence of royal patronage. Mass-produced, it was nevertheless of high quality, being light, durable, and tasteful both in its shapes and in its decoration, which was often in the popular Neoclassical style. It filled a long-felt need for good tableware that the middle class could afford, and it fixed for two centuries the prevailing taste for variants of cream-coloured domestic ware. Porcelain and tin-glazed earthenware factories both in England and abroad suffered from competition with Wedgwood's creamware. Surviving factories switched from the manufacture of tin-glazed ware, which died out, to the production of creamware. The revolution wrought by Wedgwood in the industry was helped by further factors: the act of 1763 that extended the Liverpool turnpike road to Burslem, thereby accelerating the transport both of raw materials from other parts of England and of the wares to their destination; and the invention by John Sadler and Guy Green in Liverpool in 1755 of transfer printing on pottery. Wedgwood purchased the right to use the technique in 1763, enabling the decoration to be done by comparatively unskilled workers. More elaborate and costly Wedgwood services, however, were decorated by hand.

While creamware was the staple product, Wedgwood fulfilled the demands of mid-18th-century antiquarian taste by developing, in 1768, a black, unglazed stoneware of fine texture called black basaltes. Hard enough to strike sparks on contact with steel, it had a mat finish after firing but could be polished and faceted, making it ideal for imitating antique and Renaissance objects. Basaltes seals, plaques, busts, and jewelry were produced as well as vases, which were sometimes painted with special enamel colours (called encaustic) to imitate Greek red-figure vases.

Also adapted to the Neoclassical taste was Wedgwood's jasperware, introduced in 1775, a white, matte, unglazed stoneware resembling biscuit porcelain and having ornamental potentialities similar to basaltes. It could, moreover, be stained many colours, from pale pastels (such as the famous pale blue) to stronger tints. Ornaments in white, made separately in molds, were applied to the body of the piece; the contrast of white on a coloured ground thus achieved was used in imitation of antique cameos of hardstone and glass (in which portions of the white top layer of glass are cut away, leaving the white figure in relief against the coloured underlayer). Employing outstanding artists of the day, such as the sculptor John Flaxman, Wedgwood copied innumerable antique designs, including the Roman Portland Vase. Jasperware was imitated in other European factories, notably at Sèvres.

Together with other Wedgwood wares, basaltes and jasperware are still produced in both old and modern designs at the Wedgwood factory, which moved to Barlaston, Staffordshire, in 1940.

Wednesday, fourth day of the week (*q.v.*).

weed, any plant growing where it is not wanted. Ever since human beings first attempted the cultivation of plants, they have had to fight the invasion by weeds into areas chosen for crops. Some unwanted plants later were found to have virtues not originally suspected and so were removed from the category of weeds and taken under cultivation. Other cultivated plants, when transplanted to new climates, escaped cultivation and became weeds. The category of weeds thus is ever changing, and the term is a relative one.

Because, for various reasons, weeds interfere with man's activities, many ways have been developed for suppressing or eliminating them. These methods vary with the nature of the weed itself, the means at hand for disposal, and the relation of the method to the environment. For financial reasons, methods used on a golf course or a public park cannot be applied on range land or in the forest. Chemicals sprayed on a roadside to eliminate unsightly weeds that constitute a fire or traffic hazard are not proper for use on cropland. And mulching, used to keep down weeds in a home garden, is not feasible on large farms. Weed control, in any event, has become a highly specialized activity employing thousands of trained persons. Universities and agricultural colleges teach courses in weed control, and industry provides the necessary technology. Governmental workers and private individuals are engaged daily in the practice of weed control because the growing of food and fibre crops depends on it for current levels of production.

The many reasons for controlling weeds become more complex with the increasing development of technology. Plants become weeds as a function of time and place. Tall weeds on roadsides were no problem in the horse-and-buggy days, but today they obscure vision on roads built for speed and make death traps of intersections. Sharp-edged grasses are nominal nuisances in a cow pasture; when the area is converted to a golf course or a public park, they become insufferable. Poison oak is rather a pleasant shrub on a sunny hillside in the open country; in a Boy Scout camp ground it is a definite health hazard. And nothing is more pleasant than the waving heads of grass on the hillside in spring. But when the hillside becomes a tank farm for storage of oil the fire hazard becomes serious in summer. Such examples could be given ad infinitum to cover every aspect of agriculture, forestry, highway, waterway and public land manage-

ment, arboretum, park and golf-course care, and finally home landscape maintenance.

Weeds compete with crop plants for water, light, and nutrients. Weeds of range lands and pastures may be unpalatable to animals, or even poisonous; they may cause injuries, as with lodging of foxtails (*Alopecurus* species) in horses' mouths; they may lower values of animal products, as in the cases of cockleburs (*Xanthium* species) in wool; they may add to the burden of animal care, as when horses graze in tarweeds (*Madia* species) and become covered with a black, sticky mess. Many weeds are hosts of plant disease organisms. Examples are prickly lettuce (*Lactuca scariola*) and sowthistle (*Sonchus* species) that serve as hosts for downy mildew; wild mustards (*Brassica* species) that host clubroot of cabbage; and saltbrush (*Atriplex* species) and Russian thistle, in which curly top virus overwinters, to be carried to sugar beets by leafhoppers. Many weeds are hosts of insect pests.

Modern weed control can be classified as mechanical, chemical, or biological.

Mechanical control. Mechanical weed control began when man first pulled weeds from his cereal crop and attempted to grow a single plant species, free from all plant competition. This was the start of monoculture, a method that since has come to dominate agriculture, but a process that opposes nature's way of growing plants. Contrary to the principles of ecology, farmers throughout the world grow the major food, fibre, and forage crops in a monoculture because experience has shown that the highly improved modern crop species give their highest yield under this system.

From hand pulling, man devised simple tools such as the spud, the knife, and the hoe to eliminate weeds. For thousands of years, from the Egyptian culture to the Renaissance, these simple methods were used. The first efforts to turn away from simple hand methods and mechanize the arduous task of weed control began in 17th-century England. Since then there has been continuous improvement of agricultural tools used to destroy weeds and of cultural methods employed to minimize weed growth. The principal virtue of cultivation of row crops is the control of weeds. And any method of weed control that minimizes tillage tends to conserve soil structure and maintain fertility.

In addition to tillage, other mechanical methods of weed control involve burning, grazing, the use of ducks or geese in certain crops (in cotton and mint especially), and electrovating, applying a strong electrical current. All of these methods have drawbacks: there is the arduous, painful nature of hand weeding; the repetitious and often harmful nature of clean tillage with machinery; the slow, fuel-consuming nature of burning; and the costly requirement of livestock or fowl for the biological grazing methods. Tillage, still the most widely used method of row-crop weed control, has been greatly improved by development of precision seeding and close preadjustment of tiller tools, allowing the passage of weed knives within an inch or less of the young crop plants. Despite these improvements it is known that weed knives injure crop roots, especially late in the tillage season. And where perennial weeds occur, tillage tools spread these rapidly, bringing about rapid infestation of whole fields.

Such methods as crop rotation, use of smother crops, use of weedfree seed, mulching and covering, and cleaning of machinery to prevent spread of weed seeds are also classified as mechanical.

Chemical control. Chemical weed control (*see* herbicide) has been used for a very long time: sea salt, industrial by-products, and oils were first employed. Selective control of broad-leaved weeds in fields of cereal crops was discovered in France in the late 1800s, and this practice soon spread throughout Europe. Sulfates and nitrates of copper and iron were used; sulfuric acid proved even more effective. Application was by spraying. Soon sodium arsenite became popular both as a spray and as a soil sterilant. On thousands of miles of railroad right-of-way, and in sugar and rubber plantations in the tropics, this hazardous material was used in tremendous quantities, often resulting in the poisoning of animals and occasionally humans. Diesel oil, as a general herbicide, and sodium dinitrocresylate (Sinox), as a selective plant killer, were introduced during the first three decades of the 20th century.

Sinox, the first major organic chemical herbicide, was developed in France in 1896. In the late 1940s new herbicides were developed out of the research during World War II, and the era of the miracle weed killers began. Within 20 years over 100 new chemicals were synthesized, developed, and put into use. Chemical weed control superseded both plant-disease and insect-pest control in economic importance. The year 1945 marked the beginning of a new era in chemical weed control. Introduced then were 2,4-D, 2,4,5,-T and IPC, the first two selective as foliar sprays against broad-leaved weeds, the third selective against grass species when applied through the soil. These new organic herbicides were revolutionary in that their high toxicity allowed for effective weed control at dosage rates as low as one to two pounds per acre. This contrasts with carbon bisulfide, borax, and arsenic trioxide, which were required at rates of up to one ton per acre, and with sodium chlorate, required at rates of around 100 pounds per acre.

Herbicides may be classified into two categories: selective and nonselective. Each category may be subdivided into foliage-applied and soil-applied materials and, in cases where field crops are treated, the application may be made before sowing the crop (preplanting), after sowing but before emergence of seedlings (pre-emergence), or after seedlings have emerged (postemergence).

A great advantage of chemical over mechanical weed control is the ease of application. This is particularly true in cereal croplands, pastures, rangelands, forests, and other situations where the airplane can be used. Many millions of acres are treated from the air each year, many under conditions that would not submit to any other method. And modern equipment for treating row-crop land with herbicides is making weed control increasingly convenient. Sprayers, soil incorporation equipment, and spreaders for pelleted herbicides are all adding to the convenience of, and removing uncertainty from, herbicide application. Machinery is available that simultaneously builds up beds, plants the seed, sprays with insecticide, and incorporates fertilizer and pre-emergence herbicide all in one operation. This is extremely popular on the modern mechanized farm.

A balanced view of recent developments in agriculture, however, includes some of the changes that affect human ecology. Pesticides in general have created problems through their persistence in soils and food chains. While most of these problems revolve around DDT and other chlorinated hydrocarbons, there has been interest in the possible injurious effects of 2,4,5-T, a herbicide of major importance in forest and range management.

Biological control. Efforts by man to control weeds biologically are a recent development. An early report from 1902 described the importation of insects from Mexico to Hawaii in an effort to control Lantana, an imported shrubby climbing weed that had spread over thousands of acres of pastureland, rendering them useless for grazing. Work has continued since this early attempt; additional insect species have been introduced, and this plant is slowly yielding to attacks by a number of introduced insects.

Prickly pear cacti have been very effectively controlled in Australia; some 60 million acres (24 million hectares) have been converted from cactus thicket to plowland and pasture by an insect, *Cactoblastis cactorum,* introduced from Argentina in 1925. By 1933 the major cactus areas were under control.

The next most successful use of biological weed control was in California, where St. Johnswort, locally called Klamath weed, was subjected to depredation by three insect species in 1945. Release of insects continued for a number of years, the effort being carried to Oregon, Washington, and Idaho by 1950. The insects spread rapidly after introduction, and recent reports indicate that some 2.5 million acres (1 million hectares) of rangeland have been reclaimed. Two insects of the genus *Chrysolina* and one of the genus *Agrilus* have become established, and St. Johnswort is considered to be in a satisfactory state of suppression. Many weed–insect relationships are now under study, and more instances of successful control are being recorded.

A number of vertebrate animals have been used to control certain specific weeds. Sheep and goats have been employed to control brushy plants on rangelands in many countries. Their effectiveness is evident in parts of the Middle East and Africa where dry range and desert lands have been almost completely denuded by grazing goats. In these cases, however, the destructiveness of the goats far outweighs their usefulness in plant pest control, which indicates the need for rational management in all efforts at weed control.

Geese have been used to control weeds in cotton fields in California and in mint plantations in Oregon. Certain fishes are useful in keeping aquatic plants under control; examples are the Congo tilapia, the Israeli carp, and the grass carp. The Florida manatee is known to consume many aquatic plants, and the snail *Marisa cornuarietis* feeds on alligator weed, pondweed, and water hyacinth.

Although much more desirable than chemical weed control from the standpoint of time-ecological effects, biological weed control has definite limitations. It is ideal for situations such as the cactus infestation in Australia, where a weedy plant was introduced free of its natural predators. There are places where it offers the only hope for coping with serious weed situations, for example, the control of *Halogeton,* a poisonous plant covering millions of acres of low-value land, and Canada thistle control in the north-central and northwestern United States, where millions of acres of forest, parkland, and agricultural lands are infested. On the other hand, the control by biological methods of many of the common annual weeds that occur in crops is out of the question, because the number and variety of species involved will not submit to safe introduction of suitable predators.

There are many disadvantages to biological control. Control using insects is limited almost entirely to perennial plants. Few insects can overwinter during the part of the annual cycle of an annual weed when the plant is dead and only seed carry over. Biological control is restricted mainly to weeds of uncultivated areas. The broad spectrum of weed species, the great number of seeds in the soil, and the fact that many weed seeds will live for decades in the soil all militate against success by biological agents in principal annual crops. In these cases cheap and effective herbicides have proved most useful.

The introduction of alien organisms is hazardous in that these same organisms may become pests in the new habitat. Kikuyu grass, which was introduced into California to prevent soil erosion on hillsides and roadways, soon spread into orchards, turf, and crop areas, where it became a serious weed.

Biological weed control tends to be only periodically effective. Experience has proved that the weed species, when subjected to control by insects, may be reduced initially to a very low level. The insects then die off for lack of food. Soon the weed recovers or becomes reestablished from seed. The predators then flourish; the weed is reduced and so on, through reciprocal cycles.

Weed, Thurlow (b. Nov. 15, 1797, Cairo, N.Y., U.S.—d. Nov. 22, 1882, New York, N.Y.), American journalist and politician who helped form the Whig Party in New York.

Weed learned the printer's trade, worked on various upstate New York newspapers, and became a leader in the Anti-Masonic Party (1828). When the Masons forced him out of his management of the *Rochester Telegraph,* he started an anti-Masonic campaign paper but soon realized that anti-Masonry was not a strong enough issue for a national party. Hence he became active with the Whig organization. His paper, the *Albany Evening Journal,* founded in 1830 to support anti-Masonry, became a leading Whig organ.

Weed allied himself with William H. Seward, a leading New York Whig, and was influential in Seward's election as governor of the state (1838). When the Whig Party disintegrated, Weed joined the new Republican Party and helped manage Seward's unsuccessful campaign for the Republican presidential nomination in 1860; he eventually became a staunch supporter of President Abraham Lincoln. In 1861 Seward, then Lincoln's secretary of state, sent Weed as a special agent to England, where he was a propagandist for the United States. Following Lincoln's death (1865) and the rise of the Radical Republicans, Weed's influence in the Republican Party declined. In 1863 he sold his paper and retired from politics.

Weehawken, township, Hudson county, northeastern New Jersey, U.S. It lies immediately north of Jersey City and opposite New York City, on the Hudson River. An industrial port, coal depot, and railroad centre, it is the western terminal of the Lincoln Tunnel. It was settled by the Dutch about 1647, when Maryn Adriadsen received patent for 80 morgens (169 acres [68 hectares]) of land. Prior to 1840, when Hudson county was formed, Weehawken was part of the Old Township of Bergen. Weehawken Township was incorporated in 1859. There are various theories about the derivation of its Indian place-name; one holds that it means "corn (maize) land," others allude to "rocks" and "gulls." Highwood, the estate of New York banker James Gore King, was the scene in 1804 of the duel in which Alexander Hamilton was fatally wounded by Aaron Burr. A bronze bust of Hamilton marks the site. The semicircular wall surrounding the Hamilton monument was built by King to protect his guest, author Washington Irving, from falling off the promontory where he liked to nap. Pop. (1990) 12,385.

week, period of seven days, a unit of time artificially devised with no astronomical basis. The origin of the term is generally associated with the ancient Jews and the biblical account of the Creation, according to which God laboured for six days and rested on the seventh. Evidence indicates, however, that the Jews may have borrowed the idea of the week from Mesopotamia, for the Sumerians and the Babylonians divided the year into weeks of seven days each, one of which they designated a day of recreation.

The Babylonians named each of the days after one of the five planetary bodies known to them and after the Sun and the Moon, a custom later adopted by the Romans. For a time the Romans used a period of eight days in civil practice, but in AD 321 Emperor Constantine established the seven-day week in the Roman calendar and designated Sunday as the first day of the week. Subsequent days bore the names Moon's-day, Mars's-day, Mercury's-day, Jupiter's-day, Venus'-day, and Saturn's-day. Constantine, a convert to Christianity, decreed that Sunday should be a day of rest and worship.

The days assigned by the Romans to the Sun, Moon, and Saturn were retained for the corresponding days of the week in English (Sunday, Monday, and Saturday) and several related languages. The other weekday names in English are derived from Anglo-Saxon words for the gods of Teutonic mythology. Tuesday comes from Tiu, or Tiw, the Anglo-Saxon name for Tyr, the Norse god of war. Tyr was one of the sons of Odin, or Woden, the supreme deity after whom Wednesday was named. Similarly, Thursday originates from Thor's-day, named in honour of Thor, the god of thunder. Friday was derived from Frigg's-day, Frigg, the wife of Odin, representing love and beauty, in Norse mythology.

Weeki Wachee Spring, spring in Hernando county, west-central Florida, U.S., 55 miles (89 km) north of St. Petersburg. One of the state's most popular attractions, the spring, with a depth of more than 140 feet (43 m), produces a crystal clear water flow of more than 168 million gallons (638 million litres) daily at a temperature of 70°–72° F (21°–22° C). With the development of underwater breathing techniques consisting of occasional trips by the underwater performers to free-floating air hoses, the spring (once a swimming and boating hole) was engineered and promoted as a showcase for an underwater ballet of "mermaids"—*i.e.,* female underwater swimmers. A large auditorium was built 16 feet (5 m) below the water's surface with thick plate-glass windows for viewing, and the first underwater show was presented in 1947. The spring, whose name derives from the Creek Indian words *wekiwa* ("spring") and *chee* ("little"), forms a river which meanders through the Weeki Wachee Swamp for 12 miles (19 km) to the Gulf of Mexico.

Weelkes, Thomas (b. *c.* 1570—d. Nov. 30, 1623, London, Eng.), English organist and composer, one of the most important of the English madrigal composers.

Nothing definite is known of Weelkes's early life. His later career suggests that he came from southern England. He may have been the Thomas Wikes who was a chorister at Winchester College from 1583 to 1584, since he was organist of Winchester from about 1598 to 1601. His finest work is in the two books of madrigals, of five and six parts, respectively, that appeared in 1600. He was appointed organist of Chichester Cathedral probably late in 1601. In 1602 he received the degree of bachelor of music at the University of Oxford, and the following year he married. From the time of his appointment at Chichester he composed mainly sacred works. In his last volume of madrigals (1608) he claimed the title "Gentleman of the Chapel Royal." From 1609 he was frequently reprimanded at Chichester for a variety of reasons, including bad language and drunkenness.

Nearly 100 of his madrigals survive. They have been said to combine the elegance of Luca Marenzio and the firm sense of tonality characteristic of Thomas Morley with the verbal sensitivity of William Byrd. Weelkes is noted for his word painting, lively rhythms, and highly developed sense of form and structure. He also wrote music for virginal, viol, and organ. His sacred compositions, largely unpublished, suffered much loss and destruction. Of Weelkes's 10 Anglican services none survives complete; three that have been reconstructed blend the solo writing of the English verse anthem with the massive antiphonal style of the Venetian school. Twenty-five of Weelkes's 41 anthems are either complete or restorable: the "full" anthems (with no solo verses) show him deploying large numbers of voices. His range of expression is illustrated by the airy song in the Italian madrigal style, the *balletto* "On the Plains Fairy Trains." Examples of the graver manner include the madrigal "O Care, Thou Wilt Despatch Me," noted for its chromaticism (use of notes outside the basic scale, for effects of colour or intensity), and the massive anthem *O Lord, Arise.*

The madrigals of Weelkes are published in vol. 9 to 13 of *The English Madrigal School,* ed. by E.H. Fellowes (1913–24).

Weems, Mason Locke, byname PARSON WEEMS (b. Oct. 11, 1759, Anne Arundel county, Md. [U.S.]—d. May 23, 1825, Beaufort, S.C.), American clergyman, itinerant book agent, and fabricator of the story of George Washington's chopping down the cherry tree. This fiction was inserted into the fifth edition (1806) of Weems's book *The Life and Memorable Actions of George Washington* (1800).

Weems was ordained in the Anglican church in 1784 and served as a pastor in Maryland until 1792. From 1794 he hawked books throughout the country as an agent for the publisher Mathew Carey. Weems also wrote a biography (1809) of General Francis Marion that, like that of Washington, was more noted for its apocryphal anecdotes and readability than its accuracy.

weever, any of four species of small marine fishes of the family Trachinidae (order Perciformes). Weevers are long-bodied fishes that habitually bury themselves in the sand. They have large, upwardly slanted mouths and eyes near the top of the head. There is a sharp spine on each gill cover; these spines, like those of the first dorsal fin, are associated with venom glands and can produce very painful wounds.

Three species of weevers are found in the Old World, and one in the New World, along the Chilean coast. Well-known species include the greater and lesser weevers (*Trachinus draco* and *T. vipera*), of both Europe and the Mediterranean.

weevil, also called SNOUT BEETLE, true weevil of the insect family Curculionidae. This family is not only the largest family of the order Coleoptera (about 40,000 species) but is also the largest family in the animal kingdom. Most weevils have long, elbowed antennae that may fold into special grooves on the prominent snout, which has mouthparts at its end. Many have no wings; others are excellent fliers. Most are less than 6 mm (0.25 inch) in length, although the largest exceed 80 mm (3 inches). Most are plainly coloured and marked; however, a few (*e.g.,* the diamond beetle *Entimus* of Brazil) are brightly coloured.

The majority of weevils feed exclusively on plants. The fleshy, legless larvae of most species feed only on a certain part of a plant—the flower head, seeds, fleshy fruits, stems, or roots. Many larvae feed either on a single plant species or on closely related ones. Adult weevils tend to be less specialized in their feeding habits.

Weevils have probably been successful because of the development of the snout, which is used not only for penetration and feeding but also for boring holes for eggs. This family includes some extremely destructive pests (*e.g.,* the grain weevil *Sitophilus granarius* and the rice weevil *S. oryzae*).

Wefers, Bernard J., Sr., byname BERNIE WEFERS (b. Feb. 19, 1873, Lawrence, Mass., U.S.—d. April 18, 1957, New York, N.Y.), American sprinter who held the world record for the 200-metre dash (straightaway; 1896–1921, though tied by five other runners) and

for the 220-yard dash (straightaway; 1896–1921, also tied by the same five runners).

Wefers ran for the New York Athletic Club and also coached for the club (1904–47). He held the Intercollegiate Association of Amateur Athletes of America championships for the 100-yard dash (1896–97). He is credited with having perfected the "shrug finish": throwing the body sideways across the finish line, with one arm high and the other back. His son, Bernard J., Jr., was a member of U.S. relay teams holding world records for the 4 × 110-yard relay (1921–23) and for the 4 × 220-yard relay (1921–27).

weft (weaving): *see* filling.

Wegener, Alfred Lothar (b. Nov. 1, 1880, Berlin, Ger.—d. November 1930, Greenland), German meteorologist and geophysicist who formulated the first complete statement of the continental drift hypothesis.

The son of an orphanage director, Wegener earned a Ph.D. degree in astronomy from the University of Berlin in 1905. He had meanwhile become interested in paleoclimatology, and in 1906–08 he took part in an expedition to Greenland to study polar air circulation. He made three more expeditions to Greenland, in 1912–13, 1929, and 1930. He taught meteorology at Marburg and Hamburg and was a professor of meteorology and geophysics at the University of Graz from 1924 to 1930. He died during his last expedition to Greenland in 1930.

Like certain other scientists before him, Wegener became impressed with the similarity in the coastlines of eastern South America and western Africa and speculated that those lands had once been joined together. In about 1910 he began toying with the idea that in the Late Paleozoic era (about 250 million years ago) all the present-day continents had formed a single large mass, or supercontinent, which had subsequently broken apart. Wegener called this ancient continent Pangaea. Other scientists had proposed such a continent but had explained the separation of the modern world's continents as having resulted from the subsidence, or sinking, of large portions of the supercontinent to form the Atlantic and Indian oceans. Wegener, by contrast, proposed that Pangaea's constituent portions had slowly moved thousands of miles apart over long periods of geologic time. His term for this movement was *die Verschiebung der Kontinente* ("continental displacement"), which gave rise to the term continental drift.

Wegener first presented his theory in lectures in 1912 and published it in full in 1915 in his most important work, *Die Entstehung der Kontinente und Ozeane* (*The Origin of Continents and Oceans*). He searched the scientific literature for geological and paleontological evidence that would buttress his theory, and he was able to point to many closely related fossil organisms and similar rock strata that occurred on widely separated continents, particularly those found in both the Americas and in Africa. Wegener's theory of continental drift won some adherents in the ensuing decade, but his postulations of the driving forces behind the continents' movement seemed implausible. By 1930 his theory had been rejected by most geologists, and it sank into obscurity for the next few decades, only to be resurrected as part of the theory of plate tectonics (*q.v.*) during the 1960s.

Wegener's granulomatosis, uncommon disorder marked by inflammation and necrosis (death of tissue) of small blood vessels. The disease commonly occurs in mid-adult life. Almost any organ may be affected, but most often the diseased vessels are in the respiratory tract, kidneys, and spleen. The lesions closely resemble those in polyarteritis nodosa (*q.v.*). The disease is of unknown cause but is believed to involve hypersensitivity. A runny nose, nosebleeds, and symptoms suggestive of chronic inflammation of the sinuses are among the first indications of the disease. Subsequently, inflammation of blood vessels becomes widespread. Death occurs in a matter of months, most often from kidney damage. There is evidence that survival can be prolonged by administration of cytotoxic drugs and possibly also adrenal steroids—hormones secreted by the outer substance of the adrenal glands or synthetic substitutes for these hormones.

Wehlau, Treaty of, Wehlau also spelled WELAWA (Sept. 19, 1657), agreement in which John Casimir, king of Poland from 1648 to 1668, renounced the suzerainty of the Polish crown over ducal Prussia and made Frederick William, who was the duke of Prussia as well as the elector of Brandenburg (1640–88), the duchy's sovereign ruler.

The electors of Brandenburg had inherited the duchy from the last grand master of the Teutonic Knights as a Polish fief. Frederick William's participation in the Polish-Swedish War of Succession (1600–60) was aimed at acquiring it in his own right. At first, he sided with Sweden, but, when that failed to secure his objective, he concluded the Treaty of Wehlau with John Casimir, king of Poland. According to the treaty, Frederick William promised to provide Poland with 6,000 troops from Brandenburg for use against Sweden. In return, John Casimir recognized Frederick William and his heirs as sovereign rulers of ducal Prussia. The provisions of the Treaty of Wehlau were later confirmed by the Treaty of Oliva (1660), which concluded the Polish-Swedish War.

Wei, one of the many warring states into which China was divided during the Eastern Chou period (770–221 BC). The state was located in what is now Shansi province, in north-central China. Wei was originally a vassal kingdom that was annexed by the neighbouring state of Chin in 661 BC. The latter kingdom was formally divided in 403 BC into three smaller kingdoms, those of Wei, Han, and Chao. Wei thus became one of the seven powers during the Warring States period (475–221 BC) of Chinese history. Wei embarked on several successful military campaigns against its neighbours in the first half of the 4th century, but it began to go into decline after losing an important battle against the state of Ch'i in 341 BC. Wei was conquered and annexed by the state of Ch'in in 225 BC.

Wei DYNASTY, in full **NORTHERN WEI,** Wade–Giles romanization **PEI WEI,** Pinyin **BEI WEI,** also called **T'O-PA, TOBA,** or **TABGATCH** (AD 386–534/535), the longest lived and most powerful of the northern Chinese dynasties that existed before the reunification of China under the Sui and T'ang dynasties.

The Wei dynasty was founded by Toba, or T'o-pa, tribesmen who, like many of the nomads inhabiting the frontiers of northern China, were of uncertain origin. Their language was basically Turkish, and scholars presume that their ancestry can be traced to proto-Turkish, proto-Mongol, or Hsiungnu peoples. In any case, the Toba were non-Chinese, and their conquests of the small, weak North China states in the late 4th century were clearly regarded as foreign invasions. After the takeover of Shansi province, the Toba adopted the ancient name of Wei for their kingdom and established their capital at Ta-t'ung, close to their tribal homeland. They soon expanded into Hopei and Honan and occupied parts of Shensi, Manchuria, and Kansu. During this expansionist period, the Northern Wei had to defend their territories against attacks from other northern nomads, and after many battles, the Wei launched a large-scale offensive against nomads from Outer Mongolia in 429. By 439, the Northern Wei had secured their territories from attack and unified all of North China.

Although the Wei possessed enormous military prowess, nothing in the culture of their nomadic existence prepared them for the exigencies of empire rule. Having no administrative structure, they were forced to rely on Chinese civil servants to help govern their possessions. One of the earliest and greatest Chinese advisers at the Wei court was Ts'ui Hao (381–450), who introduced Chinese administrative methods and the penal code to the Wei. As the Wei economy started to depend more and more on farming and less on cattle herding and raiding, the lifestyle of the tribesmen became more sedentary. And then, as happened so often in Chinese history, the conquerors became conquered by the appeal of Chinese culture and society. The new rulers were attracted by Chinese goods and products and found themselves developing a taste for the luxury that characterized Chinese upper classes. They were impressed by the aristocratic style and aura of distinction of Chinese nobles. Thus, the prestige of Chinese culture, as well as the change in economic base and the influence of Buddhism, transformed the nomad way of life of the Toba tribesmen.

By 495, the Wei, pursuing an active policy of sinicization, transferred their capital to the ancient Chinese city of Lo-yang. This signaled the rapid conversion of the Wei governing classes to Chinese manners and customs. Marriages between Toba and Chinese aristocracy were encouraged, while intermarriages also increased among the lower classes. Many families, including the imperial house, adopted Chinese surnames. There was even an effort at rewriting history, as the Wei dynasty tried to discredit and disown anything relating to their non-Chinese origins. Eventually the dynasty proscribed Toba language and dress.

This sinicization policy presented problems that would eventually lead to the downfall of the empire. While the upper classes of the Northern Wei became assimilated to Chinese lifestyle, the lower classes, particularly those that lived close to the frontier, and the military, responsible for the conquests in the first place, still adhered to their nomadic, tribalistic ways of life. As a result, these classes became increasingly alienated from their rulers.

The Wei dynasty was able to improve and stabilize the economy of their empire. With the unification of the north, the Wei controlled the leading oases and trading centres that served the trade routes to Central Asia. There was much trade between southern and northern China as well. But the most important change effected by the Wei dynasty was in the sphere of land reform. After the wars of conquest, much of the native population fled to the south, leaving large areas of arable land unused. The Wei responded by forcing large-scale deportations of peasants. These massive relocations served several purposes—the peasants were able to reclaim otherwise unused land, thereby increasing agricultural output; the dynasty was able to populate the deserted areas around Ta-t'ung and Shansi; the peasants were able to possess their own plots of land; the deportations assisted in the spread of Chinese culture throughout the empire; and finally, by transporting the peasants and serfs the Wei dynasty could break the power of the large landed estates so dependent on their serf populations. The impact of this population transfer was enormous. During the reign of Tao Wu Ti (396–409) alone, about 460,000 people were deported. In 486 the Wei established a land reform system that would be imitated by later Chinese dynasties. In this system, all land was owned by the emperor, who then allotted agricultural holdings to every male adult. Upon the landholder's

death, the holdings reverted to the emperor, who then reassigned it. This assured a reasonably equitable distribution of land, as well as government control of the large estates that heretofore had been virtually autonomous. There were some exceptions made to this system, but on the whole it served the purpose for which it was intended.

The Wei rulers were great patrons of Buddhism. This religion's popularity in the north was due to its universalist ethics as opposed to the particularism of Confucianism or Taoism. Fostering this religion helped assimilate the Toba into Chinese culture. Buddhism held a great appeal for the Wei rulers, as it gave their leadership a legitimate base in a multiethnic society. They fostered Buddhism as a state religion, although the dynasty took particular care to control the religious hierarchy, trying to avoid any church-state conflicts. The Wei did this by creating a clerical bureaucracy along the same lines as a civil bureaucracy, appointing a chief monk who supervised the other monks. This was also done to prevent the monasteries from becoming a refuge for those trying to escape taxes or labor obligations imposed by the monarchy. But this espousal of Buddhism did not ease all religious conflicts. The enormous wealth and huge tracts of lands acquired by Buddhist monasteries and clergy posed a threat to the state, support of these institutions drained the economy and deprived the state of tax revenues, and the thousands of retainers required by the monasteries left a huge infrastructure for the state to support. The native Chinese felt that Buddhist doctrines, with the espousal of celibacy and monastic life, conflicted with their views of the sacredness of family life. A reaction set in.

During the reign of emperor T'ai-wu ti (423–452) and his adviser Ts'ui Hao, Taoism was sponsored. The initial restrictions placed on Buddhist monasteries by the Wei rulers in 438 culminated in full-scale persecution from 446 to 452. All Buddhist monks and nuns were ordered executed; Buddhist art, architecture, and books were destroyed. With a change of rulers, the persecution ended, and the new emperor made generous amends. Buddhism once again became a sort of state religion. Once the capital was moved to Lo-yang, Buddhist fervour increased, and Lo-yang became the great centre of Buddhism in the north. Many monasteries were built with a lavish display of wealth.

The greatest cultural contribution of the Wei dynasty was in Buddhist art. This art is best represented in the sculptures of the cliff grottoes at Yün-kang (near Ta-t'ung), and after 495, in the cave temples of Lung-men (near Lo-yang). The statuary in these places shows Hellenistic naturalism and Indian sensuality influencing the linearity of Chinese art, and this eclectic style influenced not only the art of China but also that of Korea and Japan. The Wei were also great builders, and both Chinese capitals were enlarged and fortified under their rule. Lo-yang especially was the site of many changes and improvements and much sumptuous building.

Unfortunately, many of the greatest strengths of the empire were to prove its undoing. While adoption of Chinese culture made the rulers more palatable to their subjects, some of the nomadic Toba groups resisted assimilation (although eventually the Toba lost their separate identities and were absorbed into the general North China population), contributing to the instability of the empire. The armies, whose victories had provided the backbone of the empire, felt that they were being shunted aside in favour of the Chinese they had subjugated. The outrageously extravagant expenditures of the empress Hu on Buddhist temples and monasteries led to revolts. A military uprising in 524 was followed by civil war for another 10 years. The empress Hu had the emperor Hsiao-ming ti assassinated (528) and put her child on the throne. Not strong enough to quell the revolts, both she and her son were drowned in the Yellow River and 2,000 courtiers were murdered, signifying the end (534 or 535) of the Wei dynasty. The empire was then split between two rival army factions, who divided it into the short-lived Eastern Wei and Western Wei empires. But the strength of the political, economic, and social achievements of the Wei eased greatly the later reunification of northern and southern China.

Wei-ch'i (board game): *see* Go.

Wei Chung-hsien, Pinyin WEI ZHONGXIAN, also called (Wade-Giles romanization) LI CHIN-CHUNG (b. 1568, China—d. 1627, China), eunuch who completely dominated the Chinese government between 1624 and 1627, ruthlessly exploiting the population and terrorizing the official class. He is usually considered by historians to have been the most powerful eunuch in Chinese history.

Wei's career began as a butler in the service of the mother of Chu Yu-chiao, the future T'ien-chi emperor, who reigned from 1620 to 1627 during the Ming dynasty. Wei became a close companion of Chu's nurse and with her aid completely captured the young prince's trust. Upon ascending the throne at the age of 15, the T'ien-chi emperor preferred to devote his time to carpentry rather than to statecraft. In any case, he was too weak and indecisive to provide leadership. Wei, therefore, was able to take advantage of the monarch and become the actual ruler.

In 1624 Wei induced the emperor to give him what amounted to a power of attorney. He hired a division of eunuch troops to control the palace and created a network of spies throughout the empire. Extortionate taxes were levied in the provinces, and the government became filled with unprincipled opportunists. When members of the Tung-lin party, a group of idealistic Confucian officials dedicated to government reform, attempted to oppose Wei, he responded with a wide-ranging attack on Tung-lin supporters. Hundreds of loyal officials were put to death or driven out of office.

The remaining officials became sycophants vying for Wei's favour. Temples were erected in his honour, auspicious omens were ascribed to his influence, and in one memorial he was even likened to Confucius. When the emperor died in 1627, however, Wei fell from power. Banished by the new emperor, the eunuch hanged himself to avoid trial.

Wei-fang, formerly (until 1949) WEI-HSIEN, Pinyin WEIFANG, or WEIXIAN, city, east-central Shantung *sheng* (province), China.

Wei-fang is situated on the main route along the northern slopes of the Shantung Hills at the northern end of the central plain. The locality is watered by the Wei and Chiao rivers, which divide the T'ai Shan (mountain) complex to the west from the mountains of the Shantung Peninsula itself to the east. From Wei-fang, highways fan out to Lung-k'ou and P'eng-lai on the northern coast, eastward to Yen-t'ai (Chefoo), and southeastward to Tsingtao. The city is on the main railway line from Tsingtao to Tsinan (Chi-nan), completed by the Germans in 1904. After the railway was built, Wei-fang became a market centre for the agricultural produce of the plain to the south, especially tobacco.

The settlement of Wei-fang was founded before the unification of China in the 3rd century BC, when it formed part of the state of Ch'i, and it is still surrounded by many ancient remains. It was named Wei-chou under the Sui and T'ang dynasties (AD 581–907). In Sung times (960–1279) it was the seat of a military prefecture, Pei-hain, but later again became a civil prefecture. Under the Ming (1368–1644) and Ch'ing (1644–1911) dynasties it was demoted to county seat status as Wei-hsien—a name it retained until republican times (1911–49).

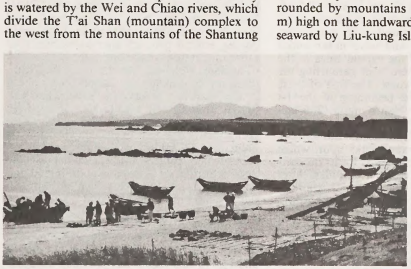
Fang-tzu, to the south, has coal mines that were opened up early in the 20th century by the German firm Shantung Bergbau Gesellschaft, which operated under concessions gained in 1898. These concessions were retained by the German company after the Chinese repurchased most other mining rights in Shantung in 1911, but they were seized by the Japanese in 1915. Eventually, in 1923, they were transferred to the Lu-ta Colliery Company (a Sino-Japanese concern).

Present-day Wei-fang is an industrial centre that processes local agricultural produce, engaging in flour milling, tobacco curing, and oil pressing (from local peanuts [groundnuts]), and manufacturing cotton textiles. It exports cloth to Honan and Shensi provinces and has a large dyeworks as well as a small metalworking industry, engaged largely in producing farm implements and machinery. Pop. (1990 est.) 428,522.

Consult the INDEX *first*

Wei-hai, also called WEI-HAI-WEI, Pinyin WEIHAI, or WEIHAIWEI, port city, Shantung *sheng* (province), China. It lies on the north coast of the Shantung Peninsula.

Until the 14th century Wei-hai was no more than a minor fishing village, but in 1398, as part of the coastal defense policy against the raids of Japanese pirates, it became a military strongpoint (*wei*). It was fortified with walls almost 2 miles (3 km) in circumference in 1406. The port has a fine natural harbour, surrounded by mountains some 1,300 feet (400 m) high on the landward side and sheltered to seaward by Liu-kung Island. In the 1880s the



Fishing boats on the beach at Wei-hai, China
Hedda Morrison

island was developed into a naval base for the newly founded Chinese Peiyang (North Ocean) Fleet. Together with Port Arthur (Lü-shun), in Liaoning province, to the north of Pohai Strait, it was to control the entrance to the Po Hai (Gulf of Chihli). During the Sino-Japanese War (1894–95) the Japanese destroyed the remnants of the Chinese fleet there and took the base without difficulty. In 1898, when the Russians leased Port Arthur on the northern shore of the strait, the British forced the Chinese to lease them Wei-hai. Under the name Port Edward it remained a summer station for the British fleet until 1923 and enjoyed the status of a free port. Its communications, however, were poor, and its hinterland consisted of unproductive mountains, so that it never flourished as a trading port. The British voluntarily relinquished their lease in 1930, after which Wei-hai reverted to Chinese administration. From 1938 to 1945 it was occupied by the Japanese. The population declined sharply after 1948, when it was 175,000. In 1949 it had again become a base for the Chinese Navy.

Modern Wei-hai is a small commercial and fishing port, with such minor industries as oil pressing and silk and cotton textile manufacturing plants. It has no rail link, although there is a highway to Yen-t'ai (Chefoo) and to Tsingtao. Pop. (1990) 128,888.

Wei River, Chinese (Wade-Giles) WEI HO, or (Pinyin) WEI HE, river in Kansu and Shensi provinces, China, a western tributary of the Huang Ho. It rises in the Ma-wei Mountains in the Kansu plateau, between Lin-t'ao and Wei-yüan, flows east, between the north-south Lung Mountains and the east-west Tsinling Mountains, and then flows along the foot of the Tsinling to the north of Sian (Hsi-an) and Hua-yin (both in Shensi) to join the Huang Ho at T'ung-kuan (Shensi). The river's total length is approximately 537 miles (864 km). Its basin is sharply defined to the south, throughout its course, by the abrupt clifflike northern face of the Tsinling Mountains. Its drainage basin is almost entirely formed by tributaries flowing from the north and is divided into three major areas: the mountainous and arid plateau region to the west of the Lung and Liu-p'an mountain ranges in Kansu; the heavily dissected plateau-basin of Shensi, which is covered with loess; and the troughlike floodplain of its lower course. Its major tributaries in Shensi are the Ching and Lo rivers.

Historically, the Wei River valley was the earliest centre of Chinese civilization and until the 10th century AD was the site of a succession of capital cities. The area around the junction of the Ching and the Wei rivers was also the site of the first ambitious irrigation works in China—the Paikung and Ch'eng-kung canal systems, built in the 3rd century BC. The Wei itself, as well as its tributaries, are heavily silt-laden and were never major waterways. To supply the capital cities in the area of Sian, canals were built paralleling the river as far as T'ung-kuan. The first of these was constructed at the beginning of the 1st century BC under the Han dynasty (206 BC–AD 220). Although this fell into disrepair, a further canal was built under the Sui dynasty (581–618). The irrigation works upon which the Wei River valley depended for its prosperity have undergone many vicissitudes. After being left derelict in the late 19th century, a new canal system called the Wei-hui was opened in 1937.

wei-so, Pinyin WEISUO (Chinese: "guard post"), any of the military garrison units utilized by China's Ming dynasty (1368–1644) to maintain peace throughout its empire. Originally developed by the preceding Yüan, or Mongol, dynasty (1206–1368), the system consisted of a guard unit of 5,600 men known as a *wei*. Each *wei* was divided into five *so* of 1,120 men each. The head of each *wei* reported directly to the Ministry of War rather than to the local civil administration. Altogether there were almost 500 such units, and they were scattered along the frontiers and at strategic spots throughout the country. In Inner Asia an unsuccessful attempt was made to divide the Mongol tribes into *wei-so* units that would be loyal to the Ming rather than to their tribal confederation.

Even in China itself, the system fell into disarray by the mid-16th century. The soldiers' positions were hereditary, and many were given land so as to make the army self-supporting. The troops became uninterested in warfare, and the army disintegrated.

Wei Yüan, Pinyin WEI YUAN (b. April 23, 1794, Shao-yang, Hunan, China—d. 1856, Hangchow), historian and geographer of the Ch'ing dynasty (1644–1911/12).

Wei was a leader in the Statecraft school, which attempted to combine traditional scholarly knowledge with practical experience to find workable solutions to the problems plaguing the Chinese government. In 1826 he published the *Huang-ch'ao ching-shih wen-pien* ("Collected Essays on Statecraft Under the Reigning Dynasty"), a study of political and economic issues. It inspired a series of similar anthologies aimed at making the ideas of officials on governmental problems readily accessible.

In 1844 Wei published his best-known work, the *Hai-kuo t'u-chih* ("Illustrated Gazetteer of the Countries Overseas"), on the geography and material conditions of foreign nations. Although handicapped by the ignorance and superstition with which the Chinese viewed the West, this work was the first to make use of translations from Western sources. Wei proposed that the Chinese learn the superior technology of the barbarians (in his day, Westerners seeking trading rights) so as to be strong enough to deal actively with their challenges. This idea provided the justification for the reform of the Chinese state attempted in the 1860s and '70s, when its leaders finally began to introduce Western devices and technology into China.

Wei Zhongxian (Chinese courtier): *see* Wei Chung-hsien.

Weichsel Glacial Stage, also called VISTULA GLACIAL STAGE, major division of late Pleistocene deposits and time in western Europe (the Pleistocene Epoch began about 1,600,000 years ago and ended about 10,000 years ago). The Weichsel Glacial Stage followed the Eemian Interglacial Stage and marks the last major incursion of Pleistocene continental ice sheets. The Weichsel is correlated with the Würm Glacial Stage of Alpine Europe and is broadly equivalent to the Wisconsin Glacial Stage of North America. The Weichsel Glacial Stage has been divided into at least two main phases, separated by an interstadial period of more moderate climatic conditions.

The late Weichsel expansion of the Scandinavian continental ice sheet began about 25,000 years ago; most of the Weichselian sediments present over a wide area of northern Europe are part of this late Weichselian cold period. Earlier periods of glacial expansion are obliterated or hidden by the late Weichselian deposits and features. Interstadial deposits are known from parts of Sweden and Finland and are older than 40,000 years. The beginning of the Weichsel has been placed at about 70,000 years ago. The Weichselian record is perhaps best studied in The Netherlands–Denmark region of northern Europe. The employment of radiometric dating techniques and pollen analyses in this region has provided an excellent chronology of Weichselian events.

Weiden, in full WEIDEN IN DER OBERPFALZ, city, Bavaria *Land* (state), southeastern Germany, on the Naab River at the entrance to the Oberpfälzerwald, a section of the Bohemian Forest, west of the Czech frontier. Chartered in 1268, it is a characteristically medieval fortified town with gabled houses, a magnificent town hall (1539–47), and a 15th-century church with a Baroque tower. The city is associated with the composer Max Reger (1873–1916), whose house is preserved as a museum. The economic and communications centre of the Upper Palatinate (Oberpfalz) district of the *Land*, Weiden has important glass, porcelain, and textile industries. Pop. (1991 est.) 42,234.

Weidenreich, Franz (b. June 7, 1873, Edenkoben, Ger.—d. July 11, 1948, New York, N.Y., U.S.), German anatomist and physical anthropologist whose reconstruction of prehistoric human remains and work on Peking man (then called *Sinanthropus pekinensis*) and other hominids brought him to preeminence in the study of human evolution.

Weidenreich received his M.D. from the University of Strasbourg in 1899 and was appointed professor of anatomy there in 1904. His writings reflected a growing interest in skeletal anatomy that eventually found expression in studies of locomotion, posture, and bone structure as related to problems in primate evolution. Professor of anatomy at the University of Heidelberg from 1919, he became professor of anthropology at the University of Frankfurt (1928–33). Because of his Jewish ancestry he left Germany in 1934 for the University of Chicago and from there went to China to the Peking Union Medical College. Weidenreich then began a series of studies dealing with the jawbones, dentition, skull, and other parts of Peking man. In 1941 he joined the American Museum of Natural History, New York City, and until his death concerned himself with human evolution. He studied Java man (then called *Pithecanthropus erectus*) and suggested that interconnected changes from early hominids to modern man included bipedalism, increased brain size, and decreased facial size. His views are summarized in a collection of scholarly but popular lectures, *Apes, Giants and Man* (1946). His fossil descriptions are without equal, and his chronological ordering of them is still considered fundamentally correct. His *Shorter Anthropological Papers* appeared in 1949.

Weidman, Charles (Edward, Jr.) (b. July 22, 1901, Lincoln, Neb., U.S.—d. July 15, 1975, New York City), major innovator of American modern dance, noted for the abstract, rhythmic pantomime he developed and employed in his comic and satiric works.

Weidman became interested in dance after seeing Ruth St. Denis and Ted Shawn perform, and after studying with Elinor Frances in his home city he joined them and became a leading Denishawn dancer, excelling in such popular character roles as the crapshooter in Shawn's *Danse américaine*. In the late 1920s



Weidman with Doris Humphrey, 1933
Culver Pictures

he left Denishawn and with Doris Humphrey founded the Humphrey–Weidman school and company, which endured until 1945. During their association he occasionally aided Humphrey in her pure-movement choreography, notably the trilogy *New Dance* (1936), and often performed in her dances; characterization and pantomime, however, remained his main interest.

The Happy Hypocrite (1931), based on Max Beerbohm's story of the same name, was his first major work. His version of Voltaire's *Candide* (1933) was one of the earliest full-evening compositions in U.S. modern dance. Although judged less than a total success, *Candide* was notable for its pantomime performed in formal dance structure. In later works Weidman so fully integrated dance and pantomime that distinct sequences of each were no longer recognizable. Weidman was also one of the first to expand modern dance thematically from its concern with the individual to include observations on society. *On My Mother's Side* (1940) and its sequel *And Daddy Was a Fireman* (1943) presented amusing, penetrating portraits of his ancestors. *Flickers* (1942), in which Weidman played Rudolph Valentino, was a comic view of silent films. In other works his subject was less humorous. The *Lynch Town* portion of his *Atavisms* concerned mob violence in the South, and *This Passion* contained a sequence derived from a famous murder case of the day. Although most of Weidman's successful works were topical, *Opus 51* (1938) and *Kinetic Pantomime* (1934) were themeless.

Weidman's other activities and contributions to dance were varied and numerous. Between 1932 and 1934 he did extensive choreography for Broadway plays and revues, including *As Thousands Cheer, I'd Rather Be Right,* and, with Humphrey, *School for Husbands.* Like Ted Shawn, Weidman encouraged male dancers and brought a masculine balance to the Humphrey–Weidman Company. Following Humphrey's retirement from performing in 1945, he founded his own school. In 1948 he formed the Theatre Dance Company, for which he created *Fables for Our Time,* based on James Thurber's book; it is often considered his masterpiece. After teaching on the West Coast during the late 1950s, he joined the artist Mikhail Santaro in New York City to form the Expression of Two Arts Theatre, which presented experimental productions blending the resources of the graphic and choreographic arts. In his final years he combined the creation of new dances with revivals of many of his most popular works.

Weierstrass, Karl (Theodor Wilhelm) (b. Oct. 31, 1815, Ostenfelde, Bavaria [Germany]—d. Feb. 19, 1897, Berlin), German mathematician, one of the founders of the modern theory of functions.

His domineering father sent him to the University of Bonn at age 19 to study law and finance in preparation for a position in the Prussian civil service. Weierstrass pursued four years of intensive fencing and drinking and returned home with no degree. He then entered the Academy of Münster in 1839 to prepare for a career as a secondary school teacher. At Münster he came under the influence of Cristof Gudermann, professor of mathematics, who was particularly interested in the theory of elliptic functions. Gudermann cultivated Weierstrass' interest in the theory of functions with emphasis on the expansion of functions by power series.

In 1841 Weierstrass obtained his teacher's certificate and began a 14-year career as a teacher of mathematics at the Pro-Gymnasium in Deutsche Krone (1842–48) and at the Collegium Hoseanum in Braunsberg (1848–56). During this time of isolation from other mathematicians—his salary was so small that he could not even correspond with his fellows—



Weierstrass, engraving after a photograph by Franz Kullrich
By courtesy of Bildarchiv Preussischer Kulturbesitz BPK, Berlin

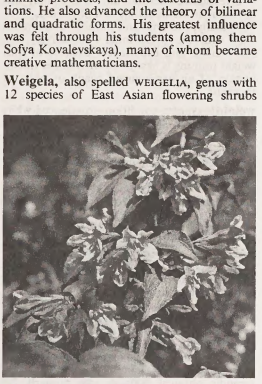
Weierstrass worked unceasingly on analysis. He conceived and in large part carried out a program known as the arithmetization of analysis, under which analysis is based on a rigorous development of the real number system. His preoccupation with rigour in mathematics is illustrated by his later development (1861) of a function that, though continuous, had no derivatives at any point. This idiosyncrasy of an apparently differentiable function caused consternation among the school of analysts who depended heavily upon intuition.

Weierstrass' work on the theory of functions was guided by his desire to complete the work begun by Niels Abel of Norway and Karl Jacobi of Germany, primarily Abel's theorem that the number of independent integrals of algebraic functions is finite and Jacobi's discovery of multiple periodic functions of many variables.

In 1854 Weierstrass burst from obscurity when his unexpected memoir on Abelian functions was published in *Crelle's Journal.* The University of Königsberg conferred upon him an honorary doctor's degree, and in 1856 a position was found for him at the Royal Polytechnic School in Berlin. Weierstrass contributed few papers to scholarly journals; his work was embodied in his lectures, which were collected in *Gesammelte Abhandlungen,* 8 vol. (1894–1927; "Collected Works").

Known as the father of modern analysis, Weierstrass devised tests for the convergence of series and contributed to the theory of periodic functions, functions of real variables, elliptic functions, Abelian functions, converging infinite products, and the calculus of variations. He also advanced the theory of bilinear and quadratic forms. His greatest influence was felt through his students (among them Sofya Kovalevskaya), many of whom became creative mathematicians.

Weigela, also spelled WEIGELIA, genus with 12 species of East Asian flowering shrubs belonging to the family Caprifoliaceae, some widely grown as ornamentals for their spring and summer flowers. The tubular, white to red blossoms are borne on upright shrubs to 4 metres (13 feet) tall.



Weigela
Valerie Finnis

Most species of *Weigela* are shorter, with narrowly oval leaves and clustered flowers about 3½ centimetres (1½ inches) long. The long, narrow seed pods split in two.

weight, gravitational force of attraction on an object, caused by the presence of a massive second object, such as the Earth or Moon. Weight is a consequence of the universal law of gravitation: any two objects, because of their masses, attract each other with a force that is directly proportional to the product of their masses and inversely proportional to the square of the distance between them. Thus more massive objects, of course, weigh more in the same location; the farther an object is from the Earth, the smaller is its weight. The weight of an object at the Earth's South Pole is slightly more than its weight at the Equator because the polar radius of the Earth is slightly less than the equatorial radius. Though the mass of an object remains constant, its weight varies according to its location. The smaller mass and radius of the Moon compared with those of the Earth combine to make the same object on the Moon's surface weigh one-sixth the value of its weight on Earth.

Because of all the mass in the universe, each point of space has a property called the gravitational field at that point, numerically equal to the acceleration of gravity at that point. Alternatively, weight is the product of an object's mass and either the gravitational field or the acceleration of gravity at the point where the object is located.

Units of weight are those of force, not mass (*see* force).

Where the same name may denote a person, place, or thing, the articles will be found in that order

weight lifting, sport in which barbells are lifted competitively or as an exercise.

For many prehistoric tribes, the traditional test of manhood was the lifting of a special rock. Such manhood stones, some with the name of the first lifter incised, exist in Greece and in Scottish castles. The competitive lifting and sometimes throwing of stones persists locally in Germany, Switzerland, the highlands of Montenegro, and the Basque region of Spain. In many such events the consecutive number of lifts in a given time is used to declare a winner. Atlas in Greek mythology is the best known mythical weight lifter. For other activities using weights but distinct from weight lifting, *see* weight training, body building, and power lifting.

History. The origins of modern competition are to be found in the 18th- and 19th-century strong men, such as Eugene Sandow and Arthur Saxon of Germany, George Hackenschmidt of Russia, and Louis Apollon of France, who performed in circuses and theatres. By 1891 there was international competition in London. The revived Olympic Games of 1896 included weight lifting events, as did the Games of 1900 and 1904, but thereafter they were suspended until 1920. In that year, at the suggestion of the International Olympic Committee, the International Weight-lifting Federation (Fédération Haltérophile Internationale; FHI) was formed to regularize events and supervise international competition. By the 1928 the one- and two-hand lifts of earlier Games had given way to only two-hand lifts: the snatch, the clean and jerk, and the clean and press (described below). The press was

abandoned in 1972. In the Games before World War II, the leading weight lifters were French, German, and Egyptian. After the war American weight lifters were dominant until 1953. Thereafter Soviet and Bulgarian weight lifters, mainly the former, held a virtual monopoly on world records and championships until the 1990s. World championships were held in 1922–23 and from 1937, except during the war years. European championships were held from 1924 through 1936. For Olympic champions and records, *see* Olympic Games.

Equipment. The weight used in modern competitive lifting is the barbell, a steel bar or rod to which cast-iron or steel disk weights are attached at each end on a revolving sleeve. The range of weights added is 25, 20, 15, 10, 5, 2.5, and 1.25 kg (55, 44, 33, 22, 11, 5.5, and 2.75 pounds).

Lifts. From 1928 to 1968, the three international lifts were the snatch, the clean and jerk, and the press (or clean and press). In all lifts the barbell rests on the floor initially. In the snatch, the barbell is lifted from the floor to arm's length overhead in a single, continuous, explosive movement with the lifter being permitted to move his feet or to squat under the barbell as he lifts it before recovering to an erect position. The clean and jerk is a two-part lift. After lifting the barbell to his shoulders, the lifter jerks it overhead to arm's length in his own time and without any restrictions on leg movements. In both lifts, the lifter must complete the lift with his feet in line, body erect, arms and legs extended, the barbell in control overhead, and he must either hold the weight overhead for two seconds or wait for the referee's signal before lowering the barbell back to the floor. The press was also a two-part lift. As in the clean and jerk, the barbell was brought to the lifter's shoulders, the same foot motion being allowed. Then the lifter had to stand erect until the referee signaled for the completion of the lift, which was achieved by pressing the barbell upward in a steady continuous movement to arm's length overhead but without any assistance by moving the legs. Lifts are performed on a wooden platform 4 m (13.1 feet) square. If a lifter steps off the platform during a lift, the lift is not allowed.

Weight categories. Contestants are divided into 10 body-weight categories: flyweight, up to 54 kg (119 pounds); bantamweight, up to 59 kg (130 pounds); featherweight, up to 64 kg (141 pounds); lightweight, up to 70 kg (154 pounds); middleweight, up to 76 kg (167 pounds); light heavyweight, up to 83 kg (182.5 pounds); middle heavyweight, up to 91 kg (200 pounds); (first) heavyweight, up to 99 kg (218 pounds); (second) heavyweight, up to 108 kg (237.5 pounds); and superheavyweight, more than 108 kg.

weight throw, sport of throwing a weight for distance or height. Men have long matched strength and skill at hurling objects. The *roth cleas*, or wheel feat, reputedly was a major test of the ancient Tailteann Games in Ireland. The competition consisted of various methods of throwing: from shoulder or side, with one or two hands, and with or without a run. The implements used varied widely in weight and conformation. Early in the 20th century, records were listed for throwing weights of 14, 28, 35, and 56 pounds (6.3 12.7, 15.9, and 25.4 kg) for both distance and height. Weight throwing is distinct from the shot put and the discus throw and from the present-day hammer throw.

In 1904 and 1920, 56-pound weight-throwing contests for distance were included as an athletics event in the Olympic Games. Étienne Desmarteau (Can.) won the 1904 competition with a throw of 10.46 m (34 feet 4 inches), and Pat MacDonald (U.S.) won in 1920 with a heave of 11.26 m. In 1914 P. Donovan (U.S.) set a world record for throwing the 56-pound weight for height with 5.17 m. By the second half of the 20th century there no longer was any international competition in weight throwing, and performances did not receive world-record listing by the International Amateur Athletic Federation, the world governing body of track and field.

The sport remained popular, however, in the northeastern United States. The 35-pound weight throw is a standard event in the annual championship indoor meets of the Amateur Athletic Union (AAU) of the United States and the Intercollegiate Association of Amateur Athletes of America (ICAAAA). The AAU also had a 56-pound weight throw on its list of outdoor championship events until 1959, when it was discontinued.

The weight, either 35 or 56 pounds, is a ball molded of lead or a brass shell filled with lead. Affixed to it by an eyebolt or swivel coupling is a triangular handle of round iron or steel. The throw must be completed from within a 2.1-metre (6.9-foot) circle, as in the more standard shot put and hammer throw events. Most athletes use a technique similar to that used in hammer throwing, whirling the weight around the body and making three accelerating revolutions of the body before release. Top standards of performance in throwing for distance have risen to more than 21.35m with the 35-pound weight and more than 12.2 m with the 56-pound weight.

weight training, system of physical conditioning using such weights as barbells and dumbbells and other devices, including Nautilus machines. It is a training system rather than a competitive sport such as weight lifting or power lifting.

Weight training is used both for physical rehabilitation and for athletic and general conditioning. Athletes use it to improve their performance by increasing strength and endurance. It is used extensively by track-and-field athletes, swimmers, football players, and soccer players, as well as by other sportsmen for whom basic strength is important to their training program.

Weight training also is used to promote general physical fitness and conditioning and to develop the musculature for physique and body-building contests. In rehabilitation after an illness, injury, or long confinement, weight training is commonly referred to as progressive resistance exercise, and it is usually undertaken at the direction of a physician.

Generally, the type and number of exercises vary with the practitioner's objectives, age, sex, weight, and experience. Because of this, weight training is best performed under the direction of an experienced coach or physical therapist.

weightlessness, condition experienced while in free-fall (*q.v.*), in which the effect of gravity is canceled by the inertial (*e.g.,* centrifugal) force resulting from orbital flight. The term *zero gravity* is often used to describe such a condition. Excluding spaceflight, true weightlessness can be experienced only briefly, as in an airplane following a ballistic (*i.e.,* parabolic) path.

Crews of spacecraft are subject to the problems of weightlessness. It was learned from early Soviet and U.S. manned missions that there is a reduction in heart and respiration rates and a progressive loss of body weight and bone calcium during flights of relatively short duration. A reversal of most of these effects occurs, however, upon return to Earth. On later missions of extended duration, such as those involving the U.S. Skylab and Soviet Salyut space stations, extensive biomedical studies were undertaken. Their findings showed that periodic physical exercise with properly designed apparatus is imperative for the maintenance of health and that it takes the human body approximately 40 days to adjust to a zero-gravity environment. In such an environment, bodily fluids are redistributed, with less in the lower extremities and more in the upper body; height increases; body mass usually, but not always, decreases with a loss of muscular tissue; the veins and arteries of the legs become weaker; and anemia occurs, accompanied by a significant reduction in blood count. A feeling of weakness and the loss of a sense of balance are experienced upon return to Earth. Recovery from all these effects is relatively rapid and is nearly complete after only a week or so. A serious cause for concern, however, is the loss of bone calcium that increases with the length of a mission and shows no sign of cessation. The possibility of irreparable deterioration on future space missions of long duration points to a need for artificial gravity. The use of centrifugal force in a suitably designed rotating space vehicle is an obvious way of simulating gravity.

Besides studying the effects of prolonged weightlessness on muscle tension, blood circulation, and vestibular functions, scientists have investigated their impact on cell metabolism, circadian rhythms, spiderweb formation, and root growth and orientation in plants. Experiments have also been conducted to determine the influence of gravity and the effects of its absence in physical, chemical, and metallurgical processes. The mixing of alloys and chemical reagents without the stratification that occurs on Earth, the mixing of gases and metals to produce foam metals of unusual properties, and the formation of large perfect crystals illustrate a few of the possibilities of zero-gravity technology.

weights and measures, the standard quantities by which comparisons are made between an object to be measured and some known quantity of the same kind. *See* measurement.

Weil, André (b. May 6, 1906, Paris, France—d. Aug. 6, 1998, Princeton, N.J., U.S.), French mathematician who established one of the central proofs in the theory of algebraic fields.

Weil studied at the Normal Superior School, Paris, and at the universities of Rome and Göttingen. His teaching career was even more international; he was professor of mathematics at the Aligarh Muslim University, India, from 1930 to 1932 and thereafter taught at the universities of Strasbourg, France (1933–40), São Paulo, Brazil (1945–47), and Chicago (1947–58). He joined the Institute for Advanced Study, Princeton, N.J., in 1958, subsequently becoming professor emeritus. His mathematical studies centred primarily on number theory, algebraic geometry, and group theory, and his published works include *Foundations of Algebraic Geometry* (1946) and *Elliptic Functions According to Eisenstein and Kronecker* (1976). He was, until his retirement in 1956, a leading member of the group of mathematicians that published under the collective pseudonym Bourbaki. He was the brother of the philosopher and mystic Simone Weil.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Weil, Simone (b. Feb. 3, 1909, Paris, France—d. Aug. 24, 1943, Ashford, Kent, Eng.), French mystic, social philosopher, and activist in the French Resistance during World War II, whose posthumously published works had particular influence on French and English social thought.

Intellectually precocious, Weil also expressed social awareness at an early age. At five she refused sugar because the French soldiers at the front during World War I had none, and at six she was quoting the French dramatic poet Jean Racine (1639–99). In addition to



Simone Weil, 1936
Snark International

studies in philosophy, classical philology, and science, Weil continued to embark on new learning projects as the need arose. She taught philosophy in several girls' schools from 1931 to 1938 and often became embroiled in conflicts with school boards as a result of her social activism, which entailed picketing, refusing to eat more than those on relief, and writing for leftist journals.

To learn the psychological effects of heavy industrial labour, she took a job in 1934–35 in an auto factory, where she observed the spiritually deadening effect of machines on her fellow workers. In 1936 she joined an Anarchist unit near Zaragoza, Spain, training for action in the Spanish Civil War, but after an accident in which she was badly scalded by boiling oil, she went to Portugal to recuperate. Soon thereafter Weil had the first of several mystical experiences, and she subsequently came to view her social concerns as "ersatz Divinity." After the German occupation of Paris during World War II, Weil moved to the south of France, where she worked as a farm servant. She escaped with her parents to the United States in 1942 but then went to London to work with the French Resistance. To identify herself with her French compatriots under German occupation, Weil refused to eat more than the official ration in occupied France. Malnutrition and overwork led to a physical collapse, and during her hospitalization she was found to have tuberculosis. She died after a few months spent in a sanatorium.

Weil's writings, which were collected and published after her death, fill about 20 volumes. Her most important works are *La Pesanteur et la grâce* (1947; *Gravity and Grace*), a collection of religious essays and aphorisms; *L'Enracinement* (1949; *The Need for Roots*), an essay upon the obligations of the individual and the state; *Attente de Dieu* (1950; *Waiting for God*), a spiritual autobiography; *Oppression et Liberté* (1955; *Oppression and Liberty*), a collection of political and philosophical essays on war, factory work, language, and other topics; and three volumes of *Cahiers* (1951–56; *Notebooks*). Though born of Jewish parents, Weil eventually adopted a mystical theology that came very close to Roman Catholicism. A moral idealist committed to a vision of social justice, Weil in her writings explored her own religious life while also analyzing the individual's relation with the state and God, the spiritual shortcomings of modern industrial society, and the horrors of totalitarianism.

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Weill, Kurt, in full KURT JULIAN WEILL (b. March 2, 1900, Dessau, Ger.—d. April 3, 1950, New York, N.Y., U.S.), German-born American composer who created a revolutionary kind of opera of sharp social satire in collaboration with the writer Bertolt Brecht.

Weill studied with Albert Bing and at the Staatliche Hochschule für Musik in Berlin with Engelbert Humperdinck. He gained some experience as an opera coach and conductor at Dessau and Lüdenscheid (1919–20). Settling in Berlin, he studied (1921–24) under Ferruccio Busoni, beginning as a composer of instrumental works. His early music was expressionistic, experimental, and abstract. His first two operas, *Der Protagonist* (one act, libretto by Georg Kaiser, 1926) and *Royal Palace* (1927), established his position, with Ernst Krenek and Paul Hindemith, as one of Germany's most promising young opera composers.

Weill's first collaboration as composer with Bertolt Brecht was on the singspiel (or "songspiel," as he called it) *Mahagonny,* which was a succès de scandale at the Baden-Baden festival in 1927. This work sharply satirizes life in an imaginary America that is also Germany. Weill then wrote the music and Brecht provided the libretto for *Die Dreigroschenoper* (1928; *The Threepenny Opera*), which was a transposition of John Gay's *Beggar's Opera* with the 18th-century thieves, highwaymen, jailers, and their women turned into typical characters in the Berlin underworld of the 1920s. This work established both the topical opera and the reputations of the composer and librettist. Weill's music for it was in turn harsh, mordant, jazzy, and hauntingly melancholy. *Mahagonny* was elaborated as a full-length opera, *Aufstieg und Fall der Stadt Mahagonny* ("Rise and Fall of the City of Mahagonny"), and first presented in Leipzig in 1930. Widely considered Weill's masterpiece, the opera's music showed a skillful synthesis of American popular-ragtime-jazz music.

Weill's wife, the actress Lotte Lenya (married 1926), sang for the first time in *Mahagonny* (1927) and was a great success in it and in *Die Dreigroschenoper.* These works aroused much controversy, as did the students' opera *Der Jasager* (1930; "The Yea-Sayer," with Brecht) and the cantata *Der Lindberghflug* (1928; "Lindbergh's Flight," with Brecht and Hindemith). After the production of the opera *Die Bürgschaft* (1932; "Trust," libretto by Caspar Neher), Weill's political and musical ideas and his Jewish birth made him persona non grata to the Nazis, and he left Berlin for Paris and then for London. His music was banned in Germany until after World War II.

Weill and his wife divorced in 1933 but remarried in 1937 in New York City, where he resumed his career. He wrote music for Paul Green's *Johnny Johnson* (1936) and Franz Werfel's *Eternal Road* (1937). In 1938 appeared *Knickerbocker Holiday,* with libretto by Maxwell Anderson, followed by *Lady in the Dark* (1941; libretto and lyrics by Moss Hart and Ira Gershwin), *One Touch of Venus* (1943; with S.J. Perelman and Ogden Nash), the musical version of Elmer Rice's *Street Scene* (1947), and *Lost in the Stars* (1949; with Maxwell Anderson). Weill's American folk opera *Down in the Valley* (1948) was much performed. Two of his songs, the "Moritât" ("Mack the Knife") from *Die Dreigroschenoper* and "September Song" from *Knickerbocker Holiday,* have remained popular. Weill's violin concerto and two symphonies, praised for their qualities of invention and compositional skill, were revived after his death.



Weill
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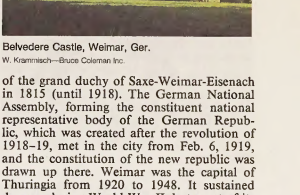
Weil's disease: *see* leptospirosis.

Weimar, city, Thuringia *Land* (state), eastern Germany. Weimar lies along the Ilm River, just east of Erfurt. First mentioned in documents in 975 as Wimare, it was declared a town in 1254 and was chartered in 1348. Ruled by the counts of Weimar-Orlamünde from 1247 to 1372, it then passed to the Saxon house of Wettin and became the capital of the duchy of Saxe-Weimar in 1547 and



Belvedere Castle, Weimar, Ger.
W. Krammisch—Bruce Coleman Inc.

of the grand duchy of Saxe-Weimar-Eisenach in 1815 (until 1918). The German National Assembly, forming the constituent national representative body of the German Republic, which was created after the revolution of 1918–19, met in the city from Feb. 6, 1919, and the constitution of the new republic was drawn up there. Weimar was the capital of Thuringia from 1920 to 1948. It sustained damage during World War II, but most of its monuments have been restored.

Many of the important buildings in Weimar are associated with the German writers J.W. von Goethe and Friedrich von Schiller, who lived there for many years and died there. During this period, the late 18th and early 19th centuries, Weimar was the intellectual centre of Germany. Reminders of the period include a bronze monument to Goethe and Schiller (1875) in front of the German National Theatre; a Goethe-Schiller Mausoleum; a Goethe-Schiller Archives (opened 1896); the Goethe National Museum (occupying a house where the poet lived) and his summer garden house; homes of Schiller and Franz Liszt; the Liszt Museum; the Franz Liszt College of Music; and an archive of Friedrich Nietzsche. Other notable landmarks, many restored since World War II, include the Wittums Palace (1767), Weimar Castle (1790–1803), Belvedere Castle (1724–32), Tiefurt Castle, and SS. Peter and Paul Church with an altarpiece by Lucas Cranach and his son. Between 1919 and 1925 Weimar was the seat of the Bauhaus architectural school before its move to Dessau. In 1953 the East German government established the National Research and Memorial Centre of the Classical Writers of German Literature, with its centre in Weimar. Also in the city are the headquarters of the German Shakespeare Society, a college of architecture and building, and a national observatory.

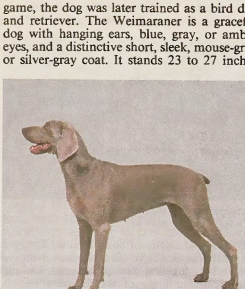
Northwest of Weimar, on the 1,568-foot (478-metre) Ettersberg (Etters Hill), is the Buchenwald National Memorial, on the site of one of the largest and most infamous of the Nazi concentration camps (established in 1937), in which about 56,000 persons died.

The Buchenwald camp, primarily for political prisoners, was especially notorious for medical experimentation on living human beings. It was the first of the large concentration camps to be entered by the Allied armies, in April 1945.

A railway junction, Weimar's most important industrial concern is a combine harvester plant. Pop. (1990 est.) 61,583.

Weimar Republic, the government of Germany (*q.v.*) from 1919 to 1933, so called because the assembly that adopted its constitution met at Weimar from Feb. 6 to Aug. 11, 1919.

Weimaraner, sporting-dog breed developed in the early 19th century by German nobles of the court of Weimar. First used to hunt big game, the dog was later trained as a bird dog and retriever. The Weimaraner is a graceful dog with hanging ears, blue, gray, or amber eyes, and a distinctive short, sleek, mouse-gray or silver-gray coat. It stands 23 to 27 inches



Weimaraner
John L. Ashbey

(58 to 69 cm) and weighs 55 to 85 pounds (25 to 39 kg). It is characterized by an alert, well-balanced stance and is valued as an aggressive hunter, good companion, and watchdog.

Weinberg, Steven (b. May 3, 1933, New York City), American nuclear physicist who in 1979 shared the Nobel Prize for Physics with Sheldon Lee Glashow and Abdus Salam (*qq.v.*) for work in formulating a theory that explains the known facts of the electromagnetic and weak interactions (*see* fundamental interaction) and makes it possible to predict the outcome of new experiments in which elementary particles are made to impinge on one another. An important series of experiments in 1982–83 found strong evidence for the W^+ and W^- and Z^0 vector bosons predicted by these scientists' "electroweak" theory.

Weinberg and Glashow were members of the same classes at the Bronx High School of Science, New York City (1950), and Cornell University (1954). Weinberg went from Cornell to the Nordic Institute for Theoretical Atomic Physics in Copenhagen for a year and then obtained his doctorate at Princeton University in 1957. He conducted research at Columbia University and at the Lawrence Berkeley Laboratory before joining the faculty of the University of California at Berkeley in 1960. During part of his last two years there, 1968–69, he was visiting professor at the Massachusetts Institute of Technology; he joined its faculty in 1969, moving to Harvard University in 1973 and to the University of Texas at Austin in 1983.

Weinberger, Jaromir (b. Jan. 8, 1896, Prague—d. Aug. 8, 1967, St. Petersburg, Fla., U.S.), Czech composer known mainly for his opera *Švanda Dudák* (*Shvanda the Bagpiper*). Weinberger studied at the Prague Conservatory and with Max Reger in Leipzig, later working with the Slovak National Theatre. In 1939 he settled in the United States.

His opera *Švanda Dudák,* first performed in Prague in 1927, quickly made him famous; it was the first Czech opera since Bedřich Smetana's *The Bartered Bride* to be widely performed internationally. The *Polka and Fugue* from the opera soon became a popular concert piece. Besides operas his works include orchestral and chamber music.

Weingartner, (Paul) Felix, EDLER (lord) VON MUNZBERG (b. June 2, 1863, Zara, Dalmatia Austrian Empire [now Zadar, Croatia]—d. May 7, 1942, Winterthur, Switz.), Austrian symphonic and operatic conductor and composer, best-known for his interpretations of the works of Ludwig van Beethoven and Richard Wagner.

Weingartner first studied composition at Graz. Beginning as a student of philosophy at the University of Leipzig, he turned to the conservatory, on the recommendation of Johannes Brahms. In 1883 he became a student of Franz Liszt's at Weimar, and in 1884 his opera *Sakuntala* was produced there. He was appointed court conductor of the Berlin Royal Opera in 1891 and led its symphony concerts until 1897. Moving to Munich in 1898, he conducted the Kaim concerts until 1905. In 1907 he succeeded Gustav Mahler as conductor of the Court Opera in Vienna and was conductor of the Vienna Philharmonic from 1908 to 1927. He directed the Vienna State Opera from late 1934 to 1936. In 1937 he became a Swiss citizen. He conducted in London beginning in 1898 with the Royal Philharmonic Society, the London Symphony Orchestra, and the Scottish Orchestra. He toured with the New York Philharmonic Society Orchestra in 1906 and conducted opera in Boston (1912–13). His conducting style, exemplified in his performances of Beethoven and Wagner, represented a reaction against



Weingartner
By courtesy of the Österreichische Nationalbibliothek, Vienna

the eccentric aspects of Romantic conducting and a move toward an ideal of craftsmanship.

Weingartner composed operas, incidental music, choral works, symphonies, concerti, chamber music, and songs. His pamphlet on conducting, "Über das Dirigieren" (1895; "On Conducting"), is famous. He did much editing of the works of Hector Berlioz. His memoirs, *Lebenserinnerungen* (1923; "Reminiscences"), were translated into English as *Buffets and Rewards* (1937).

Weinheber, Josef (b. March 9, 1892, Vienna—d. April 9, 1945, Vienna), Austrian poet noted for his technical mastery.

Weinheber's parents died when he was a child, and he spent six unhappy years in an orphanage before an aunt took him to live with her. For many years he worked in the postal service.

Weinheber's early books, *Von beiden Ufern* (1923; "From Both Shores"), the autobiographical *Das Weisenhaus* (1924; "The Orphanage"), and *Boot in der Bucht* (1926, "Boat in the Bay"), had little success but he achieved



Weinheber
Bavaria-Verlag

fame with *Adel und Untergang* (1932, enlarged 1934; "Nobleness and Extinction"), a sonnet sequence using the repeated, interlocking lines of terza rima. *Späte Krone* (1936; "Belated Crown") indicated his feelings about his late success; in it he used his key imagery of night and dark forces.

Weinheber had great range: from Viennese popular songs to metaphysical poems, sonnet cycles, odes, and elegies. His own style developed synthetically, borrowing elements of classical and modern forms. His ideas of poetic language as embodying the essence of the *Volk* rather than the individual made him a favourite poet of the Nazis. Other important works included: *Wien wörtlich* (1935; "Vienna Revealed in Words"), which cast the poet in the role of peoples' singer; *O Mensch, gib acht* (1937; "Hearken, Ye Men"), vignettes and songs using folk tunes; *Kammermusik* (1939; "Chamber Music"); *Zwischen Göttern und Dämonen* (1938; "Between Gods and Demons"), four odes on the poet's vision of reality; and *Hier ist das Wort* (posthumously published 1947; "Here Is the Word"). Weinheber committed suicide as the Soviet Red Army approached Vienna in 1945. For a time after World War II his books were proscribed by the Austrian government, but his complete works appeared in five volumes in 1953–56.

Weinheim, city, Baden-Württemberg *Land* (state), southwestern Germany. It lies along the Mountain Road, at the west foot of the Oden Forest, northeast of Mannheim. A Frankish village in 500, it was mentioned in chronicles in 755 as Winenheim, chartered in 1250, and fortified in the 14th century. It belonged to the counts Palatine from the 13th century until 1803. Notable landmarks include the old town hall (1554); Berckheim Castle (1725), with a park of exotic trees; the ruins of the 12th-century Windeck fortress; and the remains of the city's fortifications, which were dismantled in the 17th century during the Thirty Years' War. Weinheim produces one of the best-known wines on the Mountain Road. Leather, machinery, plastics, and rubber goods are manufactured. Pop. (1990 est.) 42,130.

Weininger, Otto (b. April 3, 1880, Vienna—d. Oct. 4, 1903, Vienna), Austrian philosopher whose single work, *Geschlecht und Charakter* (1903; *Sex and Character*), served as a sourcebook for anti-Semitic propagandists.

The son of a prosperous Jewish artisan, Weininger became a Christian the day he received his Ph.D. degree from the University of Vienna (1902). The following year he published his partly scientific, partly philosophical study in which he advanced the thesis that all living things combined varying proportions of masculine and feminine elements. The masculine element was positive, productive, and moral, while the feminine was negative, unproductive, and amoral. In the chapter "Über das Judentum," he denounced Judaism as feminine and amoral in contrast to Christianity. Weininger shot himself at the age of 23, shortly after the publication of *Geschlecht*

und Charakter. A psychological case study of Weininger by David Abrahamsen, *The Mind and Death of a Genius,* appeared in 1946.

Weipa, Aboriginal community and mining town, northern Queensland, Australia, on the northwestern coast of Cape York Peninsula; it lies on Albatross Bay at the estuaries of the Hey, Embley, and Mission rivers, facing the Gulf of Carpentaria. In 1802 the explorer Matthew Flinders noted the red cliffs that extended for 100 mi (160 km) along the coast. It was not until 1902 that these reddish deposits were identified as bauxite, the ore of aluminum. When their potential as one of the world's largest reserves (estimated at 3,000,000,000 tons) was recognized, exploitation began, and the town of Weipa was built, beginning in 1956, to house the workers. It was the first settlement established in the area since a Presbyterian mission station had been founded there in the 1890s. Almost 10,500,000 tons of ore are taken annually from the opencut mine and conveyed to ships in the bay; about one-half goes to aluminum refineries at Gladstone (Queensland), and the rest is exported to Japan, Europe and North America. The town, with air connections to Cairns, 400 mi southeast, derives its name from an Aboriginal term meaning "hunting ground." Pop. (1981) 2,433.

weir, any control or barrier placed in an open channel to permit measurement of water discharge. The latter may be computed from a formula expressing the discharge in terms of crest length of the weir, depth of flow above the weir, weir geometry, and other factors. A variety of weirs have been used in streams, the so-called sharp-crested and trapezoidal forms being relatively common; but broad-crested, triangular, and contracted weirs are also favoured in certain circumstances. Spillways, controls, and embankments designed to permit discharge measurements are simply different kinds of broad-crested weirs.

Weirton, city, Brooke and Hancock counties, in the northern panhandle of West Virginia, U.S., on the Ohio River (bridged just south, to Steubenville, Ohio). The area, originally settled during the U.S. War of Independence, has a long history of iron making. In the 1790s Peter Tarr built a crude furnace on nearby King's Creek to smelt local iron ore. Cannonballs, used by the U.S. fleet under Oliver Hazard Perry against the British in the Battle of Lake Erie during the War of 1812, were made there. In 1910 Ernest Tener Weir founded the Weirton Steel Company. Until 1947, when the town merged with surrounding communities to form the present city, it was one of the nation's largest unincorporated "company towns." It now sprawls across 7 mi (11 km) of the narrow panhandle between Pennsylvania (east) and Ohio (west).

In addition to steel, other industries include coal mining and the manufacture of tin cans, chemicals, cement blocks, and bottles. The Tomlinson Run State Park and Waterford Park thoroughbred racecourse are nearby. Pop. (1990) city, 22,124; Steubenville-Weirton MSA, 142,523.

Weisengrund, Theodor, also called THEODOR WEISENGRUND-ADORNO (German philosopher): *see* Adorno, Theodor.

Weiser, Johann Conrad (b. Nov. 2, 1696, near Herrenberg, Württemberg—d. July 13, 1760, Womelsdorf, Pa.), North American colonial Indian agent, musician, evangelist, and public official.

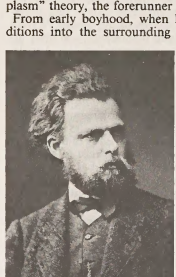
Weiser migrated to New York with his father in 1710, and the family moved to Schoharie, N.Y., four years later. Conrad lived briefly among the neighbouring Iroquois before starting his own farm, marrying, and serving the settlers as an Indian interpreter.

In 1729 Weiser moved his family to Tulpehocken, Pa. He resumed farming and began working with the colony's Indian agent, Shikellamy. During the next two decades, Weiser was able to arrange several agreements and alliances between the Iroquois tribes and the colonial governments that maintained the traditional ties between the tribal confederation and the English. The Treaty of Logstown, which he negotiated in 1748, enabled Pennsylvania to expand its Indian trade to the Mississippi River.

Weiser was also active in other capacities while he lived in Pennsylvania. He studied music, composed several hymns in German, and helped establish a German-language press. In 1735 he underwent a spiritual conversion; for several years afterward, he acted as a religious evangelist in Pennsylvania and New Jersey. Weiser failed to be elected to the Pennsylvania Assembly, but his political services included appointments as a justice of the peace and ranger for Lancaster County and justice of the peace and president-judge of Berks County. In 1753 he became a member of the Board of Trade for the Education of Youth in Pennsylvania. When the French and Indian War erupted in 1754, Weiser obtained a commission as colonel and led an expedition to the frontier. The following year he returned to become one of the commissioners founding the town of Reading.

Weismann, August (Friedrich Leopold) (b. Jan. 17, 1834, Frankfurt am Main—d. Nov. 5, 1914, Freiburg im Breisgau, Ger.), German biologist and one of the founders of the science of genetics, who is best known for his opposition to the doctrine of the inheritance of acquired traits and for his "germ plasm" theory, the forerunner of DNA theory.

From early boyhood, when he made expeditions into the surrounding countryside to



Weismann
The Bettmann Archive

collect insects and plants, Weismann showed an intense interest in natural history. From 1852 until 1856 he was a student of medicine at the University of Göttingen, after which he briefly held a number of positions: as a chemical assistant in Rostock, as a doctor in the Baden army, and as private physician to Archduke Stephan of Austria. In 1860 he made a brief study visit to Paris, and the next year to Giessen—a stay he later described as being one of the most important in his life.

In 1860 he first visited Freiburg im Breisgau. Much later, during the celebrations for his 70th birthday, he recalled that "the quiet town nestling among green vines, and the magnificent cathedral . . . made such a charming impression on me that I thought: 'If only I could live here!' " So it was to be. In 1863 he joined the University of Freiburg's medical faculty, teaching zoology and comparative anatomy. Soon a zoological institute and museum were built, of which he became the first director. He remained at Freiburg until his retirement in 1912.

In 1867 he married Marie Dorothea Gruber, whom he had met on a visit to Genoa in 1859. The couple had four daughters and a son.

During his early years at Freiburg, Weismann occupied himself with zoological research, his most important interests being insect metamorphosis and the sex cells of the Hydrozoa. Even in 1864, however, he was experiencing trouble with his eyesight, making microscope work painful and difficult. After a rest, part of which was spent on leave in Italy, he was able to write in 1874 that he again had the "intense pleasure of observing the minute inhabitants of the fresh waters and the sea," but he had to abandon microscope work in 1884 and eventually even had to employ someone to read to him. In his later years, therefore, he concentrated on theory.

Weismann conceived the idea, arising out of his early observations on the Hydrozoa, that the germ cells of animals contain "something essential for the species, something which must be carefully preserved and passed on from one generation to another." Thus was born the theory of the germ plasm, which he embodied in a book first published in German in 1886 and in English in 1893. Its essence was the notion that all living things contain a special hereditary substance. The general idea is still accepted as valid today, though in place of germ plasm one speaks of chromosomes, genes, and DNA. Weismann, however, lacked nearly all the experimental genetic data that now exists; he filled in the details of his theory with wide-ranging speculation that became at times somewhat mystical.

Even at that time, when the writings of Gregor Mendel on genetics were lying unnoticed, Weismann saw that, since the hereditary substances from the two parents become mixed together in the fertilized egg, there would be a progressive increase in the amount of hereditary substances unless at some stage there was a compensating reduction. He therefore predicted that there must be a form of nuclear division in which each daughter nucleus receives only half the ancestral germ plasms contained in the original nucleus. The cytological work of other investigators proved the correctness of this prediction and enabled Weismann, together with the others, to propose that the germ plasm was located in what were subsequently called the chromosomes of the egg nucleus.

Weismann was ever a strong supporter of Darwin and wrote that the *Origin of Species* had excited "delight and enthusiasm in the minds of the younger students" in the 1850s. Unlike Darwin, however, Weismann firmly opposed the idea of inheritance of acquired characters. He put the matter to a practical test in a somewhat naively conceived experiment in which he cut off the tails of mice. With painstaking thoroughness, he observed five generations of progeny of tailless parents, 901 mice in all. Needless to say, they all grew normal tails and Weismann was able to prove that mutilations were not inherited.

In later life Weismann established himself as one of the leading biologists of the world, and his lectures on heredity and evolution became famous. A zealous patriot, he supported the unification of Germany under Bismarck and, on the outbreak of World War I, renounced his British honours and awards. He was very fond of music and was able to play Bach until his 80th year. (G.H.B.)

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discussion of various zoological themes; *Essays upon Heredity and Kindred Biological Problems* (1889; 2nd ed., 2 vol., 1891–92); *The Germ-Plasm: A Theory of Heredity* (1893, reprinted 1974); and *The Evolution Theory* (1904), a discussion of Darwinism in relation to the germ-plasm theory.

Weiss, Johannes (b. Dec. 13, 1863, Kiel, Schleswig-Holstein [now in Germany]—d. Aug. 24, 1914, Heidelberg, Ger.), German theologian known for his work in New Testament criticism. He wrote the first eschatological interpretations of the Gospel (1892) and also set forth the principles of "form-criticism" (1912)—the analysis of biblical passages through the examination of their structural form.

Weiss was educated at the universities of Marburg, Berlin, Göttingen, and Breslau and later taught at Göttingen, Marburg, and Heidelberg. In 1892 his *Die Predigt Jesu vom Reiche Gottes* ("Jesus' Proclamation of the Kingdom of God") argued the eschatological view that Jesus Christ's teachings reflected contemporary hopes for the appearance of an imminent Kingdom of God. Weiss also wrote such popular works as *Paulus und Jesus* (1909), *Jesus von Nazareth, Mythus oder Geschichte?* (1910; *Jesus of Nazareth, Myth or History?*), and *Das Urchristentum,* completed by R. Knopf (1917; *The History of Primitive Christianity*).

Weiss, Paul Alfred (b. March 21, 1898, Vienna, Austria—d. Sept. 8, 1989, White Plains, N.Y., U.S.), Austrian-born American biologist who did pioneering research on the mechanics of nerve regeneration, nerve repair, and cellular organization. During World War II Weiss and his colleagues developed and tested the first practical system of preserving human tissue for later surgical grafting.

Weiss was trained at the University of Vienna. As assistant director of the Biological Research Institute of the Vienna Academy of Sciences (1922–29), he conducted analytical studies of cell movement, tissue organization, and organ formation, work that ultimately contributed to the understanding of the mechanics of wound healing.

Weiss went to the United States to work in the Yale University Laboratory from 1931 to 1933. From Yale he moved to the University of Chicago (1933–54), but his research on tissue organization and development was interrupted during World War II, when, working for the U.S. government, he sought improved methods of surgical nerve repair. He developed a technique for the sutureless splicing of severed nerves, for which accomplishment he received a merit citation from the U.S. War and Naval departments. He became a U.S. citizen in 1939.

As professor at the laboratory of developmental biology at the Rockefeller Institute in New York City (1954–64), Weiss continued his morphological studies and, with his laboratory associates, demonstrated that different organs' cells that have been randomly mixed and reassembled have the ability to reorganize themselves into miniature replicas of the donor organs. After two years (1964–66) as professor and dean of the University of Texas Graduate School of Biomedical Sciences, the designation of emeritus professor was conferred on Weiss by the Rockefeller University, New York City.

Among his many works, including several hundred scientific papers, is *Principles of Development* (1939), a textbook in experimental embryology. In 1980 Weiss was awarded the National Science Medal.

Weiss, Peter (Ulrich) (b. Nov. 8, 1916, Nowawes, near Potsdam, Ger.—d. May 10, 1982, Stockholm, Swed.), German dramatist and novelist whose plays achieved widespread success in both Europe and the United States in the 1960s. He was a Marxist, but a heterodox one.

The son of a textile manufacturer who was Jewish by origin but Christian by conversion, Weiss was brought up a Lutheran. In 1934 he and his family were forced into exile by Nazi persecution. He lived in England, Switzerland, and Czechoslovakia before settling, in 1939, in Sweden. He painted and made films (which showed the influence of the Surrealists) and also illustrated a Swedish edition of the *Thousand and One Nights*. Later he turned to fiction and drama. His earlier published works were in Swedish, but he eventually settled in German. His initial literary influence was the modern novelist Franz Kafka, whose dreamlike world of subtle menace and frustration impressed Weiss. An important later influence was the American writer Henry Miller.

Weiss's *Die Verfolgung und Ermordung Jean Paul Marats, dargestellt durch die Schauspielgruppe des Hospizes zu Charenton unter Anleitung des Herrn de Sade* (*The Persecution and Assassination of Jean-Paul Marat as Performed by the Inmates of the Asylum of Charenton Under the Direction of the Marquis de Sade,* usually referred to as *Marat/Sade*) pits the ideals of individualism and of revolution against each other in a setting in which madness and reason seem inseparable. The play was first performed in West Berlin in 1964 and received a celebrated staging in New York City in 1965 by Peter Brook, who filmed it in 1967. *Die Ermittlung* (1965; *The Investigation*) is a documentary drama re-creating the Frankfurt trials of the men who carried out mass murders at Auschwitz; at the same time, it attacks later German hypocrisy over the existence of concentration camps and investigates the root causes of aggression. Weiss's other plays include documentary dramas attacking Portuguese imperialism in Angola, *Gesang vom lusitanischen Popanz* (1967; *The Song of the Lusitanian Bogey*); and American destructive policy in the Vietnam War, *Viet Nam Diskurs* (1968; *Discourse on Viet Nam*). Weiss wrote three semiautobiographical novels, *Der Schatten des Körpers des Kutschers* (1960; "The Shadow of the Body of the Coachman"), *Abschied von den Eltern* (1961; *The Leavetaking*), and *Fluchtpunkt* (1962; *Exile*). The latter did much to establish him in Germany, especially after it won a literary prize in 1963.

Weiss, Pierre-Ernest (b. March 25, 1865, Mulhouse, Fr.—d. Oct. 24, 1940, Lyon), French physicist who investigated magnetism and determined the Weiss magneton unit of magnetic moment.

Weiss graduated (1887) at the head of his class from the Zürich Polytechnikum with a degree in mechanical engineering and was admitted to the École Normale Supérieure in Paris in 1888. He was named *maître de conférences* at the University of Rennes in 1895 and at the University of Lyons in 1899. In 1902 he became professor at the Zürich Polytechnikum, where Albert Einstein was a colleague. There he developed a great laboratory for magnetic research that attracted a number of well-known physicists. Assigned to the French Office of Inventions during World War I, he helped devise the Cotton–Weiss acoustical method of fixing enemy artillery positions. In 1919 he established a physics institute at the University of Strasbourg (France) that became a leading centre of magnetic research. He was elected to membership in the Paris Academy in 1926.

Weiss's chief work was on ferromagnetism. Hypothesizing a molecular magnetic field acting on individual atomic magnetic moments, he was able to construct mathematical descriptions of ferromagnetic behaviour, including an explanation of such magnetocaloric phenomena as the Curie point. His theory succeeded also in predicting a discontinuity in the specific heat of a ferromagnetic substance at the Curie point and suggested that spontaneous magnetization could occur in such materials; the latter phenomenon was later found to occur in very small regions known as Weiss domains. His major published work was *Le magnetisme* (with G. Foex, 1926).

Weissenborn, Friederike Caroline (German actress-manager): *see* Neuber, Caroline.

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Weissenfels, city, Saxony-Anhalt *Land* (state), eastern Germany. It lies on the right bank of the Saale River, south of Halle. A German town on the site of an old Slav settlement, it was chartered in 1185, when it belonged to the Saxon House of Wettin. It was the residence of the dukes of Saxe-Weissenfels from 1656 to 1746 and passed to Prussia in 1815. The Baroque castle (1660–93) is preserved, and the town museum has a notable historical collection of shoes. A rail junction and centre of the German shoemaking industry, Weissenfels also manufactures metal products and paper and has a brewery. Pop. (1989 est.) 38,881.

Weissmuller, Johnny, byname of PETER JOHN WEISSMULLER, original name JONAS WEISSMULLER (b. June 2, 1904, Freidorf, near Timişoara, Rom.—d. Jan. 20, 1984, Acapulco, Mex.), American freestyle swimmer of the 1920s who won five Olympic gold medals and set 67 world records. He became even more famous as a motion-picture actor, most notably in the role of Tarzan, a "noble savage" who had been abandoned in a jungle as an infant and was reared by apes.

Weissmuller, whose parents immigrated to the United States when he was three, attended school only through the eighth grade but was trained in swimming at the Illinois Athletic Club in Chicago. He was a member of several championship relay and water-polo teams that represented the club during the 1920s. In individual freestyle swimming he was U.S. outdoor champion at 100 yards (1922–23, 1925 [no competition 1924]), 100 metres (1926–28), 200 metres (1921–22), 400 metres (1922–23, 1925–28 [no competition 1924]), and 800 metres (1925–27); and U.S. indoor titleholder at 100 yards (1922–25, 1927–28) and 220 yards (1922–24, 1927–28). In the Olympic Games of 1924 he won three gold medals, for the 100-metre and 400-metre freestyle and the 800-metre relay (he also won a bronze medal as a member of the U.S. water-polo team); in 1928 he won two more gold medals, for the 100-metre freestyle and 800-metre relay.

Despite his athletic records, Weissmuller is best known for his motion-picture role as Tarzan of the Apes, a character created by Edgar Rice Burroughs. Weissmuller starred in 12 Tarzan films between 1932 and 1948, beginning with *Tarzan the Ape Man* (1932). He later created the role of Jungle Jim, a guide, for both television and motion pictures. His autobiography, *Water, World, and Weissmuller,* appeared in 1967.

weisuo: *see* wei-so.

Weisweiler, Adam (b. *c.* 1750, Neuwied, Trier?—d. *c.* 1810, Paris?), one of the foremost cabinetmakers of the Louis XVI period, whose works were commissioned by many European courts.

Weisweiler is believed to have studied at Neuwied under David Roentgen, later cabinetmaker to Queen Marie-Antoinette of France. He was established in Paris as an *artisan libre* (*i.e.,* a foreign craftsman who, by medieval rights of refuge, could work in privileged places) by 1777, the year in which he was married. He became a *maître-ébéniste* (master cabinetmaker) in 1778, setting up his work-

shop on the rue du Faubourg Saint-Antoine. Thus he became another leading German artisan working for royal patrons of France and creating in the French style.

Weisweiler used fine veneers, lacquer, and even polished steel to obtain his distinctive effects. He supplied a quantity of furniture for the French court, notably for Marie-Antoinette's apartments at Saint-Cloud, such as a writing table lavishly decorated with Japanese lacquer, ormolu, and ebony veneer. Distinctly architectural in conception, his most characteristic work in the Etruscan style is readily recognized by the superb mounts, which often include twisted columns or female caryatid figures at the corners (possibly made by the French metalworker Pierre Gouthière) and by the delicate scrolls, combined with goats and trumpeting cupids, in the friezes. Occasionally Weisweiler incorporated plaques of Sèvres porcelain or decorative panels created during the reign of King Louis XIV (breaking up earlier pieces for such ornamentation became a common practice in the late 18th century). He managed to survive the French Revolution, and in the Empire period he supplied furniture to Queen Hortense and to the Bonaparte family. His other royal commissions included those for the Prince of Wales and Duke of Northumberland. He retired after his wife's death in 1809, and his business was continued by his son Jean Weisweiler (died 1844).

Weisz, Erik (conjurer): *see* Houdini, Harry.

Weizmann, Chaim (Azriel) (b. Nov. 27, 1874, Motol, Pol., Russian Empire—d. Nov. 9, 1952, Rehovot, Israel), first president of the new nation of Israel (1949–52), who was for decades the guiding spirit behind the World Zionist Organization.



Weizmann, 1947

By courtesy of the Zionist Archives and Library, New York City

Early life and education. Chaim Azriel Weizmann was born of humble parents in November 1874, in Motol, a backwater hamlet in western Russia, the third of 15 children of Ezer Weizmann, a lumber transporter. Motol lay close to dense forests, surroundings that instilled in the boy a love of trees that was to persist the rest of his life. He spent adolescent summers riding his father's log rafts downriver to Baltic ports.

Despite slender means, the parents arranged for their offspring to receive the benefits of advanced education after strict Jewish orthodox schooling in childhood. All except one of the children ultimately became scientists, physicians, dentists, engineers, and pedagogues. Chaim himself, on reaching 11, was sent to the secondary school in nearby Pinsk, where his unusual scientific aptitude was encouraged by a discerning science master.

Upon matriculating (1891), the young student, irked by university quotas restricting Jewish admissions, left Russia to study chemistry in Germany and Switzerland, eking out small remittances from home by teaching science and Russian. After obtaining the Ph.D. magna cum laude at Fribourg, Switz. (1900), Weizmann taught chemistry at Geneva University and concurrently engaged in organic chemistry research, concentrating on dyestuffs and aromatics. By selling several patented discoveries in the late 1890s, he mitigated his chronic financial straits and was able to help his younger brothers and sisters through college. In 1900 he met Vera Chatzman, a medical student, in Geneva, and six years later they married; they had two sons.

Weizmann settled in England in 1904 upon taking up a science appointment at the University of Manchester. During World War I he gave valuable assistance to the British munitions industry, then (1916) in dire need of acetone (a vital ingredient of cordite), by devising a process to extract the solvent from maize. This achievement signally aided the Zionist political negotiations he was then conducting with the British government.

Although he gained international renown as a chemist, it was as a politician that he was most eminent. As a youth he imbibed Jewish nationalist culture and ideals (as distinct from traditional pietistic knowledge) under his father's influence. At the age of 11 he wrote a letter in Hebrew to his Hebrew teacher in Motol urging with boyish fervour that the Jewish people must return to Zion.

Early political involvement. Throughout his student and teaching years he assumed increasing dominance as a Zionist politician. He initially gained prominence as the leader of the "Young Zionist" opposition to Theodor Herzl, the founder of modern Zionism, especially in the "Uganda dispute," which erupted in 1903–05 over a British proposal for Jewish agricultural settlement in East Africa. Elected to the General Council (Actions Committee) in 1905, he played only a secondary role in the movement until 1914. Then, during the early years of the war he took an important part in the negotiations that led up to the government's Balfour Declaration (November 1917) favouring the establishment of a Jewish national home in Palestine.

While in Jerusalem he travelled to 'Aqaba, southern Transjordan (June 1918), where he met Amīr Faysal of Hejaz (later first king of Iraq) to discuss Jewish–Arab cooperation. They met again and reached written agreement during the Versailles peace conference (July 1919). As an observer, Weizmann attended the San Remo conference of Allied Powers (1920), which confirmed the Balfour Declaration and awarded the Palestine Mandate to Great Britain. The same year, Weizmann, who had been president of the English Zionist Federation from 1917, became head of the World Zionist Organization. From 1921 onward he travelled the world tirelessly, preaching Zionist ideology and appealing for funds at mass rallies.

Weizmann's skill as a negotiator was severely tested during the 1920s. Great Britain, confronted by the mounting problems and civil disorders stemming from nascent Arab nationalism, gradually retreated from its commitment to foster a Jewish national home. A dauntless protagonist, Weizmann nevertheless plunged into the ceaseless imbroglios of British policy vacillations, Arab and Jewish revolts, and Zionist internecine feuds and conflicts that were commingled with opposition to himself by adversaries.

Conflict with Zionist extremists. Eventually, Weizmann's doctrines of caution antagonized extremist politicians. Exasperated by counsels of gradualism, some Zionists accused him of undue amenability toward Britain in his political thinking and performance—a characteristic they averred he owed to the genteel influences of the upper English society in which he moved. His control over the world nationalist movement was challenged after Britain announced policy changes unfavourable to Zionist work in Palestine. He therefore resigned in pique in 1930 but was prevailed upon to remain in office. At the 1931 congress, however, he was subjected to a vote of nonconfidence and was not reelected president of the Zionist Organization and Jewish Agency, the expanded body of which he had been the main architect in 1929.

Weizmann turned again to science, founding the Daniel Sieff Research Institute at Rehovot, Palestine (1934), with the help of friends in England. Earlier, he had toured South Africa (1931) and played a leading part in public efforts to save German Jewry and its property after the advent of the Nazis (1933).

Back in office by election (1935), Weizmann supported the recommendation of a British royal inquiry commission (1937) to divide Palestine into Jewish and Arab areas, arguing that "half a loaf was better than none." Opponents furiously challenged this expedience as pusillanimity and craven submission to British interests, though in the end the commission's plan failed because of Arab rather than Jewish rejection.

Weizmann's unflagging insistence during World War II brought about the formation of the Jewish Brigade Group in the British army. The Sieff Research Institute under his direction also aided the Allied military effort by providing essential pharmaceuticals, and Weizmann conferred with the United States and British governments on methods of producing synthetic rubber. His younger son, Michael, was killed in 1942 while serving as an officer in the Royal Air Force.

Zionist antagonists revived allegations of Weizmann's pro-British prejudice after he had denounced (1945) on moral grounds the violent campaign waged by Jewish dissident groups against British forces in Palestine. He again lost the world Zionist presidency (1946) and never returned to the official leadership. Nevertheless, Jewish people as a whole continued to revere him.

President of Israel. Early in 1948, though divested of formal office, he was sent to Washington by the Zionist leadership for crucial talks with Pres. Harry Truman. Weizmann persuaded the United States administration both to drop its trusteeship plan for Palestine—a plan that would have jeopardized founding the State of Israel—and to forego its proposal to exclude Palestine's southern province (Negev) from Israel. His intervention also led to American recognition of the newly proclaimed state (May 14) and the grant of a $100,000,000 loan. That September Weizmann became president of the Provisional State Council and the following February was elected president of the State of Israel.

Worn out by sorrow and arduous political strife and afflicted by frail health and failing sight, he nevertheless maintained a brave front in postwar years. He died in November 1952, after a long illness. He was given a state burial on his estate at Rehovot. More than 250,000 people filed by the catafalque. The simple, unadorned grave is visited by hundreds of thousands of visitors annually. (J.L.Me.)

BIBLIOGRAPHY. A copious literature on Zionism, Palestine, and Israel contains multiple references to Chaim Weizmann's role in the contemporary context. Those more directly concerned are: *Trial and Error: The Autobiography of Chaim Weizmann* (1949, reprinted 1972); Meyer Weisgal (ed.), *Chaim Weizmann, Statesman/Scientist* (1944); Samuel Shhor, *Hollow Glory: The Last Days of Chaim Weizmann, First President of Israel* (1960; Eng. trans. from the Hebrew of 1958); Meyer Weisgal and Joel Carmichael (eds.), *Chaim Weizmann* (1962); and *The Impossible Takes Longer: The Memoirs of Vera Weizmann* (1967), written by his wife. Harold M. Blumberg, *Weizmann, His Life*

and Times (1975), adds little to the biographical literature on Weizmann but provides a valuable pictorial history. In progress is a complete edition of *The Letters and Papers of Chaim Weizmann*, Leonard Stein, *et al.* (eds.), (1968–). He himself wrote 100 scientific papers and numerous political essays and speeches in addition to a voluminous correspondence and registered 110 patents singly or in collaboration.

Weland THE SMITH (Germanic legend): *see* Wayland the Smith.

Welawa, Treaty of (1657): *see* Wehlau, Treaty of.

Welch, city, seat (1891) of McDowell County, southwestern West Virginia, U.S., at the confluence of Elkhorn Creek and Tug Fork. Settled in 1885, it was named for I.A. Welch, an early settler. There were no bridges or wagons in this extremely mountainous area until the 1880s. The principal products were furs and ginseng. The arrival of the Norfolk and Western Railroad in 1891 encouraged the opening of the surrounding coal seams. The city is now the service centre for the coal-mining area that includes the well-known Pocahontas field, source of "Black Diamond" coal. Panther State Forest is nearby. Inc. 1894. Pop. (1990) 3,028.

Welch, Adam Cleghorn (b. May 14, 1864, Goshen, Jamaica—d. Feb. 19, 1943, Helensburgh, Dunbarton, Scot.), one of the greatest Scottish biblical scholars.

The son of a United Presbyterian missionary, he attended Edinburgh University (1879–83) and the United Presbyterian Hall (1883–85), spending the summer term of 1885 at Erlangen, Ger. As minister of Waterbeck (1887–92), Helensburgh (1892–1902), and Claremont, Glasgow (1902–13), he became known as a preacher. He played a notable part in the negotiations that led to the reunion of the United Free Church and the Church of Scotland in 1929. A appointed professor of Hebrew and Old Testament exegesis in New College, Edinburgh, in 1913, he taught there until he retired in 1934.

An outstanding critic of the school of Julius Wellhausen (*q.v.*), Welch developed an alternative theory of the growth of Israel's religion, in five books: *The Code of Deuteronomy* (1925); *Deuteronomy: The Framework to the Code* (1932); *Post-Exilic Judaism* (1935); *Prophet and Priest in Old Israel* (1936); *The Work of the Chronicler* (1939). The value of Welch's contribution has come to be recognized, even though few scholars would accept his whole reconstruction. His other books include studies of Daniel and Revelation (1922), the Psalter (1926), and Jeremiah (1928). A posthumous volume, *Kings and Prophets of Israel* (1952), contains a memoir and a bibliography.

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Welch, Denton (b. March 27, 1915, Shanghai—d. Dec. 30, 1948, Middle Orchard, near Borough Green, Kent, Eng.), English painter and novelist chiefly remembered for two imaginative novels of adolescence, *Maiden Voyage* (1943) and *In Youth Is Pleasure* (1944).

Welch was educated at Repton School in Derbyshire. After a visit to China he studied painting at the Goldsmith School of Art. In 1935, while still at school, he was severely injured in a cycling accident that left him an invalid for the rest of his life; but he continued painting, exhibiting frequently at the Leicester galleries, and began his career as a writer.

With the exception of two novels and a volume of short stories, *Brave and Cruel* (1946), Welch's other works have been published posthumously: *A Voice Through a Cloud* (1950), considered by many his best novel; *Journals* (1952), an account of his wide travels, taken despite his bad health: *I Left My Grandfather's House* (1958), which is only a very rough draft; and *Denton Welch—Selections from His Published Works* (1963), which contains a notable introduction by Jocelyn Brooke.

Welch, William Henry (b. April 8, 1850, Norfolk, Conn., U.S.—d. April 30, 1934, Baltimore), American pathologist who played a major role in the introduction of modern medical practice and education to the United States while directing the rise of Johns Hopkins University, Baltimore, to a leading position among the nation's medical centres.

Undertaking graduate medical study in Germany (1876–78), Welch was working in the laboratory of the pathologist Julius Cohnheim at the University of Breslau when he witnessed Robert Koch's historic demonstration of the infectivity of *Bacillus anthracis*. Returning to the United States, Welch became professor of pathology and anatomy at Bellevue Hospital Medical College, New York City (1879), and five years later he developed the first true university department of pathology in the United States at the newly created Johns Hopkins University. There he was instrumental in recruiting for the faculty the famed physician William Osler and the surgeon William Halsted. As the university medical school's first dean (1893–98), Welch virtually single-handedly constructed a curriculum that revolutionized American medicine by demanding of its students a rigorous study of physical sciences and an active involvement in clinical duties and laboratory work. He numbered among his students the yellow-fever investigators Walter Reed and James Carroll and the bacteriologist Simon Flexner.

As an original investigator, Welch is best known for his demonstration (with Flexner; 1891–92) of the pathological effects produced by diphtheria toxin and for his discovery (1892) of *Micrococcus albus* and its relation to wound fever and of *Clostridium welchii* (Welch's bacillus), the causative agent of gas gangrene.

Weld, Sir Frederick Aloysius (b. May 9, 1823, Chideock, Dorset, Eng.—d. July 20, 1891, Bridport, Dorset), politician, statesman, and prime minister of New Zealand (1864–65), whose "self-reliant" policy was that the colony have full responsibility for the conduct of all Maori affairs, including the settlement of difficulties without help from the crown.

Born into a landed Roman Catholic family and educated at Stonyhurst and the University of Fribourg, Switz., Weld immigrated to New Zealand (1843) and started a sheep station. By 1851 he could afford to make the first of several trips to England and publish a pamphlet, *Hints to Intending Sheep Farmers in New Zealand*. Becoming involved in the Settlers' Constitutional Association in Wellington, Weld entered politics and was elected to the House of Representatives from Wairau (1853) shortly after Sir George Grey proclaimed the new Constitution Act. At the first session of the General Assembly, Weld was one of the unofficial executive councillors who undertook to smooth the transition to responsible government (1856), that is, a system under which the colonial governor could act in domestic matters only upon the advice of ministers enjoying the confidence of the elected chamber. He joined the ministry of Stafford as minister for native affairs (1860), and he remained a member of Parliament during the confusion of the next two governments' attempts to negotiate peace with the Maoris while refusing to accept responsibility for all Maori affairs. Anxious to remove the British government from any further involvement, particularly military, Governor Grey asked Weld to form a ministry (1864). During the next year British troops were withdrawn from New Zealand, and large tracts of Maori land were confiscated under the newly passed Native Lands Act (1865) and distributed to European settlers. However, the government's controversial removal of the seat of government from Auckland to Wellington, popular opposition to the self-reliant policy, and Weld's own declining health so weakened his ministry that Weld resigned (1865), did not stand in the next election, and returned to England the following year (1867). Although Weld was asked to return when the Maori conflict resumed (1868), he accepted instead the governorship of Western Australia (1869–75), in which post he undertook important governmental and educational reforms and helped develop the first rail, telegraph, and steamship facilities in the colony. He later was appointed governor of Tasmania (1875–80), where he was chiefly occupied with the feuds and antagonisms of the faction-ridden local government.

Knighted in 1880, Weld accepted appointment as governor of the Straits Settlements, where he consolidated British relations with the native rulers. Later he undertook a mission to Borneo (1887). He died shortly after returning from a visit to the Malay states.

Weld, Theodore Dwight (b. Nov. 23, 1803, Hampton, Conn., U.S.—d. Feb. 3, 1895, Hyde Park, Mass.), American antislavery crusader in the pre-Civil War period.

While a ministerial student at Lane Seminary, Cincinnati, Ohio, Weld participated in antislavery debates and led a group of students who withdrew from Lane to enroll at Oberlin (Ohio) College. Weld left his studies in 1834 to become an agent for the American Anti-Slavery Society, recruiting and training people to work for the cause. His converts included such well-known Abolitionists as James G. Birney, Harriet Beecher Stowe, and Henry Ward Beecher.

Weld wrote pamphlets (largely anonymous), notably *The Bible Against Slavery* (1837) and *Slavery As It Is* (1839). The latter was said to be the work on which Harriet Beecher Stowe partly based her *Uncle Tom's Cabin*.

Soon after his marriage (1838) to Angelina Grimké, a coworker in the antislavery crusade, Weld withdrew to private life on a farm in Belleville, N.J. He ventured back into public life in 1841–43, when he went to Washington, D.C., to head an antislavery reference bureau for the group of insurgents in Congress who broke with the Whigs on the slavery issue and were seeking the repeal of the "gag rule" restricting the consideration of antislavery petitions in Congress. Having demonstrated the value of an antislavery lobby in Washington, Weld returned to private life. He and his wife spent the remainder of their lives directing schools and teaching in New Jersey and Massachusetts. A biography is B.P. Thomas' *Theodore Dwight Weld, Crusader for Freedom* (1950).

welded tuff, rock composed of compacted volcanic ejecta (*see* tuff).

welding, technique used for joining metallic parts usually through the application of heat. This technique was discovered during efforts to manipulate iron into useful shapes. Welded blades were developed in the first millenium AD, the most famous being those produced by Arab armourers at Damascus, Syria. The process of carburization of iron, to produce hard steel was known at this time, but the resultant steel was very brittle. The welding technique—which involved interlayering relatively soft and tough iron with high-carbon material, followed by hammer forging—produced a strong, tough blade.

In modern times the improvement in

iron-making techniques, especially the introduction of cast iron, restricted welding to the blacksmith and the jeweler. Other joining techniques, such as fastening by bolts or rivets, were widely applied to new products, from bridges and railway engines to kitchen utensils.

Modern fusion welding processes are an outgrowth of the need to obtain a continuous joint on large steel plates. Riveting had been shown to have disadvantages, especially for an enclosed container such as a boiler. Gas welding, arc welding, and resistance welding all appeared at the end of the 19th century. The first real attempt to adopt welding processes on a wide scale was made during World War I. By 1916 the oxyacetylene process was well developed, and the welding techniques employed then are still used. The main improvements since then have been in equipment and safety. Arc welding, using a consumable electrode, was also introduced in this period, but the bare wires initially used produced brittle welds. A solution was found by wrapping the bare wire with asbestos and an entwined aluminum wire. The modern electrode, introduced in 1907, consists of a bare wire with a complex coating of minerals and metals. Arc welding was not universally used until World War II, when the urgent need for rapid means of construction for shipping, power plants, transportation, and structures spurred the necessary development work.

Resistance welding, invented in 1877 by Elihu Thomson, was accepted long before arc welding for spot and seam joining of sheet. Butt welding for chain making and joining bars and rods was developed during the 1920s. In the 1940s the tungsten-inert gas process, using a nonconsumable tungsten electrode to perform fusion welds, was introduced. In 1948 a new gas-shielded process utilized a wire electrode that was consumed in the weld. More recently, electron-beam welding, laser welding, and several solid-phase processes such as diffusion bonding, friction welding, and ultrasonic joining have been developed.

Basic principles of welding. A weld can be defined as a coalescence of metals produced by heating to a suitable temperature with or without the application of pressure, and with or without the use of a filler material.

In fusion welding a heat source generates sufficient heat to create and maintain a molten pool of metal of the required size. The heat may be supplied by electricity or by a gas flame. Electric resistance welding can be considered fusion welding because some molten metal is formed.

Solid-phase processes produce welds without melting the base material and without the addition of a filler metal. Pressure is always employed, and generally some heat is provided. Frictional heat is developed in ultrasonic and friction joining, and furnace heating is usually employed in diffusion bonding.

The electric arc used in welding is a high-current, low-voltage discharge generally in the range 10–2,000 amperes at 10–50 volts. An arc column is complex but, broadly speaking, consists of a cathode that emits electrons, a gas plasma for current conduction, and an anode region that becomes comparatively hotter than the cathode due to electron bombardment. Therefore, the electrode, if consumable, is made positive and, if nonconsumable, is made negative. A direct current (dc) arc is usually used, but alternating current (ac) arcs can be employed.

Total energy input in all welding processes exceeds that which is required to produce a joint, because not all the heat generated can be effectively utilized. Efficiencies vary from 60 to 90 percent, depending on the process; some special processes deviate widely from this figure. Heat is lost by conduction through the base metal and by radiation to the surroundings.

Most metals, when heated, react with the atmosphere or other nearby metals. These reactions can be extremely detrimental to the properties of a welded joint. Most metals, for example, rapidly oxidize when molten. A layer of oxide can prevent proper bonding of the metal. Molten-metal droplets coated with oxide become entrapped in the weld and make the joint brittle. Some valuable materials added for specific properties react so quickly on exposure to the air that the metal deposited does not have the same composition as it had initially. These problems have led to the use of fluxes and inert atmospheres.

In fusion welding the flux has a protective role in facilitating a controlled reaction of the metal and then preventing oxidation by forming a blanket over the molten material. Fluxes can be active and help in the process or inactive and simply protect the surfaces during joining.

Inert atmospheres play a protective role similar to that of fluxes. In gas-shielded metal-arc and gas-shielded tungsten-arc welding an inert gas—usually argon—flows from an annulus surrounding the torch in a continuous stream, displacing the air from around the arc. The gas does not chemically react with the metal but simply protects it from contact with the oxygen in the air.

The metallurgy of metal joining is important to the functional capabilities of the joint. The arc weld illustrates all the basic features of a joint. Three zones result from the passage of a welding arc: (1) the weld metal, or fusion zone, (2) the heat-affected zone, and (3) the unaffected zone. The weld metal is that portion of the joint that has been melted during welding. The heat-affected zone is a region adjacent to the weld metal that has not been welded but has undergone a change in microstructure or mechanical properties due to the heat of welding. The unaffected material is that which was not heated sufficiently to alter its properties.

Weld-metal composition and the conditions under which it freezes (solidifies) significantly affect the ability of the joint to meet service requirements. In arc welding, the weld metal comprises filler material plus the base metal that has melted. After the arc passes, rapid cooling of the weld metal occurs. A one-pass weld has a cast structure with columnar grains extending from the edge of the molten pool to the centre of the weld. In a multipass weld, this cast structure may be modified, depending on the particular metal that is being welded.

The base metal adjacent to the weld, or the heat-affected zone, is subjected to a range of temperature cycles, and its change in structure is directly related to the peak temperature at any given point, the time of exposure, and the cooling rates. The types of base metal are too numerous to discuss here, but they can be grouped in three classes: (1) materials unaffected by welding heat, (2) materials hardened by structural change, (3) materials hardened by precipitation processes.

Welding produces stresses in materials. These forces are induced by contraction of the weld metal and by expansion and then contraction of the heat-affected zone. The unheated metal imposes a restraint on the above, and as contraction predominates, the weld metal cannot contract freely, and a stress is built up in the joint. This is generally known as residual stress, and for some critical applications must be removed by heat treatment of the whole fabrication. Residual stress is unavoidable in all welded structures, and if it is not controlled bowing or distortion of the weldment will take place. Control is exercised by welding technique, jigs and fixtures, fabrication procedures, and final heat treatment.

There are a wide variety of welding processes. Several of the most important are discussed below.

Forge welding. This original fusion technique dates from the earliest uses of iron. The process was first employed to make small pieces of iron into larger useful pieces by joining them. The parts to be joined were first shaped, then heated to welding temperature in a forge and finally hammered or pressed together. The Damascus sword, for example, consisted of wrought-iron bars hammered until thin, doubled back on themselves, and then rehammered to produce a forged weld. The larger the number of times this process was repeated, the tougher the sword that was obtained. In the Middle Ages cannons were made by welding together several iron bands, and bolts tipped with steel fired from crossbows were fabricated by forge welding. Forge welding has mainly survived as a blacksmith's craft and is still used to some extent in chain making.

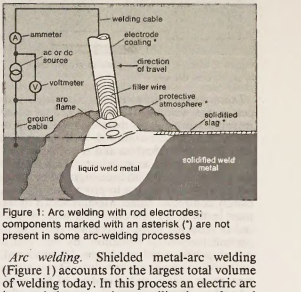


Figure 1: Arc welding with rod electrodes; components marked with an asterisk (*) are not present in some arc-welding processes

Arc welding. Shielded metal-arc welding (Figure 1) accounts for the largest total volume of welding today. In this process an electric arc is struck between the metallic electrode and the workpiece. Tiny globules of molten metal are transferred from the metal electrode to the weld joint. Since arc welding can be done with either alternating or direct current, some welding units accommodate both for wider application. A holder or clamping device with an insulated handle is used to conduct the welding current to the electrode. A return circuit to the power source is made by means of a clamp to the workpiece.

Gas-shielded arc welding, in which the arc is shielded from the air by an inert gas such as argon or helium, has become increasingly important because it can deposit more material at a higher efficiency and can be readily automated. The tungsten electrode version finds its major applications in highly alloyed sheet materials. Either direct or alternating current is used, and filler metal is added either hot or cold into the arc. Consumable electrode gas-metal arc welding with a carbon dioxide shielding gas is widely used for steel welding. Two processes known as spray arc and short-circuiting arc are utilized. Metal transfer is rapid, and the gas protection ensures a tough weld deposit.

Submerged arc welding is similar to the above except that the gas shield is replaced with a granulated mineral material as a flux, which is mounded around the electrode so that no arc is visible.

Plasma welding is an arc process in which a hot plasma is the source of heat. It has some similarity to gas-shielded tungsten-arc welding, the main advantages being greater energy concentration, improved arc stability, and easier operator control. Better arc stability means less sensitivity to joint alignment and arc length variation. In most plasma welding equipment, a secondary arc must first be struck to create an ionized gas stream and permit the main

arc to be started. This secondary arc may utilize either a high-frequency or a direct contact start. Water cooling is used because of the high energies forced through a small orifice (Figure 2). The process is amenable to mechanization, and rapid production rates are possible.

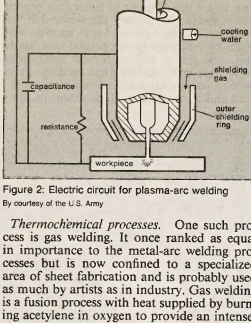


Figure 2: Electric circuit for plasma-arc welding
By courtesy of the U.S. Army

Thermochemical processes. One such process is gas welding. It once ranked as equal in importance to the metal-arc welding processes but is now confined to a specialized area of sheet fabrication and is probably used as much by artists as in industry. Gas welding is a fusion process with heat supplied by burning acetylene in oxygen to provide an intense, closely controlled flame. Metal is added to the joint in the form of a cold filler wire. A neutral or reducing flame is generally desirable to prevent base-metal oxidation. By deft craftsmanship very good welds can be produced, but welding speeds are very low. Fluxes aid in preventing oxide contamination of the joint.

Another thermochemical process is aluminothermic (thermite) joining. It has been successfully used for both ferrous and nonferrous metals but is more frequently used for the former. A mixture of finely divided aluminum and iron oxide is ignited to produce a superheated liquid metal at about 2,800° C (5,000° F). The reaction is completed in 30 seconds to 2 minutes regardless of the size of the charge. The process is suited to joining sections with large, compact cross sections, such as rectangles and rounds. A mold is used to contain the liquid metal.

Resistance welding. Spot, seam, and projection welding are resistance welding processes in which the required heat for joining is generated at the interface by the electrical resistance of the joint. Welds are made in a relatively short time (typically 0.2 seconds) using a low-voltage, high-current power source with force applied to the joint through two electrodes, one on each side. Spot welds are made at regular intervals on sheet metal that has an overlap. Joint strength depends on the number and size of the welds. Seam welding is a continuous process wherein the electric current is successively pulsed into the joint to form a series of overlapping spots or a continuous seam. This process is used to weld containers or structures where spot welding is insufficient. A projection weld is formed when one of the parts to be welded in the resistance machine has been dimpled or pressed to form a protuberance that is melted down during the weld cycle. The process allows a number of predetermined spots to be welded at one time. All of these processes are capable of very high rates of production with continuous quality control. The most modern equipment in resistance welding includes complete feedback control systems to self-correct any weld that does not meet the desired specifications.

Flash welding is a resistance welding process where parts to be joined are clamped, the ends brought together slowly and then drawn apart to cause an arc or flash. Flashing or arcing is continued until the entire area of the joint is heated; the parts are then forced together and pressure maintained until the joint is formed and cooled.

Low- and high-frequency resistance welding is used for the manufacture of tubing. The longitudinal joint in a tube is formed from metal squeezed into shape with edges abutted. Welding heat is governed by the current passing through the work and the speed at which the tube goes through the rolls. Welding speeds of 60 m (200 feet) per minute are possible in this process.

Electron-beam welding. In electron-beam welding, the workpiece is bombarded with a dense stream of high-velocity electrons. The energy of these electrons is converted to heat upon impact. A beam-focusing device is included, and the workpiece is usually placed in an evacuated chamber to allow uninterrupted electron travel. Heating is so intense that the beam almost instantaneously vaporizes a hole through the joint. Extremely narrow deep-penetration welds can be produced using very high voltages—up to 150 kilovolts. Workpieces are positioned accurately by an automatic traverse device; for example, a weld in material 13 mm (0.5 inch) thick would only be 1 mm (0.04 inch) wide. Typical welding speeds are 125 to 250 cm (50 to 100 inches) per minute.

Cold welding. Cold welding, the joining of materials without the use of heat, can be accomplished simply by pressing them together. Surfaces have to be well prepared, and pressure sufficient to produce 35 to 90 percent deformation at the joint is necessary, depending on the material. Lapped joints in sheets and cold-butt welding of wires constitute the major applications of this technique. Pressure can be applied by punch presses, rolling stands, or pneumatic tooling. Pressures of 1,400,000 to 2,800,000 kilopascals (200,000 to 400,000 pounds per square inch) are needed to produce a joint in aluminum; almost all other metals need higher pressures.

Friction welding. In friction welding two workpieces are brought together under load with one part rapidly revolving. Frictional heat is developed at the interface until the material becomes plastic, at which time the rotation is stopped and the load is increased to consolidate the joint. A strong joint results with the plastic deformation, and in this sense the process may be considered a variation of pressure welding. The process is self-regulating, for, as the temperature at the joint rises, the friction coefficient is reduced and overheating cannot occur. The machines are almost like lathes in appearance. Speed, force, and time are the main variables. The process has been automated for the production of axle casings in the automotive industry.

Laser welding. Laser welding is accomplished when the light energy emitted from a laser source is focused upon a workpiece to fuse materials together. The limited availability of lasers of sufficient power for most welding purposes has so far restricted its use in this area. Another difficulty is that the speed and the thickness that can be welded are controlled not so much by power but by the thermal conductivity of the metals and by the avoidance of metal vaporization at the surface. Particular applications of the process with very thin materials up to 0.5 mm (0.02 inch) have, however, been very successful. The process is useful in the joining of miniaturized electrical circuitry.

Diffusion bonding. This type of bonding relies on the effect of applied pressure at an elevated temperature for an appreciable period of time. Generally, the pressure applied must be less than that necessary to cause 5 percent deformation so that the process can be applied to finished machine parts. The process has been used most extensively in the aerospace industries for joining materials and shapes that otherwise could not be made—for example, multiple-finned channels and honeycomb construction. Steel can be diffusion bonded at above 1,000° C (1,800° F) in a few minutes.

Ultrasonic welding. Ultrasonic joining is achieved by clamping the two pieces to be welded between an anvil and a vibrating probe or sonotrode. The vibration raises the temperature at the interface and produces the weld. The main variables are the clamping force, power input, and welding time. A weld can be made in 0.005 second on thin wires and up to 1 second with material 1.3 mm (0.05 inch) thick. Spot welds and continuous seam welds are made with good reliability. Applications include extensive use on lead bonding to integrated circuitry, transistor canning, and aluminum can bodies.

Explosive welding. Explosive welding takes place when two plates are impacted together under an explosive force at high velocity. The lower plate is laid on a firm surface, such as a heavier steel plate. The upper plate is placed carefully at an angle of approximately 5° to the lower plate with a sheet of explosive material on top. The charge is detonated from the hinge of the two plates, and a weld takes place in microseconds by very rapid plastic deformation of the material at the interface. A completed weld has the appearance of waves at the joint caused by a jetting action of metal between the plates.

Weldability of metals. Carbon and low-alloy steels are by far the most widely used materials in welded construction. Carbon content largely determines the weldability of plain carbon steels; at above 0.3 percent carbon some precautions have to be taken to ensure a sound joint. Low-alloy steels are generally regarded as those having a total alloying content of less than 6 percent. There are many grades of steel available, and their relative weldability varies.

Aluminum and its alloys are also generally weldable. A very tenacious oxide film on aluminum tends to prevent good metal flow, however, and suitable fluxes are used for gas welding. Fusion welding is more effective with alternating current when using the gas-tungsten arc process to enable the oxide to be removed by the arc action.

Copper and its alloys are weldable, but the high thermal conductivity of copper makes welding difficult. Refractory metals such as zirconium, niobium, molybdenum, tantalum, and tungsten are usually welded by the gas-tungsten arc process. Nickel is the most compatible material for joining, is weldable to itself, and is extensively used in dissimilar metal welding of steels, stainlesses, and copper alloys.

Welensky, Sir Roy, original name ROLAND WELENSKY (b. Jan. 20, 1907, Salisbury, Southern Rhodesia [now Harare, Zimb.]—d. Dec. 5, 1991, Blandford Forum, Dorset, Eng.), Northern Rhodesian trade unionist and statesman who helped found the Federation of Rhodesia and Nyasaland and served as its deputy minister (1953–56) and prime minister (1956–63).

Welensky, of East European Jewish stock on his father's side and South African Dutch on his mother's, first gained prominence as a professional boxer, holding the heavyweight title for Southern and Northern Rhodesia from 1925 to 1927. He had previously joined the railway service (1924), and as an active member of the Railway Workers Union he won such significant concessions that he was elected to the union's national council. He later served as the union's chairman (1953–63). He entered politics, was elected to Northern Rhodesia's Legislative Council in 1938, and was named to the Executive Council

in 1946. He founded the Northern Rhodesia Labour Party in 1941.

In 1953 (the year that he was knighted) Welensky and Sir Godfrey Huggins, prime minister of Southern Rhodesia, succeeded in establishing a federation made up of the two Rhodesias and Nyasaland. Their new Federal Party, dedicated to "racial partnership," won 24 of the 26 elected seats. Huggins resigned as prime minister in 1956, and Welensky succeeded him. He served concurrently as Minister of External Affairs and for a time also as Minister of Defense. Welensky's Federal Party won the federal election of 1958, but nationalist feelings mounted and the federation was dissolved in 1963. Hoping to promote a multiracial society in gradual stages, Welensky tried to extend his political influence into Southern Rhodesia. In the October 1964 election there, however, his party suffered a crushing defeat.

Welf DYNASTY, English GUELF, or GUELPH, Italian GUELPHO, dynasty of German nobles and rulers who were the chief rivals of the Hohenstaufens in Italy and central Europe in the Middle Ages and who later included the Hanoverian Welfs, who, with the accession of George I to the British throne, became rulers of Great Britain.

The origin of the "Elder House" of Welf is a matter of controversy, since Welf in the Carolingian period seems to have been rather widespread as a baptismal name. The first clearly discernible ancestor of the dynasty is the Count Welf who had possessions in Bavaria in the first quarter of the 9th century and whose daughters Judith and Emma married, respectively, the Frankish emperor Louis I the Pious and the East Frankish king Louis the German. The best analyses of the evidence trace the Burgundian and the Swabian Welfs to two nephews of Judith and Emma, namely Conrad (d. *c.* 876) and the so-numbered Welf I (d. before 876). Conrad's son Rudolf (d. 911 or 912) became king of Burgundy in 888, and this kingdom remained with his descendants until 1032. Welf II (d. 1030), who was probably of the fifth generation from Welf I, had so strong a position in southern Germany that he and his son Welf III could occasionally defy the German kings.

Welf III was enfeoffed as duke of Carinthia in 1047, but died in 1055. His German possessions then passed to his nephew Welf IV (d. 1107), whose father was Alberto Azzo II of the House of Este (*q.v.*). Welf IV began the "Younger House" of Welf.

Welf IV became duke of Bavaria as Welf I, in 1070. He abandoned his alliance with the Holy Roman emperor Henry IV to become an important supporter of the papal party in Italy. His 17-year-old son, Welf V (later Welf II of Bavaria), married the 43-year-old countess Matilda of Tuscany in 1089; the marriage ended in separation. The elder Welf thereupon appealed to Henry IV for help against Matilda. Henry attacked Matilda's castle in Nogara, south of Verona, but abandoned the siege when Matilda's army counterattacked. The Este family tried, in Welf V's name, to claim Matilda's lands after her death but were unsuccessful.

The Duchy of Bavaria passed, in 1156, to Henry the Lion, who held it until his downfall in 1180. Bavaria and Saxony, with great inheritances by marriages, made the Welfs the most potent rivals of the Hohenstaufen kings and emperors.

The German king and Holy Roman emperor Otto IV was a son of Henry the Lion. The Welf kingship collapsed with him; but the tradition of Welf hostility to the Hohenstaufen emperors led to the Italian use of a form of the name for a supporter of the papacy against the emperor (*see* Guelfs and Ghibellines). Reconciliation between Welfs and Hohenstaufens was achieved in 1235, when the emperor Frederick II enfeoffed Otto IV's grandson, Otto the Child (d. 1252) with the duchy of Brunswick-Lüneburg, a shrunken remnant of what his ancestors had held in Saxony.

In later times the Hanoverian Welfs attained the status of electors of the Holy Roman Empire (1692), kings of Great Britain (1714), and kings of Hanover (1814). The Russian emperor Ivan VI was a Welf of Brunswick-Wolfenbüttel through his father.

The British sovereignty of the Welfs ended with Victoria. The descendants of her uncle Ernest Augustus lost Hanover in the Seven Weeks' War of 1866. They ought to have inherited Brunswick (-Wolfenbüttel) in 1884, but because they refused to acknowledge their loss of right to Hanover, the duke of Cumberland Ernest Augustus (1845–1923) was prevented from taking possession. After the marriage of his son Ernest Augustus (1887–1953) to Victoria Louise, daughter of the German emperor William II, they reigned over Brunswick alone until in the revolution after World War I they were forced to abdicate.

welfare economics, branch of economics that seeks to evaluate economic policies in terms of their effects on the well-being of the community. It became established as a well-defined branch of economic theory during the 20th century.

Earlier writers conceived of welfare as simply the sum of the satisfactions accruing to all individuals within an economic system. Later theorists became skeptical of the possibility of measuring even one person's satisfactions and argued that it was impossible to compare with precision the states of well-being of two or more individuals. In simple terms, the long-standing assumption that a poor man would derive more additional satisfaction than a rich man from any given increase in income could not be precisely maintained.

On the level of social policy, this meant that measures redistributing resources from rich to poor (as in the case of progressive income taxation) could not be said to increase the sum of individual satisfactions. A new and more limited criterion was then developed for judging economic policy: one economic situation was judged superior to another only if at least one person had been made better off without anyone else being made worse off. Alternatively, one economic state might be judged superior to a previous one even though some consumers were made worse off if the gainers could compensate the losers and still be better off than before. There would, however, be no way of judging among several alternatives of which all fulfilled this condition.

Welfare Island (New York City): *see* Roosevelt Island.

welfare program: *see* social welfare program.

welfare service: *see* social service.

welfare state, concept of government in which the state plays a key role in the protection and promotion of the economic and social well-being of its citizens. It is based on the principles of equality of opportunity, equitable distribution of wealth, and public responsibility for those unable to avail themselves of the minimal provisions for a good life. The general term may cover a variety of forms of economic and social organization.

A fundamental feature of the welfare state is social insurance, a provision common to most advanced industrialized countries (*e.g.*, National Insurance in the U.K., Old-Age, Survivors, Disability, and Health Insurance in the U.S.). Such insurance is usually financed by compulsory contributions and is intended to provide benefits to persons and families during periods of greatest need. It is widely recognized, however, that in practice these cash benefits fall considerably short of the levels intended by the designers of the plans.

The welfare state also usually includes public provision of basic education, health services, and housing (in some cases at low cost or without charge). In these respects the welfare state is considerably more extensive in western European countries than in the U.S., featuring in many cases comprehensive health coverage and provision of state-subsidized tertiary education.

Antipoverty programs and the system of personal taxation may also be regarded as aspects of the welfare state. Personal taxation falls into this category insofar as its progressivity is used to achieve greater justice in income distribution (rather than merely to raise revenue) and also insofar as it used to finance social insurance payments and other benefits not completely financed by compulsory contributions. In socialist countries the welfare state also covers employment and administration of consumer prices.

The modern use of the term is associated with the comprehensive measures of social insurance adopted in 1948 by Great Britain on the basis of the report on *Social Insurance and Allied Services* (1942) by Sir William (later Lord) Beveridge (*q.v.*). In the 20th century as the earlier concept of the passive, laissez-faire state was gradually abandoned, almost all states have sought to provide at least some of the measures of social insurance associated with the welfare state. Thus, in the U.S., the New Deal of Pres. Franklin D. Roosevelt, the Fair Deal of Pres. Harry S. Truman, and a large part of the domestic programs of later presidents were based on welfare state principles. In its more thoroughgoing form the welfare state provides state aid for the individual in almost all phases of his life—"from the cradle to the grave"—as exemplified in The Netherlands and the Social Democratic governments of the Scandinavian countries. Many less developed countries have the establishment of some form of welfare state as their goal.

The principal problems in the administration of a welfare state are: determining the desirable level of provision of services by the state; ensuring that the system of personal benefits and contributions meets the needs of individuals and families while at the same time offering sufficient incentives for productive work; ensuring efficiency in the operation of state monopolies and bureaucracies; and the equitable provision of resources to finance the services over and above the contributions of direct beneficiaries.

Welhaven, Johan Sebastian Cammermeyer (b. Dec. 22, 1807, Bergen, Nor.—d. Oct. 21, 1873, Christiania), Norwegian poet and critic who attacked the crudity and extreme nationalism of many of his contemporaries, particularly the nationalist poet Henrik Wergeland, who advocated complete cultural independence for Norway; their feud is the most famous in Norwegian literature.

Welhaven began the study of theology but dropped it. He earned a meagre living by tutoring and drawing to support his writing. He was above all a lyric poet and is remembered for his *Norges dæmering* (1834; "The Dawn of Norway"), a sonnet cycle attacking his contemporaries, and "Digtets aand" ("The Spirit of Poetry"), a short verse treatise. He later became professor of philosophy at King Frederick's University (now the University of Oslo). Welhaven sought to promote national progress by means of education and artistic refinement. He insisted that culture was indivisible and urged that whatever was valuable in Danish tradition be retained. His concepts of form and unity in art were very conservative. He was thus unable to recognize the breadth of spirit in Wergeland's poetry beneath its ap-

parent surface crudity and was outraged by Wergeland's inclusion of words from Norwegian dialects in an otherwise Danish text.

Welkom, city, Orange Free State, South Africa, southwest of Johannesburg. It was founded in 1947 amid goldfields, the development of which brought rapid growth, quickly making it the province's second largest town. It attained municipal status in 1961 and was declared a city in 1968. Unlike many gold-mining towns, it was carefully planned from the beginning around a horseshoe-shaped shopping and administrative area that surrounds a park of 11 acres (4.5 hectares). In addition to gold- and uranium-mining, Welkom has many industries, including slaughtering, steelmaking, sawmilling, and a variety of manufactures. The city has a technical college, a technological institute, and an airport. Pop. (1985) 54,488.

well-field system, Chinese (Wade-Giles) CHING-T'IEN, or (Pinyin) JINGTIAN, the communal land organization supposedly in effect throughout China early in the Chou dynasty (*c.* 1111–255 BC). The well-field system was first mentioned in the literature of the late Chou dynasty (*c.* 4th century BC), especially in the writings of the famous Confucian philosopher Mencius, who advocated it as an ideal to which the government of his day should return.

According to Mencius, each unit of the well-field system was divided among eight peasant families. Each family had its own outlying field around a central shared field, and all the families jointly worked a ninth central plot for their lord. Although it is doubtful that the actual system worked this smoothly, it does seem to represent a time when land and goods were communally shared in China; new land was cleared when the old land became infertile or the population increased.

The name for the system is derived from the Chinese character for well (*ching*), which provides a graphic representation of the central shared field surrounded by eight outlying fields. The well-field concept was repeatedly referred to by later reformers to justify their own land redistribution systems or to criticize government land practices.

well logging, field technique used in mineral exploration to analyze the geologic formations penetrated by a drill hole.

When electrical instruments are employed, the technique involves the recording of variations in the natural electrical properties of subsurface formations. Changes in the porosity, fluid content, or lithology (rock character) of the formation are indicated as variations in resistivity or conductivity.

A driller's log records occurrences during drilling of such factors as the pump pressure, the action of the tools, and the rate of drilling. In core logging, samples of the core are extracted from the drill hole and subjected to physical and chemical tests. Borehole camera logging is employed when the condition of the rock strata must be analyzed before major drilling can be undertaken. In this method a camera is lowered into a pilot hole. The camera can take either black-and-white or colour photographs or can transmit television images to a monitor on the surface, where they are then photographed.

Radioactivity logging is the method in which natural or induced radioactivity in subsurface formations is measured and recorded. Variations in the radioactive gamma rays emitted from formations reveal the character of the rock because of the presence of uranium, thorium, or potassium minerals.

Visual wall logging, as the name implies, is the actual examination of the wall of the hole by a geologist. Cuttings-analysis logging involves cuttings recovered from the drilling fluid; when combined with other logging methods, it can furnish valuable data.

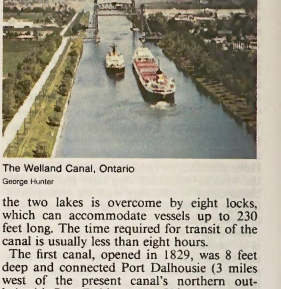
well-made play, French PIÈCE BIEN FAITE, a type of play, constructed according to certain strict technical principles, that dominated the stages of Europe and the United States for most of the 19th century. The technical formula of the well-made play, developed around 1825 by the French playwright Eugène Scribe, called for complex and highly artificial plotting, a build-up of suspense, a climactic scene in which all problems are resolved, and a happy ending. Conventional romantic conflicts were a staple subject of such plays (for example, the problem of a pretty girl who must choose between a wealthy, unscrupulous suitor and a poor but honest young man). Suspense was created by misunderstandings between characters, mistaken identities, secret information (the poor young man is really of noble birth!), lost or stolen documents, and similar contrivances. Later critics, such as Émile Zola and George Bernard Shaw, denounced Scribe's work and that of his successor, Victorien Sardou, for exalting the mechanics of playmaking at the expense of honest characterizations and serious content, but both playwrights were enormously popular in their day. Scribe, with the aid of hack assistants, wrote literally hundreds of plays that were translated, adapted, and imitated all over Europe. In England the well-made play was taken up by such practitioners as Wilkie Collins, who summed up the formula succinctly: "Make 'em laugh; make 'em weep; make 'em wait." Henry Arthur Jones and Arthur Pinero used the technique successfully, with somewhat improved characterizations and emotional tension, and Pinero actually brought it to the level of art with *The Second Mrs. Tanqueray* in 1893. The polished techniques of the well-made play were also turned to serious purposes in the plays of Émile Augier and Alexandre Dumas *fils*, which dealt with social conditions, such as prostitution and the emancipation of women, and are regarded as the precursors of the problem play (*q.v.*).

well-tempered tuning (music): *see* equal temperament.

Welland, city, regional municipality of Niagara, southeastern Ontario, Canada. It lies along the Welland River and Welland Ship Canal. During the War of 1812 the area was the scene of several battles between British-Canadian and American forces. Founded as The Aqueduct by Loyalists around the first Welland Canal (completed 1829), the settlement was renamed Merrittsville in 1842 after William Merritt, one of the canal builders. In 1856 it was renamed for the Welland River in Lincolnshire, Eng. It developed as a trading centre for the Niagara fruit-growing belt. An abundance of natural gas and electric power serves the city's diversified industry. Inc. city, 1917. Pop. (1991) 47,914.

Welland, River, river in the eastern Midlands, England. The Welland River rises in the county of Leicestershire and flows eastward past Market Harborough and Stamford for about 70 miles (110 km) into Lincolnshire to enter the southwestern corner of the shallow North Sea inlet called The Wash. From Market Deeping past Spalding its course across the drained Fens has been embanked. It was formerly canalized upstream to Stamford. A left-bank tributary, the Eye Brook, has been dammed to form a reservoir for the new town of Corby, 4 miles (6.5 km) southeast.

Welland Canal, waterway in southern Ontario, Can., that provides navigation for large vessels between Lake Erie to the south and Lake Ontario to the north and forms an important link in the St. Lawrence Seaway. The canal was necessary because the Niagara River, the natural connection between Lakes Erie and Ontario, has impassable falls and rapids. The modern Welland Canal extends 27.6 miles (44.4 km) from Port Colborne (on Lake Erie) to Port Weller (on Lake Ontario) and has a minimum depth of 30 feet (9 m). The 327-foot difference in elevation between



The Welland Canal, Ontario
George Hunter

the two lakes is overcome by eight locks, which can accommodate vessels up to 230 feet long. The time required for transit of the canal is usually less than eight hours.

The first canal, opened in 1829, was 8 feet deep and connected Port Dalhousie (3 miles west of the present canal's northern outlet) with Port Robinson on Chippawa Creek, which gave access to the Niagara River. In 1833 the canal was extended southward to Port Colborne, and between 1871 and 1887 it was enlarged. Construction beginning in 1913 led to the opening of the newer canal in 1932. Further improvements in the southern part of the canal were completed in 1972.

Weller, Thomas H., in full THOMAS HUCKLE WELLER (b. June 15, 1915, Ann Arbor, Mich., U.S.), American physician and virologist who was the corecipient (with John Enders and Frederick Robbins) of the Nobel Prize for Physiology or Medicine in 1954 for the successful cultivation of poliomyelitis virus in tissue cultures, making it possible to study the virus "in the test tube"—a procedure that led to the development of polio vaccines.

After his education at the University of Michigan at Ann Arbor (A.B., 1936; M.S., 1937) and Harvard University (M.D., 1940), Weller became a teaching fellow at the Harvard Medical School (1940–42) and served in the U.S. Army Medical Corps during World War II. He was appointed assistant director of Enders' infectious diseases laboratory at the Children's Medical Center, Boston (1949–55), and, working with Enders and Robbins, soon achieved the propagation of poliomyelitis virus in laboratory suspensions of human embryonic skin and muscle tissue. He was also first (with the American physician Franklin Neva) to achieve the laboratory propagation of rubella (German measles) virus and to isolate chicken pox virus from human cell cultures. Weller became professor of tropical public health at Harvard University in 1954 and from 1966 to 1981 served also as director of the Center for the Prevention of Infectious Diseases, Harvard University School of Public Health.

Welles, Gideon (b. July 1, 1802, Glastonbury, Conn., U.S.—d. Feb. 11, 1878, Hartford, Conn.), U.S. secretary of the navy under presidents Abraham Lincoln and Andrew Johnson.

Born into a wealthy family, Welles was educated at private schools. He studied law but in 1826 became cofounder and editor of the *Hartford Times*. The next year, he became the youngest member of the Connecticut legislature and served there until 1835. An ar-

dent Jacksonian Democrat, he was responsible for Connecticut's general incorporation law, which became a model for other states.

Welles was elected state controller of public accounts in 1835; he was reelected in 1842 and 1843. Jackson appointed him postmaster of Hartford in 1836, and Welles served until the Whigs took power in 1841. From 1846 to 1849 he was chief of the Bureau of Provisions and Clothing for the Navy.

In 1854 Welles quit the Democrats and switched to the Republican Party. In 1856 he founded the *Hartford Evening Press*, one of the first Republican papers in New England, and wrote for it extensively.

In 1861 Lincoln made Welles secretary of the Navy, in part fulfilling a political obligation to put a New Englander in the Cabinet. Welles proved to be a highly competent administrator and a surprisingly keen military strategist. He quickly built a large and effective navy from a few ships and a force reduced by the departure of Confederate sympathizers. Undisturbed by criticism, he authorized the construction of ironclads, kept his department as free from graft as possible, and promoted officers of merit over those with great seniority. He was largely responsible for implementing the "Anaconda plan" of slowly squeezing the South into submission, and he effectively directed the naval blockade that isolated the South and severed it in half.

In 1869 Welles left the Cabinet, having completed the longest term as Navy secretary to that time. He then drifted from the Republican Party, backing the Liberal Republicans in 1872 and Democrat Samuel Tilden in 1876. He spent his final years writing magazine articles and a book, *Lincoln and Seward* (1874). Long after his death the *Diary of Gideon Welles* (1911) was published, a work highly regarded by historians for its insights into the people and events of the Civil War era.

Welles, (George) Orson (b. May 6, 1915, Kenosha, Wis., U.S.—d. Oct. 10, 1985, Los Angeles), American motion-picture actor, director, producer, and writer. His innovative narrative techniques and use of photography, dramatic lighting, and music to further the



Orson Welles, still from *Citizen Kane*, 1941

Courtesy of RKO Pictures, Inc., copyright © 1941 RKO Pictures, Inc., all rights reserved, photograph from the Museum of Modern Art/Film Stills Archive, New York City

dramatic line and to create mood combined to make his *Citizen Kane* (1941)—which he wrote, directed, produced, and acted in—one of the most influential films in the history of the art.

From his progressive mother (a pianist and crack shot with a rifle), Welles learned to play the piano and the violin. His parents separated when he was six years old, and his mother died when he was eight. Through his father, a successful inventor and manufacturer, who died when his son was 13, Welles met actors and sportsmen. By the time he was 11, Welles had twice traveled around the world. He attended the Todd School for Boys in Woodstock, Ill., where he was an indifferent student but learned much about dramatics. He studied briefly at the Art Institute of Chicago and worked as a reporter before going to Ireland, where he made a sketching tour by donkey cart. His acting debut was made at the Gate Theatre, Dublin, in the autumn of 1931, where he acted in *Hamlet*. Welles remained in Ireland for a year, acting with the Abbey Players as well as at the Gate. After a tour of Spain and Morocco, he returned to Chicago and then toured with Katharine Cornell's company in 1933–34, playing Mercutio in *Romeo and Juliet*, Marchbanks in *Candida*, and Octavius Barrett in *The Barretts of Wimpole Street*. In 1934 he organized a drama festival at Woodstock, where he played Hamlet. He made his New York debut as Tybalt in *Romeo and Juliet* in December 1934. Welles was the director of an all-black cast in *Macbeth* for the Negro People's Theatre, a part of the Federal Theatre Project, in 1936. In 1937 he formed the Mercury Theatre, which presented a renowned modern-dress version of Shakespeare's *Julius Caesar*.

His radio career began early in 1934 in an adaptation of the poet Archibald MacLeish's verse play *Panic*. In 1934–35 he narrated "The March of Time" news series, and subsequent radio roles included the part of Lamont Cranston in the mystery series "The Shadow." In 1938, the Mercury players undertook a series of radio dramas adapted from famous novels. They attained national notoriety with the program based on H.G. Wells's *War of the Worlds;* the performance on Oct. 30, 1938, using the format of a simulated news broadcast, announced an attack on New Jersey by invaders from Mars. Thousands of listeners, not realizing the announcement was a simulation, were panic-stricken.

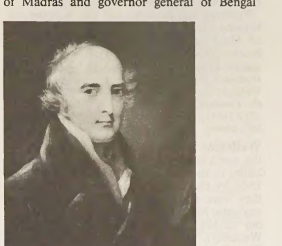
In 1940 Welles, on contract to R.K.O., went to Hollywood and made *Citizen Kane* (1941), which portrayed the life of a newspaper magnate (suggestive of William Randolph Hearst, who sought to ban the movie), and *The Magnificent Ambersons* (1942), a screen version of Booth Tarkington's novel of the same name. Welles directed and starred in *The Stranger* in 1946 and *The Lady from Shanghai* and *Macbeth* in 1948. He then lived for several years in Europe, where he produced, directed, and acted in *Othello* (1952) and *Mr. Arkadin* (1955). He returned to Hollywood to direct and perform in *Touch of Evil* (1958), then went back to Europe for *Le Procès* (1962; *The Trial*) and *Campanadas a Medianoche* (1966; *Falstaff*, or *Chimes at Midnight*). In 1975 he wrote, directed, and acted in the highly original *F for Fake*.

Welles also appeared as an actor in many other films, including *Jane Eyre* (1944), *The Third Man* (1949), *The Long Hot Summer* (1958), *Compulsion* (1959), *A Man for All Seasons* (1966), *Catch-22* (1970), and *Crossed Swords* (1978). His later stage work included the title roles in *Othello* (London, 1951) and *King Lear* (New York City, 1956).

Wellesley, urban town (township), Norfolk County, eastern Massachusetts, U.S., just west of Boston. Originally part of Dedham, it became the Western Precinct of Needham when that town was set off in 1711. Incorporated as a separate town in 1881, it was named for the estate of Samuel Welles, who had settled the site in 1763. Although some manufacturing appeared in the late 19th century, the town's character and initial growth were mainly influenced by Wellesley College, founded there as a seminary for women in 1871 by Henry Fowle Durant; its campus borders Lake Waban (400 ac [162 ha]). Wellesley is chiefly residential and is connected to Boston by the Worcester Turnpike. Babson College (1919; with a huge world globe 28 ft [9 m] in diameter and a 60 ft by 40 ft relief map of the United States on its campus) and Massachusetts Bay Community College (1961), as well as several private boarding academies, are located there. Pop. (1990) 26,615.

Wellesley, Arthur: *see* Wellington, Arthur Wellesley, 1st duke of.

Wellesley (of Norragh), Richard Colley Wellesley, Marquess, also called (from 1781) 2ND EARL OF MORNINGTON, VISCOUNT WELLESLEY OF DANGAN CASTLE, or (from 1797) BARON WELLESLEY OF WELLESLEY, original surname WESLEY (b. June 20, 1760, Dangan, County Meath, Ire.—d. Sept. 26, 1842, London), British statesman who, as governor of Madras and governor general of Bengal



Wellesley, painting by J.P. Davis; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

(both 1797–1805), greatly enlarged the British Empire in India and who, as lord lieutenant of Ireland (1821–28, 1833–34), attempted to reconcile Protestants and Catholics in a bitterly divided country. Throughout his life he displayed an ever-increasing jealousy of his younger brother Arthur Wellesley, 1st duke of Wellington, despite his own achievements.

A moderately liberal disciple of Prime Minister William Pitt the Younger, Wellesley sat successively in the Irish House of Commons, the Irish House of Lords (after inheriting his father's Irish titles in 1781), and the British House of Commons until 1797. From 1793 he was a member of the British Privy Council and a commissioner of the India Board of Control. As governor general in India, he used military force and diplomacy to strengthen and expand British authority. He annexed much territory from some states and contracted with other states a series of "subsidiary alliances" by which all parties recognized British preponderance. He received a barony in the British peerage in 1797 and a marquessate in the Irish peerage in 1799.

On receiving a British government order to restore to France its former possessions in India, he refused to comply; his policy was vindicated when the Treaty of Amiens (1802) was violated and Great Britain resumed war against Napoleonic France. Wellesley's annexations and the vast military expenditure that he had authorized alarmed the court of directors of the East India Company. In 1805 he was recalled and, soon afterward, was threatened with impeachment, although two years later he refused an offer of the foreign secretaryship. In 1809 he went to Spain to make diplomatic arrangements for the Peninsular War against France and later that year became foreign secretary in Spencer Perceval's ministry. In that office he antagonized his colleagues, who considered him an indolent megalomaniac and welcomed his resignation in February 1812.

As lord lieutenant of Ireland, Wellesley dis-

appointed the anti-Catholic George IV, and he was about to be removed when Wellington was appointed prime minister (January 1828). Wellesley then resigned because his brother was opposed to Roman Catholic emancipation, although the duke was constained to accept (1829) that policy as a political necessity. Wellesley's second term as lord lieutenant of Ireland (1833–34) ended with the fall of the 2nd Earl Grey's reform government. When the Whig Party returned to power (April 1835), he was not sent back to Ireland, and in his rage he threatened to shoot the prime minister, the 2nd Viscount Melbourne. He wanted to be created duke of Hindustān so that his rank would equal that of his brother.

Wellesley had no sons, and the marquessate became extinct upon his death. The earldom of Mornington went to his next surviving brother, William Wellesley-Pole.

BIBLIOGRAPHY. Paul E. Roberts, *India Under Wellesley* (1929); and John Kenneth Severn, *A Wellesley Affair: Richard Marquess Wellesley and the Conduct of Anglo-Spanish Diplomacy, 1809–1812* (1981), examine different periods in Wellesley's career.

Wellesley Islands, group of islands lying off the northwestern coast of Queensland, Australia, in the Gulf of Carpentaria. Sighted in 1644 by the Dutch navigator Abel Tasman, they were charted (1802–03) by the British navigator Matthew Flinders and named in honour of Marquess Wellesley (Richard Colley Wellesley), then governor-general of India. The islands are generally rocky or sandy and are covered with scrub and fringing mangrove forests. They are divided into two groups, Mornington, the largest (250 square miles [648 square km]), is the northernmost. Lying 15 miles (24 km) offshore, it rises to 300 feet (90 m) and has a mission station for Aboriginals and an airport. Bentinck (59 square miles) and Sweers (6 square miles) are the largest of the southern islands.

Wellesz, Egon (Joseph) (b. Oct. 21, 1885, Vienna, Austria—d. Nov. 9, 1974, Oxford, Oxfordshire, Eng.), Austrian composer and musicologist, highly esteemed as an authority on Byzantine music.

A pupil of Guido Adler in musicology and of Arnold Schoenberg in composition, Wellesz taught at the University of Vienna (1930–38) before settling in England (1939), where he became an influential teacher at the University of Oxford. His scholarly work ensured his importance in the history of musicology. He was influenced by Schoenberg's 12-tone method of composition, but tonality remained a shaping force in his work, which includes operas, ballets, nine symphonies, chamber music, and Roman Catholic church music.

Wellfleet, town (township), Barnstable county, Mass., U.S., on the northeastern arm of Cape Cod, 12 miles (19 km) southeast of Provincetown. First settled about 1724, it gained prominence in the 19th century as a fishing port, having from 1830 to 1870 a virtual monopoly of New England oystering. The town's name may derive from "whale fleet" or from England's Wallfleet oyster bed. It still has some fishing but mainly relies on tourism. Much of its area is covered by sections of Cape Cod National Seashore and the Wellfleet Bay Wildlife Sanctuary. At Marconi Beach are the remains of the first U.S. transatlantic wireless station (1903). Area 20 square miles (52 square km). Inc. 1763. Pop. (2000) 2,749.

Wellhausen, Julius (b. May 17, 1844, Hameln, Hanover [Germany]—d. Jan. 7, 1918, Göttingen, Ger.), German biblical scholar best known for his analysis of the structure and dating of the Pentateuch.

Wellhausen studied at the University of Göttingen and taught there briefly before becoming professor of the Old Testament at Greifswald in 1872, a position he resigned 10 years later because of conflicts with his academic superiors. After teaching at other German universities, he returned to Göttingen in 1892, remaining there until his death.

His major writings put forth the view that the books of the Pentateuch were not written by Moses but were the result of oral traditions that evolved over time from a nomadic religion through the prophets to the law, rather than from the law through the prophets, as it is presented in the Old Testament. He dissected two distinct narrative structures from Genesis, determining that these narratives were the oldest portion of the Pentateuch, while the laws and rituals were the latest elements.

Wellingborough, town and borough (district), administrative and historic county of Northamptonshire, England, situated east of Northampton on the River Nene. It grew as a market town in the Middle Ages. After a fire in 1738, it was rebuilt on its present hill site. Wellingborough School (1595) was endowed with revenues from a suppressed medieval guild. Area industries include leather-goods manufacture, flour milling, brewing, and other light industries. The borough includes a rural area stretching south from the town. Area borough, 63 square miles (163 square km). Pop. (1991) town, 41,602; (2001) borough, 72,530.

Wellington, town, east-central New South Wales, Australia. It lies at the confluence of the Macquarie and Bell rivers. The site, used by John Oxley as a base for exploration (1817–18), was named by him after the duke of Wellington. A convict settlement from 1823 to 1831, it was proclaimed a town in 1846, a municipality in 1879, and a shire in 1947. In 1950 Wellington was merged with Macquarie and a portion of Cobar shires. It serves a region producing sheep, cattle, fruits, vegetables, and mushrooms. The town has flour mills and sawmills, freezing and dairy-processing works, and farm and earth-moving machinery plants. Burrendong Dam on the Macquarie and the Wellington limestone caves are close by. Pop. (2001 prelim.) 8,835.

Wellington, town ("parish"), Taunton Deane district, administrative and historic county of Somerset, England, just west-southwest of Taunton. The first duke of Wellington (Arthur Wellesley, who took his title from the town), victor of the Battle of Waterloo (1815), is commemorated by a monument (National Trust property) on the highest point of nearby Blackdown Hill. Wellington School, at its foot, was founded in 1841. Pop. (1998 est.) 12,300.

Wellington, local government region, extreme southern North Island, New Zealand. It includes the cities of Wellington (the national capital) and Lower Hutt, Upper Hutt, Porirua, and Masterton. The broad Hutt River valley, once the locale of dairy farms and market gardens, has absorbed much of Wellington city's urban expansion since the 1950s. There is still much open farmland to the north, however.

East of the city of Wellington is the Rimutaka Range and east of that, the Wairarapa Plain. One of the earliest European-settled sections of North Island, Wairarapa (Maori: "Glistening Waters") was pioneered in the 1840s. Fruit and vegetable, dairy, sheep, and beef cattle farming predominate. The business and administrative centre of the plain is Masterton, in the north. The western and southern boundaries of Wellington local government region consist of hilly, isolated coastland fronting the South Pacific Ocean. Pop. (2001) 427,542.

Wellington, capital city, port, and major commercial centre of New Zealand, extreme south North Island. It lies on the shores and



Wellington harbour, New Zealand
Paul A. Souders—Corbis

hills surrounding Port Nicholson, an almost landlocked bay that is ranked among the world's finest harbours. Mount Victoria rises 643 feet (196 m) near the centre of the city. Its location lies in a fault zone, and the city has survived several earthquakes.

In 1839 a ship belonging to the New Zealand Company arrived with officials who were to select a site for the company's first settlement. The site chosen, at the mouth of the Hutt River, proved unsuitable, and a move was made to Lambton Harbour on the west shore. The settlement was named in 1840 in recognition of the aid given the company by the 1st duke of Wellington. It was made a borough in 1842 and a city in 1886. In 1865 the seat of the central government was transferred there from Auckland. The city is part of the Wellington local government region.

Wellington is the nation's transportation and communications hub. Rail and road services extend from it to all parts of North Island, and ferries to Picton link the capital to South Island. The city's international airport is also the focal point of the country's internal aviation network. The harbour, serving domestic and international shipping, imports petroleum products, motor vehicles, and minerals and exports meats, wood products, dairy products, wool, and fruit. Wellington's economy is primarily service-based, with an emphasis on finance, business services, and government; it is also a regional health and education centre. Tourism is important, and there is a growing film industry. Although manufacturing in the city itself has declined since the late 1980s, the region still has printing and the manufacture of chemicals, plastics, and machinery. Victoria and Massey universities are in Wellington.

Much of the city is built on land reclaimed from the bay. Notable institutions include the Parliament buildings (with the distinctive "Beehive"), the National Library, and the City Gallery (contemporary art). Te Papa Tongarewa, the national museum, moved to new quarters in 1998. The zoo and botanical garden feature local species. The Old Government Building (1876) is one of the world's largest wooden structures. Wellington is the home of the national ballet and symphony orchestra. Pop. (2001) city, 166,362; urban area, 342,828.

Wellington, Arthur Wellesley, 1st duke of, MARQUESS OF DOURO, MARQUESS OF WELLINGTON, EARL OF WELLINGTON, VISCOUNT WELLINGTON OF TALAVERA AND OF WELLINGTON, BARON DOURO OF WELLESLEY, byname IRON DUKE (b. May 1, 1769, Dublin, Ire.—d. Sept. 14, 1852, Walmer Castle, Kent, Eng.), British army commander during the Napoleonic Wars and later prime minister of Great Britain (1828–30). He first rose to military prominence in India, won successes in the Peninsular War in Spain (1808–14), and shared in the victory over Napoleon at the Battle of Waterloo (1815).

A brief treatment of the 1st duke of Wellington follows. For full treatment, *see* MACROPAEDIA: Wellington.

Wellington was the fifth son of Garret Wesley, 1st earl of Mornington. He was educated at Eton and at a military academy at Angers, Fr. In 1787 he entered the Army as an ensign and passed rapidly through the lower commissioned ranks. He was made aide-de-camp to the lord lieutenant of Ireland and later sat in the Irish House of Commons. In 1796 he was sent with his regiment to India, where, as a divisional commander in the Mysore war, he gained valuable experience. In the Marāthā war he won victories at Assaye and Argaon and dictated peace with Sindhia and the raja of Berar—and he was rewarded with a knighthood (1804). In 1807 he was employed on the expedition against Copenhagen, and he defeated a Danish force at Kioge. Then, in 1808, began the Peninsular War, in which his military greatness was fully revealed. He sailed for Portugal with a small force and defeated Gen. A. Junot near Lisbon. He returned home but was called back to Portugal in the following year, drove the French out of the country, and was rewarded with the title of Viscount Wellington. He advanced on Madrid in 1812 and was given an earldom in February; then, he defeated Marshal Marmont at Salamanca and occupied Madrid and in October was given a marquessate and a grant of £100,000 for the purchase of an estate. The French were overwhelmed at Vitoria, and before the campaign ended Wellington had crossed the frontier into France. The final battle of the Peninsular War in April 1814 was actually fought after Napoleon had abdicated, though before the news reached southern France. Returning home, Wellington, who in 1813 had been given the Order of the Garter and made a field marshal, was rewarded with a dukedom. After the first treaty of Paris he was appointed British ambassador to the restored king of France, staying in Paris until he left for the Congress of Vienna. While there he received the news of Napoleon's escape from Elba. The allies signed a declaration against Napoleon, and Wellington and Field Marshal von Blücher were to invade France through Belgium, the Austrians and Russians from the east. The brief campaign culminated in victory on June 18. Parliament made him an additional grant of £200,000 (he had already received £500,000), and he was richly rewarded too by foreign sovereigns. The prestige of his victories made Wellington one of the most honoured men in Europe. The allied sovereigns unanimously appointed him to the command of the army that occupied northern France for the next three years, and it was mainly due to the influence of Wellington and Lord Castlereagh that France was saved from dismemberment after the Hundred Days.

Wellington became prime minister of Great Britain in 1828. He made himself unpopular with the majority of his countrymen, however, when he did not oppose Catholic emancipation and the granting of rights to Roman Catholics and when he opposed reform of the voting system; and in 1830 his government fell. Wellington had won back much of his popularity by the time he retired from public life in 1846, and after his death he was buried under the dome of St. Paul's by the side of Lord Nelson.

On April 10, 1806, Wellington had married Catherine Pakenham, Lord Longford's daughter, but they were uncongenial and lived apart a good deal, though there was no formal separation. She died at Apsley house on April 24, 1831. Their elder son, Arthur (1807–84), 2nd duke, edited his father's correspondence.

Wellington Harbour (New Zealand): *see* Port Nicholson.

Wellman, William (Augustus) (b. Feb. 29, 1896, Brookline, Mass, U.S.—d. Dec. 9, 1975, Los Angeles), American film director whose more than 80 movies included Hollywood classics of documentary realism.

Wellman left secondary school in Newton, Mass., to take up professional ice hockey. In 1917 he volunteered for ambulance duty in France, soon joined the French air corps, flew in combat, and was shot down. He returned to the United States and entered business in Boston.

With Douglas Fairbanks, Sr., Wellman appeared as an actor in a silent movie, *Knickerbocker Buckeroo* (1919). From the 1920s Wellman directed and sometimes also produced films for the major Hollywood studios.

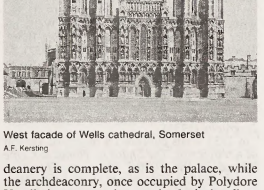
His aerial dogfight classic, *Wings* (1929), reflected Wellman's lifelong interest in aviation and set standards for documentary realism. It received the first Academy Award for best film of the year. His pictures include *Public Enemy* (1931), which made James Cagney a star and generated a long train of gangster movies, the original *A Star is Born* (1937), and *Beau Geste* (1939). *The Ox-Bow Incident* (1942; titled *Strange Incident* in Great Britain), on a lynching, is considered one of his best films.

The Story of GI Joe (1945; *War Correspondent* in Great Britain), starring Robert Mitchum, was based on Ernie Pyle's books; and *The High and the Mighty* (1954) was based on the novel by Ernest K. Gann. *Track of the Cat* (1954), also starring Mitchum, is an experiment in the minimal use of colour. Wellman retired after making *Lafayette Escadrille* (1958) about his World War I flying unit.

In *A Short Time for Insanity: An Autobiography* (1974), which includes a filmography, Wellman recounts, in free-association style, incidents of a hard-driving and sometimes picaresque life. His nickname was Wild Bill.

Wells, city, Mendip district, county of Somerset, England, at the foot of the Mendip Hills. The name derives from the many springs rising near the cathedral, which was begun in the 12th century and dominates the city. Wells became the seat of a bishopric when the ancient diocese of Sherborne was divided in 909. In 1088 the see was removed, but a century later Bishop Jocelin returned and built the existing palace. Since 1242 the see has been known as that of Bath and Wells. The first municipal charter, from the bishop, dates from 1201.

The city is an example of an English cathedral city and has an exceptional set of buildings ancillary to the cathedral. The 15th-century



West facade of Wells cathedral, Somerset
A.F. Kersting

deanery is complete, as is the palace, while the archdeaconry, once occupied by Polydore Vergil, is now used as a theological college (founded in 1841). There is the unique College of Vicars Choral of the 14th century built with a chapel at one end, dining hall at the other, and living quarters in between. The chancellor's house forms the Wells Museum with an exceptional collection of finds from the limestone caves of Mendip. The Market Place has on the north side a row of shops, now with Georgian fronts.

In general, Wells has been little affected by modern industry and growth. It remains a modest service centre, its marketplace and shopping centre lying in the shadow of its magnificent cathedral, and it is much frequented by tourists. Pop. (1981 prelim.) 8,374.

Wells, Charles Jeremiah (b. 1800?, London—d. Feb. 17, 1879, Marseille, Fr.), English writer, author of *Joseph and His Brethren* (1823), a long dramatic poem in the style of the Elizabethan dramatists, which enjoyed an immense vogue among the Pre-Raphaelites



Charles Jeremiah Wells, engraving after a miniature by T.C. Wageman, *c.* 1822
By courtesy of the London Borough of Camden, Collections at Keats House, Hampstead, London. photograph, Christopher Oxford

and their followers after it was praised first by Dante Gabriel Rossetti and then, in 1875, by Algernon Charles Swinburne.

As a young man, Wells was a member of the poet John Keats's circle of literary friends. He abandoned a legal career from boredom and ill health, leaving England in 1840 for France. He lectured in English in Brittany and finally settled in Marseille.

Wells, David Ames (b. June 17, 1828, Springfield, Mass., U.S.—d. Nov. 5, 1898, Norwich, Conn.), popular American writer on science and economics who as chairman of the National Revenue Commission was largely responsible for the creation of the U.S. Bureau of Statistics and for laying a basis for scientific taxation in the United States.

A graduate of Williams College (1847), Wells later studied under Louis Agassiz at the Lawrence Scientific School, Cambridge, Mass. From 1850 through 1866 he published with George Bliss *The Annual of Scientific Discovery.*

Wells's essay on the national debt, *Our Burden and Our Strength* (1864), did much to restore confidence in the ability of the United States to pay off the large debt incurred during the Civil War. This work, his first on economics, prompted his appointment in 1865 as chairman of the National Revenue Commission.

In opposition to the Populists in the post-Civil War period, Wells was a strong advocate of conservative monetary policies. Throughout his career he defended the doctrines of free trade and laissez-faire. His emphasis on the high rate of contemporary technological development led him to the position that economic crises were usually caused by an excessive capacity to produce.

Wells's most important economic works included *Reports of the Special Commissioner of the Revenue* (1866–69), which contained an analysis of indirect taxation, and *Recent Economic Changes* (1889) and the posthumous *Theory and Practice of Taxation* (1900), both of which demonstrated Wells's ability as an empirical investigator.

Wells, H(erbert) G(eorge) (b. Sept. 21, 1866, Bromley, Kent, Eng.—d. Aug. 13, 1946, London), English novelist, journalist, sociologist, and historian, best known for such sci-

ence fiction as *The Time Machine* and *The War of the Worlds* and such comic novels as *Tono-Bungay* and *The History of Mr. Polly*.

Early life. Wells was the son of domestic servants turned small shopkeepers. He grew up under the continual threat of poverty, and at 14, after a very inadequate education supplemented by his inexhaustible love of reading, he was apprenticed to a draper in Windsor. His employer soon dismissed him;



H.G. Wells, photograph by Yousuf Karsh
© Karsh from Rapho/Photo Researchers

and he became assistant to a chemist, then to another draper, and finally, in 1883, an usher at Midhurst Grammar School. At 18 he won a scholarship to study biology at the Normal School (later the Royal College) of Science, in South Kensington, London, where T.H. Huxley was one of his teachers. He graduated from London University in 1888, becoming a science teacher and undergoing a period of ill health and financial worries, the latter aggravated by his marriage, in 1891, to his cousin, Isabel Mary Wells. The marriage was not a success, and in 1894 Wells ran off with Amy Catherine Robbins (d. 1927), a former pupil, who in 1895 became his second wife.

Early writings. Wells's first published book was a *Textbook of Biology* (1893). With his first novel, *The Time Machine* (1895), which was immediately successful, he began a series of science-fiction novels that revealed him as a writer of marked originality and an immense fecundity of ideas: *The Wonderful Visit* (1895), *The Island of Doctor Moreau* (1896), *The Invisible Man* (1897), *The War of the Worlds* (1898), *The First Men in the Moon* (1901), and *The Food of the Gods* (1904). He also wrote many short stories, which were collected in *The Stolen Bacillus* (1895), *The Plattner Story* (1897), and *Tales of Space and Time* (1899). For a time he acquired a reputation as a prophet of the future, and indeed, in *The War in the Air* (1908), he foresaw certain developments in the military use of aircraft. But his imagination flourished at its best not in the manner of the comparatively mechanical anticipations of Jules Verne but in the astronomical fantasies of *The First Men in the Moon* and *The War of the Worlds*, from the latter of which the image of the Martian has passed into popular mythology.

Behind his inventiveness lay a passionate concern for man and society, which increasingly broke into the fantasy of his science fiction, often diverting it into satire and sometimes, as in *The Food of the Gods*, destroying its credibility. Eventually, Wells decided to abandon science fiction for comic novels of lower middle-class life, most notably in *Love and Mr. Lewisham* (1900), *Kipps: The Story of a Simple Soul* (1905), and *The History of Mr. Polly* (1910). In these novels, and in *Tono-Bungay* (1909), he drew on memories of his own earlier life, and, through the thoughts of inarticulate yet often ambitious heroes, revealed the hopes and frustrations of clerks, shop assistants, and underpaid teachers, who had rarely before been treated in fiction with such sympathetic understanding. In these novels, too, he made his liveliest, most persuasive comment on the problems of Western society that were soon to become his main preoccupation. The sombre vision of a dying world in *The Time Machine* shows that, in his long-term view of humanity's prospects, Wells felt much of the pessimism prevalent in the 1890s. In his short-term view, however, his study of biology led him to hope that human society would evolve into higher forms, and with *Anticipations* (1901), *Mankind in the Making* (1903), and *A Modern Utopia* (1905), he took his place in the British public's mind as a leading preacher of the doctrine of social progress. About this time, too, he became an active socialist, and in 1903 joined the Fabian Society, though he soon began to criticize its methods. The bitter quarrel he precipitated by his unsuccessful attempt to wrest control of the Fabian Society from George Bernard Shaw and Sidney and Beatrice Webb in 1906–07 is retold in his novel *The New Machiavelli* (1911), in which the Webbs are parodied as the Baileys.

Middle and late works. After about 1906 the pamphleteer and the novelist were in conflict in Wells, and only *The History of Mr. Polly* and the lighthearted *Bealby* (1915) can be considered primarily as fiction. His later novels are mainly discussions of social or political themes that show little concern for the novel as a literary form. Wells himself affected not to care about the literary merit of his work, and he rejected the tutelage of the American novelist Henry James, saying, "I would rather be called a journalist than an artist." Indeed, his novel *Boon* (1915) included a spiteful parody of James. His next novel, *Mr. Britling Sees It Through* (1916), though touched by the prejudice and shortsightedness of wartime, gives a brilliant picture of the English people in World War I.

World War I shook Wells's faith in even short-term human progress, and in subsequent works he modified his conception of social evolution, putting forward the view that man could only progress if he would adapt himself to changing circumstances through knowledge and education. To help bring about this process of adaptation Wells began an ambitious work of popular education, of which the main products were *The Outline of History* (1920; revised 1931), *The Science of Life* (1931), co-written with Julian Huxley and G.P. Wells, his elder son by his second wife, and *The Work, Wealth, and Happiness of Mankind* (1932). At the same time he continued to publish works of fiction, in which his gifts of narrative and dialogue give way almost entirely to polemics. His sense of humour reappears, however, in the reminiscences of his *Experiment in Autobiography* (1934).

In 1933 Wells published a novelized version of a film script, *The Shape of Things to Come* (filmed in the United States as *Things to Come*, 1935), which reverts to the utopianism of some earlier books, but as a whole his outlook grew steadily less optimistic, and some of his later novels contain much that is bitterly satiric. Fear of a tragic wrong turning in the development of the human race, to which he had early given imaginative expression in the grotesque animal mutations of *The Island of Doctor Moreau*, dominates the short novels and fables he wrote in the later 1930s. Wells was now ill and aging. With the outbreak of World War II, he lost all confidence in the future, and in *Mind at the End of its Tether* (1945) he depicts a bleak vision of a world in which nature has rejected, and is destroying, humankind.

Assessment. In spite of an awareness of possible world catastrophe that underlay much of his earlier work and flared up again in old age, Wells in his lifetime was regarded as the chief literary spokesman of the liberal optimism that preceded World War I. No other writer has caught so vividly the energy of this period, its adventurousness, its feeling of release from the conventions of Victorian thought and propriety. Wells's influence was enormous, both on his own generation and on that which immediately followed it. None of his contemporaries did more to encourage revolt against Christian tenets and accepted codes of behaviour, especially as regards sex, in which, both in his books and in his personal life, he was a persistent advocate of an almost complete freedom. Though in many ways hasty, ill-tempered, and contradictory, Wells was undeviating and fearless in his efforts for social equality, world peace, and what he considered to be the future good of humanity.

As a creative writer his reputation rests on the early science-fiction books and on the comic novels. In his science fiction, he took the ideas and fears that haunted the mind of his age and gave them symbolic expression as brilliantly conceived fantasy made credible by the quiet realism of its setting. In the comic novels, though his psychology lacks subtlety and the construction of his plots is often awkward, he shows a fund of humour and a deep sympathy for ordinary people. Wells's prose style is always careless and lacks grace, yet he has his own gift of phrase and a true ear for vernacular speech, especially that of the lower middle class of London and southeastern England. His best work has a vigour, vitality, and exuberance unsurpassed, in its way, by that of any other British writer of the early 20th century. (N.C.N./Ed.)

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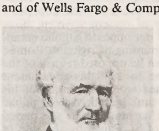
Wells, Henry (b. Dec. 12, 1805, Thetford, Vt., U.S.—d. Dec. 10, 1878, Glasgow, Scot.), pioneer American expressman, one of the founders of the American Express Company and of Wells Fargo & Company.



Henry Wells, lithograph, *c.* 1875
By courtesy of Wells Fargo Bank, History Room, San Francisco

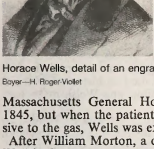
Wells gained experience as an agent for Harnden's Express at Albany, N.Y., and then as a founder of Livingston, Wells, and Pomeroy's Express, operating between Albany and Buffalo. In 1844, together with William Fargo (*q.v.*) and Daniel Dunning, Wells founded

the first express company to operate west of Buffalo, Wells and Company, which in 1850 was merged with Livingston, Wells, and Pomeroy's Express and Butterfield, Wasson, and Company to form the American Express Company. Wells served as president and Fargo as secretary of the American Express Company from 1850 to 1868. In 1852, with William Fargo, he organized Wells, Fargo & Company to serve the growing West.

In 1868 Wells founded Wells Seminary, later Wells College, for women, at Aurora, N.Y.; he also contributed to schools for stutterers.

Wells, Horace (b. Jan. 21, 1815, Hartford, Vt., U.S.—d. Jan. 24, 1848, New York, N.Y.), American dentist, a pioneer in the use of surgical anesthesia.

While practicing in Hartford, Conn., in 1844, Wells noted the pain-killing properties of nitrous oxide ("laughing gas") during a laughing-gas road show and thereafter used it in performing painless dental operations. He was allowed to demonstrate the method at the



Horace Wells, detail of an engraving
Boyar—H. Roger Viollet

Massachusetts General Hospital in January 1845, but when the patient proved unresponsive to the gas, Wells was exposed to ridicule.

After William Morton, a dental surgeon and Wells's former partner, successfully demonstrated ether anesthesia in October 1846, Wells began extensive self-experimentation with nitrous oxide, ether, chloroform, and other chemicals to ascertain their comparative anesthetic properties. His personality radically altered by frequent inhalation of chemical vapours, he was jailed in New York City for throwing acid at passersby. There, in a jail cell, he took his own life while the Paris Medical Society was publicly acclaiming him the discoverer of anesthetic gases.

Wells-Barnett, Ida Bell, *née* WELLS (b. July 16, 1862, Holly Springs, Miss., U.S.—d. March 25, 1931, Chicago, Ill.), black American journalist who led an antilynching crusade in the United States in the 1890s.

The daughter of slaves, Wells was a teacher in rural Mississippi and Tennessee before turning to journalism in the late 1880s. Using the pen name Iola, she wrote articles for black-owned newspapers on such issues as the education of black children. In 1892 she was a part-owner of the *Memphis Free Speech.* Later that same year, however, after she denounced in her editorials the lynching of three of her friends, the newspaper's office was mobbed and destroyed by local whites. Undaunted, Wells began a crusade to investigate the lynching of blacks in the American South. She argued that lynching stemmed not from the defense of white womanhood but from whites' fear of economic competition from blacks. She subsequently traveled throughout the United States and England, lecturing and founding antilynching societies and black women's clubs.

In 1893 Wells organized a black women's club in Chicago and in 1895 married Ferdinand Lee Barnett, a lawyer and editor of the *Chicago Conservator.* In 1910 Wells-Barnett



Ida Bell Wells-Barnett, 1930
Chicago Historical Society, ICHi-12966

was a founder of the Chicago Negro Fellowship League, which aided newly arrived migrants from the South. She was also a women's rights advocate, founding what may have been the first black woman suffrage group, Chicago's Alpha Suffrage Club. She published one of the first accounts of lynching episodes in *A Red Record* (1895). Her autobiography, *Crusade for Justice,* was published posthumously in 1970.

Wells, Fargo & Company, either of two American companies involved in express transport and banking. The first company was founded in 1852 as a joint-stock company, providing transportation and banking services initially between California and the eastern United States and later for other parts of the West and for Latin America. The second company, Wells Fargo & Company (spelled without a comma), was incorporated in 1968 as a holding company for Wells Fargo Bank, National Association, a descendant of the original firm. Other companies have also possessed rights to use the Wells Fargo name.

The founders of the original company were Henry Wells (1805–78) and William George Fargo (1818–81), who had earlier helped found the American Express Company. They and other investors established Wells, Fargo & Company to handle the banking and express business during the California Gold Rush. The company handled the purchase, sale, and transport of gold dust, bullion, and other goods to be moved from the West to the East Coast by ship, via the Isthmus of Panama. In the decade following 1855, Wells Fargo expanded into staging activities overland from Missouri and the Midwest to the Rockies and the Far West, leading in 1866 to a consolidation of almost all Western stagecoach lines under the Wells Fargo name.

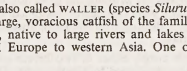
In 1905 Wells Fargo's banking operations (in California) were separated from its express operations and merged with the Nevada National Bank (founded 1875) to form the Wells Fargo Nevada National Bank. In 1923 this bank merged with the Union Trust Company (founded 1893) to form the Wells Fargo Bank & Union Trust Co., a name that was shortened to Wells Fargo Bank in 1954. In 1960 it merged again, this time with the giant American Trust Company (dating to 1854), to form the Wells Fargo Bank American Trust Company. In 1968 the holding company Wells Fargo & Company was created to own all shares of Wells Fargo Bank, NA, as the bank was renamed. In the late 20th century Wells Fargo Bank headquartered, as was the holding company, in San Francisco) had more than 300 branches throughout California, as well as subsidiaries, affiliates, and branches worldwide. In 1986 Wells Fargo & Company acquired the Crocker National Corporation for approximately $1 billion. By the early 21st century, other acquisitions and continued growth made Wells Fargo the fifth largest bank in the United States.

Meanwhile the express carrier Wells, Fargo was absorbed by other companies. In 1918 its domestic operations were taken over by American Railway Express (reorganized in 1929 as Railway Express Agency, Inc., and fading into bankruptcy in 1975 as REA Express, Inc.). Wells Fargo's foreign express business, as in Mexico and Cuba, continued independently until 1924, when American Express Company acquired 51 percent controlling interest in Wells Fargo stock and absorbed the Wells Fargo express business. During these years Wells Fargo also developed security services and these, together with rights to the Wells Fargo name, were sold in 1967 to Baker Industries, Inc., and survived in its subsidiary Wells Fargo Armored Service Corp. The merger of Loomis Armored Inc. and Wells Fargo Armored Service Corp. in 1997 created Loomis, Fargo & Co., a division of Securitas AB, a Swedish company.

Wellsburg, city, seat (1797) of Brooke county, in the northern panhandle of West Virginia, U.S. It lies along the Ohio River, just north of Wheeling, W.Va., and opposite Brilliant, Ohio. Settled in 1772, it was chartered as Charles Town in 1791 but was renamed in 1816 to honour Alexander Wells, an early settler. Boatyards and warehouses sprang up around its river landing. The state's first glass plant was built there in 1813. Two floodwalls were erected in 1829 to check inundation and erosion. For many years Wellsburg was widely known as West Virginia's Gretna Green, where quick marriages were performed, until a 1937 law prescribed a three-day waiting period. An industrial economy now prevails, and manufactures include paper, glass products, and cement. There are coal mines in the vicinity. Inc. city, 1887. Pop. (2000) 2,891.

Wels, city, *Bundesland* ("federal state") Oberösterreich, north-central Austria. It lies along the Traun River at the foothills of the Eastern Alps, southwest of Linz. The site has been occupied since prehistoric times. Wels originated as the Roman Ovilava, capital of Noricum province. In the European Middle Ages it was a leading market town. Notable landmarks include the Lederer Tower (1376) on the picturesque town square; the town hall (remodeled 1748); the late Gothic parish church with magnificent 14th-century stained-glass windows; and the former imperial castle where the Holy Roman emperor Maximilian I died in 1519. A railway junction and important cattle and grain market, the city holds a big annual fair (the Welser Messe). Wels manufactures agricultural machinery, textiles, foodstuffs, pharmaceuticals, and building materials. Pop. (2001 prelim.) 56,515.

wels, also called WALLER (species *Silurus glanis*), large, voracious catfish of the family Siluridae, native to large rivers and lakes from central Europe to western Asia. One of the



Wels (*Silurus glanis*)
Painting by Gilbert Emerson

largest catfishes, as well as one of the largest of European freshwater fishes, the wels attains a length of about 4.5 m (15 feet) and a weight of 300 kg (660 pounds).

It is a long-bodied, scaleless fish, usually mottled greenish to blackish with a pale belly and dark fins. It has a long anal fin, a small dorsal fin near the large, flattened head, and six mouth barbels, two of which, on the upper jaw, are very long. A nocturnal predator,

the wels feeds on fish, frogs, water birds, and occasional small mammals. It is an important food fish and a fine sport fish.

Welsbach, Carl Auer, Freiherr von (baron of) (b. Sept. 1, 1858, Vienna—d. Aug. 4, 1929, Treibach, Austria), Austrian chemist and engineer who invented the gas mantle, thus allowing the greatly increased output of light by gas lamps.

In 1885 Welsbach discovered and isolated the elements neodymium and praseodymium from a mixture called didymium, which was previously considered an element. His interest in rare-earth elements continued, and he found that a fabric impregnated with a mixture of thorium nitrate and cerium nitrate could be made into a mantle that glowed brightly when heated by a gas flame. Patented in 1885, the Welsbach mantle greatly improved gas lighting and, although largely supplanted by the incandescent lamp, is still widely used in kerosene and other lanterns.

In 1898 Welsbach introduced the first metallic filament for incandescent lamps. Although the osmium he used was too rare for general use, his improvement paved the way for the tungsten filament and the modern light bulb.

Welsbach also developed misch metal, a mixture of cerium and other rare earths, which he combined with iron to make Auer's metal, the first improvement over flint and steel for making sparks since ancient times. It is used in cigarette lighters and in strikers for lighting gas jets.

Welser FAMILY, family of German merchants, most prominent from the 15th to the 17th century. It first became important in the 15th century, when the brothers Bartholomew and Lucas Welser carried on an extensive trade with the Levant and elsewhere, and had branches in southern Germany and Italy, and also in Antwerp, London, and Lisbon. The business was continued by Antony (d. 1518), a son of Lucas Welser, who was one of the first among the Germans to use the sea route to the East that had been discovered by Vasco da Gama. Having amassed great wealth, Antony's son Bartholomew (1488–1561) lent large sums of money to Charles V and in return received several marks of the imperial favour. Bartholomew and his brother Antony, however, are chiefly known as the promoters of an expedition under Ambrose Dalfinger (d. 1532), which in 1528 seized the province of Caracas in Venezuela, holding it until 1555. After Bartholomew's death the business was carried on by three of his sons and two of his nephews; but the firm became bankrupt in 1614. Antony's grandson, Marcus (1558–1614), was distinguished for his scholarship and his writings, the most important of his many works being *Rerum Boicarum libri quinque,* dealing with the early history of the Bavarians.

Welsh corgi, either of two breeds of working dogs developed to handle cattle. They are similar in appearance but are of different origins. Their resemblance results from crosses between the two breeds.

The Cardigan Welsh corgi, named after Cardiganshire, can be traced back to dogs brought to Wales by the Celts about 1200 BC. The original type was known as the Bronant and was related to the progenitors of the dachshund. The Pembroke Welsh corgi, of Pembrokeshire, is descended from dogs brought to Wales by Flemish weavers about AD 1100. The ancestors of the Pembroke belonged to the group that produced the Keeshond, Pomeranian, and Samoyed.

Both Welsh corgis are small, short-legged dogs with foxlike heads and erect ears. The Cardigan has a long tail and ears that are



Cardigan Welsh corgi
Sally Anne Thompson—EB Inc.

rounded at the tips, while the Pembroke has a short tail and pointed ears. Both are hardy, able farm dogs and good guards and companions. They stand about 10 to 12 inches (25 to 30 cm) tall and weigh 15 to 24 pounds (7 to 11 kg). The Cardigan has a short to medium-long coat of reddish brown, brindle, black with tan or white, or blue-gray with black mottling. The Pembroke has a more finely textured coat of reddish or grayish brown or of black-and-tan. Both breeds may have white markings.

Welsh language, Welsh CYMRAEG, member of the Brythonic group of the Celtic languages, spoken in Wales. Modern Welsh, like English, makes very little use of inflectional endings; British, the Brythonic language from which Welsh is descended, was, however, an inflecting language like Latin, with word endings marking such grammatical categories as noun case and verb tense. The spoken language occurs in several local dialects but has been declining on the whole since the accession of Henry Tudor (Henry VII), of Welsh descent, to the English throne in 1485. At present few people speak only Welsh.

Welsh law, the native law of Wales. Though increasingly superseded by English law after the 13th century, Welsh law has been preserved in lawbooks that are important documents of medieval Welsh prose. The traditional name of this law is Cyfraith Hywel, or Law of Howel. The Welsh king after whom the law is named, Howel Dda (*q.v.*), must certainly have been responsible for some consolidation of the law, though no manuscript now extant dates from his time. The oldest extant Welsh lawbook is a manuscript in Latin dating from *c.* 1200; about a dozen manuscripts in Welsh date from the 13th or early 14th century.

The Welsh lawbooks, though also used in teaching, were compilations made by practicing lawyers. A few seem to be casual collections of miscellaneous material, but most purport to give a complete statement of the law. These "complete" manuscripts fall into three groups, generally called the Book of Iorwerth, Book of Blegywryd, and Book of Cyfnerth.

The oldest manuscripts are of the Book of Iorwerth, but the Book of Cyfnerth (which is attributed to Morgenau and his son Cyfnerth, members of the most famous family of lawyers in Gwynedd) reflects the earliest stage of development. The Book of Blegywryd resembles that of Cyfnerth but shows strong ecclesiastical influence, and it has now been shown to be a translation from a Latin compilation which can be compared with the so-called *Leges Henrici Primi* (of the beginning of the 12th century) in England.

Any medieval Welsh lawbook contains several strata, some provisions being already obsolete when it was written, others traditional material that was still living law, and other more or less recent innovations. Thus in the Book of Iorwerth most of the opening section on the court (which gives more prominence to the officers of the chase who were so significant in the heroic age than to the administrative officers who in fact guarded royal interests) was obsolete in the 13th century. In the land law, however, a detailed account of the procedure for claiming land shows that what had been a nonjudicial mode of taking possession of land had been transformed into a possessory action comparable to the assize of novel disseisin in England. Finally, in the last sections of the book, there is a very practical statement of the rules for compensation for cattle trespass and for the contract of joint plowing, whose importance increased greatly in the 13th century.

Welsh literary renaissance, literary activity centring in Wales and England in the mid-18th century that attempted to stimulate interest in the Welsh language and in the classical bardic verse forms of Wales. The movement centred on Lewis, Richard, and William Morris, Welsh scholars who preserved ancient texts and encouraged contemporary poets to use strict metres of the ancient Welsh bards such as the cywydd and *awdl.* Other scholars also collected and copied bardic manuscripts, laying the groundwork for later scholarly research. A new classical school of poetry was led by Goronwy Owen, a poet who wrote verse modeled after the bards of the Middle Ages. The Cymmrodorion Society, established by the Welsh community in London as a centre for Welsh literary studies, combined with other such scholarly groups (*e.g.,* the Gwyneddigion and Cymreigyddion societies) to encourage the reestablishment of local eisteddfods (poetic assemblies or contests). As a result, the National Eisteddfod was revived in the early 19th century.

A great number of publications, popular as well as scholarly, were a product of the revival, which also produced religious verse in free metres, lyrical hymns, popular ballads employing cynghanedd (a complex system of accentuation, alliteration, and internal rhyme), and verse dramas based on historical tales, incidents from the Bible, and Welsh mythology and legend.

By the 19th century the arts in Wales had become almost totally dominated by England, and the revival subsided. A second revival, based on the scholarly groundwork of the first, occurred at the end of the 19th century, centred in the newly established University of Wales. Careful scholarship was applied to the study of ancient texts. Some poets, stimulated by the renaissance, wrote experimental verse that reflects an awareness of the past (especially in the use of cynghanedd) and a solicitude for the survival of the Welsh language.

Welsh literature, body of writings in the Welsh language with a rich and unbroken history stretching from the 6th century to the present.

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

The history of Welsh literature may be divided into two main periods, early (including medieval) and modern. The early period was preeminently the age of professional bards, who trained in a teacher–pupil relation and practiced a poetic art so complex as to exclude the untrained altogether. Prior to the late 13th century, the bards had been patronized by the independent Welsh princes; henceforth they were patronized by the Welsh nobility that served the English crown. They retained their intricate system of versification (cynghanedd), although in a simpler, if more rigid, form, as well as their basic theme, eulogy, but they had perforce to include some new themes, mainly that of love. To the old tales, the *Mabinogion* and "Culhwch and Olwen," new ones of continental provenance were added, and new didactic prose appeared in the language through the activity of ecclesiastics.

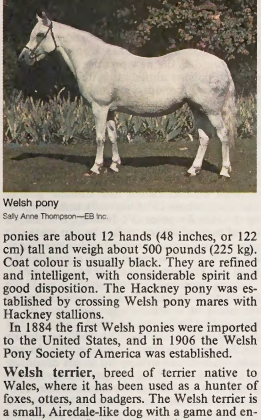
The modern period was ushered in by the Renaissance, the Protestant Reformation, and the Counter-Reformation. Many of the early reformers of both faiths were imbued with the Renaissance spirit and with the desire to

see the Welsh language take its proper place among the languages of Europe. Religion and learning contributed to a renewal of Welsh literature in the 18th century. The Welsh created what was almost a new literature that reflected the Romantic movement. But there was also a classical movement, known as the Welsh literary renaissance, centred on three brothers, Lewis, Richard, and William Morris. They were inspired by a deep love for everything Welsh and encouraged the collecting of all material of literary value, including that found in manuscripts and that found on the lips of their fellow countrymen.

Contemporary Welsh literature may be said to have begun with the foundation of the University of Wales in the late 19th century. The movement for reform that came with the extension of popular education, and especially with the establishment of university colleges in Wales, had at its head John Morris-Jones, a professor of Welsh and a poet. A modern Welsh literature was created in which the various prose genres enjoyed almost the same esteem as the poetic, and drama flourished for the first time.

Welsh Nationalist Party: *see* Plaid Cymru.

Welsh pony, breed of small horse popular as a child's or an adult's mount. A hardy breed that developed in the Welsh mountains, the Welsh pony was originally used in coal mines. A saddle type was developed by introducing Thoroughbred and Arabian blood. Welsh



Welsh pony
Sally Anne Thompson—EB Inc.

ponies are about 12 hands (48 inches, or 122 cm) tall and weigh about 500 pounds (225 kg). Coat colour is usually black. They are refined and intelligent, with considerable spirit and good disposition. The Hackney pony was established by crossing Welsh pony mares with Hackney stallions.

In 1884 the first Welsh ponies were imported to the United States, and in 1906 the Welsh Pony Society of America was established.

Welsh terrier, breed of terrier native to Wales, where it has been used as a hunter of foxes, otters, and badgers. The Welsh terrier is a small, Airedale-like dog with a game and energetic nature. It has a hard, wiry coat, usually black-and-tan, stands about 15 inches (38 cm) high, and weighs about 20 pounds (9 kg). Wide-set eyes and a flat skull give the breed a distinctive, "intelligent" expression.

Welshpool, Welsh Y TRALLWNG, town, Powys county, historic county of Montgomeryshire, Wales, in the valley of the River Severn. Its charter, granting market rights, dates from 1263. Lying near the English border, the town showed pro-English sympathies in the Middle Ages and has traditionally been predominantly English-speaking. Welshpool has a large livestock market and is the service centre for an extensive rural area in central Wales. Powys Castle, dating back to the 12th century and modernized in the 19th century, is maintained by the National Trust. Pop. (1991) 5,725.

Welt, Die (German: "The World"), daily newspaper, one of the most influential in Germany and the only one of national scope and stature published in Bonn during that city's time as West German capital.

Die Welt was established in 1946 as a four-page semiweekly by British occupation authorities in Hamburg. The paper's circulation rose rapidly, reaching 500,000 (including an edition in Essen) in 1947 and 1,000,000 in 1949. British control of the paper was terminated in 1950, and it was bought by the Hamburg publisher Axel Springer.

Die Welt was essentially conservative to start with, and it became more so under the militantly anti-Fascist, anti-Communist Springer. Hostile to social innovation, it has, however, innovated extensively in technical areas. By 1955 it was operating three plants—in Hamburg, Berlin, and Essen—the first German paper to do so. In 1975 its editorial headquarters was moved to Bonn, where it was thought costs would be lower and where *Die Welt*'s main interests in political and financial developments in government could be more readily covered.

Welti, Emil, in full FRIEDRICH EMIL WELTI (b. April 23, 1825, Zurzach, Switz.—d. Feb. 24, 1899, Bern), statesman, six times president of the Swiss Confederation, and a champion of federal centralization.

Political leader and *Landammann* (chief executive) of his native canton of Aargau in 1858, 1862, and 1866, Welti entered the federal Ständerat (council of cantons) in 1857 and subsequently served as assembly president (1860, 1866). Elected to the federal executive (Bundesrat) in December 1866, he served six terms as president of the confederation (1869, 1872, 1876, 1880, 1884, 1891) and successively headed the departments of the army, posts and telegraphs, justice, and railways. He led the trend toward centralization of political and military administration in a federal executive, pressed for revision of the constitution, inaugurated a plan of military reorganization (1874–75), and supported demands for railway nationalization.

Weltschmerz (German: "world grief"), the prevailing mood of melancholy and pessimism associated with the poets of the Romantic era that arose from their refusal or inability to adjust to those realities of the world that they saw as destructive of their right to subjectivity and personal freedom—a phenomenon thought to typify Romanticism. The word was coined by Jean Paul in his pessimistic novel, *Selina* (1827), to describe Lord Byron's discontent (especially as shown in *Manfred* and *Childe Harold's Pilgrimage*). *Weltschmerz* was characterized by a nihilistic loathing for the world and a view that was skeptically blasé. In France, where it was called the *mal du siècle*, *Weltschmerz* was expressed by Chateaubriand, Alfred de Vigny, and Alfred de Musset; in Russia by Aleksandr Pushkin and Mikhail Lermontov; in Poland by Juliusz Słowacki; in America by Nathaniel Hawthorne.

Welty, Eudora (b. April 13, 1909, Jackson, Miss., U.S.—d. July 23, 2001, Jackson), American short-story writer and novelist whose work is mainly focused with great precision on the regional manners of people inhabiting a small Mississippi town that resembles her own birthplace and the Delta country.

After being educated at the Mississippi State College for Women, Columbus, the University of Wisconsin, and the Columbia University School of Advertising, Welty worked as a writer for a Jackson radio station and newspaper before her fiction won critical acclaim. Her readership grew steadily after the publication of *A Curtain of Green* (1941; enlarged 1979), a volume of short stories. Her novels include *Delta Wedding* (1946), *The Ponder Heart* (1954), *The Bride of the Innisfallen* (1955), *Losing Battles* (1970), and *The Optimist's Daughter* (1972), which won a Pulitzer Prize. *The Wide Net* (1943) and *The Golden Apples* (1949) are collections of short stories, and *The Eye of the Story* (1978) is a volume of essays. *The Collected Stories of Eudora Welty* was published in 1980.

Welty's main subject is the intricacies of human relationships, particularly as revealed through her characters' interactions in intimate social encounters. Among her themes are the subjectivity and ambiguity of people's perception of character, and the presence of virtue hidden beneath an obscuring surface of convention, insensitivity, and social prejudice. Welty's outlook is hopeful, and love is viewed as a redeeming presence in the midst of isolation and indifference. Her works combine humour and psychological acuity with a sharp ear for regional speech patterns.

One Writer's Beginnings, an autobiographical work, was published in 1984.

Welwitschiaceae, a family of southwestern African desert plants in the order Gnetales, named for its single genus, *Welwitschia*. Tumboa plants (*W. mirabilis* or *W. bainesii*), constituting the only species, have deep taproots



Tumboa (*Welwitschia mirabilis*)
Sirna Eliovson

and resemble giant radishes, 60 to 120 cm (about 25 to 50 inches) in diameter and projecting about 30 cm (12 inches) above the ground. From the base of the cone-shaped trunk, two broad, flat, straplike leaves grow throughout the life of the plant (100 years or more) but are kept about 3 m (nearly 10 feet) in length by erosion at the tips.

The male and female flowers are carried in scales of scarlet cones that grow in a ring above the leaves. In the male flower is a female flower component, an ovule. Although the ovule is rudimentary and abortive in *Welwitschia*, its presence suggests a hermaphroditic condition more typical of angiosperms.

Welwyn Garden City, also called WELWYN, new town in Welwyn Hatfield district, administrative and historic county of Hertfordshire, Eng., on the northern periphery of London. It was founded in 1920 by Sir Ebenezer Howard as a planned town to provide for both industry and pleasant living conditions. Across a main railway line a large concentration of light industrial factories has developed, but many of the inhabitants commute daily to London, which is 23 miles (37 km) away. After World War II, Welwyn was designated and administered as a new town and grew rapidly. Pop. (1991) Welwyn Garden City, 42,087; Welwyn Urban Area, 55,964.

Welwyn Hatfield, district, administrative and historic county of Hertfordshire, southeastern England, occupying 49 square miles (128 square km) directly north of the metropolitan county of Greater London. The district is in the Thames basin, and its southern sections are in the Greater London Greenbelt. Welwyn Garden City and Hatfield, located 3 miles (5 km) apart and about 30 miles northwest of central London, both were designated as

new towns in the late 1940s to help meet London's urgent postwar housing needs. Welwyn Garden City was founded in 1920 by Sir Ebenezer Howard, the originator of the garden-city movement, and many experiments of combined rural-and-urban living have been undertaken in the town.

East of Hatfield is the early 16th-century Hatfield House, constructed for Robert Cecil (1520–98), 1st earl of Salisbury, which includes a section of the red brick Tudor palace where Elizabeth I spent her childhood.

Dairy farming, market gardening, and seed-growing nurseries are the principal economic activities in the southern greenbelt. Welwyn Garden City, the district seat, has a wide variety of industries; light industries include radio and electronics, pharmaceuticals, plastics, and food processing. An aircraft manufacturing division of British Aerospace Public Ltd. Company (founded in 1980) is located at Hatfield. Pop. (2001) 97,553.

Weme River (Benin): *see* Ouémé River.

Wen Ch'ang (Chinese god): *see* Wen Ti.

Wen-cheng (Chinese administrator and soldier): *see* Tseng Kuo-fan.

Wen Cheng-ming, Pinyin WEN ZHENGMING, original name WEN PI (b. 1470, Heng-yang, Hunan province, China—d. 1559), Chinese painter, calligrapher, and scholarly figure who was a student of Shen Chou, the two being considered the leading figures of the Wu school of scholar-artists in China.

Born to an established family, Wen Cheng-ming was brought up in a strongly Confucian home, and he met many of the learned people of his time. He was by nature sensitive and withdrawn, and it was not until the age of 53 in 1523 that he emerged from his scholarly isolation, receiving the recognition of the court with his appointment to the Hanlin Academy. He stayed there for only three years and then retired to produce his best-known works.

Wen Cheng-ming was expert at the four major styles of calligraphy: seal, official, regular, and "running." He was also known as a collector and connoisseur, especially of calligraphy. In painting he admired the great literati (*wen-jen*) of the Yüan dynasty (1206–1368) as well as earlier artists from the Sung (960–1279) and Five Dynasties (907–960) periods. He followed no single style, but throughout his paintings there is a spirit of studied antiquarianism and cautious consideration; in technique, the paintings range from the highly detailed to the more freely washed. His students included his son, Wen Chia (1501–83), and his nephew, Wen Po-jen (1502–75).

Wen Ch'i (Chinese poet): *see* Wen T'ing-yün.

Wen-chou, also called YUNG-CHIA, Pinyin WENZHOU, or YONGJIA, city and port in southeastern Chekiang *sheng* (province), China. Wen-chou is situated on the south bank of the Ou River, some 19 miles (30 km) from its mouth. The estuary of the Ou River is much obstructed by small islands and mudbanks, but the port is accessible by ships of up to about 1,000 tons. The Ou provides the main transport artery for the mountainous southeastern section of Chekiang.

The settlement was first given the name Wen-chou in AD 675. Wen-chou's port was opened to foreign trade as a treaty port in 1876, and for a while there was a considerable tea trade there; but the port never played a large part in foreign trade, and there was no foreign settlement. Wen-chou's trade again flourished during the war with Japan, when from 1937 to 1942 it was one of the few ports left in Chinese hands. Not until 1955 was sea transport along the Chekiang coast fully restored, after which Wen-chou rapidly recovered.

By the early 1970s an important coastal traffic, closely linked with Shanghai, had grown up. Wen-chou's role as the port and chief collecting centre for southeastern Chekiang province has led to a large export trade in various foodstuffs, tea, jute, timber, paper, and alum from inland. Wen-chou itself has grown into a food-processing centre engaged in polishing rice, curing tea, making wine, extracting oils, processing meat, and preparing butter and milk products. It is also a centre of paper-making and exports large quantities of bricks and tiles. There are minor engineering works, mostly making farm machinery, and various traditional handicrafts. In 1984 Wen-chou was designated one of China's "open" cities in the new open-door policy inviting foreign investment. Pop. (1999 est.) 512,523.

Wen Fei-ch'ing (Chinese poet): *see* Wen T'ing-yün.

wen-jen-hua, Pinyin WENRENHUA, English LITERATI PAINTING, ideal of the Chinese scholar-painter who was more interested in



"Saying Farewell to a Friend," hanging scroll dated 1531, ink on paper by Wen Cheng-ming, artist of the Wu school of *wen-jen-hua,* Ming dynasty; private collection, Switzerland

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personal erudition and expression than in either outward representation or an immediately attractive surface beauty. First formulated in the Northern Sung period (960–1127)—at which time it was called *shih-ta-fu-hua*—by the poet-calligrapher Su Tung-p'o (*q.v.*), the ideal of *wen-jen-hua* was finally and enduringly codified by the great Ming dynasty critic and painter Tung Ch'i-ch'ang (*q.v.*), who identified two great lineages of painters.

One was the "Southern school" beginning with the poet-painter Wang Wei (*q.v.*) in the T'ang dynasty and continuing with such masters as Tung Yüan and Chü-jan (*q.v.*) in the Five Dynasties period, Mi Fei in the Northern Sung, the Four Masters of the Yüan dynasty (*q.v.*), and the Wu school (*q.v.*) artists of the second half of the 15th and first half of the 16th centuries (Ming dynasty). The paintings of the artists in this grouping were characterized generally by subjective, personal, and expressive treatment of reality. In contrast were those artists more interested in precise and decorative paintings, beginning with Li Ssu-hsün in the T'ang dynasty and continuing with artists of the Southern Sung academy and their heirs of the 15th-century Che school (*q.v.*) in the Ming dynasty. According to the principle of *wen-jen-hua,* the completely literate, cultured artist—learned in all of the humane arts—who revealed the privacy of his vision in his painting was to be preferred to the "professional," whose paintings were more obviously pleasing to the eye. The contrast is overly categorical, but it is useful still in understanding the major interests and intentions of Chinese painters through the ages.

Wen Jiabao (b. September 1942, Tianjin, China), Chinese official, premier of China from 2003. Wen studied at the Beijing Institute of Geology, where he earned a graduate degree in structural geology in 1968. While a student at the institute, he joined the Chinese Communist Party (CCP). After working as a technician and political instructor, he joined (1982) the Ministry of Geology and Mineral Resources. Wen was named deputy director of the General Office of the CCP Central Committee in 1985 and served as its director from 1986 to 1992. He also held a number of other party positions, serving as chief of staff to three general secretaries of the CCP. Wen became a full member of the Secretariat of the CCP Central Committee in 1993 and a member of the Political Bureau in 1997. In 1998 he was appointed one of China's four vice-premiers. Wen was credited with helping to launch a program to reduce taxes on Chinese farmers. He also was involved in financial and environmental matters. In 2003 Wen was formally approved as the new premier of China. He pursued policies aimed at revitalizing China's lagging rural economy, restructuring its heavily indebted banking system, and continuing the reform of state-owned enterprises to make them globally more competitive.

Wen Pi (Chinese artist): *see* Wen Cheng-ming.

Wen Ti, also called WEN CH'ANG, or WEN CH'ANG TI-CHÜN, Pinyin WEN DI, WEN CHANG, or WEN CHANG DIJUN, the Chinese god of literature, whose chief heavenly task, assigned by the Jade Emperor (Yü Huang), is to keep a log of men of letters so that he can mete out rewards and punishments to each according to his merit. He also maintains a register of the titles and honours each writer has received.

Among numerous legends about Wen Ti, he is said to have had 17 reincarnations, during the ninth of which he appeared on earth as Chang Ya. Some say he lived during T'ang dynasty times (AD 618–907), others say during the 3rd or 4th century or even earlier. In any case, his brilliant writing led to his canonization during the T'ang dynasty and to his appointment as lord of literature in the 13th century. Because Chang is said to have lived at Tzu-t'ung in Szechwan province, persons of that region worship him under the title Tzu-t'ung Shen (Spirit of Tzu-t'ung).

In representations, Wen Ti usually sits, wears a mandarin robe, and holds a sceptre. He is flanked by a male and a female servant, one called T'ien-Lung (Heavenly Deaf One), the other Ti Ya (Earthly Mute). The names suggest that Wen Ti must turn a deaf ear to those who inquire about the secrets of literature, for such a topic necessarily leaves one speechless.

Wen Ti also has two assistants, K'uei Hsing, the god of examinations, with whom he is sometimes confused, and Chu I, whose name signifies Red Coat.

Wen-ti, Pinyin WENDI (posthumous name, or *shih*), personal name (*hsing-ming*) LIU HENG (d. 157 BC, China), fourth emperor (reigned 180/179–157/156 BC) of the Han dynasty of China. His reign was marked by good govern-

ment and the peaceful consolidation of imperial power.

A son of Kao-tsu, the first ruler of the Han dynasty, Wen-ti was the prince of Tai when he was chosen emperor over several other contenders for the imperial throne. His reign of 23 years made him the first Han emperor to rule for such a long period of time and gave the dynasty a stability it had hitherto lacked. Wen-ti further weakened the power of local dukes and other vassals in the process of consolidating the central government's authority. At the same time, he was credited with the ideal behaviour of a monarch; he listened to his subordinates' advice and sought their agreement in important decisions. Wen-ti's legendary frugality enabled him to lighten the tax burdens on the peasantry. He also took measures to improve irrigation and otherwise promote agricultural production. Under his rule China's economy prospered and its population expanded. The continuity of Han rule was assured when, at Wen-ti's death, the throne passed peacefully to his son, Ching-ti, whose reign was also known for its good government. To later ages, Wen-ti epitomized the virtues of frugality and benevolence in a Chinese ruler.

Wen-ti (Chinese emperor): *see* Ts'ao P'ei.

Wen-ti, Pinyin WENDI (posthumous name, or *shih*), temple name (*miao-hao*) (SUI) KAO TSU, personal name (*hsing-ming*) YANG CHIEN (b. 541, China—d. 604, China), emperor (reigned 581–604) who reunified and reorganized China after 300 years of instability, founding the Sui dynasty. He conquered the several dynasties into which southern China had been divided, and he broke the power of the Mongols and Turks in the northern part of the country.

Early life. Wen-ti was born into a powerful family that had held high office under the non-Chinese dynasties that controlled North and Central China in the period of fragmentation. His ancestors had married into prestigious non-Chinese clans, and the culture of such families was as mixed as their descent. Until he reached the age of 13, Wen-ti was brought up by a Buddhist nun. He then briefly attended the school maintained by the state for the education of sons of nobles and officials; it is doubtful that he acquired more than the mere rudiments of composition, a bit of history, and some maxims of Confucian morality, for young men of his class devoted themselves chiefly to horsemanship, the hunt, falconry, archery, and military exercises.

He received his first military appointment at 14 and rose rapidly in the service of the Yü-wen, the non-Chinese ruling house of the Northern Chou dynasty (557–581), who, with their military prowess, would soon control all of North China. Wen-ti held a command in the campaign against the dynasty which controlled the northern plain and a post in the administration of the conquered territory. He had done well for the Chou, and, as part of his reward, he was permitted to marry one of his daughters to the Chou crown prince.

Seizure of the throne. When the Chou emperor unexpectedly became ill and died at 36 and the crown prince's sanity became doubtful, Wen-ti, his wife, and their confidants decided to seize the throne. The summer of 580 was crucial, for rival contenders and Chou loyalists rose in many places. But, with luck, ruthlessness, superior military force, and discord among his rivals, Wen-ti prevailed. He assumed the imperial title, held an audience on March 4, 581, and the Sui dynasty was founded.

Wen-ti surrounded himself with able men, mostly of mixed descent and mostly from backgrounds similar to his own. An early move was the building of a new capital on a new site southeast of the Han capital of Ch'ang-an; it was built on a scale unprecedented in Chinese history. The Sui evidently meant to replace the weak regimes of the age of disunion with strong centralized government, to unify China by eliminating the feeble "legitimate" Chinese regime at Nanking.

The emperor moved into his half-built capital in 583, and he immediately set his grand design in motion. Centralization required drastic reforms on many levels—for example, the entrenched families that held local office by hereditary right had to be replaced by a bureaucracy answerable to the throne. The hereditary rights and the institutions that supported them were quickly abolished; a method of selecting new men by examination and recommendation was devised; appointment powers were vested in the Board of Civil Office (Chinese: Li Pu); and the "rule of avoidance" was instituted, forbidding officials to serve in their native places. Wen-ti planned the conquest of the south with his usual care and attention to detail. The eight-pronged assault by land and water overwhelmed the southerners; the integration of this culturally different area into the Sui empire began and was greatly facilitated by the canal system that Wen-ti had begun.

Foreign affairs. Beyond China proper Sui power was less easily asserted against the formidable empires of the western and the eastern Turks, but fortune and Sui intrigues brought success; the Turkish empires were weakened by internal rivalries, and by 603 the Sui had broken Turkish power in the areas most vital to them: Turkistan and Mongolia. A Sui attempt to administer Vietnam was a failure, but, toward the close of Wen-ti's reign, Korea and Japan were beginning to notice the new paramount power in eastern Asia.

In the year 601, when Wen-ti was 60, he had solid grounds for satisfaction; the empire was reunified and at peace; the people were productive, and the officials—carefully selected, frequently rotated, and under constant checks—collected taxes, saw that the granaries were filled, and carried out imperial orders at the local level. Looking about him in his spacious capital city, Wen-ti could see a large and increasing population, the opulent mansions of his nobles and ministers, temples, and thriving marketplaces. Moreover, the arrival of tribute missions reminded him that Sui power was being felt by neighbouring peoples.

Yet, for all his accomplishments, Wen-ti was deeply unhappy. Henpecked by his aging wife, on bad terms with his sons, deprived of many of his life-long confidants by death or by his wife's jealousy of them, haunted by feelings of guilt and nameless fear, he turned against state Confucianism and ever more ardently to Buddhism. On his birthday in 601, he began an elaborate empire-wide series of observances. Shrines were built in key cities and towns; then the emperor himself sealed holy relics in jars, which delegations of eminent monks carried into the provinces. At a set time throughout the empire, the relics were simultaneously enshrined with appropriate ceremony. By this act of grandiose public piety, Wen-ti followed in the footsteps of the great 3rd-century-BC Indian emperor Aśoka, who was, like himself, a unifying emperor. At the time he assuaged his feelings of fear and guilt and laid in a great store of spiritual merit (karma) to see him through the lives to come.

Three years later—at the end of one of the great reigns in Chinese history—he fell ill and died, his end possibly hastened by the son who succeeded him. (A.F.W.)

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Wen-ti (Chinese emperor; 1360–1424): *see* Yung-lo.

Wen T'ing-yün, Pinyin WEN TINGYUN, original name (Wade-Giles romanization) WEN CH'I, courtesy name (*tzu*) FEI-CH'ING (b. 812, T'ai-yüan, China—*d. c.* 870, China), Chinese lyric poet of the late T'ang dynasty who helped to establish a new style of versification associated with the *tz'u* form, which flourished in the subsequent Sung dynasty.

Derived from ballads performed by professional female singers, or "flowers," in the wineshops and brothels of the day, *tz'u* borrowed metres from existing musical scores and were themselves sung to instrumental accompaniment. Wen, whose aristocratic birth allowed him a life of leisure, frequented the urban amusement quarters to collect ballads as models for his own love lyrics. Admired for the delicate sensuality of his verse and his skill at evoking feminine sensibility, Wen was chosen as the lead poet in the first major anthology of *tz'u* poetry, the *Hua chien chi* ("Among the Flowers"), compiled by Chao Ts'ung-tsu in 940 to popularize the new genre.

Wen-tsung, Pinyin WENZONG (temple name, or *miao-hao*), personal name (*hsing-ming*) LI ANG (b. 809, China—d. 840, China), 14th emperor (reigned 826/827–840) of the T'ang dynasty (618–907) of China who attempted unsuccessfully to free the court from the influence of the palace eunuchs, who had usurped much of the imperial power. His carefully laid plots against the eunuchs all misfired, resulting in the Sweet Dew Incident of 833, in which three of his chief ministers and several other officials were slaughtered. The power of the eunuchs was greatly enhanced; they even dared assassinate an heir apparent of whom they did not approve.

Wen-wang, also called HSI PO, Pinyin WENWANG, or XI BO (fl. 12th century BC, China), father of Wu-wang, the founder of the Chou dynasty (*c.* 1111–255 BC) and one of the sage rulers regarded by Confucian historians as a model king.

Wen was the ruler of Chou, one of the semibarbaric states on the western frontier of China, long a battleground between the civilized Chinese and nomadic invaders. By 1144 he had assumed the title Hsi Po (King of the West) and had begun to threaten the Shang dynasty (18th–12th century BC). In 1144 he was captured and imprisoned by Chou, the last Shang ruler. During the three years of his imprisonment, according to tradition, he wrote the Confucian Classic *I Ching* (*q.v.*); the eight trigrams (*pa kua*) on which the *I Ching* divinations are based, however, were probably conceived much earlier.

Wen-wang gained his freedom when the people of Chou paid a ransom of a beautiful girl, a fine horse, and four chariots. He returned to Chou, where he spent the rest of his life remonstrating against the cruelty and corruption of his age. Upon his death, his son and successor, Wu-wang, destroyed the Shang and founded the Chou dynasty.

Wen Zhengming: *see* Wen Cheng-ming.

Wenatchee, city, seat (1899) of Chelan county, central Washington, U.S., in the foothills of the Cascade Range, just below the confluence of the Wenatchee and Columbia rivers, opposite East Wenatchee. It was founded in 1888 by Don Carlos Corbett and moved in 1892 1 mile (1.6 km) east to be on the Great Northern Railway. With the development of the Columbia River Irrigation Project, the city grew as a packing and shipping centre for a large fruit- (especially apple-) growing district. Lumber mills and an aluminum reduction plant also aided growth. The city is the headquarters of the Wenatchee National Forest and is a base for the resort areas of the eastern Cascades. It is the site of

the North Central Washington Museum (containing Indian and pioneer relics), Wenatchee Valley College (1939), and a Washington State University horticultural experiment station.



Apple harvest in Wenatchee, Wash.
Josef Scaylea—Shostal/EB Inc.

The city hosts the annual Washington State Apple Blossom Festival (April–May). Inc. village, 1892; city, 1901. Pop. (1990) 21,756.

Wenceslas, also spelled WENCESLAUS, name of rulers grouped below by country and indicated by the symbol •.

Foreign-language equivalents:

Czech	Václav
German	Wenzel
Hungarian	Vencel
Polish	Wacław

Bohemia

• **Wenceslas I,** also called SAINT WENCESLAS, Czech SVATÝ VÁCLAV (b. *c.* 907, Stochov, near Prague—d. Sept. 28, 929, Stará Boleslav, Bohemia; feast day September 28), prince of Bohemia, martyr, and patron saint of Czechoslovakia.

Wenceslas was raised a Christian by his grandmother St. Ludmila, but his ambitious mother, Drahomíra (Dragomir), a pagan, had her murdered and acted as regent herself, until Wenceslas came of age in 924 or 925. Her court intrigues and the wishes of the people to end the conflicts between Christian and non-Christian factions in Bohemia led Wenceslas to take the reins of government. As duke he was pious, reportedly taking the vow of virginity, and encouraged the work of German missionary priests in the Christianization of Bohemia. His zeal in spreading Christianity, however, antagonized his non-Christian opponents.

Faced with German invasions in 929, Wenceslas submitted to the German king Henry I the Fowler. His submission provoked some of the nobles to conspire against him, and they prompted his younger brother, Boleslav (Boleslaus), to murder him. Waylaid by Boleslav en route to mass, Wenceslas was killed at the church door. Frightened by the reports of miracles occurring at Wenceslas' tomb, Boleslav had his remains transferred in 932 to the Church of St. Vitus, Prague, which became a great pilgrimage site during the medieval period. Wenceslas was regarded as Bohemia's patron saint almost immediately after his assassination. His virtues are sung in the Christmas carol (19th century) "Good King Wenceslas."

F. Dvornik's *Life of St. Wenceslas* appeared in 1929.

• **Wenceslas I** (b. 1205—d. Sept. 23, 1253), king of Bohemia from 1230 who brought Austria under his dynasty while using the influence of German colonists and craftsmen to keep Bohemia strong, prosperous, and culturally progressive.

Succeeding his father, Přemysl Otakar I, in 1230, Wenceslas prevented Mongol armies from attacking Bohemia (1241) but could not defend Moravia, which was subsequently ravished by the Mongols before they moved into Hungary. The King's main foreign policy objective then became the acquisition of Austria. On the death of the last Babenberg duke of Austria, Frederick II (1246), Wenceslas secured the hand of the Duke's niece for his son Vladislas. But Vladislas soon died, and Wenceslas lost Austria. After suppressing a Bohemian revolt in 1248–49, however, he finally forced the Austrian estates to accept his son Přemysl Otakar II as their duke in 1251. Bohemia prospered under Wenceslas' reign. Towns grew and German merchants and colonists added considerably to the wealth of the country, while German influence at the court caused a rich flowering of the arts, especially literature and architecture.

• **Wenceslas II** (b. Sept. 17, 1271—d. June 21, 1305), king of Bohemia from 1278 and of Poland from 1300 who ably ruled his Bohemian kingdom and spread his influence not only into Poland but also into Hungary.

Succeeding to the throne at the age of seven on the death of his father, Přemysl Otakar II, in 1278, Wenceslas lived at the court of his cousin Otto IV of Brandenburg who served as regent for Wenceslas until 1283. When Wenceslas then returned to Prague, he found that his country was dominated by the ambitious Záviš of Falkenstein, his mother's lover and later her husband. Wenceslas arrested Záviš in 1289, destroyed the dissident faction, and executed his rival in 1290. Thereafter he governed his kingdom successfully, exploiting its natural resources and increasing its wealth. After annexing most of Upper Silesia, Wenceslas occupied Kraków in 1291 and finally became king of Poland in 1300. Offered the Hungarian crown, he declined and placed his son Wenceslas (later King Wenceslas III) on the throne in 1301 but was forced to withdraw him in 1304.

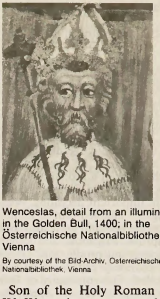
• **Wenceslas III** (b. Oct. 6, 1289—d. Aug. 4, 1306, Olomouc, Moravia, Bohemia), last king of the Přemyslid dynasty of Bohemia, king of Hungary from 1301 to 1304, and claimant to the Polish throne; his brief reign in Bohemia was cut short by his assassination, which also prevented him from asserting his right to Poland.

Wenceslas renounced his hereditary rights to Austria and his Hungarian crown before succeeding his father, King Wenceslas II, on the Bohemian throne in 1305. An intelligent and well-educated yet dissolute person, he determined to enforce his claim to Poland and was raising an army when he died at the hand of an unknown assassin. The male line of the Přemyslid dynasty, which had ruled Bohemia for nearly four centuries, died with him.

• **Wenceslas IV:** *see* Wenceslas (Germany/Holy Roman Empire).

Germany/Holy Roman Empire

• **Wenceslas** (b. Feb. 26, 1361, Nürnberg—d. Aug. 16, 1419, Prague), German king and, as Wenceslas IV, king of Bohemia, whose weak and tempestuous, though eventful, reign was continually plagued by wars and princely rivalries that he was unable to control, plunging his territories into a state of virtual anarchy until he was stripped of his powers altogether by a rebellious nobility.



Wenceslas, detail from an illumination in the Golden Bull, 1400; in the Österreichische Nationalbibliothek, Vienna
By courtesy of the Bild-Archiv, Österreichische Nationalbibliothek, Vienna

Son of the Holy Roman emperor Charles IV, Wenceslas was crowned king of Bohemia in 1363 and king of the Romans in 1376, proving a largely incompetent ruler after his father's death in 1378. He was a peace-loving man and held frequent diets in Germany from 1378 to 1389, but he could not prevent the continuing wars between town leagues and princes that reduced Germany to anarchy for almost a decade. The diet at Eger (modern Cheb) in 1389 finally settled most conflicts by a general peace, but, because the King spent most of his time in Prague to the detriment of Germany, the empire's princes repeatedly demanded the appointment of a *Reichsverweser* (imperial governor) for Germany, a request consistently refused by Wenceslas.

After 1389 Wenceslas left Germany largely to its own devices, returning only in 1397 to hear the princes' complaints before travelling to France to attempt to resolve the Western Schism that was dividing Christendom. Finally, in August 1400, when Wenceslas refused to attend another meeting of the princes, they deposed him and elected Rupert (Ruprecht) III, elector Palatine, king of the Romans. Wenceslas was, however, able to retain the title of German king for the rest of his life.

Wenceslas' reign in Bohemia was even less successful than that in Germany. Constantly beset by jealous and ambitious relatives, he was in 1394 faced by a revolt of magnates led by his cousin Jobst, margrave of Moravia, who held the King prisoner in Austria. Wenceslas was shortly restored with German help but was stripped of virtually all his power in 1396, when he was forced to appoint Jobst governor of the realm and to entrust the government to a royal council mainly consisting of nobles. In 1402 his younger half brother Sigismund (later Holy Roman emperor), whom the King had aided in his successful quest for the Hungarian crown (1387), deposed Wenceslas in Bohemia. Once more imprisoned, Wenceslas was able to restore himself in the next few years, but at the price of yielding real power to the royal council. Subsequently, he grew inert and found solace in drinking. Although he initially supported the Bohemian religious reformers around Jan Hus, after the reformer's condemnation by the church, characteristically, the King did nothing to prevent his execution as a heretic (1415). Wenceslas was married twice, first to Joanna of Lower Bavaria (died 1386) and, from 1389, to Sophia of Bavaria. He had no children, and the Bohemian crown passed to Sigismund.

Hungary

• **Wenceslas:** *see* Wenceslas III (Bohemia).

Poland

• **Wenceslas:** *see* Wenceslas II (Bohemia).

Wenceslas, SAINT: *see* Wenceslas I (prince) *under* Wenceslas (Bohemia).

Wenceslaus (personal name): *see under* Wenceslas.

Wend, any member of a group of Slavic tribes that settled in the area between the Oder River (on the east) and the Elbe and Saale rivers (on the west) by the 5th century AD, in what is now Germany. The Wends occupied the eastern borders of the domain of the Franks and other Germanic peoples. From the 6th century the Franks warred sporadically against the Wends, and, under Charlemagne in the 9th century, they began a campaign to subjugate the Wends and forcibly convert them to Christianity. German annexation of the Wendish territories began under Henry I in 929, but the Germans' control of the area east of the Elbe collapsed during a Wendish rebellion in 983. During their periodic rebellions against Slavic and German overlords, the Wendish peasantry would also repudiate Christianity.

The German expansion into the Elbe-Oder region resumed in 1125, and in 1147 a German crusade led by Henry the Lion against the Wends was authorized by the Roman Catholic church. This crusade caused great loss of life among the Wends, and they consequently offered little opposition to German colonization in the following centuries. German settlers established themselves in the former Wendish areas, and their towns became important commercial centres in northern Germany. The Wends themselves were enserfed and were gradually assimilated by the Germans, with the exception of a minority in the traditional region of Lusatia (*q.v.*), in present-day Germany, who are now known as Sorbs.

Wendat, also spelled WYANDOT, among North American Indians, a confederacy of four Iroquoian-speaking bands of the Huron (*q.v.*) nation—the Rock, Bear, Cord, and Deer—together with a few smaller, dependent communities that joined them at different periods for protection against the Iroquois League. When first encountered by whites in 1615, they occupied a territory, sometimes called Huronia, around what are now Lake Simcoe and Georgian Bay, Ontario. Some of the Wendat villages, consisting of large, bark-covered dwellings housing several families each, were palisaded for protection. They were situated near fields where the Wendat grew maize (corn), the staple of their diet, supplemented by fish and, to a lesser extent, game.

The Wendat, weakened by diseases introduced by Europeans and unable to obtain as many firearms and ammunition as their enemies, were destroyed by the Iroquois League in 1648–50, and the constituent tribes dispersed. The neighbouring Tionontati (*q.v.*) united with some Huron refugees and became known to the English as the Wyandot, a corrupted form of Wendat.

Wenden (Latvia): *see* Cēsis.

Wenders, Wim (b. Aug. 14, 1945, Düsseldorf, Ger.), German film director who was one of the principal members of the New German Cinema of the 1970s.

During the late 1960s Wenders studied film at the Munich Film Academy while working as a film critic, and in 1971 he made his first feature, *Die Angst des Tormanns beim Elfmeter* (1971; *The Goalie's Anxiety at the Penalty Kick*). In 1976 he wrote, directed, and produced *Im Lauf der Zeit* ("In the Course of Time"; Eng. title *Kings of the Road*), a "buddy" picture in which two men, one a linguist, have trouble communicating as they travel across Germany together. His film *Der amerikanische Freund* (1977; *The American Friend*) further explores themes of dislocation. Wenders achieved international fame with the gritty English-language film *Paris, Texas* (1984). In 1987 he received more acclaim for the hauntingly beautiful *Der Himmel über Berlin* ("Heaven over Berlin"; Eng. title *Wings of Desire*), in which angels roam modern-day Berlin. The lyrical, innovative film combines German, French, and English and was shot in both black-and-white and colour.

Wenders's films are notable for their lush imagery, a product of his collaboration with the cinematographer Robby Müller. His later work includes *Lisbon Story* (1995), *The End of Violence* (1997), and the critically lauded documentary *The Buena Vista Social Club* (1999).

Wendish languages: *see* Sorbian languages.

Wenlock Series, the second of four main divisions (in ascending order) in the Silurian System, representing all those rocks on a global basis deposited during the Wenlock Epoch (428–421 million years ago). Its name is derived from Wenlock Edge, a prominent escarpment that stretches for about 29 km (18 miles) southwest from the town of Much Wenlock in Shropshire, Eng. The ridge is formed by fossiliferous limestones (Wenlock Limestone) with a maximum thickness of 29 m (95 feet), but broadly underlain by siltstones and mudstones up to 292 m (960 feet) thick.

By international agreement, the base of the Wenlock Series is defined with a global stratotype section and point (GSSP) on the north bank of Hughley Brook near Hughley Church at Ape Dale, Shropshire. The boundary point coincides with the base of the Buildwas Formation and closely corresponds to the first occurrence of the graptolite species *Cyrtograptus centrifugus.* The base of the Wenlock Series is also marked by the fossil disappearance of the conodont *Pterospathodus amorphognathoides.* The Wenlock Limestone is one of the best-studied Silurian formations of the world and is noted for its abounding variety of excellently preserved fossils: brachiopods, corals, trilobites, clams, bryozoans, and crinoids.

Wenrohronon, Iroquoian-speaking Indians whose name means "People of the Place of the Floating Scum," probably after the oil spring at what is now Cuba, N.Y., U.S., where they lived. The oil was a highly regarded medicine for various ailments. Like other Iroquoian tribes, they were semisedentary, cultivating maize (corn), hunting, and fishing for their livelihood. Each community was guided by a chief and a council of elders.

An alliance with the Neutral protected the Wenrohronon from Iroquois predation until 1639, when the Neutral withdrew their support. This act and an epidemic (probably smallpox) left some 600 Wenrohronon, mainly the elderly, women, and children, to flee to the Huron for refuge. Many died of hunger, exposure, exhaustion, and disease before reaching safety with the Huron. The remaining Wenrohronon, who may have numbered 1,500, were incorporated with the Neutral and were later destroyed with them by the Iroquois.

Wensleydale, cheese-producing area and tourist region of the upper valley of the River Ure in Richmondshire district, county of North Yorkshire, Eng., within the Pennine highlands. Steep limestone slopes flank the valley dale floor, and waterfalls and gorges—notably Aysgarth Falls and Hardraw Force—are formed where side streams and the main river cross limestone outcrops. The valley is separated from neighbouring dales by open moorland more than 2,000 feet (600 m) high.

Most of the upper dale was once included within Wensley Forest. At Jervaulx are the ruins of a Cistercian abbey (founded 1145). Middleham Castle (12th century) and Bolton Castle (14th century) are other historic buildings in the locality. Dairy farming and cheese making are principal activities of the lower valley, and the dale is famous for the cheese to which it gave its name. There are also large limestone quarries in the area.

Went, F.A.F.C., in full FRIEDRICH AUGUST FERDINAND CHRISTIAN WENT (b. June 18, 1863, Amsterdam, Neth.—d. July 24, 1935, Wassenaar), Dutch botanist who initiated the study of plant hormones and advanced the study of botany in The Netherlands.

Went was educated at the University of Amsterdam (Ph.D., 1886), where he attracted attention with his dissertation on plant vacuoles, which he believed arose only from preexisting vacuoles. As director of the Sugar Cane Experiment Station in Java, he undertook a study of sugarcane diseases and saved the island's crop from destruction by the virus disease known as sereh.

After his return to The Netherlands, Went was appointed professor of botany at the University of Utrecht, where he remained until his retirement in 1934. At Utrecht he demonstrated the existence of plant hormones as regulators of physiological activities (*e.g.,* growth) and worked on the role of these hormones in the responses of plants to stimuli (*e.g.,* bending toward light).

wentletrap, also called STAIRCASE SHELL, or LADDER SHELL, any marine snail of the family Epitoniidae (subclass Prosobranchia of the class Gastropoda), in which the turreted shell—consisting of whorls that form a high, conical spiral—has deeply ribbed sculpturing. Most species are white, less than 5 cm (2 inches) long, and exude a pink or purplish dye. Wentletraps occur in all seas, usually near sea anemones, from which they suck nourishment. The common wentletrap (*Epitonium clathrus*) occurs in European waters; the money wentletrap (*E. indianorum*) is common from Alaska to Mexico.



Angulate wentletrap (*Epitonium angulatum*)
John H. Gerard

Wentworth, Thomas: *see* Cleveland, Thomas Wentworth, Earl of; Strafford, Thomas Wentworth, 1st Earl of.

Wentworth, W.C., in full WILLIAM CHARLES WENTWORTH (b. 1790, Norfolk Island, New South Wales [Australia]—d. March 20, 1872, Wimborne, Dorset, Eng.), the leading Australian political figure during the first half of the 19th century.

Wentworth became a public figure in 1813, when his crossing of the Blue Mountains near the coast of New South Wales opened up a vast new area for grazing. His book *A Statistical, Historical, and Political Description of the Colony of New South Wales and Its Dependent Settlements in Van Diemen's Land* (1819) publicized opportunities for colonization and argued for a liberal voting franchise. In 1824

he started a newspaper, the *Australian,* utilizing it and the Australian Patriotic Association, which he headed in 1835, to campaign for representative government.

After 1837 Wentworth sided with the large landowners and others who wanted a property-based franchise. He continued to work for home rule, making possible the Constitution Act of 1842, which provided for the election (rather than appointment) of two-thirds of the Legislative Council in New South Wales, and the constitution of the colony adopted in 1855. In 1853 he made the earliest proposal for federal government in Australia and led the upper house in 1861. He also helped to establish state primary education and the first Australian university, at Sydney, in 1850. He retired to England in 1862.

Wenxiang (Chinese official): *see* Wen-hsiang.

Wenzel (German personal name): *see under* Wenceslas.

Wenzhou (China): *see* Wen-chou.

Werbőczi, István (b. *c.* 1458—d. 1542, Buda, Hung.), statesman and jurist, whose codification of Hungarian law served as his country's basic legal text for more than 400 years.



Werbőczi, portrait on a coin; in the Hungarian National Museum, Budapest
By courtesy of the Hungarian National Museum, Budapest, Hungary

A member of the lesser nobility, Werbőczi was commissioned by King Vladislas II to collect the customary and statute law of the Hungarian kingdom. His resulting work, the famous *Tripartitum* (1514), most notably proclaimed the complete equality of all nobles, both great and small, and stressed the rights of the aristocracy at the expense of royal sovereignty. It also reinforced the servile status of the peasantry, thus leading to a further deterioration of their condition. In effect, the *Tripartitum* virtually identified aristocratic interests with the nation's legal personality.

During the reign of Vladislas' young son Louis, Werbőczi served on several diplomatic missions to obtain assistance against the Turks and in 1525 was elected palatine (imperial governor), a position he was, however, soon forced to resign. Following King Louis's death during the disastrous rout of the Hungarians by the Turks at Mohács (August 1526), Werbőczi supported the native claimant to the royal succession, János Zápolya (later King John), against the Habsburg Ferdinand I. In 1541 he advised that Buda be ceded to the Turks, and in the Turkish administration he rose to the rank of chief justice. He was, however, soon poisoned by the Pasha of Buda.

werewolf, in European folklore, a man who turns into a wolf at night and devours animals, people, or corpses but returns to human form by day. Some werewolves change shape at will; others, in whom the condition is hereditary or acquired by having been bitten by a



Lon Chaney, Jr., as a werewolf in *The Wolf Man* (1941)
By courtesy of Universal Pictures; photograph, Lincoln Center Library of the Performing Arts, New York Public Library

werewolf, change shape involuntarily, under the influence of a full moon. If he is wounded in wolf form, the wounds will show in his human form and may lead to his detection. Belief in werewolves is found throughout the world. The psychiatric condition in which a person believes he is a wolf is called lycanthropy (*q.v.*).

In countries in which wolves are not common, the monster may assume the form of another dangerous animal, such as the bear, tiger, or hyena. In French folklore, the werewolf is called *loup-garou.* France was particularly afflicted with reports of them in the 16th century, and there were many notable convictions and executions of *loups-garous.* As a subject for 20th-century horror films, the werewolf tradition is second only to the vampire tradition in popularity. Werewolves are believed to turn into vampires after death.

Werfel, Franz (b. Sept. 10, 1890, Prague—d. Aug. 26, 1945, Hollywood), German writer who attained prominence as an Expressionist poet, playwright, and novelist. As a consequence of his experiences with Nazism, he espoused human brotherhood, heroism, and religious faith.

The son of a glove manufacturer, Werfel left home to work in a Hamburg shipping house. Shortly afterward he published a book of lyric poems. After fighting on the Italian and Galician fronts in World War I, he became antimilitary, recited pacifistic poems in cafés, and was arrested. His playwriting career began in 1916 with an adaptation of Euripides' *Trojan Women,* which had a successful run in Berlin. He turned to fiction in 1924 with *Verdi, Roman der Oper* (Eng. trans., *Verdi, A Novel of the Opera,* 1925). International fame came with *Die vierzig Tage des Musa Dagh* (1933; *The Forty Days of Musa Dagh,* 1934), an epic novel in which Armenian villagers resist savage Turks until rescued by the French.

Keeping ahead of a spreading Nazism, Werfel, a Jew, settled in an old mill in southern France. With the fall of France in 1940 (reflected in his play *Jakobowsky und der Oberst,* written in 1944 and successfully produced in New York City that year as *Jakobowsky and the Colonel*), he decided to flee to the United States. In the course of his journey, he found solace in the pilgrimage town of Lourdes, Fr., where St. Bernadette had visions of the Virgin. He vowed to write about the Saint if he ever reached America and kept the vow with *Das Lied von Bernadette* (1941; *The Song of Bernadette,* 1942).

Wergeland, Henrik Arnold (b. June 17, 1808, Kristiansand, Nor.—d. July 12, 1845, Christiania), Norway's great national poet, symbol of Norway's independence, whose humanitarian activity, revolutionary ideas, and love of freedom made him a legendary figure. The clash between his faction (the "patriots") and the pro-Danish "intelligentsia" led by Johan Welhaven (*q.v.*) marked the beginning of an ideological conflict that persisted throughout the century.

Of Wergeland's enormous and varied output, his poetry has stood the test of time. Some of the best known titles are *Skabelsen, mennesket og messias* (1830; "Creation, Humanity, and Messiah"), *Digte, første ring* (1829; "Poems, First Cycle," selections from this and later cycles translated in *Poems,* 1929), *Spaniolen* (1833; "The Spaniard"), *For arbeidsklassen* ("For the Working Class"), and *Jøden* (1842; "The Jew"). His narrative poems, *Jan van Huysums blomsterstykke* (1840; "Jan van Huysum's Flowerpiece") and *Den Engelske lods* (1844; "The English Pilot") are often cited as his finest works.

Wergeland had an undaunted belief in the new Norway, its people, and the constitution of 1814, but it did not blind him. His criticism was very outspoken, and he had to fight against a constant strong opposition. The tremendous optimism of his verse was, in his case, not the product of a sheltered existence. His battle for the abolition of the paragraph in the constitution that excluded Jews from the country was typical of his practical political undertakings. He did not live quite long enough to see his success in this case.

wergild, also spelled WERGELD, or WEREGILD (Old English: "man payment"), in ancient Germanic law, the amount of compensation paid by a person committing an offense to the injured party or, in case of death, to his family. In certain instances part of the *wergild* was paid to the king and to the lord—these having lost, respectively, a subject and a vassal. The *wergild* was at first informal but was later regulated by law.

In certain areas a man's *wergild* was determined by his status in society; for example, in England, a feudal lord's *wergild* could be many times that of a common man. The *wergild* of a woman was usually equal to, and often more than, that of a man of the same class; in some areas, a woman's *wergild* might be twice as much as that of a man. Clergy also had their own rate of *wergild,* although this was sometimes dependent on the class into which they were born. Among the Franks, the *wergild* of a Roman might be half that of a Frank, largely because no money had to be paid, on his death, to a kinship group, as it had for a Frank.

Other fines, particularly among the Anglo-Saxons and early Franks, were related to *wergild.* One, *bot,* included various types of compensation for damages done but also covered maintenance allowances for the repair of houses and tools for those who lived on an estate. Another, *wite,* was a fine paid to the king by a criminal as an atonement for his deed. If a crime was intentional, both *wite* and *wergild* had to be paid; otherwise, simple *wergild* was sufficient.

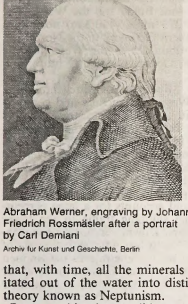
During the 10th and 11th centuries, particularly on the Continent, where the monarchies did not have sufficient power to collect their share of the *wergild* that had been set by law, fines were determined increasingly by agreement or judicial decision. Gradually, however, certain crimes became no longer expiable by compensation; criminals, particularly in cases of felony, were punished by the local authorities, usually by death or mutilation.

Werner, Abraham Gottlob (b. Sept. 25, 1750, Wehrau, Saxony—d. June 30, 1817, Freiberg), German geologist who founded the Neptunist school, which proclaimed the aqueous origin of all rocks, in opposition to the Plutonists, or Vulcanists, who argued that granite and many other rocks were of igneous origin. Werner rejected uniformitarianism (belief that geological evolution has been a uniform and continuous process).

A member of an old iron-mining family, Werner worked with his father for five years in

the ironworks at Wehrau and Lorzendorf. In 1775 he was appointed inspector and teacher in the Freiburg School of Mining. During his 40-year tenure, the school grew from a local academy into a world-renowned centre of scientific learning. Werner was a brilliant lecturer and a man of great charm, and his genius attracted students who, inspired by him, became the foremost geologists of Europe.

A distinguishing feature of Werner's teaching was the care with which he taught the study of rocks and minerals and the orderly succession of geological formations, a subject that he called geognosy. Influenced by the works of Johann Gottlob Lehmann and Georg Christian Füchsel, Werner demonstrated that the rocks of the Earth are deposited in a definite order. Although he had never travelled, he assumed that the sequence of the rocks he observed in Saxony was the same for the rest of the world. He believed that the Earth was once completely covered by the oceans and



Abraham Werner, engraving by Johann Friedrich Rossmässler after a portrait by Carl Demiani
Archiv für Kunst und Geschichte, Berlin

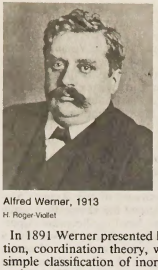
that, with time, all the minerals were precipitated out of the water into distinct layers, a theory known as Neptunism.

Because this theory did not allow for a molten core, he proposed that volcanoes were recent phenomena caused by the spontaneous combustion of underground coal beds. He asserted that basalt and similar rocks were accumulations of the ancient ocean, whereas other geologists recognized them as igneous minerals. It was primarily disagreement on this point that formed one of the great geological controversies.

Werner wrote only 26 scientific works, most of them short contributions to journals. His aversion to writing grew, and finally he adopted the practice of storing his mail unopened. Elected a foreign member of the Académie des Sciences in 1812, he learned of the honour much later, when he happened to read about it in a journal. In spite of his failure to produce extensive geological writings, Werner's theories were faithfully adopted and widely spread by his loyal students. Even though many of them eventually discarded his Neptunist theories, they would not publicly renounce them while Werner still lived.

Werner, Alfred (b. Dec. 12, 1866, Mulhouse, Fr.—d. Nov. 15, 1919, Zürich), Swiss chemist whose research into the structure of coordination compounds brought him the 1913 Nobel Prize for Chemistry.

Werner earned his Ph.D. from the University of Zürich (1890) for work with Arthur Hantzsch on the oximes, a class of organic nitrogen compounds. His exploration of the three-dimensional arrangement of the oxime molecule proved to be a valuable contribution to stereochemistry. He subsequently worked with Marcelin Berthelot at Paris, returning in 1891 to Zürich, where he taught from 1893 until his death. He was reputed to be an excellent teacher.



Alfred Werner, 1913
H. Roger-Viollet

In 1891 Werner presented his great contribution, coordination theory, which permitted a simple classification of inorganic compounds and extended the concept of isomerism. He and his students prepared many new series of compounds and fitted them into the new system. Though his views have been modified slightly, they are fundamental to modern inorganic chemistry and prepared the way for modern concepts of chemical bonding.

wernerite, variety of the feldspathoid mineral scapolite (*q.v.*).

Wernicke, Carl (b. May 15, 1848, Tarnowitz, Pol., Prussia—d. June 15, 1905, Thüringer Wald, Ger.), German neurologist who related nerve diseases to specific areas of the brain. He is best known for his descriptions of the aphasias, disorders interfering with the ability to communicate in speech or writing.

Wernicke studied medicine at the University of Breslau and did graduate work at Breslau, Berlin, and Vienna before entering practice in Berlin. In 1885 he joined the faculty at Breslau, where he remained until 1904.

In a small book published in 1874, Wernicke tried to relate the various aphasias to impaired psychic processes in different regions of the brain; the book included the first accurate description of a sensory aphasia located in the temporal lobe. Wernicke also demonstrated the dominance of one hemisphere in brain functions in these studies. His *Lehrbuch der Gehirnkrankheiten* (1881; "Textbook of Brain Disorders") is an attempt to comprehensively account for the cerebral localization of all neurologic disease. Some nerve disorders were described in that work for the first time; one of them is Wernicke's encephalopathy, caused by a thiamine deficiency.

Wernigerode, city, Saxony-Anhalt *Land* (state), central Germany, at the confluence



Medieval town hall in Wernigerode, Ger.
W. Krammisch—Bruce Coleman Inc./EB Inc.

of the Holtemme and the Zillierbach rivers, north of the Harz Mountains and southwest of Magdeburg. First mentioned in 1121 and chartered in 1229, it joined the Hanseatic League in 1267. In 1429 it became the seat of the counts of Stolberg, later the counts of Stolberg-Wernigerode. The old castle (first mentioned in 1213) houses a feudal museum. Many old timber-framed buildings, including the town hall (1494–98), survive. A road and rail junction and vacation resort, Wernigerode manufactures electric motors, machine tools, chocolate, glass, paper, leather goods, bricks, and wood products. Iron ore, pyrites, and limestone are worked locally. Pop. (1989 est.) 36,909.

Werribee, town and shire in southern Victoria, Australia, situated on the Werribee River about 19 mi (29 km) southwest by rail from Melbourne and nearly 5 mi from the coast of Port Phillip Bay. Three major government facilities are located at Werribee: The Melbourne and Metropolitan Board of Works Farm (a sewage farm that experiments with water waste purification methods), the State (agricultural) Research Farm, and the Werribee Hydraulic Experimental Station. Situated in a dairying, grazing, and gardening district, Werribee also has one of the world's largest poultry farms and the University of Melbourne Veterinary Clinic Center. Near the town is a park, a scenic gorge, and a zoo. Inc. shire, 1964. Pop. (1981) shire, 40,555.

Wertheimer, Max (b. April 15, 1880, Prague—d. Oct. 12, 1943, New Rochelle, N.Y., U.S.), Czech-born psychologist, one of the founders, with Kurt Koffka and Wolfgang Köhler, of Gestalt psychology (*q.v.*), which attempts to examine psychological phenomena as structural wholes, rather than breaking them down into components.

During his adolescence, Wertheimer played the violin, composed symphonic and chamber music, and generally seemed destined to become a musician. In 1900 he began to study law at Charles University in Prague but was soon drawn to the philosophy of law and then to the psychology of courtroom testimony. The following year he left Prague to study psychology at Friedrich-Wilhelm University in Berlin, under Carl Stumpf, noted for his contributions to the psychology of music.

Wertheimer received his Ph.D. from the University of Würzburg in 1904, developing a lie detector for the objective study of testimony and devising a method of word association as part of his doctoral dissertation. He then carried out research in various areas at Prague, Berlin, and Vienna, becoming particularly interested in the perception of complex and ambiguous structures. He discovered that feebleminded children can solve problems when they can grasp the overall structures involved, and he began to formulate the ideas that would later take root in Gestalt psychology.

While on a train trip in 1910, Wertheimer became intrigued by the phenomenon of perception of motion and stopped at Frankfurt long enough to buy a toy stroboscope with which to test his ideas. He noted that two lights flashed through small apertures in a darkened room at short intervals would appear to be one light in motion; this perception of movement in a stationary object, called the phi phenomenon, became a basis for Gestalt psychology. He studied the phi phenomenon with two assistants, Wolfgang Köhler and Kurt Koffka. Convinced that the segmented approach of most psychologists to the study of human behaviour was inadequate, Wertheimer, Köhler, and Koffka formed the new Gestalt school.

During his early work leading to Gestalt psychology, Wertheimer was on the faculty of the

University of Frankfurt, leaving to become a lecturer at Friedrich-Wilhelm University in Berlin (1916–29). In 1921, with others, he founded *Psychologische Forschung* ("Psychological Research"), the journal that was to be the central organ of the Gestalt movement. Wertheimer returned to Frankfurt as professor of psychology (1929), directing research in social and experimental psychology. Wertheimer criticized the current educational emphasis on traditional logic and association, arguing that such problem-solving processes as grouping and reorganization, which dealt with problems as structural wholes, were not recognized in logic but were important techniques in human thinking. Related to this argument was Wertheimer's concept of *Pragnanz* ("precision") in organization; when things are grasped as wholes, the minimal amount of energy is exerted in thinking. To Wertheimer, truth was determined by the entire structure of experience rather than by individual sensations or perceptions.

Although much of Wertheimer's work dealt with perception, the Gestalt school soon was extended to other areas of psychology, always emphasizing dynamic analysis and the relation of elements within a structured whole, taking as its basic attitude the concept that the whole is greater than the sum of its parts.

Wertheimer fled from Germany to the United States shortly before the Nazis came to power in 1933. He became a professor at the New School for Social Research in New York City, where he remained until his death. During the last years of his life, Wertheimer devoted himself to problems of psychology and social ethics. His *Productive Thinking*, which discussed many of his ideas, was published posthumously in 1945.

Wertmüller, Lina, original name ARCANGELA FELICE ASSUNTA WERTMÜLLER VON ELGG SPANOL VON BRAUEICH-JOB (b. Aug. 14, 1928, Rome, Italy), Italian motion-picture director and screenwriter noted for her comedies focusing on the eternal battle of the sexes and on contemporary political and social issues.

Wertmüller graduated from the Academy of Theatre in Rome in 1951 and then held various jobs as a puppeteer, actress, stage manager, and writer. After working as an assistant to the director Federico Fellini in 1962, she was able to write and direct her first film, *I basilischi* (*The Lizards*), in 1963. At about this time she became friends with the actor Giancarlo Giannini, who would star in most of her subsequent films.

Wertmüller achieved international fame with her fifth film, *Mimi metallurgico ferito nell'onore* (1972; variously entitled *The Seduction of Mimi* or *Mimi the Metalworker, Wounded in Honour*), a satire on sexual hypocrisy and changing social mores. Her next picture was *Film d'amore e d'anarchia* . . . (1973; *Love and Anarchy*), about an anarchist torn between his plot to assassinate Benito Mussolini and his love for a prostitute who has given him shelter in a Rome brothel. Wertmüller's two finest films are *Travolti da un insolito destino nell'azzurro mare d'agosto* (1974; *Swept Away*), a witty comedy in which a poor sailor establishes his dominance over a haughty rich woman while they are marooned on a deserted island; and *Pasqualino settebellezze* (1976; *Seven Beauties*), a film about an Italian dandy who must betray all moral values while trying to survive World War II and his internment in a Nazi death camp.

Wertmüller's subsequent films were critical and commercial disappointments, but her reputation was secure on the basis of her earlier films.

Wesak, also spelled VESAK, Sanskrit VAIŚĀKHA, Pali VESĀKHA, most important of the Theravāda Buddhist festivals, commemorating the birth, Enlightenment, and death of the Buddha. The event is observed on the full-moon day of the lunar month Vesākha, which falls in April or May. The day is observed as a public holiday in many Southeast Asian countries. It is marked by special devotional services and various deeds intended to be meritorious, such as the presentation of food or alms to monks or the release of captive birds in memory of the Buddha's compassion.

Wesel, town, North Rhine-Westphalia *Land* (state), northwestern Germany. It lies along the Rhine and Lippe rivers and the Lippe-Seiten Canal, northwest of the Ruhr. Chartered in 1241, it joined the Hanseatic League in about 1350 and has long been an important trade and shipping point. It was also a traditional district capital and cultural centre of the border area of the lower Rhine. The town fell to Brandenburg in 1667 and was a Brandenburg-Prussian garrison town until 1918. Its citadel was one of the finest 17th-century examples of its type.

Almost completely razed by air raids in World War II (though some medieval buildings still survive), Wesel has since been rebuilt along modern lines. Its most notable new building is the Municipal Playhouse (1958). There are large harbour installations and many industrial plants (mainly for metal products) and bussess enterprises. Pop. (1989 est.) 57,986.

Weser-Ems, *Regierungsbezirk* (administrative district), western Lower Saxony *Land* (state), northwestern Germany. Weser-Ems is bordered by The Netherlands to the west, the North Sea to the north, Bremen *Land* and the *Regierungsbezirke* of Lüneburg and Hannover (Hanover) to the east, and North Rhine-Westphalia *Land* to the south. The district occupies an area of 5,773 square miles (14,952 square km) and is coextensive with portions of the former German states of Hanover and Oldenburg and part of the larger historic region of Saxony. Its contemporary boundaries were created by an administrative reorganization in 1977, merging the smaller *Regierungsbezirke* of Aurich (northwest) and Osnabrück (south) with Oldenburg *Verwaltungsbezirk* (northeast). Weser-Ems *Regierungsbezirk* takes its name from the two major river systems that drain the district.

The North German Plain extends across all of Weser-Ems, with the exception of a small area surrounding the southern city of Osnabrück. The Ems River and Dortmund-Ems Canal flow parallel to the district's western border, while the Weser River forms the eastern border north of Bremen. Numerous shipping canals dissect the lowlands, including the heavily traveled east–west Mittelland Canal in the south and Küsten Canal in the north. The North German Plain comprises two varied landscapes—the Ostfriesland (East Friesland) coastal strip, extending approximately 15 miles (24 km) in width along the North Sea and the Weser and Ems estuaries, and the great expanses of sandy uplands, heath, and moorland to the south.

Along the coastal strip, natural sand dunes and man-made dikes protect the artificially drained coastal marshland (polders) from flooding by sea and river waters. The clay soil of the reclaimed marshland is planted in lush pasture grass that supports an important dairy and meat industry. The extensive sand beaches and dunes are the basis of a prosperous summer resort industry. The industrial and port city of Wilhelmshaven is located on the Jadebusen, a North Sea inlet near the Weser estuary. The harbour at Emden, the terminus of the Dortmund-Ems Canal, serves the Ruhr industrial region.

The sandy uplands to the south are dissected into separate blocks by poorly drained rivers and low-lying depressions of marshland. With the exception of Oldenburg, a centre of food processing and light diversified manufactures, there is little industry, and the towns are small. Paralleling the district's western border, the Emsland has endured a long struggle to drain its peat bogs. Farmers have created new farmland by mixing the peat with underlying sand and artificial fertilizers. A rich belt of oil and natural-gas fields stretches from the Emsland near Linden, east to the Weser River.

Most of the district's population are descendants of the western Saxons and speak a Low German (Plattdeutsch) dialect. The marshlands and inlands of the northern coast are the homeland of the Frisian cultural group, but the use of the distinctive Frisian language has declined. About two-thirds of the district's people are Protestants and one-third are Roman Catholics. Higher education in the district is centred at universities in Osnabrück and Oldenburg. Pop. (1989 est.) 2,136,735.

Weser River, major river of western Germany that serves as an important artery of a highly industrialized area. Formed near the city of Münden by the union of its two headstreams—the Fulda and the Werra—the Weser flows 273 miles (440 km) northward through northern Germany to the North Sea. The major tributaries of the Weser are the Aller, Lesum, Geeste, Diemel, Ochtum, and Hunte rivers.

Just below Minden, the Mittelland Canal crosses the Weser by aqueduct and connects the river within the Ruhr district and the Rhine River in the west and the waterways of Berlin in the east. For 84 miles (135 km) between Minden and Bremen, the river has been straightened and provided with eight hydroelectric dams. As a result, this part of the river is navigable for ships up to 1,200 tons deadweight and accounts for a large percentage of all the shipping traffic in the lower Weser harbours. Downriver further canalization permits North Sea tides with a range of 11.5 feet (3.5 m) to penetrate to the Bremen Dam. The Küsten Canal links the lower Weser to the Dortmund-Ems Canal, and another small canal leads from Bremerhaven to the lower Elbe River. The principal cities along the river are Bremerhaven, Bremen, Münden, and Kassel.

The plant and animal life of the river basin is representative of that of central Europe. Pollution has taken its toll since the 19th century, and the once-abundant salmon in the river have now completely vanished.

Wesley, Arthur: *see* Wellington, Arthur Wellesley, 1st Duke of.

Wesley, Charles (b. Dec. 18, 1707, Epworth, Lincolnshire, Eng.—d. March 29, 1788, London), English clergyman, poet, and hymn writer, who, with his elder brother John, started the Methodist movement in the Church of England.

The youngest and third surviving son of Samuel and Susanna Wesley, Wesley entered Westminster School, London, in 1716. In 1726 he was elected to Christ Church College, Oxford, where he translated Greek and Latin classics into English verse. During the winter of 1728–29, he underwent a spiritual awakening and initiated, with two other undergraduates, the Holy Club. In 1735, in order to aid his brother John in a mission to Georgia, he accepted holy orders.

Charles was subject to greater extremes of emotion than his brother, and his spiritual despair and physical exhaustion in Georgia led him to return happily to England after only a few months' stay. With the help of the Moravians, like his brother John, he found spiritual peace. On Whitsunday, May 21, 1738, he found himself "at peace with God." He became a very eloquent preacher for the Methodist cause and translated the gospel message into hymns, which became important means of evangelism.

In 1749 Charles married Sarah Gwynne; two sons and a daughter survived out of eight children born to the marriage. Though Charles was active in Bristol and London, his interference with his brother's proposed marriage to Grace Murray caused an estrangement between the two, and Charles withdrew from active leadership of the Methodist societies. Also, he was more deeply attached to the Church of England and did not approve of John's ordaining preachers. His work as an evangelist and hymn writer for Methodism, however, had already made its permanent mark. He published more than 4,500 hymns and left some 3,000 in manuscript; George Frideric Handel wrote music specifically for some of them. Among Wesley's best known hymns are "Love divine, all loves excelling"; "Hark, the herald angels sing"; "Christ the Lord is ris'n today"; "Soldiers of Christ, arise"; "Rejoice, the Lord is king"; and "Jesu, lover of my soul."

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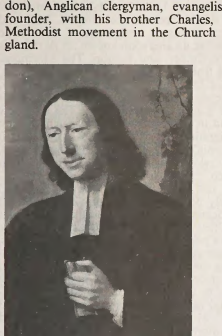
Wesley, John (b. June 17, 1703, Epworth, Lincolnshire, Eng.—d. March 2, 1791, London), Anglican clergyman, evangelist, and founder, with his brother Charles, of the Methodist movement in the Church of England.



John Wesley, detail of an oil painting by Nathaniel Hone, 1766; in the National Portrait Gallery, London
By courtesy of the National Portrait Gallery, London

John Wesley was the second son of Samuel, a former Nonconformist (dissenter from the Church of England) and rector at Epworth, and Susanna Wesley. After six years of education at the Charterhouse, London, he entered Christ Church, Oxford University, in 1720. Graduating in 1724, he resolved to become ordained a priest; in 1725 he was made a deacon by the Bishop of Oxford and the following year was elected a fellow of Lincoln College. After assisting his father at Epworth and Wroot, he was ordained a priest on Sept. 22, 1728.

Recalled to Oxford in October 1729 to fulfill the residential requirements of his fellowship, John joined his brother Charles, Robert Kirkham, and William Morgan in a religious study group that was derisively called the "Methodists" because of their emphasis on methodical study and devotion. Taking over the leadership of the group from Charles, John helped the group to grow in numbers. The "Methodists," also called the Holy Club, were known for their frequent communion services and for fasting two days a week. From 1730 on, the group added social services to their activities, visiting Oxford prisoners, teaching them to read, paying their debts, and attempting to find employment for them. The Methodists also extended their activities to workhouses and poor people, distributing food, clothes, medicine, and books and also running a school. When the Wesleys left the Holy Club in 1735, the group disintegrated.

Following his father's death in April 1735, John was persuaded by an Oxford friend, John Burton, and Col. James Oglethorpe, governor of the colony of Georgia in North America, to oversee the spiritual lives of the colonists and to missionize the Indians as an agent for the Society for the Propagation of the Gospel. Accompanied by Charles, who was ordained for this mission, John was introduced to some Moravian emigrants who appeared to him to possess the spiritual peace for which he had been searching. The mission to the Indians proved abortive, nor did Wesley succeed with most of his flock. He served them faithfully, but his stiff high churchmanship antagonized them. He had a naive attachment to Sophia Hopkey, niece of the chief magistrate of Savannah, who married another man, and Wesley unwisely courted criticism by repelling her from Holy Communion. In December 1737 he fled from Georgia; misunderstandings and persecution stemming from the Sophia Hopkey episode forced him to go back to England.

In London John met a Moravian, Peter Böhler, who convinced him that what he needed was simply faith, and he also discovered Martin Luther's commentary on the Letter of Paul to the Galatians, which emphasized the scriptural doctrine of justification by grace through faith alone. On May 24, 1738, in Aldersgate Street, London, during a meeting composed largely of Moravians under the auspices of the Church of England, Wesley's intellectual conviction was transformed into a personal experience while Luther's preface to the commentary to the Letter of Paul to the Romans was being read.

From this point onward, at the age of 35, Wesley viewed his mission in life as one of proclaiming the good news of salvation by faith, which he did whenever a pulpit was offered him. The congregations of the Church of England, however, soon closed their doors to him because of his enthusiasm. He then went to religious societies, trying to inject new spiritual vigour into them, particularly by introducing "bands" similar to those of the Moravians—*i.e.*, small groups within each society that were confined to members of the same sex and marital status who were prepared to share intimate secrets with each other and to receive mutual rebukes. For such groups Wesley drew up Rules of the Band Societies in December 1738.

For a year he worked through existing church societies, but resistance to his methods increased. In 1739 George Whitefield, who later became a great preacher of the Evangelical revival in Great Britain and North America, persuaded Wesley to go to the unchurched masses. Wesley gathered converts into societies for continuing fellowship and spiritual growth, and he was asked by a London group to become their leader. Soon other such groups were formed in London, Bristol, and elsewhere. To avoid the scandal of unworthy members, Wesley published, in 1743, *Rules* for the Methodist societies. To promote new societies he became a widely travelled itinerant preacher. Because most ordained clergymen did not favour his approach, Wesley was compelled to seek the services of dedicated laymen, who also became itinerant preachers and helped administer the Methodist societies.

Many of Wesley's preachers had gone to the American colonies, but after the American Revolution most returned to England. Because the Bishop of London would not ordain some of his preachers to serve in the United States, Wesley took it upon himself, in 1784, to do so. In the same year he pointed out that his societies operated independently of any control by the Church of England.

Toward the end of his life, Wesley became an honoured figure in the British Isles.

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Wesley, Richard Colley: *see* Wellesley (of Norragh), Richard Colley Wellesley, Marquess.

Wesleyan Church, U.S. Protestant church, organized in 1968 by the merger of the Wesleyan Methodist Church of America and the Pilgrim Holiness Church. The Wesleyan Methodist Church originated in 1843 after members of the Methodist Episcopal Church withdrew from that church to organize a nonepiscopal, antislavery church. The Pilgrim Holiness Church originated in 1897 by uniting several Holiness groups.

The Wesleyan Church is considered one of the Holiness Churches. It stresses entire sanctification, a postconversion experience that allows the person to live a sinless life. Members of the church promise not to use, produce, or sell tobacco or alcoholic beverages, and membership in secret societies is forbidden.

Headquarters are in Marion, Ind.

Wessel, Horst (b. Sept. 9, 1907, Bielefeld, Ger.—d. Feb. 23, 1930, Berlin), martyr of the German Nazi movement, celebrated in the song "Horst Wessel Lied," adopted as an anthem by Nazi Germany.

A student and low-life bohemian, Wessel joined the Nazi Party in 1926 and became a member of the SA (Storm Troopers). In 1930 political enemies, possibly Communists, killed him in a brawl in his room in the Berlin slums. Nazi propagandists, led by Joseph Goebbels, elevated him to martyrdom.

Wessel, Johan Herman (b. Oct. 6, 1742, Jonsrud, near Vestby, Nor.—d. Dec. 29, 1785, Copenhagen), Norwegian-born Danish writer and wit, known for his epigrams and light verse and for a famous parody of neoclassical tragedy.

From 1761 when he entered the University of Copenhagen until his death at 43, Wessel lived the bohemian life of a debt-ridden, perpetual student. He was one of the founders (1772) and the outstanding talent of the Norske Selskab (Norwegian Society), an influential literary and convivial club of Norwegian students at Copenhagen. Reacting against the early signs of literary Romanticism coming from Germany, the Norwegian students opted for Rationalism and chose as their motto *"Vos exemplaria Graeca"* ("Let the Greeks be your models"). Wessel contributed epigrams, verse and impromptus to the anthologies that the club began to publish in 1775. He aimed his satiric wit at the excesses of both Neoclassicism and Romanticism. His only important long work, *Kiærlighed uden strømper* (1772; "Love Without Stockings"), is

a "tragedy" in five acts dealing with the theft of an apprentice's stockings on his wedding day. It is written in alexandrines and observes the classical unities to the letter; at the end all the characters die, on the same day and in the same place. Wessel's other works include songs and comic verse tales.

Wessel Islands, chain of small islands extending 75 miles (120 km) northeast from the Napier Peninsula in northeastern Northern Territory, Australia, into the Arafura Sea. Named for a Dutch ship that explored the area in 1636, the islands form the western gate to the Gulf of Carpentaria at Cape Wessel, their northern extremity. Marchinbar, the largest island (30 miles by 7 miles [48 km by 11 km]), has undeveloped bauxite deposits. The island group lies within the Arnhem Land Aboriginal Reserve, and the islands have caves decorated with Aborigine art.

Wesselényi Conspiracy (*c.* 1664–71), group of Hungarians, organized by Ferenc Wesselényi, that unsuccessfully plotted to overthrow the Habsburg dynasty in Hungary; its efforts resulted in the establishment of an absolutist, repressive regime in Hungary.

When the Habsburg emperor Leopold I (reigned 1658–1705) ceded a large portion of Hungarian land to the Ottoman Turks (1664; Treaty of Vasvár), he provoked the opposition of many previously pro-Habsburg Hungarian Roman Catholic magnates, including the palatine administrator Ferenc Wesselényi; the bán (governor) of Croatia, Péter Zrínyi; the chief justice of Hungary, Ferenc Nádasdy; and Ferenc Rákóczi. They formed a conspiracy to free Hungary from Habsburg rule and secretly negotiated for assistance from France and Turkey.

Finally in 1670 Zrínyi received some encouragement from the sultan and prepared to march into Styria. Rákóczi, believing rumours that a formal alliance had been concluded, also assembled his forces and arrested Count Rüdiger von Starhemberg, the imperial commander in the northern Hungarian city of Tokay. The Turks' chief interpreter, however, had revealed the plot to Habsburg officials in Vienna. Imperial troops rescued Starhemberg and easily dispersed the rebels. Several leaders were tried for high treason by an Austrian court, and Zrínyi, Nádasdy, and two others were executed (April 30, 1671). Wesselényi had earlier died of natural causes, and Rákóczi was fined.

Special commissions, set up throughout Habsburg Hungary, arrested about 2,000 nobles, accused them of participating in the conspiracy, and confiscated their estates. In addition, Leopold's advisers concluded that, by conspiring against the regime, the Hungarian nation had forfeited its special rights and privileges and had become subject to the emperor's absolute rule.

Wessex, one of the kingdoms of Anglo-Saxon England, whose ruling dynasty eventually became kings of the whole country. In its permanent nucleus, its land approximated that of the modern counties of Hampshire, Dorset, Wiltshire, Somerset, and southern Avon. At times its land extended north of the River Thames, and it eventually expanded westward to cover Devon and Cornwall. The name Wessex is an elision of the Old English form of "West Saxon."

Wessex grew from two settlements: one was founded, according to the Anglo-Saxon Chronicle, by Cerdic and his son (or grandson) Cynric, who landed in Hampshire in 494 or 495 and became kings in 500 or 519; the other, known only from archaeological evidence, was situated on the upper Thames and was probably settled from the northeast. Though the Chronicle implies that this area was in British hands in 571, when Cuthwulf (perhaps a member of the West Saxon royal house) captured Luton, Aylesbury, Bensington (now Benson, in Oxfordshire), and Eynsham, archaeological evidence proves earlier settlement.

Only a few incidents of the early expansion are recorded. These include the conquest by Cerdic and Cynric of the Isle of Wight in 530 and battles fought by Cynric at Salisbury in 552 and Barbury Castle (Wiltshire) in 556. A victory won by a successor, Ceawlin (who reigned 560–592 and is mentioned by Venerable Bede as the second English king to hold an imperium in Britain), at Dyrham, Gloucestershire, in 577, which led to the capture of Bath, Cirencester, and Gloucester, and Ceawlin's battle at a place called Fethanleag, probably in North Oxfordshire, in 584, are also recorded. Ceawlin also defeated Aethelberht of Kent at a place called Wibbandun in 568. Having extended the power of Wessex north of the Thames, Ceawlin was expelled in 592 by his nephew Ceol, who reigned for five years. Ceol was succeeded by his brother Ceolwulf (reigned 597–611), whose reign was followed by that of Ceol's son Cynegils (reigned 611–643). During this period, Wessex was threatened first by Northumbria and then by the growing midland kingdom of Mercia. Cynegils and his son Cwichelm lost the provinces of the Hwicce (Gloucestershire, Worcestershire, and southwest Warwickshire) to Penda of Mercia. Cynegils was succeeded as king by his son Cenwalh (reigned 643–672), who married Penda's sister but soon discarded her. For this act he was driven into exile (645–648) in East Anglia by Penda. Throughout much of his reign he fought the Mercians and the Welsh, and Penda's successor seized South Hampshire and the Isle of Wight from him. These regions were held by the Mercians from 661 to 686 and, according to the Venerable Bede's *Historia ecclesiastica,* Wessex was temporarily divided among subkings after Cenwalh's death.

During this period, however, kings of Wessex won victories over the Britons, expanding steadily westward. Ceadwalla (685–688) recovered the Isle of Wight and South Hampshire, and there was a Saxon monastery at Exeter before 690. Ine (reigned 688–726), the first West Saxon king to issue a code of laws, placed a see at Sherborne (Dorset) for the western areas. Mercian dominance over Wessex, which included direct control of parts of Berkshire, Wiltshire, and Somerset, ended with the accession of Egbert (reigned 802–839). He gained all of Devon and Cornwall, and in 825 he defeated Beornwulf of Mercia and brought Surrey, Sussex, and Kent permanently under West Saxon rule.

The final supremacy of the West Saxon kings stemmed from their successful resistance to the Danes, whose "great army" arrived in 865 and destroyed the other Anglo-Saxon kingdoms but was withstood in Wessex by Aethelred I (reigned 865–871) and Alfred (reigned 871–899). The latter recovered London in 886 and was accepted as overlord by all the English who were not subject to the Danes. Following the reconquest of remaining Danish-held territory, completed in 927 by Alfred's grandson Athelstan, the kings of Wessex became kings of England.

The region figures prominently in legends of King Arthur and the knights of the Round Table, and the designation "Wessex" was used by novelist Thomas Hardy to represent the region of southwestern England in which he set his works of fiction.

West, THE, region, western U.S., mostly west of the Great Plains and including, by federal-government definition, Alaska, Arizona, California, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming. Virtually every part of the United States except the Eastern Seaboard has been "the West" at some point in American history, linked in popular imagination with the last frontier of American settlement. But especially it is that vast stretch of plain, mountains, and desert west of the Mississippi that has loomed so large in American folklore, a region of cowboys, Indians, covered wagons, outlaws, prospectors, and a whole society operating just outside the law.

As with other sections of the United States, regional boundaries are somewhat imprecise. The West of the cowboy and the cattle drive covered many non-Western states, including Kansas and Nebraska. Much of the West's fiercest Indian fighting took place in the Dakotas, both of which are now considered to be part of the Middle West. Alaska and Hawaii, geographically the most western of all the states, are really no part of the popularly conceived West at all.

Furthermore, though the West was the last region of the United States to be settled and developed, its modern history predates that of the British colonies on the eastern seaboard. The Spaniards reached the Grand Canyon in 1540, what is presently Kansas in 1541, and San Francisco in 1542. Santa Fe was founded in 1610, only three years after the British founding of Jamestown. Extensive settlement, however, was still hundreds of years away.

Much of the West became part of the United States through the Louisiana Purchase of 1803; the Southwest, however, was a Mexican possession until 1848. The Lewis and Clark Expedition of 1804–06 established much of what would become the Oregon Trail and thereby facilitated settlement of the Pacific Northwest, an area soon known for its richness in furs, timber, and salmon. The Mormons, fleeing from harassment in Midwestern states, reached Utah in 1847, built Salt Lake City, and began a vigorous colonization of all parts of the Rocky Mountain West. The discovery of gold in California in 1848 brought a burst of migration to the West Coast and led to California's admission to the Union in 1850, barely two years after it had been ceded from Mexico.

The rest of the West, however, remained sparsely populated. For many decades, most Americans knew of the Great Plains simply as the Great American Desert, an inhospitable area of poor soil, little water, hostile Indians, and general inaccessibility. But the years following the American Civil War changed that conception. In 1862 the Homestead Act was passed by Congress; in 1869 the first transcontinental railroad was completed; and in 1873 barbed-wire fencing was introduced. Coupled with improvements in dry farming and irrigation and the confinement of American Indians (after much brutal and costly warfare) to reservations, the Great American Desert grew steadily in population.

In the 20th century the rapid growth of the West continued. In every census decade but one from 1850 to 1960, the West's population growth rate was more than twice the national average, although the rate diminished thereafter. While the several Mountain states account for only a small percentage of the nation's manufacturing, the preponderance of the industrial strength in the West lies in the few Pacific states, which have shown a dramatic increase in the number of manufacturing establishments (1940 to the late 1970s) and nearly doubled the West's percentage of the national value added by manufacture. No longer merely a land of "wide, open spaces," cattle, mines, and mountains, the West has become famous for other things: for example, the motion-picture industry in southern California, gambling in Nevada, aerospace production in Washington and California, environmental protection in Oregon, and retirement communities in Arizona.

West, Benjamin (b. Oct. 10, 1738, near Springfield, Pa., U.S.—d. March 11, 1820, London, Eng.), American-born painter of historical, religious, and mythological subjects who had a profound influence on the development of historical painting in Britain. He was historical painter to George III (1772–1801), a founder of the Royal Academy (1768), and in 1792 he succeeded Sir Joshua Reynolds as its president.



"Agrippina Landing at Brundisium with the Ashes of Germanicus," oil on canvas by Benjamin West, 1768; in the Yale University Art Gallery
By courtesy of the Yale University Art Gallery, gift of Louis M. Rabinowitz

As a young man, West showed precocious artistic talent and was sent to Philadelphia in 1756 to study painting. At 20 years of age he was a successful portraitist in New York City and in 1760, through the assistance of friends, he sailed for Italy, where Neoclassicism was rapidly gaining ground. West visited most of the leading art cities of Italy and in 1763 went to London, where he set up as a portrait painter. His subsequent patronage by George III and the assurance of financial support from the crown absolved him of the necessity to continue to earn a living through portraiture. In London he soon became intimate with Sir Joshua Reynolds and gained widespread popularity. "The Death of General Wolfe" (*c.* 1771; several versions exist), one of his best-known and—at the time—most controversial works, made a noteworthy concession to realism in its use of modern dress rather than antique drapery to depict a contemporary historical event within a classical composition. It was considered by many academicians to be an affront to the art of history painting, but ultimately it was a popular success and won Reynolds' approval.

Though loyal to America, West retained the king's friendship and patronage until 1801. In 1802 he visited Paris and exhibited his final sketch for "Death on the Pale Horse" (*c.* 1802; several versions exist), which anticipated developments in French Romantic painting. He never returned to the United States, but through such pupils as Washington Allston, Gilbert Stuart, Charles Willson Peale, and John Singleton Copley, he exerted considerable influence on the development of art in that country during the first decades of the 19th century.

West, Mae (b. Aug. 17, 1892/93, Brooklyn, N.Y., U.S.—d. Nov. 22, 1980, Los Angeles, Calif.), American stage and film actress, a sex symbol whose frank sensuality, regal postures, and blasé wisecracking became her trademarks. She usually portrayed women who accepted their lives of dubious virtue with flippant good humour.

West made her debut with a Brooklyn stock company about 1901, and by 1907 she had become a performer on the national vaudeville circuit in partnership with Frank Wallace. She made her Broadway debut as a singer and acrobatic dancer in the revue *A la Broadway and Hello, Paris* in 1911. For the next 15 years she alternated between vaudeville and Broadway shows and an occasional nightclub act.

In 1926 West began to write, produce, and star in her own plays. In the first of these, *Sex* (1926), her performance as a prostitute created a sensation but also earned her an eight-day jail sentence for "corrupting the morals of youth." Her plays *Diamond Lil* (1928) and *The Constant Sinner* (1931) were also successful. For all the variety of the scripts she wrote, the constant factor was West's own ironic, languorous personality and her ability to burlesque social attitudes, especially toward sex.

In 1932 West moved to Hollywood. Her first film, *Night After Night* (1932), showed the lighthearted approach that was characteristic of her subsequent pictures. *She Done Him Wrong* (1933), a screen adaptation of *Diamond Lil,* is memorable for her amusing ability to charge such lines as "Come up and see me sometime" with suggestive implications. West then wrote and costarred in *I'm No Angel* (1933), *Belle of the Nineties* (1934), and *Klondike Annie* (1936), which brought her popularity to its height. After two more films, she costarred with W.C. Fields in the comic western *My Little Chickadee* (1940), whose script she coauthored with him. During World War II, Allied soldiers, in honour of her hourglass figure, called their inflatable life jackets "Mae Wests." Her films were revived in the 1960s, and she appeared in *Myra Breckenridge* (1970) and *Sextette* (1979). West's provocative drawl, her appreciation of her own hourglass figure, and her variety of languid poses and swivels were unique. The title of her autobiography, *Goodness Had Nothing to Do with It* (1959), captured her style precisely—it was a retort one of her characters made to the exclamation "Goodness, what beautiful diamonds!"



Mae West in *My Little Chickadee,* 1940
By courtesy of Universal Pictures; photograph, from the Collection of Penguin Photo

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West, Morris, in full MORRIS LANGLO WEST (b. April 26, 1916, Melbourne, Vic., Australia—d. Oct. 9, 1999, Sydney), Australian novelist noted for such best-sellers as *The Devil's Advocate* (1959) and *The Shoes of the Fisherman* (1963).

Educated at the University of Melbourne, West taught modern languages and mathematics as a member of the Christian Brothers Order in New South Wales and Tasmania from 1933 until he joined the army in 1939, having left the order before taking his final vows. In 1943 he was released from the army and began working for the radio network of *The Herald* in Melbourne. He later became a partner in Australasian Radio Productions, but after 10 years he suffered a breakdown, sold his share of the business, and settled near Sydney as a writer. In 1955 he established himself permanently in Sorrento, Italy. Though West had previously written several novels, his first popular success was *Children of the Sun* (1957), a nonfiction account of the slum children of Naples. It was followed by such novels as *The Devil's Advocate, Daughter of Silence* (1961), *The Tower of Babel* (1968), *Summer of the Red Wolf* (1971), *The Navigator* (1976), *Proteus* (1979), and *The Clowns of God* (1981). West worked with themes of international interest; his best-known books combine religion and intrigue in what have been called "religious thrillers."

West, Nathanael, original name NATHAN WEINSTEIN, (b. Oct. 17, 1903, New York, N.Y., U.S.—d. Dec. 22, 1940, near El Centro, Calif.), American writer best known for satiric novels of the 1930s.

Of middle-class Jewish immigrant parentage, he attended high school in New York City and graduated from Brown University in 1924. During a 15-month stay in Paris, he completed his first novel, *The Dream Life of Balso Snell,* which told the story of an odd assortment of grotesque characters inside the Trojan horse. It was published in 1931 in an edition of only 500 copies.

After his return to New York, West worked as a hotel manager, giving free or low-rent rooms to such struggling fellow writers as Dashiell Hammett, James T. Farrell, and Erskine Caldwell. His second novel, *Miss Lonelyhearts* (1933), deals with a lovelorn columnist whose manipulative attempts to solace his correspondents end in ironic defeat.

In *A Cool Million* (1934), West effectively mocks the American success dream popularized by Horatio Alger by portraying a hero who slides from bad to worse while doing the supposedly right thing. In his last years West worked as a screenwriter in Hollywood. *The Day of the Locust* (1939) is, in the opinion of many, the best novel written about Hollywood. It dramatizes the false world and people on the fringes of the movie industry.

West was killed in an automobile accident with his wife, Eileen McKenney, the heroine of *My Sister Eileen* (1938), a popular book, play, and film by Ruth McKenney. Never widely read during his lifetime, West attracted attention after World War II, at first in France, where a successful translation of *Miss Lonely-hearts* appeared in 1946. Publication in 1957 of *The Complete Works of Nathanael West* sparked new interest in West's work in the United States.

West, Dame Rebecca, pseudonym of CICILY ISABEL ANDREWS, *née* FAIRFIELD (b. Dec. 21, 1892, London, Eng.—d. March 15, 1983, London), British journalist, novelist, and critic, who was best known for her reports on the Nürnberg trials of war criminals (1945–46).

West was the daughter of an army officer and was educated in Edinburgh after her father's death in 1902. She later trained in London as an actress (taking her pseudonym from a role that she had played in Henrik Ibsen's play *Rosmersholm*).



Dame Rebecca West, 1971
© Ray Godwin's Photo Files

From 1911 she became involved in journalism, contributing frequently to the left-wing press and making a name for herself as a fighter for woman suffrage. In 1916 she published a critical biography of Henry James that revealed something of her lively intellectual curiosity, and she then embarked on her career as a novelist. Among her novels are *The Judge* (1922), *Harriet Hume* (1929), *The Thinking Reed* (1936), *The Fountain Overflows* (1957), and *The Birds Fall Down* (1966). Her novels have attracted much less attention than have her social and cultural writings. In 1937 she visited Yugoslavia and later wrote *Black Lamb and Grey Falcon,* 2 vol. (1942), an examination of Balkan politics, culture, and history. In 1946 she reported on the trial for treason of William Joyce ("Lord Haw-Haw") for *The New Yorker* magazine. Published as *The Meaning of Treason* (1949; rev. ed., 1965), it examined not only the traitor's role in modern society but also that of the intellectual and of the scientist. Later she published a similar collection, *The New Meaning of Treason* (1964). Her brilliant reports on the Nürnberg trials were collected in *A Train of Powder* (1955). She was created Dame in 1959.

Rebecca West: A Celebration, a selection of her works, was published in 1977, and her personal reflection on the turn of the century, *1900,* was published in 1982. The critic and author Anthony West was the son of Dame Rebecca and the English novelist H.G. Wells.

West, Thomas: *see* De La Warr, Thomas West, 12th Baron.

West Africa, western region of Africa between the Sahara (north) and the Gulf of Guinea (south). On the east, the western boundary of Cameroon, extending northeast to Lake Chad, is a commonly used delimitation of the region. The countries of West Africa with coastlines on the Atlantic are, from north to south, Mauritania, Senegal, The Gambia, Guinea-Bissau, Guinea, Sierra Leone, Liberia, Côte d'Ivoire, Ghana, Togo, Benin, and Nigeria. Inland nations are Burkina Faso and those parts of Mali and Niger south of the Sahara. With the formation of the Economic Community of West African States (ECOWAS) in 1975, the above countries became members. Cape Verde joined in 1977. Constituent members formed the Economic Community of West African States Cease-Fire Monitoring Group (ECOMOG) in 1990 to act as a peacekeeping and observer force in conflicts involving member states. ECOMOG forces became embroiled in conflicts in Liberia and Sierra Leone during the 1990s. For historical analysis, this encyclopaedia treats all of Mali and Niger, as well as Chad, as a part of West Africa. *See* Western Africa.

West Allis, city, western suburb of Milwaukee, Milwaukee county, southeastern Wisconsin, U.S. In 1835 settlers from New York began farming the land along Honey Creek, for which the community was first named. The Chicago and North Western Railway established a station in 1880 called North Greenfield, which became the name of the community. The city's growth was spurred by the location of the annual Wisconsin State Fair within its boundaries in 1891 and the construction of streetcar lines from Milwaukee in 1894. After the arrival of the Edward P. Allis Company (manufacturers of heavy machinery), the city was renamed West Allis in 1902.

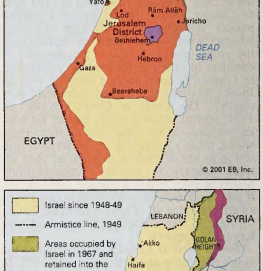
Manufacturing (including engines, metal products, and machinery) and services are important. The state fair is held annually in August, and other events are staged on the fairgrounds throughout the year. Inc. 1906. Pop. (2000) 61,254.

West Atlantic languages, also called ATLANTIC LANGUAGES, a branch of the Niger-Congo family of languages spoken primarily in Senegal, The Gambia, Guinea, Guinea-Bissau, Sierra Leone, and Liberia. According to many scholars, the group should be divided into a northern subgroup, containing the Balante, Banyun, Biafada, Bijagós, Bissão, Bolama, Cobiana-Cassanga (Kobiana-Kassanga), Diola, Fulani, Konyagi (Koniagi), Manjak (Mandyako), Nalu, Pepel, Serer-Sin, Serer-Non, and Wolof languages; and a southern subgroup, containing the Baga, Bullom, Gola, Kissi, Landuma, Limba, and Temne languages. Fulani is the most important language of the group; it is spoken in nomadic and pastoral communities as far east as Cameroon and the area east of Lake Chad. *See also* Niger-Congo languages.

West Australian Current, relatively cold surface current of the southeast Indian Ocean, part of the general counterclockwise movement in the southern section of that ocean. As the South Indian Current (part of the West Wind Drift) approaches the west coast of Australia, it turns north to parallel that coast as the West Australian Current. The current, which is much affected by winds, is weak during the winter and strong during the summer, attaining velocities of 20–35 cm (8–14 inches) per second. The flow dissipates by sending some of its water northwest to join the Indian South Equatorial Current and the remainder northeast into the Timor Sea.

West Bank, Arabic AD-ḌAFFAH AL-GHARBĪYAH, Hebrew HA-GADAH HA-MA'ARAVIT, area of the former British-mandated (1920–47) territory of Palestine west of the Jordan River, claimed from 1949 to 1988 as part of the Hashemite Kingdom of Jordan but occupied from 1967 by Israel. The territory, excluding East Jerusalem, is also known within Israel by its biblical names, Judaea and Samaria.

The approximately 2,270-square-mile (5,900-square-kilometre) area is the centre of contending Arab and Israeli aspirations in Palestine. Within its present boundaries, it represents the portion of the former mandate occupied in 1948 by Arab forces trying to prevent the creation of the Jewish state. The borders and status of the area as a zone of Arab occupation were established by the Jordanian-Israeli armistice of April 3, 1949, though this agreement did not establish Jordanian sovereignty in the West Bank. The West Bank defined by the armistice was broadly similar to one of the zones designated for Arab occupation by the United Nations' partition plan for Palestine in 1947, except for the Israeli salient that connected the Mediterranean coast of Israel with Jerusalem (the city was to have been an international zone, according to that plan).





West Bank

Upon the departure of the British occupying forces in May 1948 and the proclamation of the State of Israel, the Arab powers rejected the 1947 partition plan and attacked Israel. In the ensuing war, Israel expanded beyond the territory contemplated by the partition plan. The cease-fire lines formalized by the 1949 armistice defined the borders of Israel in the West Bank, and Jerusalem was divided into Israeli (west) and Jordanian (east) sectors. The Arab state whose creation was envisioned by the partition plan never came into being, and the West Bank was formally annexed by Jordan on April 24, 1950, although this annexation was recognized only by Great Britain and Pakistan.

From 1950 until it was occupied by Israel in the Six-Day War of 1967, the West Bank was governed as part of Jordan, though the relationship between East and West banks was uneasy, both because of Palestinian suspicions of the Hashemite dynasty and because of the aspirations of Palestinians in the West Bank for a separate nation. The web of relationships connecting the two halves of Jordan grew during this period, however, and by 1967 the West Bank represented nearly half of Jordan's population and almost one-third of its gross domestic product.

During the 1967 war, Israel occupied the West Bank and established a military administration throughout the area, except in East Jerusalem, which Israel incorporated into itself, extending Israeli citizenship, law, and civil administration to the area. During the first decade of Israeli occupation, there was comparatively little civil resistance to Israeli authorities and very little support among Arab residents for terrorist activity. This has been attributed to such factors as the relatively light hand of the Israeli administration and its introduction of increased electrification and improved housing and health care to the area—as well as to the difficulty of opposing the Israeli army and the lack of affinity between the West Bank's Palestinian (*i.e.*, Arab) population and neighbouring Arabs, particularly those of Jordan's East Bank.

This period of truce began to wane during the late 1970s and early '80s as Israel began a more aggressive course of establishing settlements both as part of Israel's defense perimeter and as extensions of its agricultural economy. By the early '80s the settlements numbered in the scores, and their combined area did not constitute a significant proportion of the whole. Land, businesses, and buildings were expropriated from the Arab inhabitants, many of whom were long absent, having fled the wars of 1948 and 1967. There were, as well, increasing numbers of Israeli acts circumscribing the civil life of the Arab Palestinians. Israeli settlements tended for the most part to be founded on uncultivated land or land to which no clear legal claim existed (though judgments as to the sufficiency of Arab claims rested with Israeli authorities). During the administration of Menachem Begin (1979–83), the number of Israeli settlements more than tripled, and the number of Israeli settlers increased more than fivefold. Israeli claims of a right to administer land in the West Bank not cultivated or privately owned (a category that might amount to between 30 and 70 percent of the West Bank, depending on the definitions adopted) gave rise to suspicions that Israel intended ultimately to annex the area piecemeal.

Throughout the 1970s and '80s the issue of Israeli rule over the West Bank Palestinians remained unsolved. Israel regarded possession of the West Bank as vital to its security while it remained menaced by neighbouring Jordan and Syria, and the growing number of Israeli settlements further stiffened Israeli unwillingness to relinquish control of the area. At the same time, the chief political representative of the West Bank Palestinians, the Palestine Liberation Organization (PLO), refused to recognize Israel's right to exist or to negotiate with Israel over the West Bank. Israel in turn refused to recognize or negotiate with the PLO.

In 1988 Jordan's King Hussein renounced all administrative responsibility for the West Bank, thereby severing his country's remaining connections with the area. Meanwhile, anti-Israeli rioting broke out among the Arabs of the West Bank in December 1987 and became virtually a permanent feature of West Bank life in subsequent years, despite the Israeli army's continued attempts to suppress the disorders.

As a result of secret negotiations begun in April 1993, Israel and the PLO reached agreement in September on a plan to gradually extend self-government to the Palestinians of the West Bank (and Gaza Strip) over a five-year period prior to a final settlement of the issue of Palestinian statehood. Under the plan, Israel's civilian and military administration would be dissolved and the Israeli army withdrawn from populous Arab areas. In the West Bank, the plan's actual implementation began in May 1994 with the Israelis' withdrawal from the town of Jericho and its environs. Negotiations over Israeli withdrawals faltered by the late 1990s, however, largely a result of Israeli settlement expansion and the failure of Palestinians to contain violence by Islāmic extremists. The process broke down amid escalating violence in late 2000.

Geographically, the West Bank is mostly composed of north-south–oriented limestone hills (conventionally called the Samarian Hills north of Jerusalem and the Judaean Hills south of Jerusalem) having an average height of 2,300 to 3,000 feet (700 to 900 m). The hills descend eastwardly to the low-lying valley of the Jordan River and the Dead Sea. The West Bank does not lie entirely within the drainage system of the Jordan River, as elevated areas in the west give rise to the headwaters of streams flowing westward to the Mediterranean Sea.

Annual rainfall of more than 27 inches (685 mm) occurs in the most highly elevated areas in the northwest and declines in the southwest and southeast, along the Dead Sea, to less than 4 inches (100 mm). Widely variable land-use patterns are dictated by the availability of water. Relatively well-watered nonirrigated terrain in the hills (especially those in the north) is used for the grazing of sheep and the cultivation of cereals, olives, and fruits such as melons. Irrigated land in the hills and the Jordan River valley is intensively cultivated for assorted fruits and vegetables.

The industrial development of the West Bank was never strong during the Jordanian period, and by the mid-1960s there were less than a dozen industrial establishments with more than 30 employees in the area. Israel did not actually hamper industrial development, but investment capital remained scarce both in the West Bank and Israel, and only the transportation infrastructure improved much after 1967. This improvement occurred mostly for military reasons, and the West Bank's excellent highway system came primarily to benefit the Israelis, since most main roads either bypassed Palestinian villages or were exclusively reserved for the use of Israeli settlers.

The principal Palestinian municipalities of the West Bank are Janīn, Nābulus, and Rām Allāh north of Jerusalem and Bethlehem (Bayt Laḥm) and Hebron (al-Khalīl) south of Jerusalem. Jericho (Arīḥā) is the chief municipality of the Jordan River valley. Several small universities on the West Bank (founded or attaining university status in the 1970s) enroll mostly Palestinian students.

Many Palestinians were displaced after the 1948 and 1967 wars. About 300,000 Palestinians (most of whom were originally from territory captured by Israel in 1948) left the impoverished West Bank for Transjordan (later Jordan) during the year after the 1948 war; and about 380,000 Palestinians fled the West Bank after it was captured by the Israelis in 1967. Between 1967 and 1977 an estimated 6,300 Palestinians were evicted from East Jerusalem and replaced by Jewish immigrants. Pop. (2000 est.) 2,184,000.

West Bengal, constituent state of India, situated in the northeastern part of the country. It is bounded on the north by Bhutan and the state of Sikkim, on the east by Bangladesh and the state of Assam, on the south by the Bay of Bengal, on the southwest by the state of Orissa, on the west by the states of Bihār and Jharkhand, and on the northwest by Nepal. Its 1,350-mile- (2,170-kilometre-) long frontier with Bangladesh and its separation from China only by the buffer states of Bhutan and Nepal are perennial sources of tension in West Bengal. Its capital, Calcutta (Kolkata), is one of the largest cities in India.

A brief treatment of West Bengal follows. For full treatment, *see* MACROPAEDIA: India: *West Bengal.*

West Bengal's early and intellectually productive contact with the West and with other parts of India is one of the most significant factors affecting the history of the state. The other was its partition into Muslim East Pakistan (later Bangladesh) and the Hindu Indian state of Bengal in 1947. Partition left the new state with ill-defined boundaries and a constant flow of non-Muslim refugees from East Pakistan. In 1950 the princely state of Cooch Behār was integrated with West Bengal, and in 1954 the former French enclave of Chandernagore was transferred to the state. After the reorganization of Indian states on linguistic lines in 1956, West Bengal gained 3,157 square miles (8,200 square km) from Bihār. The new land provided a link between the northern and southern parts of the state, which until then had been separated.

West Bengal has a peculiar configuration; its breadth varies from 200 miles (320 km) at one point to hardly 10 miles (16 km) at another. Physiographically, West Bengal may be broadly divided into two natural regions—the Gangetic Plain in the south and the Himalayan and sub-Himalayan area in the north. The Gangetic Plain in West Bengal consists of the westernmost part of the great Ganges River delta, most of which lies in Bangladesh. The plain has many marshes and shallow lakes and is underlain entirely by deep alluvial soil that, when adequately drained, forms rich farmland. The plain is the state's largest and most populous region. The elevation of the area slowly increases toward the west. The sub-Himalayan tract (known as the Duārs, or Terai) consists of low land. From the Duārs, the Himalayan mountain ranges rise abruptly along the northern boundary of the state. Mount Kānchenjunga, with adjacent high peaks in Sikkim, dominates the landscape in northern West Bengal, and on a clear day Mount Everest can be seen in the distance.

The climate in the plains is tropical, with high humidity and moderately high temperature. The annual rainfall varies in the sub-Himalayan region between 150 and 210 inches (3,810 and 5,330 mm) and in the plains between 45 and 75 inches (1,140 and 1,900 mm). There are three seasons: hot and dry (March to early June), hot and wet (mid-June to September), and cool (October to February). During the hot and wet season, rain-bearing monsoon winds blow from the southwest.

West Bengal contains about 40 recognized tribal communities—the better known among them being the Santāls, Oraons, Muṇḍās, Lepchās, and Bhutias—that make up less than one-tenth of the total population. Bengali is the language of most of the people, with

Hindī, Urdū, Nepālī, and English as minority languages. English, however, is the language of administration and a lingua franca for business purposes.

Nearly four out of five inhabitants are Hindus and the rest Muslims, with tiny minorities of Christians, Buddhists, Jains, and Sikhs. Three-fourths of the people live in villages, with the remaining one-fourth living in urban areas. About one-sixth reside in greater Calcutta. There are about a dozen West Bengal cities (including Calcutta) with populations of more than 100,000, and West Bengal has four zones of conurbation developed in association with industrial complexes.

Of the working population, more than half are engaged in agriculture as either cultivators or labourers. Rice is the most important crop on the plains, where farmers also raise jute, leguminous plants, oilseeds, corn (maize), wheat, barley, sugarcane, vegetables, and some tropical fruits. West Bengal's tea plantations account for much of India's tea production.

The state produces a significant amount of India's total value of mineral output, including coal (there are extensive deposits near the Jharkhand border), dolomite, limestone, and china clay (kaolin). It has steel plants, an automobile-manufacturing plant, and numerous chemical, machinery-building, and light-engineering industries. The state enjoys better-than-average road, rail, and water transportation systems. Frequent air service connects Bāghdogra in the north to Calcutta in the south. Calcutta's international airport accommodates jet aircraft from around the world, and its harbour handles some of India's commerce.

The area has always fostered literature, art, music, and drama, and it produced Rabindranath Tagore, winner of the 1913 Nobel Prize for Literature. The theatre is popular, and both amateur and professional performances are quite sophisticated. *Yātrā*s, traditional open-air performances, are popular in the countryside, along with *kavi*, an impromptu duel in musical verse between village poets. Traditional music takes the form of devotional and cultural songs. The *kathakata*, a religious recital based on folklore, is another traditional form of rural entertainment. Films offer yet another type of popular diversion, and Bengali productions have earned national and international awards.

West Bengal has universities offering degrees in arts and sciences, engineering, and various technological fields; there are also numerous technical institutes. In Calcutta, the Indian Association for the Cultivation of Science, the Bose Research Institute, and the science laboratories of the University of Calcutta have made notable contributions to scientific knowledge. The Asiatic Society of Bengal, which was the best-known Oriental historical-research body in the 19th century, is located in West Bengal. Viśva-Bhārati University, founded by Tagore in Śantiniketan, is a world-famous centre for the study of Indology and international cultural relations. Area 34,267 square miles (88,752 square km). Pop. (1994 est.) 73,600,000.

West Bengal Duārs, physical region in extreme northeastern West Bengal state, northeastern India. It is bounded by Sikkim state and Bhutan on the north, Assam state on the east, Nepal on the west, and the continuation of West Bengal state on the south.

The West Bengal Duārs were ceded to the British by Bhutan in 1863. They constitute a lowland forest belt along the junction between the Himalayan foothills to the north and the North Bengal Plain region of the Lower Ganges Plains to the south. The name Duārs (literally "doors") is derived from the several passes that lead from the region northward into the Lesser Himalayas. Along the northern portion of the West Bengal Duārs are large banks of boulders, through which flow numerous streams cutting across the slope from the low foothills in the north to the plains in the south. These streams and the Tista River on the western side of the Duārs occasionally bring devastating floods. The area is covered with dense forests of conifers, including silver fir, and oak, magnolia, rhododendron, beech, birch, and sal (*Shorea*). Forests have been cleared for tea plantations in the Darjeeling foothills in the northeast. Rice, jute, corn (maize), potatoes, vegetables, and fruits are the other major crops grown. Industries in the area produce foodstuffs, beverages, dairy products, leather footwear, and transport equipment; rice, oilseeds, and wheat are milled. Siliguri, Darjeeling, and Jalpaiguri are the region's most important towns and are linked by roads and railways. Siliguri has an airfield at nearby Bāghdogra.

West Berkshire, unitary authority, geographic and historic county of Berkshire, England. The unitary authority extends westward from the district of Reading along both sides of the River Kennet and edges into the Berkshire Downs on the north and the Hampshire Downs on the south; both downs are composed of chalk and rise to elevations of between 600 to 800 feet (185 to 245 m). The downs have occasional clumps of beech, and cereal grains (especially barley) are grown there. The Kennet River valley itself is devoted to pastureland, and dairy cattle and the locally bred Berkshire pig are commonplace. The unitary authority covers a large, mainly rural area centred on the town of Newbury. Area 272 square miles (704 square km). Pop. (1998 est.) 144,200.

West Berlin, the western half of the German city of Berlin (*q.v.*), which until the reunification of the German state in 1990 was treated as a city and *Land* (state) of the Federal Republic of Germany (West Germany), though it was not constitutionally part of that nation.

West Bridgewater, town (township), Plymouth county, eastern Massachusetts, U.S. It lies approximately 25 miles (40 km) south of Boston. The area was deeded by Massasoit, a Wampanoag Indian chief and sachem (intertribal leader) of all Wampanoags, to six people in trust for 56 proprietors of Duxbury plantation for the price of knives, hatchets, hoes, coats, and cotton. It was settled by colonists in 1656. Some mills were established along its rivers in the 19th century.

West Bridgewater's economy, long focused on agriculture, is now based on retail trade and light manufacturing. It was administratively separated from Bridgewater in 1822. Pop. (2000) 6,634.

West Bridgford, town, Rushcliffe district, administrative and historic county of Nottinghamshire, England. The town now functions largely as a residential suburb of Nottingham, which lies just to the northwest. West Bridgford's parish church was built in the 14th century. Trent Bridge cricket ground (one of England's most famous) and Nottinghamshire's county hall lie within the boundaries of the community. Pop. (1991) 33,843.

West Bromwich, locality in the metropolitan borough of Sandwell, metropolitan county of West Midlands, historic county of Staffordshire, England. It lies about 5 miles (8 km) northwest of Birmingham. Though the town is of ancient origin, its appearance is modern and industrial. Coal was long mined until the end of the 20th century. West Bromwich is well known for its metallurgical industries, particularly its production of coiled springs. It also has electrical engineering and chemical plants. West Bromwich's historic buildings include a 13th-century moated manor house (now a restaurant) and the 16th-century Oak House (now a museum). The Church of All Saints, formerly St. Clement, was rebuilt in 1872. Pop. (1991) 146,386.

West Caroline Trench (Pacific Ocean): *see* Yap Trench.

West Chester, borough (town), seat (1786) of Chester county, southeastern Pennsylvania, U.S. It lies 27 miles (43 km) west of Philadelphia. Settlement began in the early 1700s, and Turk's Head Inn was established there in 1761, but the town's growth was delayed by a prolonged dispute with Chester (now in Delaware county) over the permanent location of the county seat. During the American Revolution, the Battle of the Brandywine (*q.v.*) was fought (Sept. 11, 1777) about 7 miles (11 km) south from the town.

It is a trade centre with some light manufacturing. West Chester University of Pennsylvania was established in 1871. The former estate (now called Longwood Gardens) of industrialist Pierre S. du Pont is in nearby Kennett Square. Inc. 1799. Pop. (2000) 17,861.

West Coast, local government region in west-central South Island, New Zealand. It is bounded by the Tasman Sea (west), the unitary authority of Tasman (north), and the local government regions of Canterbury and Otago (east) and Southland (south). The Southern Alps, with their towering peaks and rugged terrain, contribute to its isolation and varied landscape. Mount Cook (12,316 feet [3,754 m]) is the highest point in New Zealand. The Franz Josef and Fox glaciers and the Taramakau, Hokitika, Wanganui, and Haast rivers all flow northwestward from the Southern Alps; the rivers dissect the narrow coastal plain, and several of them pass near Brunner and Kaniere lakes.

Early Maori settlements in the region were succeeded by European ones when gold was discovered in the Greenstone Valley near Greymouth in 1864. In 1865 the West Coast region formed an extension of the West Canterbury goldfields with its administrative headquarters at Hokitika. Between 1865 and 1867 there was a steady influx of population from the declining goldfields of Otago and Victoria. Mining, especially of coal, developed at Greymouth and at nearby Brunner during the 1870s and '80s. A range of coal grades are exploited underground, including bituminous, subbituminous, and lignite. Sawmilling and dairying are also economically important. Rimu and beech are the source of most of the timber. Westland, Mount Cook, and part of Mount Aspiring national parks are situated within the region.

The region's major towns are Westport, Reefton, Greymouth, Kumara, Hokitika, and Ross. A coastal road connects Westport via Greymouth and Hokitika with the Haast River valley. Greymouth can also be approached by road from Nelson and Blenheim. Pop. (1998 est.) 32,900.

West Coast jazz (music): *see* cool jazz.

West Covina, city, Los Angeles county, California, U.S. It lies at the eastern end of the San Gabriel Valley and is about 20 miles (32 km) east of the city centre of Los Angeles. Settled in 1905, it began as an agricultural community surrounded by citrus and walnut groves. After World War II it experienced rapid growth with the urbanization of the Los Angeles metropolitan area. West Covina consists almost entirely of moderate-sized single-family homes, and its working population mainly commutes to Los Angeles, Pomona, and other nearby manufacturing and commercial centres. Inc. city, 1923. Pop. (2000) 105,080.

West Derbyshire (England): *see* Derbyshire Dales.

West Des Moines, city and suburb of Des Moines, Polk county, central Iowa, U.S. The area was settled in the 1840s and became an important rail junction in the 1850s called Valley Junction. James Cunningham Jordan, the town's first settler, operated a station on the Underground Railroad assisting fugitive slaves. The city was renamed in 1938.

Industry includes the manufacture of tires and agricultural implements. Services are also important. The Raccoon River flows northeastward through the southern part of the city and is surrounded with many recreational areas, including Walnut Woods State Park. Inc. 1893. Pop. (2000) 46,403.

West Devon, borough (district), administrative and historic county of Devon, southwestern England. The borough lies directly north of the city of Plymouth. West Devon encompasses most of Dartmoor in the county's southeast and is separated from the county of Cornwall on the west by the narrow, lowland valley of the River Tamar. The bleak granite mass of Dartmoor comprises about half of West Devon and has an elevation of 1,000 to 2,000 feet (305 to 610 m); it is rough grazed by hardy breeds of sheep (such as Blackface) and wild ponies. The poorly drained clay soils of the lower-lying, dissected plateau in the northern and western parts of the district are grazed by both sheep and cattle, and some cereals and fodder crops are cultivated. The mixed farming of early-season vegetables, fruits, pigs, and poultry is pursued in the lower Tamar valley.

West Devon was a centre of prehistoric, Anglo-Saxon, and Norman settlement and of tin and, later, copper and lead mining; remains of these periods of occupation or exploitation, including cairns, clapper bridges, and extant medieval farmhouses, are found through the district. The site of Morwellham, an early 19th-century copper-shipping port on the River Tamar southwest of Tavistock, has become an open-air museum of industrial archaeology where remains of inclined planes, quays, water wheels, and the harbour itself have been preserved. The 13th-century Buckland Abbey south of Tavistock was lived in by both the (Sir Richard) Grenville and (Sir Francis) Drake families of seafaring fame and contains a maritime history museum. The austere granite Castle Drogo on the northeastern edge of Dartmoor is Great Britain's last private home built (1910–30) on a grand scale. The small market centres and administrative centres of Tavistock and Okehampton are located on the southwestern and northern edges of Dartmoor, respectively. Dartmoor Prison, 7 miles (11 km) east of Tavistock, is England's principal correction centre for serious offenders. Area 448 square miles (1,160 square km). Pop. (1998 est.) 47,500.

West Dorset, district, administrative county of Dorset, southern England. The district lies almost entirely within the historic county of Dorset, except for small areas along the northern border that belong to the historic county of Somerset. It occupies an area bordering on Lyme Bay of the English Channel and surrounds to landward the ports of Weymouth and Portland, which together form a district (borough) in the south. Nearly all of West Dorset is a governmentally designated Area of Outstanding Beauty. West Dorset's landscape and some of its towns, vividly described by the 19th-century novelist Thomas Hardy, are dominated by two parallel chalk ridges, oriented east-west and located in the south and east, that merge in central West Dorset to form a horseshoe-shaped upland. The interior valley of the upland and other areas to the north and west of the ridges are intensely cultivated in some places and elsewhere consist of grassland or heath cover. The oceanside cliffs, between the coastal resorts of Lyme Regis and Bridport in the southwest, and the narrow, pebbly Chesil Beach, extending 16 miles (25 km) from Bridport east along the central coast, are visited by tourists.

Lyme Regis, which was a favourite retreat of the rich and famous of the 19th century, was an important medieval port. Bridport has long been known for its manufacture of cordage, twine, and nets. Sherborne, situated in the northern part of the district, was an Anglo-Saxon cathedral city from 705 to 1075, and Dorchester is associated with prehistoric earthworks and Roman ruins; Thomas Hardy was born nearby.

Dairy cattle and cereals (particularly barley) are raised on the chalk ridges, and mixed farming (including pigs, sheep, and horticultural products) is practiced in the lowlands. The city of Dorchester is the seat of both the county of Dorset and West Dorset district. Area 418 square miles (1,083 square km). Pop. (1998 est.) 91,100.

West Dunbartonshire, council area, west-central Scotland, along the north bank of the lower River Clyde, northwest of Glasgow. It extends north to the shores of Loch Lomond, Scotland's largest lake, and encompasses an area of lowlands surrounding the Kilpatrick Hills, which stand in the centre of the council area.

Most of the population lives in three large towns—Alexandria, Dumbarton, and Clydebank—which lie in the south and west. The rural areas, mainly in the north and east, produce sheep on the higher land and dairy products, vegetables, pigs, and poultry in the lower areas. The Kilpatrick Hills serve as a water catchment area for the Glasgow metropolitan area. In the southeast Clydebank, the largest town, suffered severely from the virtual collapse of its historic shipbuilding and heavy engineering industries in the decades after World War II. The shipyard responsible for the great Cunard liners, culminating with the *Queen Elizabeth II* (1967), now manufactures offshore oil-drilling rigs and related equipment. Tourism, pharmaceuticals, financial services, and whisky distillation are also important. Dumbarton is the administrative centre. Area 60 square miles (155 square km). Pop. (1999 est.) 94,980.

West Falkland, one of the two major islands of the Falkland Islands (*q.v.*) in the South Atlantic Ocean. It is 80 miles (130 km) long and 45 miles (70 km) wide and rises to Mount Adam (2,297 feet [700 m]). The total area is 1,750 square miles (4,532 square km), excluding adjacent small islands, and the coastline is deeply indented. Pop. (1996) 174.

West Flanders, Flemish WEST-VLAANDEREN, French FLANDRE OCCIDENTALE, the westernmost *province* of Belgium. It extends inland from the North Sea coast and is bounded by France on the west and south and by Hainaut, East Flanders, and The Netherlands on the east. It is divided into eight administrative *arrondissements*—Veurne, Ostend, Brugge, Tielt, Roeselare, Kortrijk, Ypres, and Diksmuide. It was once part of the old county of Flanders.

Drained by the Yser and Leie (Lys) rivers, the *province* can be geographically divided into maritime Flanders and the interior plain. The former comprises the coastal area and the polders (or land reclaimed from the sea). Maritime West Flanders' straight, unembayed 42-mile (68-kilometre) coastline has broad sandy beaches backed by a rampart of sand dunes that reach as high as 100 feet (30 m) and are 1 mile (1.6 km) wide in places. Planted marram grass and conifers help to stabilize the sand. This line of dunes is broken only at the mouth of the Yser River at Ostend, near Zeebrugge, and at the mud-covered inlet of the former Zwijn estuary. Behind the dunes lies a flat plain, the Flemish polders, which are seamed with drainage channels and which extend for 6–10 miles (10–16 km) inland.

West Flanders is Belgium's leading agricultural *province*. Along the edge of the dunes the sandy soils grow potatoes and carrots. In the fertile polders, grass, oats, and fodder crops support extensive livestock raising (horses, cattle, pigs). Farther inland, the sand and clay alluvial deposits of the interior plain produce wheat, oats, malting barley, sugar beets, potatoes, tobacco, flax (in the Leie River valley), and fodder crops for dairy herds.

In the coastal area tourism is the chief source of income, based on a string of seaside resorts, notably Ostend (a cross-Channel ferry port), Blankenberge, Knokke-Heist, and De Panne. Fishing has also gained some importance at Ostend, Nieuwpoort, and Zeebrugge. The polders are thinly populated, with only a few small market towns, such as Veurne, Brugge (Bruges) is the capital and the largest town in the *province*. Part of the Flemish textile industry, mainly cotton and linen at Kortrijk, Roeselare, and Menen, is centred in the Leie River valley, in the southeast. The southwestern region of West Flanders was virtually destroyed in the trench warfare of World War I, and many towns such as Ypres have been rebuilt. The *province* is served by railway lines, the Ghent-Brugge Canal, and numerous smaller canals. The Westhoek Natural Reserve (1957) near De Panne protects dunes, estuaries, and maritime vegetation. The silted-up Zwijn estuary has been made a bird sanctuary. Area 1,214 square miles (3,145 square km). Pop. (1999 est.) 1,127,091.

West Florida Controversy, in U.S. history, dispute over the status of the territory lying on the Gulf of Mexico between the Apalachicola and Mississippi rivers. Though Spain claimed the area as part of its New World discovery in 1492, France occupied it as a portion of Louisiana after 1695. Under the Treaty of Paris of 1763, West Florida was held by Great Britain, which returned it to Spain under the Treaty of Paris of 1783. The United States, wishing to control the river outlets in the region, claimed the area as part of the Louisiana Purchase of 1803. In 1810 American frontiersmen in the Baton Rouge section rebelled against Spanish control, and the remainder was soon included in the Mississippi Territory. In the Transcontinental (Adams-Onís) Treaty of 1819, Spain ceded all claim to West Florida, which came under official U.S. jurisdiction two years later.

West Frisian Islands, Dutch WEST FRIESE EILANDEN, part of the chain of Frisian Islands (*q.v.*), which lie in the North Sea just off the coast of northwestern Europe. They belong to The Netherlands.

West Germany, from 1949 to 1990, a republic consisting of the western two-thirds of what is now Germany. West Germany was created in 1949 when the United States, Great Britain,



Lyme Regis, West Dorset
Paul Grundy/Robert Harding Picture Library

and France consolidated those zones, or portions, of Germany that they had occupied at the end of World War II. When West and East Germany were reunited in 1990, West Germany's constitution and official name (Federal Republic of Germany) were adopted by the former East German state. *See* Germany.

West Glamorgan, former county (1974–96) of South Wales. The region is now incorporated into the county of Swansea and the county borough of Neath Port Talbot (*qq.v.*).

West Greenland Current, cool flow of water proceeding northward along the west coast of Greenland. *See* Greenland Current.

West Hartford, urban town (township), Hartford county, central Connecticut, U.S. Founded in 1679 as an agricultural community, it was known as West Division Parish or West Society. It became a wealthy residential suburb of Hartford, was named West Hartford in 1806, and was separately incorporated in 1854. Industry is restricted to a relatively small zone in the south end. The town is the birthplace of lexicographer Noah Webster and the seat of the American School for the Deaf (the oldest institution of its kind in the country), founded in 1817 by Thomas Hopkins Gallaudet. The University of Hartford (formed in 1957 by the union of three colleges, one of which dates from 1877) and St. Joseph College (1932) are in West Hartford. Area 22 square miles (57 square km). Pop. (2000) 63,589.

West Haven, city, coextensive with the town (township) of West Haven, New Haven county, southwestern Connecticut, U.S. It lies on New Haven Harbor and across the West River from New Haven. Early settlement began in the 1640s, when the area was called West Farms. Additional land was divided among veterans of King Philip's War (1675–76). The parish of West Haven, organized about 1720, became part of the town of Orange (incorporated 1822) and was created a borough in 1873. In 1921 it was separated and incorporated as a town. The industrial city of West Haven was chartered and consolidated with the town in 1961. Historic saltbox buildings in West Haven include the Ward Heitman House (1684). British Redcoats, commanded by Major General William Tryon, sacked the town on July 5, 1779. Early industries were fishing, blacksmithing, milling, and boatbuilding. Buckles have been made in West Haven since 1853. Manufacturing is now well diversified. Savin Rock on Long Island Sound, with its White City theme park, was a popular early 20th-century resort; it closed in the early 1960s. The University of New Haven (founded 1920) is in the city. Pop. (2000) 52,360.

West Highland white terrier, breed of terrier that probably originated at Poltalloch, in the former county of Argyll, Scotland. It was bred there for many years by the Malcolm family, whose dogs appear to be traceable back to the time of King James I of England. Typically hardy and gay-spirited, the West Highland white terrier is a short-legged dog standing 10 to 11 inches (25.5 to 28 cm) and weighing 13 to 19 pounds (6 to 8.5 kg). Its coat is pure white and consists of a soft, furry undercoat overlaid by a straight, hard outer coat. It is thought that the breed is descended from the same ancestral stock as the other Scottish terriers—the Dandie Dinmont, Scottish, and cairn terriers.

West India Company (Dutch): *see* Dutch West India Company.

West Indian cedar (tree): *see* cigar-box cedar.

West Indian cherry (plant): *see* Barbados cherry.

West Indies, Spanish INDIAS OCCIDENTALES, French INDES OCCIDENTALES, Dutch WEST-INDIË, crescent-shaped group of islands more than 2,000 miles (3,200 km) long separating the Gulf of Mexico and the Caribbean Sea on the west and south from the Atlantic Ocean on the east and north. From the North American mainland peninsula of Florida in the north, the islands stretch 1,200 miles (1,930 km) southeastward, then 500 miles (800 km) south, then west along the north coast of Venezuela on the South American mainland. Area 90,720 square miles (234,910 square km). Pop. (2000 est.) 36,738,000.

The three major physiographic divisions of the West Indies are: the Greater Antilles, comprising the islands of Cuba, Jamaica, Hispaniola (Haiti and the Dominican Republic), and Puerto Rico; the Lesser Antilles, including the Virgin Islands, Anguilla, Saint Kitts and Nevis, Antigua and Barbuda, Montserrat, Guadeloupe, Dominica, Martinique, Saint Lucia, Saint Vincent and the Grenadines, Barbados, and Grenada; and the isolated island groups of the North American continental shelf, The Bahamas, including the Turks and Caicos Islands, and the South American shelf, including Trinidad and Tobago, Aruba, Curaçao, and Bonaire. Although physiographically not a part of the West Indies, Bermuda has common historical and cultural ties with the other islands and is often included in discussions of the West Indies.

A brief treatment of the West Indies follows. For full treatment, *see* MACROPAEDIA: West Indies.

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

The land. The islands of the West Indies are formed by two main chains of mountains. One chain runs west-east and forms the islands of the Greater Antilles, while the other chain trends north-south and forms the Lesser Antilles. These mountain chains are now mostly submerged by the Atlantic Ocean and Caribbean Sea, with only the higher peaks visible above the water. Besides interior mountain peaks, each Greater Antillean island has an encircling coastal plain.

The West Indies' Caribbean climate is tropical maritime. Daily temperature maxima over most of the region range from the mid-80s Fahrenheit (upper 20s Celsius) from December to April to the upper 80s Fahrenheit (low 30s Celsius) from May to November. Nighttime temperatures are about 10° F (6° C) cooler. Most islands experience a wet and dry season with annual precipitation ranging from 30 to 80 inches (800 to 2,000 mm) but reaching more than 200 inches (5,000 mm) on the highest peaks. The region's moisture-laden trade winds produce heavy rainfall on the windward sides of the higher islands. Hurricanes frequently occur between August and October, and the relative humidity is high throughout the year.

In the coast, forests covered most of the West Indies but were cut down in many areas by sugar-plantation owners for firewood to heat their refining vats. This practice resulted in soil impoverishment and erosion. Destruction of primeval forest has also occurred as a result of the practice of shifting agriculture. Surviving types of forest include mangrove swamps, which thrive along some coasts; semideciduous woodlands, found in the Leeward Islands and other areas of prolonged drought; tropical rainforests of the wet lowlands; and montane and cloud forests.

A large number of plant species in the Caribbean are indigenous to the region. At high elevations in the Greater Antilles, species more typical of mid-latitude and subarctic flora are found. There are many rodents, including rabbitlike agoutis, and numerous species of bats and lizards. Bird species include several parrots, hummingbirds, ibis, and flamingoes. The coastal seas are rich in marine life, including turtles, shellfish, caimans, dolphins, red snappers, bonitos, and flying fishes. The chief minerals exported from the Caribbean are bauxite from Jamaica and petroleum and natural gas from Trinidad.

The people. The population of the West Indies is ethnically heterogeneous and largely descended from a colonial plantation society based on slave labour. Most of the population is either black, mulatto, or white. Most of the blacks are descended from African slaves, while many of the whites are descended from Spanish, French, British, or Dutch colonists. The West Indies' Creole languages, evolved from pidgin variants of European languages, have become the common languages of many of the people. The French and English Creoles are a blend of these languages with African and West Indian languages. By contrast, the major Spanish-language communities—Cuba, Puerto Rico, and the Dominican Republic—speak common Spanish dialects. Papiamento, a Spanish-Dutch-Portuguese-English Creole, is widely spoken in Aruba and the Netherlands Antilles. East Indians constitute a substantial minority in the region, especially in Trinidad and Tobago, where they make up about two-fifths of the population. Chinese constitute a smaller minority. Roman Catholicism is the predominant religion in the Spanish- and French-speaking islands, while Protestantism is the norm in the English-speaking and Dutch territories.

Despite their diversity in ancestry and language, the countries of the West Indies share many aspects of culture because of their somewhat parallel experiences as plantation colonies. The islands take pride in their lively cultural scenes, with dances, parties, and festivals culminating in annual carnivals.

Nine-tenths of the region's people live in the Greater Antilles; Cuba alone makes up nearly one-third of the total, and Haiti and the Dominican Republic combined account for more than two-fifths. The remainder of the islandnations and dependencies range in population from several thousand (*e.g.,* Anguilla) to some 1,300,000 (Trinidad and Tobago).

One-third of the population is younger than 15 years of age, and the median age on most islands is in the mid-20s. The birth rate has historically been low for the developing world and has declined at a faster-than-average rate since the 1950s. Emigration, moreover, has played a more significant role in the West Indies than in most other regions, having the effect of dampening population growth even more. The death rate has also declined steadily since the 1950s, primarily because of reductions in the rate of infant mortality, and is comparatively lower than in other developing regions. The rural population has dwindled on many islands because of considerable rural-to-urban migration, and most people live in urban areas.

The economy. With the exception of Cuba, which has a centrally planned economy, the West Indies can be characterized as a predominantly free-enterprise market region. The economies of the islands are marked by dependence on external economic events. Wealth is unevenly distributed among the nations of the region. In the late 1990s the gross national product (GNP) per capita was only about $400 for Haiti but about $4,500 for Trinidad and Tobago and nearly $12,000 for the U.S. Virgin Islands.

Most countries are not self-sufficient in food production, and cereals, primarily wheat, are the chief food imports. Sugar, bananas, citrus, cacao, and spices are the principal exports and the major source of foreign exchange for a number of countries. To reduce vulnerability to external markets, many countries are attempting to diversify agricultural production.

Manufacturing in the West Indies accounts for a minor part of overall economic activity.

Several countries and dependencies, including Jamaica, Barbados, Trinidad and Tobago, Puerto Rico, and the Netherlands Antilles, have developed significant mineral industries.

Among the dependent states, foreign subsidies and remittances provide a major source of income. In Montserrat, one of the British Leeward Islands, the United Kingdom finances the bulk of the government's budget and provides significant amounts of other foreign aid.

Tourism has become the main economic activity on some islands and a major source of foreign exchange. Often, however, it raises the local cost of living without producing much employment. It is also quick to decline during times of economic recession.

Cuba, the largest of the Caribbean islands, remains partially dependent on sugar exports. However, it has attempted to diversify its output through such products as chemicals and pharmaceuticals and nontraditional "exports" of health care services. Since the mid-1990s the government has granted an increasing number of concessions to foreign investors; as a result, the tourist sector has grown markedly.

In an attempt to overcome problems of small size and dependency on a few export items, the Caribbean countries have formed economic unions, including the Caribbean Community and Common Market (better known as Caricom) and the African, Caribbean, and Pacific Group of States. West Indian countries often run negative balances of trade. The region's main trading partners are the United States and various nations of the European Union.

Government and social conditions. The governmental forms of the independent states of the West Indies range from the socialist state of the Republic of Cuba, to republics such as Dominica and the Dominican Republic, to constitutional monarchies such as Jamaica and Saint Lucia; the majority of these countries have gained their independence since the early 1960s. Dependent states include those in free association with the United States, internally self-governing states within the Kingdom of The Netherlands, dependent territories of the United Kingdom, and overseas *départements* of France. In most of the region, political parties openly express opposition views. Notable exceptions include Cuba and Haiti. In countries with parliamentary governments, the two-party system is common.

The United Kingdom, France, and the United States are responsible for the defense of their dependencies. They also maintain military bases on several of these strategically important islands.

Standards of living, relative to other developing countries, are generally high, particularly in the dependent states that receive large subsidies from central governments. Life expectancy in the more-developed countries is more than 70 years, whereas, in the less-developed ones it is a decade shorter, and in Haiti it is only about 50 years. Infant mortality ranges from a relatively low 10–15 per 1,000 live births in several countries to about 100 per 1,000 live births in Haiti. Health services remain generally inadequate, and, partly because of the high rate of emigration, shortages of medical personnel are common. The main health problems are those associated with the supply of drinking water and with the disposal of sewage. Diseases of the circulatory system and cancer are major causes of death, while gastroenteritis, influenza, pneumonia, malaria, tuberculosis, and childhood diseases are also major health problems. In the less-developed countries, children and women commonly suffer from nutritional-deficiency diseases. Housing is often substandard, and shortages are chronic throughout the region.

Educational systems are generally well developed, and the great majority of countries have literacy rates exceeding 80 percent. Higher education is available at a number of colleges and universities, including the University of the West Indies, which has campuses in more than half of the countries in the region.

Press and broadcast media are best developed in Cuba, the Dominican Republic, Haiti, Jamaica, and Trinidad and Tobago, but they are present at least minimally in all of the political units. The extent of government censorship varies considerably within the region.

Cultural life. The culture of the Caribbean people is a blend of African, American Indian, European, and, in some cases, Asian influences. Reggae music, now world-renowned, originated in the Rastafarian religious movement that in turn originated in the Maroon society of Jamaica. Modern literature owes much to writers and philosophers of the West Indies.

History. There were three different indigenous groups living in the Caribbean when Christopher Columbus first landed in 1492: the Arawak, the Carib, and the Ciboney. The most numerous were the Arawak, or Taino, who inhabited the Greater Antilles, the Bahamas, and the Leeward Islands. The Arawak and Carib practiced agriculture and were seafarers. The Ciboney were fishermen and, when forced away from coastal regions, became hunters and gatherers. Columbus established the first permanent European settlement in the West Indies in 1493 on the island of Hispaniola, and Spanish settlement expanded to other islands in the Greater Antilles during the early 16th century. The main interest of the Spanish was mining for gold and other precious metals, and they forced the West Indians to work in their mines. However, the combination of harsh treatment and contagion from European diseases quickly decimated the indigenous population.

As the island gold became exhausted, the Caribbean possessions came to be valued chiefly as ports of call and trade. The Spanish made some attempts to dominate the Caribbean, putting up fortresses in Hispaniola, Cuba, and Puerto Rico, and tried to keep other nations from trading with the islands.

British and French privateers carried out armed raids on the Spanish possessions between 1536 and 1609, and they subsequently founded colonies in the Lesser Antilles, an area which had not been settled by the Spaniards. Between 1630 and 1640 the Dutch claimed Curaçao, Aruba, Bonaire, Sint Eustatius, Saint Martin, and Saba. In the same period, the British claimed Barbados, Nevis, Antigua, and Montserrat, and the French claimed Martinique and Guadeloupe. Each nation tried to keep its colonies from trading with any other country, and between 1697 and 1814 there were numerous conflicts regarding Caribbean possessions.

Sugar production came to dominate most island economies, and both manufacturing techniques and slave labour largely from western Africa) were supplied by European traders. Conditions for the African slaves were deplorable. The only hope for the slave was to escape into the hinterland and join with others to form a Maroon community. Maroon societies were an important element in the preservation of African culture in the Caribbean, and they had an economic self-sufficiency lacking in the sugar plantations.

After many attempts at slave rebellion, a successful revolution was led by Toussaint-Louverture, an abolitionist who gained control of the colony of St. Domingue (now Haiti) during the French Revolution (1789–99). His successors, Jean-Jacques Dessalines and Henry Christophe, won independence from France after Napoleon had attempted to restore slavery in St. Domingue.

Collapse of the slave society elsewhere in the West Indies was hastened by external as well as internal factors. British abolitionists argued that, through the slave trade, Britain was enriching its rival, France, because of the re-export of slaves to French colonies. Humanitarian views of slavery and the slave trade gained influence. Finally, in 1803, Denmark abolished the slave trade, and Britain followed in 1807, France in 1817, Holland in 1818, Spain in 1820, and Sweden in 1824. Slavery itself was finally abolished in the British colonies in 1833, in the French colonies in 1848, and in the Dutch colonies in 1863; it was abolished in the Spanish colonies of Puerto Rico in 1873 and Cuba in 1880.

The plantation system changed considerably after emancipation. The majority of plantations were not viable, and sugar production could survive only if several plantations amalgamated to supply sugar to a central factory. Some diversification of agriculture was achieved in several islands with smallholders growing food crops and cash crops such as cacao, nutmeg, and bananas. The trend toward diversification was continued in the 20th century by the development of the tourist trade and oil and bauxite industries, but difficult economic conditions were made worse by the Great Depression of the 1930s, and many of the colonies moved closer to their mother countries.

U.S. involvement in the West Indies, which began with the occupation of Cuba and Puerto Rico during the Spanish-American War (1898), grew in scope during the early 20th century. The United States bought the Danish Virgin Islands (1917) and occupied Haiti (1915–34) and the Dominican Republic (1916–24). U.S. military bases in the Caribbean served to protect Western interests during World War II but also provided investment opportunities, which often led to economic dependency and resentment.

West Indian nationalism was hampered after World War II by the economic limitations of most of the individual territories, but by the 1980s most had attained independence. In the early 21st century tourism and other services continued to gain importance in the region, although Caribbean trade remained largely dependent on the economies of North America and Europe.

West-Indische Compagnie (Netherlands): *see* Dutch West India Company.

West Irian (Indonesia): *see* Irian Jaya.

West Java (Indonesia): *see* Jawa Barat.

West Lafayette, city, Tippecanoe county, west-central Indiana, U.S. It lies along the Wabash River (bridged) opposite Lafayette. Founded in 1855 and named Kingston; it was later called Chauncey (1866) before being renamed West Lafayette in 1888. Primarily residential, it is the seat of Purdue University (1869). Nearby are the Tippecanoe Battlefield National Historic Landmark and the site of Fort Ouiatenon (1717), the first white settlement in Indiana and a trading and military post controlled at different times by the French, British, and Indians. Inc. 1924. Pop. (2000) 28,778.



Administration Building, Purdue University, West Lafayette, Ind.

By courtesy of the Indiana Department of Commerce

West Lancashire, district, administrative and historic county of Lancashire, northwestern England, north of the city of Liverpool. West Lancashire is separated from the Irish Sea by the narrow coastal strip of Sefton except in the north at the mouth of the River Ribble. The district is essentially a low-lying coastal plain, much of it reclaimed marshland, though marshes in the extreme north have not been drained. Its proximity to large urban centres encourages intensive market gardening of the rich peat soils. At higher elevations in the southeast near Skelmersdale, glacial moraines are found.

Ormskirk, the administrative centre in the southwest, preserves much of its medieval market town character. Its street market is said to date back 700 years. A brass foundry and confectionery are in Ormskirk. Skelmersdale, the other centre, has experienced industrial relocation and town development and expansion since being designated a new town in 1961. The Rufford Old Hall in the small town of Rufford is an example of a late medieval timber-framed building. Area 134 square miles (347 square km). Pop. (1998 est.) 111,200.

West Lindsey, district, administrative and historic county of Lincolnshire, east-central England, north of the city of Lincoln. West Lindsey district comprises two low-lying fertile clay valleys at an elevation of less than 100 feet (30 m) split by the Lincoln Edge, a narrow limestone ridge 200 feet (60 m) high that extends north from the Cotswold Hills. On the northeast, this overwhelmingly rural area edges into the chalk hills of the Lincoln Wolds. The historic market parish of Gainsborough, the administrative centre, is a navigable river port in the western part of the district. Its light industrial base has undergone considerable expansion since World War II and includes the manufacture of hosiery and agricultural implements. The town of Market Rasen, 20 miles (32 km) to the east, is known for its horse racecourse. Limestone and chalk are quarried in the Lincoln Wolds. The valleys produce wheat, barley, and sugar beets; cattle and sheep are extensively raised. Area 445 square miles (1,154 square km). Pop. (1998 est.) 77,200.

West Lothian, council area and historic county, southeastern Scotland, on the southern shore of the River Forth estuary and the Firth of Forth just west of Edinburgh. The council area and historic county occupy somewhat different areas. The historic county borders the Forth from Bo'ness to the mouth of the River Almond just west of Cramont. It extends southwest across a lowland area between the Rivers Avon and Almond. West Lothian council area encompasses most of the historic county, with the exceptions of the area around Bo'ness and the area along the Forth around South Queensferry. West Lothian council area also incorporates a portion of the historic county of Midlothian that extends south of the Almond to the crest of the Pentland Hills.

Pit graves and burial mounds provide evidence of extensive prehistoric settlement. The Antonine Wall, which the Romans built in the 2nd century AD between the Firth of Forth in the east and the River Clyde in the west, had its eastern termination at Bridgeness, near Bo'ness. During the Middle Ages West Lothian was the westernmost portion of the historic region of Lothian. It gained the status of a separate county by the 16th century, and until the 20th century it was known as Linlithgowshire, for its county town (seat) Linlithgow. In the Middle Ages Linlithgow Palace at Linlithgow was a favourite Scottish royal residence and the birthplace of James V of Scotland and Mary, Queen of Scots. Another royal castle is at the edge of the village of Blackness. St. Michael's Church in Linlithgow is one of the finest parish churches in Scotland, as is the 12th-century Romanesque parish church at Dalmeny. By the 11th century South Queensferry, along the Firth of Forth, was the site of a ferry across the Firth to Fife.

The Industrial Revolution in the late 18th and 19th centuries spurred coal and iron ore mining and some heavy industry in southwestern West Lothian, around Bathgate. The completion of the Forth Rail Bridge in 1890 provided an alternative to the historic ferry across the Forth, and the opening of the 1.1-mile- (1.8-km-) long Forth Road Bridge in 1964 led to the end of ferry service across the estuary. By the late 20th century coal mining and heavy industry had virtually disappeared.

New industries, including electronics manufacture and a variety of service activities, have largely replaced heavy industry. The "new town" of Livingston has several high-technology firms. The best agricultural land is in the lower areas in the north and west. Wheat, barley, fodder crops, and potatoes are important, although there is increasing emphasis on dairying. Sheep are raised on the higher land in the south. Livingston, Linlithgow, and Bathgate are the administrative centres. Area council area, 183 square miles (475 square km). Pop. (1999 est.) council area, 154,680.

West Malaysia, wing of the 13-state federation of Malaysia. It occupies the southern half of the Malay Peninsula and is separated from East Malaysia by the South China Sea. Formerly the Federation of Malaya (1948–63), it contains the bulk of Malaysia's population and has the capital city of Kuala Lumpur. Pop. (1991) 14,131,723.

West Memphis, city, Crittenden county, eastern Arkansas, U.S. It lies along the west bank of the Mississippi River opposite Memphis, Tennessee (with which it is linked by bridges). It was founded in 1910 as a logging camp, near the site of Fort Esperanza (built by the Spanish in 1797), and was known as Bragg's Mill until 1927, when it was incorporated as a city and renamed West Memphis. The city subsequently absorbed the neighbouring town of Hulbert.

West Memphis is a timber, cotton, and shipping centre. Retail trade is important, as is the manufacture of chemicals and automotive lubricants. The city is home to one of the world's largest greyhound racing parks. Pop. (2000) 27,666.

West Midlands, metropolitan county of England, comprising seven metropolitan boroughs: the city of Birmingham (England's second largest city), the city of Coventry, and the boroughs of Dudley, Sandwell, Solihull, Walsall, and Wolverhampton. The metropolitan county incorporates parts of three historic counties. In the northwest, the boroughs of Wolverhampton and Walsall and parts of the boroughs of Dudley, Sandwell, and Birmingham belong to the historic county of Staffordshire. In the southwest, parts of the boroughs of Dudley, Sandwell, and Birmingham lie in the historic county of Worcestershire. In the centre and the east, part of Birmingham, including the city's historic core, and the entire boroughs of Solihull and Coventry belong to the historic county of Warwickshire. From 1974 to 1986 West Midlands was an administrative metropolitan county. In 1986 the metropolitan county lost its administrative powers, and its constituent boroughs became autonomous administrative units, or unitary authorities. West Midlands is now a geographic and ceremonial county without administrative authority.

The West Midlands is situated in a predominantly lowland area of sandstones, clays, and underlying coal reserves dominated by the plateau area around Birmingham, from where the Rivers Stour, Avon, and Tame drain basically southward. Climatically the area fluctuates between the milder and wetter weather of the west and the drier and colder conditions of the east. The area's distance from the sea results in a somewhat larger range of climatic conditions. The city of Birmingham, for example, has one of the highest annual temperature ranges in Britain, with relatively high summer and low winter temperatures.

Early settlement was sparse in the remote and heavily wooded countryside until Saxon colonists penetrated the river valleys. Birmingham originated as a small Saxon settlement near a crossing of the River Rea, though it long remained but a minor town. Dudley and its castle dominated the remote and sparsely populated area now known (from its grimy landscape) as the Black Country. Coventry was in fact the region's only significant town by the late 14th century, when, as the fourth largest town in England (after London, York, and Bristol), it had a population of 7,000.

The area's rich coal seams and deposits of iron and limestone made it almost inevitable that it would become an important iron-producing centre. Small metalworking industries had begun in Birmingham as early as the 16th century, and by the 18th century the coalfield towns of Dudley, Walsall, and Wolverhampton had become important for ironworking. Birmingham, by contrast, became a centre for the skilled manufacture of smaller articles, such as buttons, guns, and jewelry. By the 19th century particular towns were known for particular products: Dudley for chains, Wolverhampton for locks and keys, and West Bromwich for springs and weighing machines. The construction of many canals, which remain more conspicuous in the landscape than the region's few small rivers, facilitated commerce.

Many of the West Midlands' traditional metallurgical and manufacturing industries persisted into the 20th century, and the region has proved less vulnerable to economic recession than other old industrial areas. Electrical engineering and the manufacture of motor vehicles, aircraft, and synthetic fibres are now the most important industries. A mood of civic activism has been inherited from the well-known 19th-century mayor of Birmingham, Joseph Chamberlain. The West Midlands' urban centres, especially Coventry, were remodeled and rebuilt following severe bomb damage during World War II. Housing for the area's many immigrant workers is an object of public concern. The region's key position in England's motorway and railway networks contributed to its selection as the site of the National Exhibition Centre, opened in 1976 between Birmingham and Coventry. West Midlands has several universities, colleges, and cultural institutions; but it remains best known for its manufactures, ranging from the luxurious—Rover cars from Solihull—to the everyday—chocolate and cocoa from Cadbury's model workers' settlement at Bournville. Area 347 square miles (898 square km). Pop. (1998 est.) 2,628,200.

West New Guinea (Indonesia): *see* Irian Jaya.

West New York, town, Hudson county, northeastern New Jersey, U.S. It lies along the Hudson River, adjacent to Weehawken. The area, originally settled by the Dutch in 1790, was alternately a part of Guttenberg and North Bergen until 1898, when it was detached from North Bergen as a separate town. Situated about 4 miles (6 km) north of Jersey City and directly west of Manhattan Island, New York City, it is a part of the Port of New York and New Jersey and has docks and grain elevators serving oceangoing ships. It is an industrial community, and its manufactures include embroideries, apparel, silk, and leather goods. Inc. 1898. Pop. (2000) 45,768.

West Nile virus, virus belonging to the family Flaviviridae, related to viruses that can cause yellow fever and dengue and more closely to those that can cause encephalitis (inflammation of the brain). Predominantly an infection of birds, West Nile is highly fatal for many avian species. A threat to human health occurs when infected birds are bitten by mosquitoes, which then transmit the virus to humans. Most human infections are mild or inapparent, causing a flu-like illness that usually lasts only a few days. However, in a minority of infected persons, particularly in those over the age of 50, the virus multiplies in the bloodstream and reaches the brain, resulting in encephalitis, which can prove fatal. Symptoms of West Nile encephalitis include headache, fever, neck stiffness, and muscle weakness.

Historically, West Nile virus had been largely confined to Africa, the Middle East, and parts of Russia, India, and Indonesia, where it has caused minor epidemics of dengue-like illness or sporadic encephalitis. However, in recent years the virus was imported more broadly into Europe by migratory birds. In 1999 West Nile was imported into the United States, spreading also into Canada.

There is no specific treatment. In severe cases, intensive care is necessary, with monitoring of respiratory function and prevention of secondary infections. (D.Mo.)

West Norfolk (England): *see* King's Lynn and West Norfolk.

West Nusa Tenggara (Indonesia): *see* Nusa Tenggara Barat.

West Orange, township (town), Essex county, northeastern New Jersey, U.S., about 4 miles (6 km) northwest of Newark. It was part of Orange until set off in 1863 as the township of Fairmount (later renamed West Orange). The town is widely known for its association with the inventor Thomas A. Edison, who lived and worked there for more than 40 years.

Edison National Historic Site, created in 1962, preserves the Edison Laboratory (1887) and Glenmont, Edison's home from 1886 to 1931. At the laboratory Edison worked on numerous inventions, including silent and sound motion pictures and the phonograph. The 29-room Glenmont is about 1 mile (1.6 km) from the laboratory in an area of West Orange called Llewellyn Park, which is considered the forerunner of the modern garden-type suburban development.

West Orange is now largely a residential suburb of the New York City region. Light manufactures include electrical appliances. Eagle Rock Reservation, a county park, contains Eagle Rock, a 644-foot (196-metre) elevation in the Orange Mountains used by George Washington as an observation post during the American Revolution. The Kessler Institute for Rehabilitation is in West Orange. Inc. town, 1900. Pop. (2000) 44,943.

West Oxfordshire, district, administrative and historic county of Oxfordshire, south-central England, encompassing a mainly rural area in the western part of the county. The Cotswold Hills extend into the northwest, and the clay valley predominates in the rest of the district and borders on the Thames in the south and east.

West Oxfordshire's economy is supported by mixed farming (particularly sheep) and light industries that manufacture precision machinery and furniture. Long-established specialized industries are located in various old stone-built towns in the district. They include the manufacture of tweeds at Chipping Norton in the northwest, gloves at Charlbury and Woodstock in the centre, and blankets (since 1669) at Witney, now the district seat, in the south. Chipping Norton, a prosperous wool town as early as the 13th century, has fine examples of 16th- and 17th-century stonemasons' skills. Winston Churchill was born at Blenheim Palace 1 mile (1.6 km) south of Woodstock and is buried in the churchyard of the nearby village of Bladon. Area 276 square miles (715 square km). Pop. (1998 est.) 97,400.

West Palm Beach, city, seat (1909) of Palm Beach county, southeastern Florida, U.S. It is situated along the western shore of Lake Worth (part of the Intracoastal Waterway), a lagoon separated from the Atlantic Ocean to the east by a barrier island, about 65 miles (105 km) north of Miami. The town of Palm Beach lies opposite the city on the barrier island.

The area, homesteaded in 1880 by Irving R. Henry, a settler from North Carolina, was developed after the arrival in 1894 of Henry M. Flagler's Florida East Coast Railway. Using the town as a workers' base and transfer point, Flagler developed a winter resort across the lagoon at Palm Beach. As transport facilities improved (which, in addition to the railroad, included constructing the West Palm Beach Canal westward to Lake Okeechobee), West Palm Beach also became a tourist centre, as well as the commercial and financial hub of the area.

Tourism is still the basis of the economy, and manufacturing (including jet and rocket engines), high-technology industries, and citrus shipping are also important. The area has a large retiree population. The Port of Palm Beach, one of the busiest in the state, is immediately to the north.

The city is the home of Palm Beach Atlantic College (1968). Cultural institutions include opera and ballet companies and an art museum. The South Florida Science Museum has a planetarium and aquarium. To the west is Lion Country Safari, a 500-acre (200-hectare) preserve where African animals roam freely amid surroundings similar to their native habitats. Loxahatchee National Wildlife Refuge, in the northern Everglades, is about 15 miles (25 km) southwest of the city. Inc. 1894. Pop. (2000) 82,103; West Palm Beach–Boca Raton–Delray Beach MSA, 1,131,184.

West Point, city, seat (1874) of Clay county, eastern Mississippi, U.S., 47 miles (76 km) south of Tupelo. With Columbus and Starkville it forms the Golden Triangle industrial region. It was developed on land known as "the Granary of Dixie," which was sold to James Robertson (1844) by two Native Americans. A minor battle was fought there (February 1864) during the American Civil War.

The city is now primarily a retirement community. Meat processing and the manufacture of metal products are also important. Mary Holmes College was founded there in 1892. The Prairie Arts Festival is held each summer; the Waverley Mansion (*c.* 1852), one of the largest remaining antebellum plantations, is nearby. Inc. 1858. Pop. (2000) 12,145.

West Point Academy: *see* United States Military Academy.

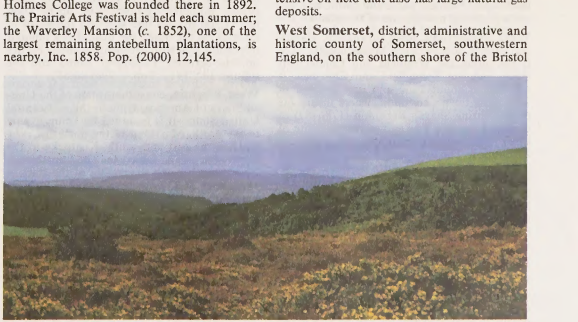
West River (China): *see* Hsi River.

West Scotia Basin, submarine trough of the Scotia Sea, an arm of the South Atlantic Ocean, about 500 miles (800 km) southeast of Tierra del Fuego, South America. Its mean depth is about 9,800 feet (3,000 m), and it is some 700 miles (1,130 km) long and 300 miles (480 km) wide. The submerged Scotia Ridge rises to the north of it and the South Shetland Islands to its south. The West Scotia Basin parallels the East Scotia Basin but is separated from it by a slight submerged rise that runs between the island of South Georgia and the South Orkney Islands. A part of the basin floor is covered with a silt that is probably glacial rock flour; the rest of it is largely covered by oozes made up of the skeletons of diatoms and foraminifera; glass and micro-manganese nodules have been found there. The Antarctic Circumpolar Current flows from west to east in the basin.

West Seneca, town (township), Erie county, western New York, U.S. It was settled in 1842 by the Ebenezer Society, a German religious sect. Between 1855 and 1865, the Ebenezers, sold their property and moved west to Iowa, but not before they established an agricultural economy that has since given way to more specialized nursery, greenhouse, and truck farming. Pop. (2000) 45,920.

West Siberian Plain, Russian ZAPADNO-SIBIRSKAYA RAVNINA, one of the world's largest regions of continuous flatland, central Russia. It occupies an area of nearly 1,200,000 square miles (3,000,000 square km) between the Ural Mountains in the west and the Yenisey River Valley in the east. On the north the West Siberian Plain is bounded by the Kara Sea and in the south by the Turgay Plateau, the Kazakh folded country, and the Altai Mountains. The plain is drained by the Ob, Irtysh, and Yenisey rivers and their tributaries. It is a region of the Earth's crust that has undergone prolonged subsidence and is composed of horizontal deposits from as much as 65,000,000 years ago. Glacial deposits extend as far south as the Ob-Irtysh confluence, forming occasional low hills and ridges, but otherwise the plain is exceedingly flat and featureless and has very poor drainage. Much of it lies within the zone of coniferous forest. Parts of the lowland are underlain by an extensive oil field that also has large natural gas deposits.

West Somerset, district, administrative and historic county of Somerset, southwestern England, on the southern shore of the Bristol



Heather-covered hills in Exmoor National Park, West Somerset
A.F. Kersting

Channel. West Somerset district is an elevated area of moors and wooded hills including the Quantock Hills, the Brendon Hills, and Exmoor, except for a small section of the low-lying Sedgemoor Basin in the extreme east. The western two-thirds of the district, including the Brendon Hills and Exmoor, lies within Exmoor National Park, which was described in Richard Doddridge Blackmore's 19th-century novel, *Lorna Doone.* The park is covered principally with heath or coarse grass, affording sustenance for the native red deer and ponies. The coastal region, popular with tourists, has exceptional rugged headlands interspersed with narrow wooded valleys.

The resort of Minehead, the largest town of the district on the central coast, was formerly a herring port. A nearby town, Dunster, medieval in appearance, has a 16th-century yarn market indicative of its former status as a cloth centre. The town of Porlock, between Exmoor and the Bristol Channel in the sparsely populated extreme west, has a well-known riding school. The administrative centre is Williton, an inland town located between the Brendon and Quantock hills in the less rugged eastern part of West Somerset. Area 281 square miles (727 square km). Pop. (1998 est.) 32,500.

West Spitsbergen, Norwegian VESTSPITSBERGEN, largest island of the Spitsbergen group of islands in the Arctic Ocean, and part of Norway. The Spitsbergen group (area 23,641 square miles [61,230 square km]) is itself the main group of the Svalbard archipelago.

West Spitsbergen, with an area of 15,075 square miles (39,044 square km), is approximately 280 miles (450 km) long and ranges from 25 to 140 miles (40 to 225 km) wide. The terrain is mountainous, and most of the island is covered with glaciers. The highest point on the island is Mount Newton (5,633 feet [1,717 m]) in the northeast. Other notable peaks include Hornsundtind (4,695 feet [1,431 m]) and Drygalski Crest (4,669 feet [1,423 m]). Many other peaks on the mountainous west coast have elevations over 3,000 feet (900 m).

West Spitsbergen is deeply indented by fjords; Longyear city on Is Fjord (the largest fjord on the west coast) is the island's main settlement. Most of the island's few settlements are mining communities on the west coast. Both Norwegians and Russians mine the rich coal deposits, and, consequently, the island has a sizable Russian community. Cruise ships dock at Longyear, and tourists can make walking tours of the island's scenic landscapes. National parks and nature reserves are a relatively new feature of the island.

West Springfield, town (township), Hampden county, southwestern Massachusetts, U.S. It lies along the Westfield and Connecticut rivers opposite Springfield and Chicopee. It was settled about 1660 and incorporated in 1774. The town's common, where insurgents drilled during Shays's Rebellion (1786–87) of dissident farmers, was earlier the campsite of three American armies during the American Revolution. The town now has a service-based economy; light manufactures include electronic components and chemicals. Storrowton Village Museum, the site of the annual Eastern States Exposition (an agricultural and industrial fair), is a restored early New England village. Pop. (2000) 27,899.

West Sumatra (Indonesia): *see* Sumatera Barat.

West Sussex, administrative county of southern England, bordering the English Channel. West Sussex lies within the historic county of Sussex, except for a small area in the north around Gatwick Airport, which belongs to the historic county of Surrey. It comprises seven districts: Adur, Arun, Chichester, Horsham, and Mid Sussex and the boroughs of Crawley and Worthing. The administrative centre is Chichester.

A ridge of chalk hills, the South Downs, runs across the county from east to west. The northern slopes of the Downs are abrupt, where the chalk gives way to the heavy clays and sands of The Weald. To the south the Downs slope more gently toward the English Channel. South of Chichester a fertile coastal plain broadens out into the flat headland of Selsey Bill. Coastal erosion, especially around Selsey Bill, has produced continual changes in the shoreline.

Since the beginning of the 19th century, the growth of seaside resorts has been a major factor in the development of the West Sussex coast. Today the built-up area is almost continuous from Shoreham in the east to Selsey in the west; Littlehampton and Bognor Regis are substantial resorts, while Worthing has developed as a retirement town. Recreational sailing is popular along the indented coastline of the western part of the county. Away from the coast, much of West Sussex remains rural in character, with winding lanes, woodland, and small villages. However, during the 20th century, suburban development spread to the northeastern part of West Sussex, and Gatwick Airport spurred commercial development in and around Crawley. Many residents commute by rail to work in London. Area 768 square miles (1,990 square km). Pop. (1998 est.) 751,800.

West Syrian rite: *see* Antiochene rite.

West Texas Basin: *see* Permian Basin.

West University Place, city, Harris county, southeastern Texas, U.S. A residential suburb southwest of downtown Houston, it is bounded by Bellaire (west) and Southside Place (south) but is entirely encompassed by the city limits of Houston. In 1910 Ben W. Hooper, governor of Tennessee, acquired the site from an old Spanish grant, and development was begun seven years later. In 1925 it was incorporated as a city, and by the 1970s virtually all of its 2 square miles (5 square km) was occupied. The city took its name from its proximity to Rice University (founded 1891). Pop. (2000) 14,211.

West Vancouver, district municipality forming a suburb of Vancouver, southwestern British Columbia, Canada. It lies on the north side of the entrance to Burrard Inlet, across from the city of Vancouver. West Vancouver is an almost exclusively residential community adjacent to North Vancouver and is connected to Vancouver by the Lions Gate Bridge. Bordered by mountains, up to 5,000 feet (1,500 m), on one side and the Strait of Georgia on the other, the district is a popular recreation area with excellent facilities. Ferries operate between Vancouver Island and the suburb. Inc. 1912. Pop. (1996) 40,882.

West Virginia, constituent state of the United States of America, lying in the east-central United States. It is bounded by Pennsylvania to the north, Maryland to the northeast, Virginia to the east and south, Kentucky to the southwest, and Ohio to the northwest. Charleston became the capital of the state in 1885. Area 24,232 square miles (62,761 square km). Pop. (2000) 1,808,344.

A brief treatment of West Virginia follows. For full treatment, *see* MACROPAEDIA: United States of America: *West Virginia.*

The earliest inhabitants of the area were Native Americans known as the Adena, or Mound Builders, whose mounds are still prominent archaeological landmarks at several sites in the state. The Mound Builders were succeeded by the Fort Ancient people, who were in turn succeeded in the 17th century by the Iroquois and the Cherokee. The first permanent settlers entered the area in the 1730s, and the English won control of the region over the French in the 1750s and '60s. After the American Revolution the older settled parts of the area began to fill up. West Virginia was originally part of Virginia, but its largely nonslaveholding population voted against secession in 1861 and split away from Virginia. In 1863 West Virginia was admitted into the Union as a newly constituted state.

All of West Virginia's terrain is in the Appalachian Mountain system. The western two-thirds of the state belongs specifically to the Allegheny Plateau; this region is severely dissected by streams into a maze of irregular hills and valleys. Its drainage runs westward and eventually reaches the Gulf of Mexico. The eastern third of the state is largely occupied by a chain of mountains running northeast to southwest, and its rivers ultimately drain into the Atlantic Ocean. The maximum elevation in West Virginia is 4,861 feet (1,482 m) at Spruce Knob in the east. The lowest elevation is 247 feet (75 m) at Harpers Ferry, near the confluence of the Shenandoah and Potomac rivers. Virtually all of the state's land is rugged, ranging from hilly to mountainous, and there are no extensive areas of level land.

The state has distinct seasons of about equal duration. Mean annual temperatures reflecting latitude and elevation range from about 56° F (13° C) in the south to 52° F (11° C) in the north and 48° F (9° C) in the most mountainous regions. January is the coldest month, with a statewide average of 33° F (1° C), and July is the warmest, with an average of 73° F (23° C).

Forests cover approximately three-fourths of the state. The plateau forests consist of hardwoods of red and white oak, hickory, and beech, as well as yellow poplar, sugar and red maple, basswood, black cherry, and yellow birch. Coniferous softwoods of loblolly pine, shortleaf and white pine, spruce, and hemlock cover the high mountain slopes, deep gorges, and other scattered areas. The eastern section is predominantly an oak and pine woodland. Other species such as sycamore, locust, elm, and dogwood are common. The white-tailed deer, rabbit, squirrel, gray fox, opossum, skunk, raccoon, and groundhog are common in West Virginia, and the black bear thrives in high country. Mountain streams support trout, bass, pike, and muskellunge, while the improving water quality of the larger rivers accommodates increasing numbers of perch, bluegill, catfish, and other species.

The broad, level tops of ridges and the fertile valley bottoms are usually used for agriculture and housing. Rural dwellings are distributed as ribbons of settlement along the highways or near other transportation systems. Many rural inhabitants commute to cities and towns for employment because of the decline of the state's agriculture and the increasing mechanization of the coal-mining industry, which was for a long time the dominant employer in the state. West Virginia has a number of cities with populations of more than 20,000. Of these, Huntington, Wheeling, Parkersburg, and Weirton are situated on the Ohio River. Most urban and industrial growth extends along other streams, as in the Kanawha and Monongahela river valleys. The larger cities, with their industrial concentrations, their political importance, and the cultural centres in their colleges and universities, dominate the state's activities.

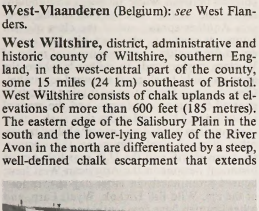
West Virginia has an abundance of natural resources, mostly mineral and energy-producing ones. Bituminous coal, the state's most valuable mineral, is found in almost every section of the state and is produced from underground and open-pit mines. West Virginia was the nation's leading producer of coal for much of the 20th century. Labour strife has periodically marked the coal mining industry, particularly between 1912 and 1921, when the

National Guard and the U.S. Army were repeatedly required to quell violence, but since the right to organize unions was obtained during the 1930s, the industry has been basically peaceful. West Virginia produces significant quantities of natural gas and petroleum, and it ranks among the leading states in its production of thermal electric power. The state also has virtually unlimited quantities of limestone, as well as abundant rock-salt beds. West Virginia has developed a concern for environmental quality and resource conservation, and limits have been placed on the expansion of and the techniques used in the strip mining of its coal. Although the state has traditionally been relatively poor compared to other states, there has been considerable progress since 1950 in the encouragement of manufacturing and in the demand for the state's coal and minerals.

The higher education system includes West Virginia University at Morgantown (1867), Marshall University at Huntington (1837), and several other state-supported educational institutions. The early isolation of mountainous West Virginia resulted in the development and transmittal of a local cultural heritage that was largely unaffected by those of neighbouring regions or of the nation as a whole. Locally produced handicrafts, musical instruments, ballad-singing, and other remnants of the past persist in the rural regions. Tourism and recreation have developed as thriving industries based upon the historical site of Harpers Ferry, the unique rural culture, and the more scenic spots in the mountain areas.

West-Vlaanderen (Belgium): *see* West Flanders.

West Wiltshire, district, administrative and historic county of Wiltshire, southern England, in the west-central part of the county, some 15 miles (24 km) southeast of Bristol. West Wiltshire consists of chalk uplands at elevations of more than 600 feet (185 metres). The eastern edge of the Salisbury Plain in the south and the lower-lying valley of the River Avon in the north are differentiated by a steep, well-defined chalk escarpment that extends



The horse carved in the white chalk hill above the Vale of Avon at Westbury, West Wiltshire
National Monuments Record

through the district. The oolitic limestone of the Cotswold Hills that border the district on the northwest has long provided building stone that is much in evidence throughout West Wiltshire. Agricultural and light industrial towns ("parishes") in the Vale of Avon include Trowbridge, the district seat, and Melksham and Bradford-on-Avon. The town of Westbury is located at the edge of the escarpment, and Warminster, in the uplands, is adjacent to an army camp.

Most of the aforementioned towns were already prosperous in the Middle Ages as clothmaking or woolen-trading centres. Bradford-on-Avon was of particular importance; its unadorned Church of St. Laurence, dating from the 8th to the 11th century, is one of the most complete Anglo-Saxon churches in England. It was neglected in a jumble of other buildings until its true identity and value were recognized in 1856.

Cereals are grown in the district, and cattle, sheep, and pigs are raised. The manufacture of carpets, cloth, gloves, and rubber products is important. Above the Vale of Avon at Westbury there is a figure, of unknown origin, of a giant horse carved in the white chalk escarpment. Area 200 square miles (517 square km). Pop. (1998 est.) 108,600.

West Wind Drift: *see* Antarctic Circumpolar Current.

West Wyalong, town, south-central New South Wales, Australia, in the fertile Riverina district. Founded as a gold-mining settlement in 1895, it was originally known as Main Camp to distinguish it from Wyalong (3 miles [5 km] away). Proclaimed a town in 1900, it became a shire in 1906. Since the last mine closed in 1921, West Wyalong has become the service centre for a region of wheat, stock, and mixed farming and lumbering; it is also the business headquarters for the adjoining towns of Wyalong Central and South Wyalong. Industries include flour mills and sawmills, brick and plaster factories, and a eucalyptus-oil distillery. At the junction of the Newell and Mid Western highways, West Wyalong has rail and air links to Sydney (218 miles [351 km] east). Pop. (1996) 3,419.

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West Yorkshire, metropolitan county of northern England, comprising five metropolitan boroughs: Calderdale, Kirklees, and the city of Bradford in the west and the cities of Leeds and Wakefield in the east. From 1974 to 1986 West Yorkshire was an administrative unit. In 1986 the metropolitan county lost its administrative powers, and its constituent boroughs became autonomous administrative units, or unitary authorities. West Yorkshire is now a geographic and ceremonial county without administrative authority. It encompasses the urban complex that has developed in the deeply etched valleys of the Rivers Aire and Calder as they descend from the Pennine uplands in the west to the Vale of York in the east. West Yorkshire extends north into the scenic valleys of Airedale and Wharfedale.

In the 18th and 19th centuries abundant waterpower and later steam power based on locally mined coal stimulated the growth of industry in the region. The traditional textile towns in the hilly western area, including Huddersfield, Halifax, and Bradford, are no longer major textile producers, and mining in that part of the county has ceased. Today in those areas, including the boroughs of Calderdale and Kirklees, engineering, paper and packing, and light manufacturing are among the most important activities. In the eastern part of the county, coal mining declined dramatically during the late 20th century; only a single mine remains, near the town of Pontefract. Wakefield is the only town that retains a large textile sector. In both Wakefield and Leeds, engineering and food processing are important. Leeds, the largest city in Yorkshire and a major commercial and cultural centre, also has substantial electronics, chemicals, furniture, and printing and publishing sectors, an important financial services industry, and two universities. Area 782 square miles (2,025 square km). Pop. (1998 est.) 2,113,300.

Westbury, town ("parish"), West Wiltshire district, administrative and historic county of Wiltshire, southern England. It was noted as "Westberie a royal manor" in Domesday Book (1086), the record of the land survey ordered by William the Conqueror. The first mention of the town as a borough occurs in 1442–43, but its borough status was lost in 1886. The nearby Westbury White Horse—a figure, of unknown origin, of a giant horse cut in a chalk hillside—was reshaped in 1873. All Saints' Church in the town is Norman, with later additions. Westbury is a railway junction. Its industries include the manufacture of cloth, gloves, and leather. Pop. (1991) 11,863.

Westchester, county, southeastern New York state, U.S., lying just north of New York City. It consists of a hilly region bounded to the east by Connecticut, to the southeast by Long Island Sound, and to the west by the Hudson River.

The original inhabitants of Westchester, Algonquian-speaking Wappinger Indians, were displaced in the 1640s by Dutch colonists along the Hudson and by colonists from New England along what is now the Connecticut border; most of the Wappinger moved westward in 1756. After the surrender of New Netherland to the English in 1664, Westchester became part of the Province of New York and was established as one of New York's original counties in 1683. It was named for Chester, Eng. An area of divided allegiances with many Loyalist residents, it was the scene of extensive military activity during the American Revolution—including the Battle of White Plains (Oct. 28, 1776), a raid by British Lieutenant Colonel Banastre Tarleton (1779), and the apprehension by the Americans of the British spy Major John André near Tarrytown (1780).

The county's narrow, rolling southern reaches are primarily suburban residential areas with generally planned industrial development in the cities of Yonkers, New Rochelle, Mount Vernon, White Plains (the county seat since 1778), and Rye. Light manufacturing includes nonelectrical machinery, food and beverages, printing and publishing, electrical machinery and electronic equipment, chemical products, and clothing. Since the 1950s a number of major multinational corporations have established their headquarters in central and northern Westchester county.

To the north of White Plains, the county widens to double its southern width of about 12 miles (19 km) and is characterized by wooded granite ridges rising to 1,228 feet (374 m) at Anthony's Nose promontory in the northwest corner of the county. Many of its numerous lakes and streams are part of New York City's water-supply system. The hilly country along the Hudson valley was the home of Washington Irving (at Tarrytown) and the locus of some of his writings. Northern Westchester is more sparsely populated, and farms (mainly orchards producing apples and pears) survive among exurban villages. Nursery and greenhouse products and dairy products also have some economic importance. Large estates dating from the late 19th century abound, although many, along with farms, have given way to expensive residential developments on spacious tracts. There is some light industry in the northern part of the county centred at Peekskill.

Among the county's institutions of higher education are the State University of New York College at Purchase (founded 1969), campuses of Pace University at Pleasantville (1963) and White Plains (1976), and a number of small private colleges, including Sarah Lawrence College (established 1926 at Bronxville). Area 433 square miles (1,121 square km). Pop. (2000) 923,459.

Westcott, Brooke Foss (b. Jan. 12, 1825, near Birmingham, Warwickshire, Eng.—d. July 27, 1901, Auckland Castle, Durham), Anglican bishop of Durham, Eng., and biblical scholar who collaborated with Fenton J.A.

Hort on an influential critical edition of the Greek text of the New Testament.

Westcott took a degree at Trinity College, Cambridge, in 1848 and was elected a fellow of the college in 1849. He left Cambridge in 1852 for a post at Harrow, where he earned a distinguished reputation as a lecturer and scholar during a 17-year tenure.

In 1870 Westcott became regius professor of divinity at Cambridge, a position he retained even after being named bishop of Durham in 1890. The Westcott-Hort New Testament appeared in 1881 after nearly 30 years of work and became a major source for the English Revised Version of the Bible published the same year. Westcott also wrote commentaries on the gospel and epistles of St. John, and his *History of the New Testament Canon* (1855) was for many years a standard work in biblical scholarship.

In 1889 Westcott convened a conference of Christians from all over Europe to consider the arms race then afflicting the continent. From this conference emerged the Christian Social Union, with Westcott as its president. His social concerns found other outlets in the promotion of missionary work, which he enthusiastically supported as bishop, and in the mediation of the Durham coal strike of 1892.

Westcott, Edward Noyes (b. Sept. 27, 1846, Syracuse, N.Y., U.S.—d. March 31, 1898, Syracuse), American novelist and banker whose posthumously published novel *David Harum: A Story of American Life* (1898) was immensely popular.

Westcott attended schools in Syracuse until age 16, when he became a junior clerk in a local bank. He devoted the next 30 years of his life to the banking business. In the summer of 1895 Westcott began to write *David Harum* while recuperating in the Adirondack Mountains from tuberculosis. He continued writing the book in Italy and finished it in late 1896 after returning to the United States. The book was rejected by six publishers before it was finally accepted for publication late in 1897.

Westcott died in March 1898, six months before the publication of *David Harum,* which became a best-seller. More than 1,000,000 copies of the book were sold in the next four decades. *David Harum* is the story of a shrewd, crusty small-town banker in upstate New York who has an abundant fund of humour, an obvious talent for horse trading, and a strong streak of Yankee decency. A dramatization of the book in 1900 provided the American comic actor William H. Crane with one of his finest roles. Crane and later Will Rogers appeared in respective motion-picture versions of the story.

Westend (U.S. Virgin Islands): *see* Frederiksted.

Westerbork, small Jewish transit camp in World War II, located near the town of Westerbork in northeastern rural Netherlands. The camp was originally set up in 1939 by the Dutch government to accommodate Jewish refugees from Nazi Germany; but, after the Germans had conquered the country in July 1940, Westerbork functioned as a transit camp where Jewish inmates were worked before shipment east to other concentration camps or extermination camps. Anne Frank and her family were briefly incarcerated there immediately after their arrest in August 1944.

Westerly, town (township), Washington county, southwestern Rhode Island, U.S. It lies along the Pawcatuck River across from Pawcatuck, Conn. The state's westernmost town, whence the name, it includes the villages of Westerly, Bradford, White Rock, part of Potter Hill, and the resorts of Weekapaug, Avondale, Misquamicut, and Watch Hill. In 1648 the first permanent European settlers arrived; newcomers from a land company in Newport came in 1661, and the town was incorporated in 1669. Westerly was a shipbuilding centre from its early days until the 19th century. Before the War of 1812, Oliver Hazard Perry, the American naval hero, built gunboats there for the government. The present economy depends partly on tourism and the manufacture of textiles and fishlines. A U.S. Coast Guard lighthouse is at Watch Hill. Woody Hill Management Area (for sustained forest growth and hunting) is in eastern Westerly. Pop. (1994 est.) 22,334.

Westermann, Diedrich, in full DIEDRICH HERMANN WESTERMANN (b. June 24, 1875, Baden, Ger.—d. May 31, 1956, Baden, W.Ger.), German scholar of African languages and culture who refined and extended the work of Carl Meinhof, his teacher. Westermann specialized in the languages of an enormously complex linguistic region extending from the Sénégal River eastward to the upper reaches of the Nile River.

Westermann was first a missionary in Togo, western Africa, and later a professor at the Institute for Oriental Languages in Berlin. His 1911 publication, *Die Sudansprachen* ("The Languages of the Sudan"), paralleled Meinhof's work on the Bantu languages: it postulated the genetic unity of a group of languages that had earlier been classified as "Mixed Negro," and he reconcted a parent language, "Ur-Sudan," that preceded them. To do so, Westermann compared the structures and vocabularies of eight Sudanese languages (Ewe, Twi, Ga, Yoruba, Efik, Kunama, Nuba, and Dinka). His next major contribution was "Sprache und Erziehung" ("Language and Education"), which was Part 2 of *Völkerkunde von Afrika* (1940; "Ethnology of Africa"). This major classification of African languages established three major divisions: the Khoisan languages, the Negro languages (including the Sudan, Bantu, and Nilotic), and the Hamito-Semitic languages (since reorganized and now called Afro-Asiatic). In this work, his method was to draw correspondences and not conclusions, but he did implicitly reject some of Meinhof's groupings.

Westermann's publications on African culture include *Der Afrikaner heute und morgen* (1937; *The African Today and Tomorrow*) and *Geschichte Afrikas* (1952; "History of Africa").

Westermarck, Edward, in full EDWARD ALEXANDER WESTERMARCK (b. Nov. 20, 1862, Helsinki, Fin.—d. Sept. 3, 1939, Lapinlahti), Finnish sociologist, philosopher, and anthropologist who denied the widely held view that early humans had lived in a state of promiscuity and instead theorized that the original form of human sexual attachment had been monogamy. He asserted that primitive marriage was rooted in the needs of the nuclear family, which he considered to be the fundamental and universal unit of society.

Westermarck was a lecturer in sociology at the University of Helsinki (1890–1906) and then professor of moral philosophy (1906–18) and professor of philosophy at the Åbo Academy (1918–30). He also was professor of sociology at the University of London (1907–30). Westermarck helped introduce the work of Adam Smith, Herbert Spencer, and other British thinkers into Finland.

Westermarck's major interests were the history of marriage, the comparative sociological study of moral ideas and various human institutions, and the culture of Morocco. His first book was the influential *The History of Human Marriage* (1891), in which he advanced his ideas on primitive marriage and society. His most important work, however, is considered to be *The Origin and Development of the Moral Ideas,* 2 vol. (1906–08), in which he proposed a theory of ethical relativity according to which moral judgments are ultimately based on emotions of approval and disapproval rather than on intellect. Viewing ethics as a sociological and psychological discipline, he denied the existence of general moral truths and the objective validity of moral judgments. He favoured an ethic that would examine moral consciousness but not establish rules for conduct. Westermarck's other writings include *Ritual and Belief in Morocco,* 2 vol. (1926), and *Ethical Relativity* (1932).

Consult the INDEX *first*

western, an original genre of novels and short stories, motion pictures, and television and radio shows that are set in the American West, usually in the period from the 1850s to the end of the 19th century. Though basically an American creation, the western had its counterparts in the gaucho literature of Argentina and in tales of the settlement of the Australian outback. The genre reached its greatest popularity in the early and middle decades of the 20th century and declined somewhat thereafter.

The western has as its setting the immense plains, rugged tablelands, and mountain ranges of that portion of the United States lying west of the Mississippi River, in particular the Great Plains and the Southwest. This area was not truly opened to white settlement until after the American Civil War (1861–65), at which time the Plains Indians were gradually subdued and deprived of most of their lands by white settlers and by the U.S. cavalry. The conflict between white pioneers and Indians forms one of the basic themes of the western. Another sprang out of the class of men known as cowboys, who were hired by ranchers to drive cattle across hundreds of miles of Western pasturelands to railheads where the animals could be shipped eastward to market. (*See* cowboy.) The cattle and mining industries spurred the growth of towns, and the gradual imposition of law and order that such settled communities needed was accomplished by another class of staple figures in the western, the town sheriff and the U.S. marshal. Actual historical persons in the American West have figured prominently in latter-day re-creations of the era. Wild Bill Hickok, Wyatt Earp, and other lawmen have frequently been portrayed, as have such notorious outlaws as Billy the Kid and Jesse James.

The western has always provided a rich mine for stories of adventure, and indeed a huge number of purely commercial works have capitalized on the basic appeal of gunslinging frontier adventurers, desperadoes, and lawmen. But the western has also furnished the material for a higher form of artistic vehicle, particularly in motion pictures. This was perhaps because the historical western setting lacked the subtly confining web of social conventions and mundane safeties that typify more settled societies. The West's tenuous hold on the rule of law and its fluid social fabric necessitated the settling of individual and group conflicts by the use of violence and the exercise of physical courage, and the moral dramas and dilemmas arising within this elemental, even primeval, framework lent themselves remarkably well to motion-picture treatment.

In literature, the western story had its beginnings in the first adventure narratives that accompanied the opening of the West to white settlement shortly before the Civil War. Accounts of the western plainsmen, scouts, buffalo hunters, and trappers were highly popular in the East. Perhaps the earliest and finest work in this genre was James Fenimore Cooper's *The Prairie* (1827), though the high artistic level of this novel was perhaps atypical in regard to what followed. An early writer to capitalize on the popularity of western adventure narratives was E.Z.C. Judson, whose

pseudonym was Ned Buntline; known as "the father of the dime novel," he wrote dozens of western stories and was responsible for transforming Buffalo Bill into an archetype. Owen Wister, who first saw the West while recuperating from an illness, wrote the first western that won critical praise, *The Virginian* (1902). Classics of the genre have been written by men who actually worked as cowboys; one of the best loved of these was *Bransford in Arcadia* (1914; reprinted 1917 as *Bransford of Rainbow Range*) by Eugene Manlove Rhodes, a former cowboy and government scout. Andy Adams incorporated many autobiographical incidents in his *Log of a Cowboy* (1903). By far the best-known and one of the most prolific writers of westerns was Zane Grey (*q.v.*), an Ohio dentist who became famous with the classic *Riders of the Purple Sage* in 1912. In all, Grey wrote more than 80 books, many of which have retained wide popularity. Another popular and prolific writer of westerns is Louis L'Amour.

Western short stories have also been among America's favourites. A.H. Lewis (*c.* 1858–1914), a former cowboy, produced a series of popular stories told by the "Old Cattleman." Stephen Crane created a comic classic of the genre with "The Bride Comes to Yellow Sky" (1898), and Conrad Richter (1890–1968) wrote a number of stories and novels of the Old Southwest. The Western Writers of America, formed in 1952, has cited many fine western writers: Ernest Haycox (1899–1950); W.M. Raine (1871–1954), a former Arizona ranger who wrote more than 80 western novels; and B.M. Bower (1871–1940), a woman whose talent for realistic detail convinced thousands of readers that she was a real cowboy writing from personal experience. Other western classics are *The Ox-Bow Incident* (1940) by Walter van Tilburg Clark, who used a Nevada lynching as a metaphor for the struggle for justice; A.B. Guthrie, Jr.'s *The Big Sky* (1947), about frontier life in the early 1840s, and *The Way West* (1949); and Larry McMurtry's *Lonesome Dove* (1985). Many western novels and short stories first appeared in pulp magazines, such as *Ace-High Western Stories* and *Double Action Western*, that were specifically devoted to publishing works in the genre.

The western film can be dated from Edwin S. Porter's *The Great Train Robbery* (1903), which set the pattern for many films that followed. D.W. Griffith made a series of highly successful westerns in the years before World War I. During the silent-screen era three actors achieved great popularity as stars of westerns. G.M. (Bronco Billy) Anderson, the screen's first cowboy star, made hundreds of pictures that appeared almost weekly for four years; William S. Hart realistically portrayed a strong, silent man of the frontier; and Tom Mix dazzled audiences with his polished horsemanship and cleverness in outwitting outlaws. Buck Jones, Hoot Gibson, Ken Maynard, William Boyd (Hopalong Cassidy), and Harry Carey, other early cowboy stars, contributed to a romanticized concept of the hero of westerns.

Most of the hundreds of westerns made from the 1920s to the 1940s were low-budget films that had only slight variations on standard plots. But an increasing number were "big" or "epic westerns," a type introduced in James Cruze's *The Covered Wagon* (1923) and John Ford's *The Iron Horse* (1924). This type featured important stars and used larger budgets and modern production methods. The first epic western to use talking in its soundtrack was Raoul Walsh's *The Big Trail* (1930). Other early epic westerns include *Cimarron* (1931), *Destry Rides Again* (1939), and John Ford's *Stagecoach* (1939). The latter film starred John Wayne, who was to become the mainstay of many westerns. The singing cowboy, first made popular by Gene Autry and later by Tex Ritter and Roy Rogers, was an odd accoutrement of some of the westerns of the late 1930s, '40s, and '50s.

The epic western entered its heyday in the 1940s and '50s with high-quality films by important directors such as John Ford (*My Darling Clementine;* 1946), Howard Hawks (*Red River;* 1948), Michael Curtiz (*Santa Fe Trail* and *Virginia City;* both 1940), Fritz Lang (*Western Union;* 1941), William Wellman (*The Ox-Bow Incident;* 1943), King Vidor (*Duel in the Sun;* 1946), and others. Their films were marked by greater artistic self-expression and a somewhat more rigorous historical realism.

A new and intently serious western that could treat a wide variety of themes with sensitivity and dramatic realism appeared in the 1950s. Notable among these films were Henry King's *The Gunfighter* (1950), Anthony Mann's *Winchester 73* (1950) and *The Man From Laramie* (1955), Fred Zinnemann's *High Noon* (1952), Fritz Lang's *Rancho Notorious* (1952), George Stevens' *Shane* (1953), Nicholas Ray's *Johnny Guitar* (1954), Samuel Fuller's *Run of the Arrow* (1956), William Wyler's *The Big Country* (1958), and Howard Hawks's *Rio Bravo* (1959). These later westerns tended to dispense with the traditional models of the "good" lawman and the "bad" outlaw and instead treated their main characters as complex and fallible human beings. Westerns explored various moral ambiguities and topical problems by means of dramatic allegories set in the Old West, thereby becoming a completely sophisticated genre in the process.

The emphasis on human psychology and motivation continued into the 1960s with such films as Marlon Brando's *One-Eyed Jacks* (1961), Ford's *The Man Who Shot Liberty Valance* (1962), and Sam Peckinpah's *Ride the High Country* (1962), but there was also a new accent on graphically portrayed violence, as in Peckinpah's *The Wild Bunch* (1969). There was also a shift in sympathy toward the Indians, the previous film depictions of whom were remarkably lacking in both understanding and appreciation. This new sympathy was exemplified in Ford's *Cheyenne Autumn* (1964) and Arthur Penn's *Little Big Man* (1970).

By the time that Wayne made his last film (*The Shootist;* 1976), the epic western was clearly suffering from exhaustion, as cinematic attempts to debunk the mythologies of the Old West had merely resulted in the destruction of the genre's credibility and relevance altogether. These efforts did, however, produce some notably light-hearted westerns, including *Cat Ballou* (1965), *Butch Cassidy and the Sundance Kid* (1969), and *Blazing Saddles* (1974). During the late 1960s and the '70s, low-budget, Italian- and Spanish-made western films achieved some commercial success. Sergio Leone was the chief director of such films, and Clint Eastwood, his principal actor in *A Fistful of Dollars* (1964) and *The Good, the Bad, and the Ugly* (1967), went on to direct and star in a few notable resuscitations of the western, including *The Outlaw Josey Wales* (1976), *Pale Rider* (1986), and *Unforgiven* (1992). But by the 1980s westerns had virtually ceased to be produced in the United States. They were partially replaced by the space epic, a genre in which often all of the aspects of a western were utilized but the setting. Kevin Costner's *Dances With Wolves* (1990), another film sympathetic to the Indians, was one of the most successful westerns made late in the 20th century.

Westerns were also serialized on radio programs during that medium's heyday in the 1930s and '40s. The best known of these western radio dramas were "The Lone Ranger," featuring the mysterious lawman of that name, and "Death Valley Days," which was set in the Far West. The medium of television also took up westerns in its earlier years. Such long-lived series as "Gunsmoke," "Bonanza," "The Big Valley," and a half-dozen others captured large viewing audiences in the late 1950s and the '60s, after which their popularity faded.

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Scene from *The Ox-Bow Incident* (1943), a western starring Henry Fonda (second from right)
Everett Collection

western Africa, also called WEST AFRICA, region of the western African continent comprising, in the *Encyclopædia Britannica,* the countries of Benin, Burkina Faso (formerly Upper Volta), Cameroon, Cape Verde, Chad, Côte d'Ivoire (Ivory Coast), Equatorial Guinea, The Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone, and Togo. Excluded here is the Western (former Spanish) Sahara, which is often placed within the region although its cultural orientation is toward North Africa.

A brief treatment of western Africa follows. Fuller treatment is provided in the following MACROPAEDIA articles. For full details about its geography and history, *see* Western Africa. For information about the region and its major physiographic features in their continental setting, *see* Africa. For information about the major cultural manifestations of the region, *see* African Arts.

The 19 countries of western Africa occupy an area of about 3,068,400 square miles (7,947,000 square km). The region may be divided into several broad physiographic regions. The northern portion of western Africa is composed of a broad band of semiarid terrain, called the western Sudan, stretching from the Atlantic Ocean on the west to the area of Lake Chad on the east, a distance of about 2,500 miles (4,000 km). It is largely a plateau

of modest elevation and borders the Sahara (desert) on the north and the Guinea Coast forests on the south. Rainfall in this region ranges from less than 10 inches (250 mm) in its arid northern reaches to about 50 inches (1,250 mm) in the south. The flora of the western Sudan consists of the scrub vegetation of the transitional zone known as the Sahel in the north and of a mix of tall trees and high savanna grasslands in the south. Lying south of the western Sudan are the Guinea coast equatorial forests, which flourish along the Atlantic coast and extend inland for about 100 to 150 miles (160 to 240 km).

Most of the Sahara and the transitional vegetational zones to its south (the Sahel and the western Sudan) are drained where there is enough rainfall to support surface streams, either southward via the Niger River system or inland to the Lake Chad basin in the east. Along the better-watered Atlantic coastal areas, the chief features are (west to east) the Mauritanian-Senegal Basin, drained by the Sénégal River; the Fouta Djallon and Guinea highlands; the Volta River and Niger River coastal plains; and the uplands of Nigeria's Jos Plateau and the Cameroon Highlands.

Culturally, the people of the region belong for the most part to one of three major language families. In the northern and least-populous Saharan regions, Arabs and Berbers of the Semito-Hamitic language family predominate. South of a line connecting the course of the Sénégal River, the Niger River, and the southern two-thirds of Nigeria, Niger-Congo languages are spoken. Along the middle course of the Niger River and around Lake Chad, Nilo-Saharan languages related to those of peoples farther east predominate. These peoples are divided into a very complex ethnic and tribal mosaic but may often be conveniently classified by their individual languages.

Evidence of the earliest human habitation of the region has been best preserved in the Sahara, where stone tools and rock paintings attest to Paleolithic hunters and gatherers between 100,000 and 50,000 years ago. They were succeeded by Neolithic pastoralists (the Sahara then had a far more hospitable climate) during the last 10,000 years. Because most of these peoples were nonliterate, they left few records of the period up to about AD 1000, when Arab historians and scholars began describing a western African region that already possessed centralized states, agriculture, and long-distance trading routes. From the 11th to 16th century these kingdoms of the savanna, Sudan, and southern Sahara—chief of which were those of Mali, Songhai, and the Hausa Bakwai states—grew, coalesced, divided, and waned. Toward the end of this period, trading contacts with European powers began to grow around the coastal periphery of the Guinea coast and elsewhere, gradually supplanting the trans-Saharan caravan routes with the waning Arab states of North Africa.

During the 15th and 16th centuries, gold was the principal attraction for the European powers, but this gave way in the 17th century to the slave trade, which predominated by the 18th century. European colonialism became aggressive during the second half of the 19th century, and by World War I most of the native states had become colonial possessions of the French, British, Germans, Portuguese, and other European powers. Liberia was the only independent state during this period. Great economic advances occurred during the interwar period, but these were exploitive in nature and tended to result in structural imbalances in the local national economies. After World War II the climate of world opinion, the interwar growth of indigenous nationalist movements in many of the countries of the region, and the emergence of local bureaucracies led to the divestiture by the European powers of their western African colonies. Ghana became the first British colony in western Africa to reach independence (in 1957), and it was followed by Nigeria (1960), Sierra Leone (1961), and The Gambia (1965). Most of France's colonial possessions in the region reached independence in 1960, and thus the nations of Dahomey (now Benin), Upper Volta (now Burkina Faso), Cameroon, Chad, Ivory Coast (Côte d'Ivoire), Mali, Mauritania, Niger, Senegal, and Togo came into being. The Portuguese did not relinquish their possessions until guerrilla warfare forced them out. Guinea-Bissau achieved independence in 1974, and Cape Verde in 1975. Spanish-held Equatorial Guinea attained independence in 1968.

In the first 25 years of independence there were few successes in the struggle for economic development, and most efforts toward local development were negated by political instability, bureaucratic inefficiency and corruption, tribalism, natural disasters, and the economic dependence of many countries on a single agricultural or mineral export. There were some successes, however, particularly among the former French colonies; Côte d'Ivoire and Cameroon were notable for their stable governments and for their pragmatic development strategies, which concentrated on export-oriented tropical agriculture as the basis of foreign-exchange earnings. The Sahel states of Burkina Faso, Chad, Mali, and Niger were perhaps the most unfortunate, since these semiarid countries had limited food-producing resources to begin with and were extremely vulnerable to drought and to desertification. Pop. (1994 est.) 206,123,000.

Western Air Lines, Inc., former American airline that was first incorporated in 1925 as Western Air Express, Inc., reincorporated in 1928 as Western Air Express Corp., and renamed Western Air Lines in 1941. The airline was acquired by Delta Air Lines, Inc. (*q.v.*), in 1987.

Less than a month after becoming an operating mail carrier for the federal government, Western began the first scheduled and sustained passenger service in the United States (May 23, 1926), on a route between Salt Lake City, Utah, and Los Angeles, via Las Vegas, Nev. In 1928 regular service was inaugurated between Los Angeles and Oakland, Calif., and soon a series of weather stations were established enroute, the first for any airline.

In 1930 Western became part of Transcontinental & Western Air (TWA); but government pressure and the loss of mail contracts in 1934 caused many amalgamated airlines to split up. Western became fully independent again, reduced to its Salt Lake City–Los Angeles route, with a spur to San Diego, Calif. During the 1940s and '50s, however, the airline grew, and in 1967 it merged with Pacific Northern Airlines. Western subsequently added more routes, and by the time it was acquired by Delta it served the West Coast, the Rockies, the northern Midwest, Alaska, Hawaii, and Miami, Fla.

Western Australia, state of western Australia, occupying the part of the continent most isolated from the major cultural centres of the east. Western Australia is bounded on the north by the Timor Sea, on the northwest and west by the Indian Ocean, and on the south by the Antarctic Ocean. To the east lie the Northern Territory and South Australia. The state has an area of 975,100 square miles (2,525,500 square km), constituting one-third of the total area of the continent.

A brief treatment of Western Australia follows. For full treatment, *see* MACROPAEDIA: Australia.

Physical and human geography. Western Australia consists almost entirely of a low, dry tableland. It is separated by desert from the more thickly populated eastern-coastal belt of the continent. There are few rivers that flow year-round. There are no large lakes, and rainfall is insufficient everywhere except in the southwest corner and in the far north. Between December and March disastrous hurricanes ("willy-willies") sometimes hit the coast between Broome and Onslow and proceed southeastward, bringing torrential rains and some flooding.

Botanically, there are three provinces in Western Australia. In the northern province the flora is rich in Malayan (Paleotropical) forms, whereas in both the desert and the southwestern provinces, native plants are strongly represented. Long isolation without biological or human interference has resulted in the evolution of many forms peculiar to the region. There are approximately 7,000 species of plants, the strangest being the carnivorous, insect-eating pitcher plant, the kangaroo paws, the feather flower, and the Christmas tree.

The main woodland is in the southwest; jarrah, a type of eucalyptus, grows on the sandy coastal plain, and karri, another eucalyptus, occurs on the far southwest. Of two other eucalypti, the tuart is restricted to the coastal plain and the wandoo grows throughout the jarrah forest area.

Western Australia contains less than one-tenth of Australia's total population. There are about 38,000 Aborigines in the state. About two-thirds of the population has been born in Australia.

Agriculture in Western Australia is specialized and commercial in character. Wool production, mostly from Merino sheep, is the most widespread of the state's rural industries. The state is also one of Australia's granaries; wheat is the major crop. Dairying is important in the more heavily timbered country of the extreme southwest, including the coastal area south of Perth, where irrigation and drainage projects have considerably increased productivity. Meat production is mainly a sideline to wool production, wheat growing, and dairying; it ranks below wool and crops in value.

Almost two-thirds of the prime-forest belt has been designated as state forest for the production of timber in perpetuity. Managed under the principle of sustained yield, these forests provide most of the state's total timber output. The remainder comes from private property. There is a sawmilling industry using jarrah and karri woods, both of which are renowned for their strength and durability.

Gold was discovered toward the end of the 19th century, and iron-ore deposits in the Pilbara region (northwest) have been exploited since the 1950s. Other minerals produced include tin, ilmenite, monazite, rutile, leucoxene, and zircon. A large bauxite deposit in the hills near Perth is being mined. Oil and natural gas are extracted from the northwest shelf off the Port Hedland–Karratha coast. A diamond mine at Argyle has become one of the world's greatest producers of this mineral.

Manufacturing is confined mainly to the Perth metropolitan area. Apart from industries related to primary production, a large oil refinery and a steel-rolling mill have become the nucleus of an industrial complex of allied industries. The city of Albany has the only good natural harbour.

The education of its sparse population is addressed by Western Australia through programs of busing, correspondence classes, and the use of itinerant teachers in the remote northwest. The University of Western Australia (founded 1911) has faculties in the arts, law, education, economics and commerce, science, engineering, agriculture, architecture, dental science, and medicine. There are technical schools and teacher-training colleges.

Perth, the state capital, has an annual summer festival featuring theatre, music, ballet, films, and visual arts. The West Australian Arts Orchestra has the support of both the state

government and the Australian Broadcasting Corporation. The Wigmore Music Library at the state university has an extensive collection of Aboriginal music. The Art Gallery of Western Australia has paintings, sculpture, and Aboriginal art.

History. Aborigines have occupied Western Australia for about 40,000 years. Until European contact, their hunter-gatherer way of life was largely undisturbed. Early in the 17th century, Dutch navigators encountered the west coast of Australia, but the coastline was treacherous, and they saw no potential for exploitation of the land. Later navigators, both British and French, seemed to draw the same conclusion; only in 1826 did the governor of New South Wales stake a claim on the region. Captain James Stirling led the first group of settlers—Australia's first nonconvict colony—in 1829–30. Of 4,000 original settlers, only 1,500 remained in 1832. By the 1860s pastoralism had taken hold, and wool was the colony's staple export. Nonetheless, development of the region was relatively slow. Gold was discovered in 1886; the resulting economic activity revolutionized the economy of the region and prompted a movement for constitutional autonomy. Although the British government attempted to make some provision for the displaced Aborigines, the settlers of Western Australia repealed a single proviso to that effect in 1897, seven years after self-government was granted. In 1901 Western Australia became a constituent state of the newly constituted Commonwealth of Australia. Pop. (1996 est.) 1,755,500.

Western Bancorporation: *see* First Interstate Bancorp.

Western Bohemia: *see* Západočeský.

Western Cape, province, Republic of South Africa, situated in the southern extremity of the African continent. The provincial capital, Cape Town, is also the nation's legislative capital. Western Cape province was part of former Cape of Good Hope province until 1994. Coastline fronting the Atlantic and Indian oceans forms Western Cape's western and southern boundaries, respectively. The province borders Northern Cape province to the north and Eastern province to the east.

Western Cape province lies just to the south of the great interior plateau (Highveld) of southern Africa. The southward edges of this plateau form a conspicuous rocky escarpment extending roughly along the northern border of the province. The central part of the province consists of the semiarid plateaus of the Karoo region, which are separated by east-west–running mountain ranges—including the Great Swart Mountains—and extend as far south as the Lange Mountains. The narrow coastal zone south and west of the Karoo has varied relief from which the sandy Cape Columbine extends to the west and the rocky Cape of Good Hope extends to the southwest. The province is drained by the Olifants, Berg, Breë, Gourtis, and other small rivers.

A maritime climate and accompanying vegetation are found in the coastal regions. Much of the remainder of the land to the north has a Mediterranean climate changing to semiarid farther north. The mean annual precipitation over most of the province amounts to less than 15 inches (380 mm), and areas of the northwest receive less than 5 inches (125 mm). Inland daily maximum temperatures usually range from 68° F (20° C) in winter (July) to 90° F (32° C) in summer (February).

In the late 20th century, approximately three-fifths of the province's population was of mixed race, one-fourth was white, and the remainder was black. Almost all of the population was urban, concentrated for the most part in the city of Cape Town. Xhosa, a Bantu language, is spoken by many blacks, and both Afrikaans and English are important.

Although Western Cape province's economy is diversified, agriculture dominates, traditionally employing many blacks. In the late 20th century, much of South Africa's wool, wheat, alfalfa (lucerne) hay, and fruit (including apples, pears, apricots, and peaches) came from Western Cape province, as did almost all of its wine. The interior is a sheep-raising region. Ostrich feathers were once an important product, but their value is now far surpassed by that of alfalfa seed, hay, fruit, tobacco, and wool. The area enjoys a steady export trade in fresh fruit, table grapes, wine, brandy, and canned goods. Timber is a valuable product in the area east of Mossel Bay on the south coast.

Rich Atlantic fishing grounds, ranging from Cape Agulhas to as far north as Namibia, supply an important fish meal and canning industry. The province's manufacturing industries include textiles, clothing, footwear, motor vehicles, tires, fertilizers, pesticides, and petrochemicals, along with marine engineering and ship repair. The province's mineral resources are not extensive.

There are universities at Cape Town, Stellenbosch, and Bellville. Cape Town has numerous libraries and museums—including the South African Museum (founded 1825). Traveling companies sponsored by the Cape Performing Arts Board stage theatrical and ballet performances throughout the province. Area 49,950 square miles (129,370 square km). Pop. (1995 est.) 3,721,000.

Western Chin, a phase of the Chin dynasty, ruling China from AD 265 to 317. *See* Chin dynasty.

Western Dvina River, Russian ZAPADNAYA DVINA, Lettish DAUGAVA, Belarusian DZVINA, major river of Latvia and northern Belarus. It rises in the Valdai Hills and flows 632 miles (1,020 km) in a great arc south and southwest through Russia and Belarus and then turns northwest prior to crossing Latvia. It discharges into the Gulf of Riga on the Baltic Sea. Its tributaries include the Mezha, Kasplya, Ula, and Dzisna entering from the left and the Toropa, Drysa, Aiviekste (with its tributary the Pededze), and Ogre entering from the right.

The Western Dvina drains an area of approximately 34,000 square miles (88,000 square km). Most of the river basin is between 300 and 700 feet (100 and 200 m) above sea level—a rolling plain with numerous swamps and forests. The basin also has more than 5,000 lakes, most quite small. Among the larger are lakes Rezna and Lubana, in Latvia; Zhizhitsa, in the river's upper reaches; Osveya and Drysvyaty, in the middle part of the basin on the border of Belarus and Latvia; and Lukoml, in the southernmost part. The basin has a humid climate with warm summers and mild winters.

The Western Dvina draws much of its water from melting snow, and consequently, like other rivers of the eastern European plains, it has high spring floodwaters. It also floods after heavy rains. In spring the water level rises by 20 to 35 feet (6 to 11 m) or more at various places. Its average discharge is about 25,000 cubic feet (700 cubic m) per second. The ice-bound period begins in the upper reaches in late November or early December and somewhat later in the middle part of the course. Thawing begins near the mouth of the river about the end of March, and in the upper reaches the water is open by about the middle of April.

The Western Dvina has been an important water route since early times. Connected in its upper reaches by easy portages to the basins of the Dnieper, Volga, and Volkhov rivers, it constituted part of the great trade route from the Baltic region to Byzantium and to the Arabic east. At the beginning of the 19th century the Western Dvina was joined by canals through its tributary, the Ula, to the Byarezina (Berezina) River and thus to the Dnieper, but this system was never much used except for rafting timber. Through another tributary, the Drysa, it is connected with Lake Sebezha, and a small canal unites the Western Dvina with the Gavya River.

The river was first studied intensively in 1701, when, by command of Tsar Peter I, a survey was made from its source to the city of Polotsk (now Polatsk, Belarus). In 1790–91 a detailed atlas of the Western Dvina from Vitebsk (now Vitsyebsk, Belarus) to Riga was published.

The abundance of rapids and, in the 20th century, the presence of dams have restricted navigation on the river to a few separate stretches. The main items carried are lumber, construction materials, and grain. Seagoing vessels navigate the mouth of the river as far as Riga, 9 miles (15 km) from the sea. Hydroelectric stations have been built at Ķegums, Plaviņas, and Riga.

Western Electric Company Inc., American telecommunications manufacturer that throughout most of its history was under the control of the American Telephone and Telegraph Company (AT&T). The company was dissolved as a separate subsidiary in 1983 with the breakup of AT&T, though the Western Electric brand name continued to be used. Its factories were taken over by AT&T Technologies. It was the major manufacturer of a broad range of telephone equipment: telephones, wires and cables, electronic devices and circuits, power equipment, transmission systems, communications satellites, and so on. It was also a prime defense contractor for such products as radar, aerospace guidance and communications systems, missile systems, and nuclear weapons.

The company was founded in Cleveland, Ohio, in 1869 as an electric-equipment shop under the name of Gray & Barton. In the same year, the founders, Elisha Gray and Enos N. Barton, moved the firm to Chicago. By 1872, when it was incorporated as the Western Electric Manufacturing Company, it was beginning its successful career of manufacturing a number of new inventions, including the world's first commercial typewriters and incandescent lamps. In 1878–79, when Western Union and Bell Telephone were battling in and out of court for control of the burgeoning telephone industry, Western Electric was Western Union's major ally and supplier. But in 1881, after winning the patent war, Bell Telephone bought a controlling interest in Western Electric. In the following year the company was reincorporated as Western Electric Company and became a part of the Bell company that came to be known as AT&T.

Western European Union (WEU), association of 10 nations (Belgium, France, Germany, Greece, Italy, Luxembourg, The Netherlands, Portugal, Spain, and the United Kingdom) that operates as a forum for the coordination of matters of European security and defense. It contributed to the creation of the North Atlantic Treaty Organization (NATO) and works in cooperation with that organization.

The WEU grew out of the Brussels Treaty of 1948—an agreement between the nations of Belgium, France, Luxembourg, The Netherlands, and the United Kingdom to provide for collective defense and to facilitate cooperation in economic, social, and cultural matters. NATO and the Council of Europe, both of which were formed in 1949, developed out of that framework. In 1954 the Brussels Treaty was strengthened and modified to include West Germany and Italy, to end the occupation of West Germany, and to include West Germany in NATO; and the WEU came into

being on May 6, 1955. In 1960 the activities of committees for social and cultural affairs were transferred to the Council of Europe. In 1984 the union was "reactivated" and a new agenda was established: it recognized the significance of U.S. arms to the defense of Europe and resolved to increase regional military cooperation. In 1990 Portugal and Spain joined the union; Greece joined in 1995. The WEU also has associate members, observer countries, and associate partners.

The WEU is administered by a council consisting of the ministers of foreign affairs and of defense of the member nations. The council is responsible for policy formulation and holds meetings (twice a year at the ministerial level, more often at the ambassadorial level) to discuss problems of common concern. Three internal agencies are also involved. The assembly of the WEU, which has a number of permanent committees, consists of the delegates of the member nations to the Parliamentary Assembly of the Council of Europe. Headquarters of the WEU are in Brussels.

Western Indian bronze, any of a style of metal sculpture that flourished in India during the 6th to the 12th century and later, mainly in the area of modern Gujarāt and Rājasthān states. The bronzes are, for the most part, images of the Jaina faith—representations of the saviour figures and ritual objects such as incense burners and lamp bearers.

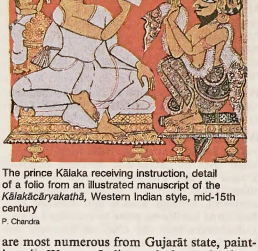
Important hoards have been discovered at Akota, near Vadodara (formerly Baroda, in Gujarāt), and at Vasantgarh, near Pindwāra (Rājasthān). The images are mostly small in size, intended for private worship. The bronzes were cast by the cire-perdue ("lost wax") process, and the eyes and ornaments are frequently inlaid with silver and gold. In the earliest images—such as the Ṛsabhanātha and the Jivantasvami (Mahāvīra as prince) from Akota that are now in the Baroda Museum—the Gupta idiom is apparent.

The dictates of the Jaina religion, which emphasizes the detachment of the Tīrthaṅkaras from the world, left little scope for variety of representation (*see* Tīrthaṅkara). The main figures are shown either standing stiffly with arms to the side in the *kāyotsarga* ("abandoning the body") pose or sitting in the posture of meditation (dhyana-mudra). More variety is seen in the attendant figures, such as the graceful *caurī* ("whisk") bearer from Akota in the Baroda Museum. From the 8th century the number of attendant figures, such as yakshas and yakshis (respectively, male and female nature deities), and of the Tīrthaṅkaras increased, and the composition became more elaborate. This tendency reached its extreme in metal images depicting all 24 Tīrthaṅkaras. With the elaboration of design, the quality of the modeling became increasingly dry, so that the later bronzes are somewhat static.



Ṛsabhanātha, Western Indian bronze from Chāhārdi, western Khāndesh, Mahārāshtra state, 9th century AD; in a private collection
P. Chandra

Western Indian painting, also called JAINA PAINTING, a highly conservative style of Indian miniature painting largely devoted to the illustration of Jaina religious texts of the 12th–16th century. Though examples of the school



The prince Kālaka receiving instruction, detail of a folio from an illustrated manuscript of the *Kālakācāryakathā*, Western Indian style, mid-15th century
P. Chandra

are most numerous from Gujarāt state, paintings in Western Indian style have also been found in Uttar Pradesh and central India. In Goa on the east coast, the style has persisted almost to the present.

The school is characterized by simple, bright colours, highly conventionalized figures, and wiry, angular drawing. The naturalism of early Indian wall painting is entirely absent.

The earliest manuscripts are on palm leaves, and the same oblong format (about 12 by 4 inches [30 by 10 cm]) was continued even after paper began to be used toward the end of the 14th century. The style, fairly well established by the end of the 13th century, changed little over the next 250 years. Figures are shown for the most part from a frontal view, with the head in profile. The facial type, with its pointed nose, is related to that seen in wall paintings at Ellora and is remarkably close to medieval sculpture. A striking convention is the projecting "further eye," which extends beyond the outline of the face in profile.

The large number of extant Jaina manuscripts is a result mainly of their preservation in *bhaṇḍaras*, or libraries maintained by the Jaina communities. The pious Jaina gained religious merit by commissioning religious works, and when the Muslim conquest of Gujarāt at the end of the 13th century discouraged the erection of new temples, the wealthy patrons turned their attention to illustrated manuscripts, which became increasingly lavish in their use of gold.

Western Indian painting exerted considerable influence on the development of painting in India, particularly in the Rājasthanī schools of western and central India.

Western Isles, islands area, in the Atlantic Ocean off northwestern Scotland; created by the reorganization of 1975, they are part of two former counties: Ross and Cromarty, and Inverness. The islands area consists of the Outer Hebrides. Stornoway is the seat of the islands area council, which carries out the responsibilities of both region and district authority. Area 1,119 square miles (2,898 square km). Pop. (2001) 26,502.

Western Learning (Korean thought): *see* Sŏhak.

Western Panjabi language: *see* Lahnda language.

Western Port, circular bay, about 20 miles (32 km) across, indenting the south coast of Victoria, Australia, southeast of Melbourne. An inlet of Bass Strait, it is separated from Port Phillip Bay (12 miles [19 km] west) by Mornington Peninsula. Phillip Island (40 square miles [100 square km]) lies at its entrance flanked by passages on the west and east, the latter, narrower one being bridged to the mainland. French Island (84 square miles [218 square km]) fills much of the bay's interior. The discovery of large deposits of oil and natural gas off the Gippsland coast in the 1960s has led to the development of the Western Port area as a zone of heavy industry. The inlet was named by George Bass, the English explorer, because it was the most westerly point reached by his expedition (1798). At one time all of the Victorian coast between Wilson's Promontory and Port Phillip Bay was known as Western Port.

Western Reserve, in American history, territory of some 6,000 square miles (15,500 square km) along the southern shore of Lake Erie in what is now northeastern Ohio. After the Revolutionary War, when the United States was formed, most of the former colonies had claims to unsettled lands in the West based on royal charters and grants. All the states eventually ceded these to the federal government, but Connecticut, which by a charter of 1662 had claim to a huge area reaching to the "South Sea," reserved this part of its claim, intending to use it to compensate Connecticut citizens who had incurred serious losses during the war. A stream of Connecticut immigrants thus entered the territory. In 1800, however, Connecticut and the United States agreed to attach the Western Reserve to the Ohio Territory. The significance of the Western Reserve was its function as an extension of New England into the West.

Western Rift Valley (Africa), branch of the East African Rift System (*q.v.*).

Western Sahara, Arabic SAHARĀ' AL-GHARBĪYAH, formerly (until 1976) SPANISH SAHARA, former overseas province of Spain occupying an extensive desert Atlantic-coastal area



Former headquarters of the Spanish Foreign Legion at Dakhlah (formerly Villa Cisneros), Western Sahara
Art Resource

(97,344 square miles [252,120 square km]) of northwest Africa. It is composed of the geographic regions of Río de Oro ("River of Gold"), occupying the southern two-thirds of the region (between Cape Blanco and Cape Bojador), and Saguia el Hamra, occupying the northern third. It is bounded by the Atlantic Ocean on the west and northwest, by Morocco on the north, by Algeria for a few miles in the

northeast, and by Mauritania on the east and south.

Little is known of the prehistory of the Western Sahara, although rock engravings in Saguia el Hamra and in isolated locations in the south suggest a succession of hunting and pastoral groups, with some agriculturists in favoured locales. By the 4th century BC there was trade between the Western Sahara and Europe across the Mediterranean; the Phoenicians sailed along the west coast of Africa in this period. The Romans also had little contact with the Saharan peoples. By medieval times this part of the Sahara was occupied by Ṣanhājāh Berber tribes who were later dominated by Arabic-speaking Muslim Bedouin.

In 1346 the Portuguese discovered a bay that they mistakenly identified with a more southerly Río de Oro, probably the Sénégal River. The coastal region was little explored until Scottish and Spanish merchants arrived in the mid-19th century. In 1884 Emilio Bonelli, of the Sociedad Española de Africanistas y Colonistas ("Spanish Society of Africanists and Colonists"), went to Río de Oro Bay and signed treaties with the coastal peoples. Subsequently, the Spanish government claimed a protectorate over the coastal zone. Further Spanish penetration was hindered by French claims to Mauritania and by partisans of Sheikh Mā' al-'Aynayn, who in 1904 founded the town of Smara at an inland oasis. Cape Juby was occupied for Spain by Colonel Francisco Bens in 1916 and Güera in 1920; Smara and the rest of the interior was occupied in 1934.

In 1957 the Spanish Sahara was claimed by Morocco, which itself had just reached independence the previous year. Spanish troops succeeded in repelling Moroccan military incursions into the territory, and in 1958 Spain formally united Río de Oro and Saguia el Hamra into a Spanish province known as Spanish Sahara. But the situation was further complicated by newly independent Mauritania's putting forth claims to the province in 1960, and in 1963 huge phosphate deposits were discovered at Bu Craa in the northern portion of the Spanish Sahara. This made the province a potentially economically valuable prize for any nation that could firmly establish possession of it. Mining of the deposits at Bu Craa began in 1972.

In the meantime, an independence movement and guerrilla insurgency by the Spanish Sahara's indigenous inhabitants, the nomadic Saharawi, sprang up in the early 1970s. The insurgency led Spain to declare in 1975 that it would withdraw from the area, and in that same year the World Court ruled that Morocco's and Mauritania's legal claims to the Spanish Sahara were irrelevant to the area's self-determination.

From November 1975 the area was administered jointly by Spain, Morocco, and Mauritania; and, when in February 1976 the Spanish departed, Morocco and Mauritania divided the area between themselves, Morocco gaining the northern two-thirds of the area and, consequently, the phosphates. Sporadic fighting developed between Moroccan forces and guerrillas of the Saharawi insurgency, the Polisario Front (from Popular Front for the Liberation of Saguia el Hamra and Río de Oro), which was supported by and based in Algeria. The Polisario in 1976 declared a government-in-exile of what it called the Saharan Arab Democratic Republic (a government recognized by some 70 nations), and it continued to raid the Mauritanian and Moroccan outposts in the Western Sahara.

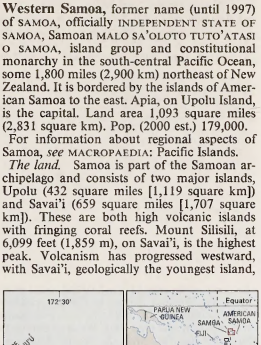
Mauritania bowed out of the fighting and reached a peace agreement with the Polisario Front in 1979, but in response Morocco promptly annexed Mauritania's portion of Western Sahara. Morocco fortified the vital triangle formed by the Bu Craa mines, the old colonial capital of El Aaiún (Laayoune), and the city of Smara, while the Polisario guerrillas continued their raids. A United Nations peace proposal in 1988 specified a referendum for the indigenous Saharawis to decide whether they wanted an independent Western Sahara under the Polisario Front's leadership or whether the region would officially become part of Morocco. This peace proposal was accepted by both Morocco and the Polisario Front, and the two sides agreed to a cease-fire in 1991. Preparations to hold the referendum subsequently stalled, however, and the Polisario Front's position grew weaker as Algeria cut back its military and financial support and Morocco moved large numbers of settlers into the Western Sahara. By 2001 tens of thousands of Western Saharans, including numerous Polisario soldiers, remained in semipermanent refugee camps in Algeria.

Western Sahara is virtually all desert and is extremely sparsely inhabited. The Kasbah and Mosque of Smara are the only major Muslim monuments in the Western Sahara. The principal town is El Aaiún, the old colonial capital. There is little agriculture in the region; camels, goats, and sheep are raised, and dried fish is exported to the Canary Islands. Sources of potash and iron ore are at Agracha and elsewhere, and the vast phosphate deposits are at Bu Craa, southeast of El Aaiún. Phosphate extraction, however, presents problems because of the shortage of water. Motorable tracks abound in the country's extremely flat terrain, but there are no proper roads. There is regular air service between El Aaiún and Dakhlah (formerly Villa Cisneros) and between El Aaiún and Las Palmas (in the Canary Islands), Nouakchott (in Mauritania), and Casablanca. Pop. (2000 est.) 245,000.

Western Samoa, former name (until 1997) of SAMOA, officially INDEPENDENT STATE OF SAMOA, Samoan MALO SA'OLOTO TUTO'ATASI O SAMOA, island group and constitutional monarchy in the south-central Pacific Ocean, some 1,800 miles (2,900 km) northeast of New Zealand. It is bordered by the islands of American Samoa to the east. Apia, on Upolu Island, is the capital. Land area 1,093 square miles (2,831 square km). Pop. (2000 est.) 179,000.

For information about regional aspects of Samoa, *see* MACROPAEDIA: Pacific Islands.

The land. Samoa is part of the Samoan archipelago and consists of two major islands, Upolu (432 square miles [1,119 square km]) and Savai'i (659 square miles [1,707 square km]). These are both high volcanic islands with fringing coral reefs. Mount Silisili, at 6,099 feet (1,859 m), on Savai'i, is the highest peak. Volcanism has progressed westward, with Savai'i, geologically the youngest island,



Samoa

experiencing eruptions from the volcanoes of Matavanu (1905–10), Mount Mu (1902), and Mount Afi (*c.* 1690). There are also seven small islands, of which only Apolima and Manono are inhabited. Savai'i's central volcanoes are surrounded by lava plateaus that give way farther down to hills and coastal plains. Upolu's central volcanic range, rising to Mount Fito (3,600 feet [1,097 m]), slopes down on both sides to hills and coastal plains. Both major islands have numerous swiftly flowing rivers with rapids and waterfalls.

Crater lakes are fed by rainfall that averages 118 inches (3,000 mm) annually at Apia on the northern coast of Upolu but is unevenly distributed, with the interior portions of the islands receiving as much as 275 inches (7,000 mm) annually. The temperature varies from 72° F (22° C) between May and November, when the southeast trade winds blow, to 86° F (36° C) during the rainy season (November to March). Typhoons are a danger from January to March.

The islands' volcanic soils are rich but porous and are easily exhausted. The mountainous island centres are forested with tall evergreen rainforest, coconut palm, *Barringtonia,* and pandanus. Mangroves thrive at lower elevations in swamps. Vines and ferns are abundant. Animal life is sparse, with only flying foxes and smaller bats, together with several species of lizards and two species of snakes. Rats, feral cattle, and pigs were introduced by humans.

The people. Samoans are mainly Polynesian, closely akin to Tongans and to New Zealand Maori. There are small minorities of mixed Euro-Polynesians, Europeans, other Pacific islanders, and Chinese. Samoan, a Polynesian dialect, and English are the official languages. Samoans are predominantly Christian: about three-fourths are Protestant and one-fifth Roman Catholic.

The density of population is four times higher on Upolu than on Savai'i. The average annual population growth rate is somewhat low because of emigration. More than two-fifths of the population of Samoa is less than 15 years old.

The economy. Samoa's developing economy is based mainly on agriculture, with some light manufacturing, fishing, lumbering, and tourism. The gross national product (GNP) showed little growth during the 1980s and '90s. The GNP per capita is relatively low in comparison with those of other island states in the Pacific.

In Samoa four-fifths of the land is held as customary land; this is land vested in *matai* (chiefs), who hold it for lease to their *aiga* (extended-family groups). The remaining one-fifth is either freehold or public land. Agriculture accounts for almost half of the gross domestic product (GDP) and employs nearly two-thirds of the labour force. Some two-fifths of the total land area is arable. Cash crops traditionally include coconuts, for copra; cacao; bananas; and, more recently, taro, tropical fruits, and nuts. Subsistence crops include yams, breadfruit, and pawpaw. Goats, pigs, cattle, and chickens are raised for meat.

Forests cover almost half of the land, and lumbering supplies domestic needs and is exported. Fishing fulfills domestic needs, and fisheries training, fishing boats, and fish freezing have been introduced. Tuna makes up most of the fish catch.

Diversification of manufacturing has been a major government goal, and manufacturing has grown to account for one-sixth of the GDP. Besides the traditional food-processing and handicrafts industries, modern industries include electrical components, clothing and footwear, animal feed, coconut by-products, brewing, and fruit and juice canning. Tourism has grown, and hotel facilities have been expanded. There are two deepwater ports, at Apia and at Asau (on Savai'i). An international airport is located at Faleolo, near Apia.

Taro, coconut cream, automotive wiring harnesses, beer, and cigarettes are the leading exports, but imports, including food, machinery,

fuels, and manufactured goods, greatly exceed exports. The principal trading partners are New Zealand, Australia, the United States, American Samoa, Fiji, and Japan.

Government and social conditions. Samoa's constitution of 1960 blends Polynesian and British traditions. Initially, two *o le ao o le malo* (paramount chiefs) became heads of state, with the provision that at the death of one, the other would remain in office for life; the subsequent heads of state are to be elected by the Legislative Assembly (Fono) to five-year terms. Members of the Legislative Assembly are elected by universal adult suffrage. With a few exceptions, only *matai* may stand for election. The judicial system is headed by a Supreme Court; a separate Land and Titles Court settles disputes involving land or traditional titles.

Health conditions are good, with district hospitals on Upolu and Savai'i. Life expectancy is about 70 years. Education is patterned on the New Zealand model, and, although education is optional, most children attend school. Secondary, vocational, and teacher-training schools are available. The National University of Samoa was founded in 1988.

The Voice of Samoa government-owned radio broadcasts daily in Samoan and in English. A government-owned television station is operated by Television New Zealand, and television programs are also received via satellite. There are several privately owned weekly newspapers. The National Museum and Culture Centre opened in 1984.

Traditional culture is strong, though influenced by Christianity. Sunday and evening vespers curfews are strictly observed in the villages. The kava-drinking ceremony is held both in villages and by government for distinguished visitors. The *matai* and *aiga* social system predominates, except among mixed and non-Samoan residents. Complex rules of etiquette govern conversation and social intercourse, and *fale* (house) privacy is strictly observed.

History. Polynesians who made decorated Lapita ware first settled in the Samoan group about 1000 BC. Characteristics of the Samoan language suggest that these settlers came from Tonga. Pottery making ceased about AD 200, by which date Samoa had become the centre from which much of eastern Polynesia was settled. By 300 BC Samoa had sizable but nonnucleated settlements, with house and ritual mounds and agricultural terraces, including unique star-shaped mounds and the largest surviving mound in Polynesia, Pulemelei, in Palauli district, Savai'i. A short time before European arrival, stratified society with paramount chiefs and fortified settlements developed.

Although the islands were probably sighted (1722) by the Dutch navigator Jacob Roggeveen, the French explorer Louis-Antoine de Bougainville was the first European visitor (1768). He named the group the Navigator Archipelago because of the Samoans' skill in handling canoes. Jean-François de Galaup, comte de La Pérouse, surveyed the islands in 1787.

Two London Missionary Society members settled on Savai'i in 1830 and, by 1834, put the Samoan language into writing. Commercial treaties—between Samoan chiefs and Captain Bethune of HMS *Conway* (1838) and Charles Wilkes, commander of a U.S. survey team (1839)—set the pattern for European and U.S. relations with Samoa, and European settlers and commercial agents had begun to concentrate around Apia by mid-century. Armed and advised by foreigners, the Samoan paramount chiefs fought bitter wars for supremacy (1848–73) until a U.S. special agent, Colonel A.B. Steinberger, helped negotiate a peace (1873). Steinberger helped draft a European-style constitution (1875) and, as premier, became virtual dictator until his arrest and deportation by the British in 1876. As factional warfare erupted anew, the British established the Municipality of Apia (1879). Continuing strife among the chiefs, compounded by British, German, and U.S. rivalry for influence, culminated in the Apia disaster of March 16, 1889, when three German and three U.S. warships were trapped in Apia harbour by a typhoon and beached or sunk. This disaster helped bring about the Berlin Treaty of 1889, in which the three powers agreed to Samoa's independence and neutrality. When strife between the Samoan king and chiefs resumed, the three powers reconvened in 1899 and, annulling the 1889 treaty, annexed the Samoan group, Germany getting Western Samoa.

Chafing under German rule, Samoans formed the Savai'i-based Mau a Pule resistance movement (1908). New Zealand occupied Western Samoa at the outbreak of World War I in 1914. Under military rule an epidemic of influenza killed 8,500 Samoans, more than one-fifth of the population. Western Samoa was granted to New Zealand as a League of Nations mandate in 1920. Mau a Pule resistance continued, culminating in a shootout in 1929. From 1936 the government of New Zealand promoted reconciliation, but World War II intervened. The U.S. military built an airport and roads on Upolu, ushering in development. After the war Western Samoa became a UN trust territory administered by New Zealand; movement toward independence was initiated with the formation of a council of state and the Fono (1947). In 1961 a draft constitution was approved, followed by a UN-supervised plebiscite, which overwhelmingly ratified it, along with a resolution for independence. Western Samoa became independent on Jan. 1, 1962. Later that year a Treaty of Friendship was signed with New Zealand, authorizing New Zealand to act as an agent for Western Samoa in foreign relations when requested. In 1997 the nation's name was officially changed from Western Samoa to Samoa, despite protests from American Samoa.

Popes during the Western Schism

years	Roman obedience	Avignon obedience	Pisan obedience
1378–89	Urban VI		
1378–94		Clement VII	
1389–1404	Boniface IX		
1394–1423		Benedict XIII (deposed 1417)	
1404–06	Innocent VII		
1406–15	Gregory XII (resigned)		
1409–10			Alexander V
1410–15			John XXIII (deposed)
1417–31	Martin V		

Western Scheldt, Dutch WESTERSCHELDE, estuary, flowing westward for about 30 miles (50 km) through the Delta Islands in southwestern Netherlands to the North Sea. The former islands of Walcheren and Zuidbeveland (now a peninsula) are located to the north of the estuary. The Zeeuwsch Vlaanderen region, consisting of land that was reclaimed during the 16th and 17th centuries, lies to the south. The Western Scheldt is formed in the east where the Scheldt (Schelde) River enters The Netherlands from Belgium. It has been an important transportation route since the 16th century, when the Holy Roman emperor Charles V designated Vlissingen (on Walcheren) as his port of embarkation from the Netherlands. Unlike inlets to the north, the Western Scheldt continues to be kept open to the North Sea as an important shipping route to Antwerp and destinations on canalized waterways farther north, south, and east.

Dikes built along most of the coastline prevent flooding. The estuary is not bridged; ferry services operate between Vlissingen and Breskens, and Perkpolder and Kruiningen.

Western Schism, also called GREAT SCHISM, or GREAT WESTERN SCHISM, in the history of the Roman Catholic church, the period from 1378 to 1417, when there were two, and later three, rival popes, each with his own following, his own Sacred College of Cardinals, and his own administrative offices.

Shortly after the return of the papal residence to Rome following almost 70 years in Avignon, the archbishop of Bari was elected pope as Urban VI amid demands by the Roman populace for "a Roman or at least an Italian." Urban VI proved to be so hostile to the cardinals, who had assumed great powers during the years at Avignon, that a group of cardinals retired to Anagni and elected one of themselves, Robert of Geneva, as Clement VII, claiming the election of Urban VI had been invalid because it was made under fear. Clement VII then took up residence at Avignon. Although Roman Catholic church historians generally agree that Urban VI and his successors were the legitimate popes, there has never been an official pronouncement to this effect.

The double election had disastrous effects upon the church. The followers of the two popes were divided chiefly along national lines, and thus the dual papacy fostered the political antagonisms of the time. The spectacle of rival popes denouncing each other produced great confusion and resulted in a tremendous loss of prestige for the papacy.

Various proposals for ending the schism were made, especially by the University of Paris, which suggested either mutual resignation or a decision by an independent tribunal or a general council. This last proposal was in line with the growing conciliar movement, according to which a general council has greater authority than a pope. Both lines of popes refused to submit. Eventually cardinals from both obediences, seeking to end the schism, arranged a council in Pisa, which met in 1409 and elected a third pope, Alexander V, who was succeeded shortly thereafter by John XXIII. Under pressure from the emperor Sigismund, John XXIII convoked, in 1414, the Council of Constance, which deposed him, received the resignation of the Roman pope, Gregory XII, and dismissed the claims of the Avignon pope, Benedict XIII. This series of events opened the way to the election of Martin V in November 1417, whereby the schism was ended.

Western Slovakia: *see* Západní Slovensko.

Western Union Corporation, former telecommunications company that was the largest provider of telegraphic services in the United States.

The company was founded in 1851, when the New York and Mississippi Valley Printing Telegraph Company was formed to build a telegraph line from Buffalo, N.Y., to St. Louis, Mo. Five years later, with the acqui-

sition of several other independent lines, the company reorganized to become the Western Union Telegraph Company. By the end of 1861, Western Union had built the first transcontinental telegraph line. The company made a brief foray into the telephone field but lost a legal battle with Bell Telephone in 1879 and thereafter concentrated solely on telegraphy. It grew rapidly and absorbed more than 500 other companies, including its chief competitor, Postal Telegraph Inc., in 1943.

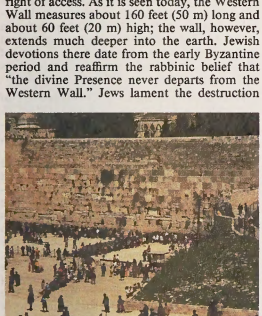
As telegraphy was increasingly replaced by other methods of telecommunication, Western Union diversified its operations to include automatic teletypewriter services, leased private-line circuitry, and a money order service, as well as telegrams and mailgrams. Western Union's Telex and TWX systems made it the chief operator of teleprinter networks in the United States in the 1960s and '70s, and its Westar communications satellite (1974) made it a major participant in the American satellite communications industry. Later in the century, the advent of high-speed digital data transmission and modern fax machines supplanted some of the company's most important services, notably telegrams, TWX, and Telex. In the face of rapidly changing technology, the Western Union Telegraph Co. was reorganized in 1988 as the Western Union Corp. to handle money transfers and related services. Parts of the company were sold to AT&T and GM Hughes Electronics Corp., among other buyers, and the company's name was changed to New Valley Corp. in 1991. The company entered bankruptcy proceedings in 1993 and shortly thereafter sold the last of its major holdings, Western Union Financial Services Inc., to First Financial Management Corp.

Western Uplands (New Zealand): *see* King Country.

Western Wall, Hebrew HA-KOTEL HA-MA'ARAVI, also called WAILING WALL, in the Old City of Jerusalem, a place of prayer and pilgrimage sacred to the Jewish people. It is the only remains of the Second Temple of Jerusalem, held to be uniquely holy by the ancient Jews and destroyed by the Romans in AD 70. The authenticity of the Western Wall has been confirmed by tradition, history, and archaeological research; the wall dates from about the 2nd century BC, though its upper sections were added at a later date.

Because the wall now forms part of a larger wall that surrounds the Muslim Dome of the Rock and al-Aqṣā Mosque, Jews and Arabs have long fought over its control or for the right of access. As it is seen today, the Western Wall measures about 160 feet (50 m) long and about 60 feet (20 m) high; the wall, however, extends much deeper into the earth. Jewish devotions there date from the early Byzantine period and reaffirm the rabbinic belief that "the divine Presence never departs from the Western Wall." Jews lament the destruction of the Temple and pray for its restoration. Such terms as Wailing Wall were coined by European travelers who witnessed the mournful vigils of pious Jews before the relic of the sacred Temple.

Arab and Jewish sources both confirm that after the Arab capture of Jerusalem in 638, Jews led the conquerors to the site of the Holy Rock and Temple yard and helped clear away the debris. When the State of Israel captured the Old City during the fighting of June 1967, the Jews once more gained control over the historic site.



The Western Wall in the Old City of Jerusalem

© Don Smetzer/Tony Stone Images

western yellow blight (plant disease): *see* curly top.

western yew, also called PACIFIC YEW, CALIFORNIA YEW, OREGON YEW, or AMERICAN YEW (*Taxus brevifolia*), an evergreen timber tree of the yew family (Taxaceae). It is the only commercially important yew native to North America, where it is found from Alaska to California. Usually between 5 and 15 m (about 15 to 50 feet) tall, it sometimes reaches 25 m. *See also* yew.

Westernizer, Russian ZAPADNIK, in 19th-century Russia, especially in the 1840s and '50s, one of the intellectuals who emphasized Russia's common historic destiny with the West, as opposed to Slavophiles, who believed Russia's traditions and destiny to be unique. *See* Slavophile.

Westerschelde (estuary, The Netherlands): *see* Western Scheldt.

Westerwald, mountainous region in western Germany lying northeast of Koblenz and east-southeast of Bonn. It is on the right (east) bank of the Rhine and extends eastward for about 50 miles (80 km), between the Lahn River or the Taunus (south) and the Sieg River or Bergisches Land (north), and reaches a high point in the Fuchskaute (2,155 feet [657 m]). There is some iron mining and quarrying of clay (for pottery) in the area and some farming.

Westerwald stoneware, salt-glazed stoneware produced in German towns such as Höhr, Grenzau, and Grenzhausen in the area known as the Westerwald. Their products (jugs, tankards, and the like), made from the 15th century to the present day, are molded, stamped with dies, and sometimes incised. Westerwald pottery received impetus from the immigration in the late 16th century of Anno Knütgen and his family from Siegburg to Höhr, and of the Mennicken family from Raeren to Grenzhausen. Although some late examples are white, bluish gray was the predominant colour of the wares, which were decorated in contrasting black, brownish purple, and, most frequently, dark blue.

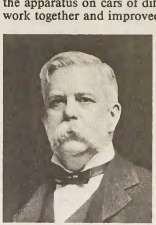
Westfalen (historical region, Germany): *see* Westphalia.

Westfield, city, Hampden county, southwestern Massachusetts, U.S. It lies along the Westfield River, just west of Springfield. Originally part of Springfield, it was the site of the western frontier trading post (1660) of the Massachusetts Bay Colony and was incorporated as a separate town in 1669. Farming gave way to light industry in the 19th century, and the manufacture of whips and lashes was important until the automobile replaced the horse. The city's modern products include paper, machinery, firearms, and bicycles. Westfield State College was founded as a state normal (teachers' training) school in 1839. Inc. city, 1920. Pop. (1994 est.) 38,186.

Westinghouse, George (b. Oct. 6, 1846, Central Bridge, N.Y., U.S.—d. March 12, 1914, New York City), American inventor and industrialist who was chiefly responsible for the adoption of alternating current for electric power transmission in the United States.

After serving in both the U.S. Army and the navy in the Civil War, Westinghouse received his first patent in late 1865 for a rotary steam engine. Though the engine proved impractical, he later applied the same principle to develop a water meter. In that same year he invented a device for placing derailed freight cars back on their tracks.

Westinghouse's interest in railroads in general led to his first major invention, an air brake, which he patented in 1869 (eventually he received more than 100 patents); in the same year he organized the Westinghouse Air Brake Company. With additional automatic features incorporated into its design, the air brake became widely accepted, and the Railroad Safety Appliance Act of 1893 made air brakes compulsory on all American trains. As the use of his automatic air brake spread to Europe, Westinghouse saw the advantages of standardizing all air-brake equipment so that the apparatus on cars of different lines would work together and improved designs could be used on earlier models. He thus became one of the first to adopt the modern practice of standardization.



Westinghouse

By courtesy of Westinghouse Electric Corporation

Westinghouse then turned his attention to the problems of railroad signaling. By purchasing patents to combine with his own inventions, he was able to develop a complete electrical and compressed-air signal system. In 1883 he began to apply his special knowledge of air brakes to the problem of safely piping natural gas, and within two years he obtained 38 patents for piping equipment.

Although the electrical system being developed in the United States in the 1880s used direct current (DC), in Europe several alternating-current (AC) systems were being developed. One of the most successful, first demonstrated in 1881 in London, was devised by Lucien Gaulard of France and John Gibbs of England. Four years later, Westinghouse imported a pair of Gaulard-Gibbs transformers and a Siemens AC generator and set up an electrical system in Pittsburgh. With the aid of three American electrical engineers, he altered and perfected the transformer and developed a constant-voltage AC generator. In 1886 he incorporated the Westinghouse Electric Company, which three years later was renamed the Westinghouse Electric & Manufacturing Company. He purchased the patents of Nikola Tesla's AC motor and hired Tesla to improve and modify the motor for use in his power system. When the system was ready for the American market, the advocates of DC power immediately set out to discredit AC power. Their attacks culminated in charges that the use of AC power was a menace to human life; to support their argument, they introduced a standard Westinghouse AC generator as the official means of executing death sentences in the state of New York. This tactic was insufficient to suppress AC power, however, and in 1893 the Westinghouse company was retained to light the World's Columbian Exposition at

Chicago. In addition, Westinghouse secured the rights to develop the great falls of the Niagara River with AC generators. His business flourished until 1907, when a financial panic resulted in his losing control of the company. By 1911 he had severed all connections with his companies. His health failed soon thereafter.

Westinghouse Electric Corporation, major American television and radio broadcasting company that was formerly a leading manufacturer of electrical equipment. Headquarters are in Pittsburgh, Pa.

The company was founded as the Westinghouse Electric Company in 1886 by George Westinghouse (1846–1914), the inventor of the air brake and other devices, to construct and market alternating-current electrical systems. Overcoming strong opposition from those fearful that alternating current posed a greater threat to health and safety than the direct current then used in the United States, the company prospered, branching out into all phases of electrical production and use. In 1907 the company was forced to reorganize to avoid insolvency, and George Westinghouse was subsequently relieved of his chairmanship. The company assumed its present name in 1945.

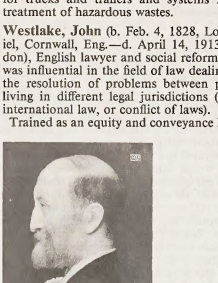
Westinghouse became a major supplier to the electric utility industry, manufacturing a complete line of machinery and products used to generate, transmit, distribute, and control electricity. It consistently lagged behind the General Electric Company in sales of home appliances, however, and basically ceased competing in that market in 1975.

In the decades after World War II, Westinghouse became a leading maker of commercial nuclear reactors and also produced reactors for U.S. Navy submarines. The company also made radar and other electronic systems used in military aircraft, submarines, and munitions until it sold its defense electronics unit to Northrop Grumman Corporation in 1996.

In the 1990s Westinghouse acquired television and radio stations throughout the United States. In an effort to focus on broadcasting, the company purchased CBS Inc., a major television network, in 1995. The following year Westinghouse purchased Infinity Broadcasting Corporation, thereby merging the nation's two largest radio broadcasters. The company's other operations include refrigeration systems for trucks and trailers and systems for the treatment of hazardous wastes.

Westlake, John (b. Feb. 4, 1828, Lostwithiel, Cornwall, Eng.—d. April 14, 1913, London), English lawyer and social reformer who was influential in the field of law dealing with the resolution of problems between persons living in different legal jurisdictions (private international law, or conflict of laws).

Trained as an equity and conveyance lawyer,



Westlake, oil painting by Marianne Stokes, 1902; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

Westlake helped establish the Working Men's College, London, in 1854 and was one of the founders of the Institut de Droit International (Institute of International Law) in 1873. He was a Liberal member of Parliament (1885–86) and Whewell professor of international law at the University of Cambridge (1888–1908). Among the social reforms for which he fought was woman suffrage; he also worked actively for the restoration of the constitution of Finland (1899–1900).

Westlake's *Treatise on Private International Law* (1858) was a pioneering work in the field as practiced in England, and it exercised profound influence on numerous subsequent judicial decisions. His other works include *International Law* (part 1, *Peace,* 1904; part 2, *War,* 1907). His *Collected Papers* were published in 1914.

Westland National Park, park in west-central South Island, New Zealand. Established in 1960, it shares a common boundary with Mount Cook National Park along the main divide of the Southern Alps. With an area of 454 square miles (1,175 square km), it extends from the Tasman Sea in the west to the steep northwestern face of the Southern Alps in the east.

There are over 60 named glaciers in the park. The highest point is Mount Tasman, 11,473 feet (3,497 m), in the Southern Alps. The park is well dissected by rivers and streams fed by the heavy precipitation, which falls as both rain and snow. Three main rivers rise in the park and empty into the Tasman Sea: the Waiho, Cook, and Karangarua. Vegetation includes beech, manuka, rimu and other pines, miro, rata, cypress, and subalpine scrub; these shelter the park's varied birdlife. Chamois, red deer, stoat, and *thar* form some of the wildlife. Fishing, hiking, and mountaineering provide recreation for visitors.

Westmeath, Irish AN IARMHÍ, county in the province of Leinster, central Ireland. It is bounded by Counties Cavan (north), Meath (east), Offaly (south), Roscommon (west), and Longford (northwest). The western boundary is the lower part of Lough (lake) Ree and the River Shannon, but elsewhere the county's limits wind through the central lowland, except at Lough Sheelin in the north. The county's terrain is largely undulating and about 200–400 feet (60–120 m) above sea level; in the south are numerous long, narrow glacial ridges called eskers.

Westmeath was the north Teffia part of the ancient kingdom of Meath, Longford being south Teffia. With the Anglo-Norman conquest in the 12th century, it became part of the de Lacy earldom of Meath, but it was not intensively Anglicized, and the Irish held their ground. In 1241 the earldom lost its unity, and, with the deterioration of the English hold on Ireland, the western part of the earldom passed out of government control. Following the 16th-century reconquest of Ireland, Westmeath was separated from Meath in 1541 and ultimately passed into the hands of English landlords. The town of Athlone had military importance as a key to the crossing of the River Shannon.

Mullingar is the seat of the county council and a principal industrial town, along with Athlone. The county is largely pastoral, and young cattle are brought in from west of the Shannon for fattening. The main road to Galway runs to the Shannon crossing at Athlone. Area 681 square miles (1,763 square km). Pop. (1991) 61,880.

Westminster, City of, inner borough of Greater London, lying on the north bank of the River Thames at the heart of London's West End. The City of Westminster is flanked to the west by Kensington and Chelsea and to the east by the City of London. The City of Westminster was established as a borough in 1965 by the amalgamation of the former boroughs of Westminster, Paddington, and St. Marylebone.

The City of Westminster is the site of some of the finest and most historically important buildings in England, and it includes some of the most desirable residential properties. It contains Westminster Abbey (Anglican) and Westminster Cathedral (Roman Catholic), Buckingham Palace, the Houses of Parliament and the principal government offices, St. James's Palace, the most important shopping districts of the country, New Scotland Yard, most of the London area's luxury hotels, and some of its more renowned museums of art. The National Gallery has a superb collection of Old Master paintings, while the Tate Gallery, built in 1893–97 on the river near Vauxhall Bridge, has large holdings of British paintings, modern foreign works, and sculpture. The Wallace Collection is kept in Hertford House, Manchester Square, and the National Portrait Gallery is based north of Trafalgar Square.

The avenue of the Mall points eastward from Buckingham Palace, passing St. James's Palace before arriving at the Admiralty Arch, the entryway to Charing Cross and Trafalgar Square. South of Charing Cross is Whitehall, the site of the main British government offices (as well as the residence of the prime minister, at No. 10 Downing Street), while to the east, the Victoria Embankment traces the River Thames from the Houses of Parliament to the City of London. Northeast of Somerset House (home of the Courtauld Institute Galleries) is the eastern terminus of the Strand, as well as the voluminous Royal Courts of Justice. The theatre district, including Covent Garden, is in the environs.

The Imperial College of Science, Technology and Medicine is near the Royal Albert Hall at the southern border of Hyde Park. Other notable buildings include the British Broadcasting Corporation headquarters, Madame Tussaud's waxworks, the London Planetarium, the Royal Opera House, and the London Central Mosque. Hospitals include St. George's, St. Mary's, Middlesex, and Westminster. Also in the borough are Lord's Cricket Ground, St. James's Park, Green Park, parts of Kensington Gardens and Regent's Park, and the Zoological Gardens. Nearly one-quarter of the borough is parkland and open space.

Westminster was originally an island above the ill-drained Thames marshes, but there is evidence of possible early Roman settlement. A community of monks was established on the site by 785. Edward the Confessor (reigned 1042–66) built a palace and a new church there, the latter of which would become known as Westminster Abbey. A fire in 1834 destroyed almost the entire palace and led to the building of the present Houses of Parliament (1837–60). Area 6 square miles (22 square km). Pop. (1993 est.) 189,000.

Westminster, Statute of (1931), statute of the Parliament of the United Kingdom that effected the equality of Britain and the then dominions of Canada, Australia, New Zealand, South Africa, Ireland, and Newfoundland.

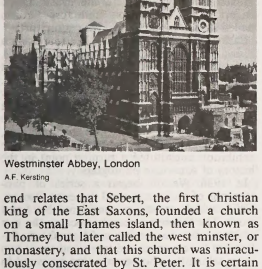
The statute implemented decisions made at British imperial conferences in 1926 and 1930; the conference of 1926 in particular declared that the self-governing dominions were to be regarded as "autonomous communities within the British Empire, equal in status, in no way subordinate one to another in any aspect of their domestic or external affairs, though united by a common allegiance to the Crown, and freely associated as members of the British Commonwealth of Nations." The statute itself recognized the sovereign right of each dominion to control its own domestic and foreign affairs, to establish its own diplomatic corps, and (except for Newfoundland) to be separately represented in the League of

Nations. It was also stated that "no law hereafter made by the Parliament of the United Kingdom" or by any dominion parliament "shall extend to any of the said Dominions as part of the law of that Dominion otherwise than at the request and at the consent of that Dominion."

The statute left many difficult legal and constitutional questions unsettled—*e.g.*, the functions of the Crown, the possibility of one or more of the autonomous communities remaining neutral while others are at war, and so forth—but mutual forbearance and constant consultation between the different units made the formula remarkably successful in operation.

Westminster, Statutes of (1275, 1285, 1290), three statutes important in medieval English history, issued in "parliaments" held by Edward I at Westminster. Each comprised a miscellaneous series of clauses designed to amend or clarify extremely diverse aspects of the law, both civil and criminal. The first Statute of Westminster (1275), written in Old French, was issued at Edward's first "general" parliament, to which representatives of the commons had been summoned; the other two statutes were promulgated in parliaments attended only by the great lords and councillors. The second statute (1285) has become known as *De donis conditionalibus* ("concerning conditional gifts") from its first clause, which sought to restrain alienation of land and preserve entail. The statute (1290) generally referred to by its opening words, *Quia emptores terrarum* . . . ("because sellers of lands . . ."), called the Third Statute of Westminster by a contemporary chronicler, forbade subinfeudation (the letting out of parcels of land upon feudal tenure) in an attempt to restrict practices that cheated existing lords of their dues. It has been called the first English conveyancing act.

Westminster Abbey, church, originally a Benedictine monastery, refounded as the Collegiate Church of St. Peter in Westminster (today one of the boroughs constituting Greater London) by Queen Elizabeth I in 1560. Legend relates that Sebert, the first Christian king of the East Saxons, founded a church on a small Thames island, then known as Thorney but later called the west minster, or monastery, and that this church was miraculously consecrated by St. Peter. It is certain that in about AD 785 there was a small community of monks on the island and that the monastery was enlarged and remodelled by St. Dunstan in about AD 960.



Westminster Abbey, London
A.F. Kersting

St. Edward the Confessor (reigned 1042–66) built a new church on the site, which was consecrated in 1065. It was of considerable size, cruciform in plan, and with a central and two western towers. In 1245 Henry III pulled down the whole of Edward's church (except the nave) and replaced it with the present abbey church in the pointed Gothic style of the period. The design and plan were strongly influenced by contemporary French cathedral architecture, which is perhaps explained by the fact that the first architect was Henry of Reims. Other famed architects who worked on Westminster Abbey were Henry of Gloucester and Robert of Beverley.

The rebuilding of the Norman-style nave was begun by 1376 under the architect Henry Yevele and continued intermittently until Tudor times. The Early English Gothic design of Henry III's time predominates, however, giving the whole church the appearance of having been built at one time. The chapel of Henry VII (begun *c.* 1503), in Perpendicular Gothic style, replaced an earlier Lady chapel and is famed for its exquisite fan vaulting. Above the original carved stalls hang the banners of the Knights of the Bath.

The western towers were the last addition to the building. They are usually said to have been designed by Sir Christopher Wren, but they were actually built by Nicholas Hawksmoor and John James and completed in 1745. The choir stalls in the body of the church date from 1848, and the high altar and reredos were also installed by Sir George Gilbert Scott in 1867. Scott and J.L. Pearson also restored the north transept front (1880–90).

Since William the Conqueror, every British sovereign has been crowned in the abbey except Edward V and Edward VIII, neither of whom was crowned. Many kings and queens are buried near the shrine of Edward the Confessor or in Henry VII's chapel. The last sovereign to be buried in the abbey was George II (died 1760); since then they have been buried at Windsor.

The abbey is also crowded with the tombs and memorials of famous British subjects. Part of the south transept is well-known as the Poet's Corner, while the north transept has many memorials to British statesmen. The grave of the "Unknown Warrior," whose remains were brought from Flanders in 1920, is in the centre of the nave near the west door.

Westminster Assembly (1643–52), assembly called by the English Long Parliament to reform the Church of England, wrote the Larger and Shorter Westminster catechisms, the Westminster Confession, and the Directory of Public Worship. It was made up of 30 laymen (20 from the House of Commons and 10 from the House of Lords), 121 English clergymen, and a delegation of Scottish Presbyterians. Although all were Calvinists in doctrine, the assembly represented four different opinions on church government: Episcopalian, Erastian, Independent, and Presbyterian. From July 1, 1643, until Feb. 22, 1649, it held 1,163 sessions in Westminster Abbey, and it continued to meet occasionally until 1652. The works produced were generally accepted by Presbyterians throughout the world, although Presbyterianism in England was suppressed when episcopacy was reestablished in 1660.

Westminster Catechism, either of two works, the Larger Westminster Catechism and the Shorter Westminster Catechism, used by English-speaking Presbyterians and by some Congregationalists and Baptists. Written by the Westminster Assembly, which met regularly from 1643 until 1649 during the English Civil War, the catechisms were presented to the English Parliament in 1647 and were approved by Parliament in 1648. They lost their official status in England, however, in 1660, when the monarchy was restored and episcopacy was reestablished. The General Assembly of the Church of Scotland authorized their use in July 1648, and the Scottish Parliament authorized them in January 1649.

The Larger Catechism was prepared for the use of ministers and is too detailed and minute for memorizing. It has never been as widely used as the Shorter Catechism.

The Shorter Catechism was prepared primarily for instructing children in the Christian faith. It is composed of a brief introduction on the end, rule, and essence of religion and of 107 questions and answers. It is divided into two parts that discuss (1) the doctrines that Christians are to believe concerning the nature of God and the decrees of God and their executions, and (2) the duties that Christians are to perform in regard to the moral law and in regard to the gospel. The first question and answer of the Shorter Catechism are well known: "What is the chief end of man? To glorify God, and to enjoy him forever."

Westminster Confession, confession of faith of English-speaking Presbyterians. It was produced by the Westminster Assembly, which was called together by the Long Parliament in 1643, during the English Civil War, and met regularly in Westminster Abbey until 1649. The confession was completed in 1646 and presented to Parliament, which approved it after some revisions in June 1648. When the English monarchy was restored in 1660, the episcopal form of church government was reinstated, and the Presbyterian confession lost its official status in England. It was adopted by the Church of Scotland in 1647, by various American and English Presbyterian bodies (with some modifications), and by some Congregationalists and Baptists.

Patterned after the Irish Articles of Religion (1615), it also drew heavily upon the Reformed tradition of the European continent and the creedal heritage of the early Christian Church. In effect a theological consensus of international Calvinism in classic formulation, it consists of 33 chapters, closely reasoned and grave in style, and it provides some latitude among points of view recognized within the orthodoxy of the time. It states that the sole doctrinal authority is Scripture, and it agrees with and restates the doctrines of the Trinity and of Christ from the creeds of the early church. Reformed views of the sacraments, the ministry, and the two covenants of works and grace are given. According to the confession, the doctrine of the eternal decree (predestination) is that "some men and angels are predestinated unto everlasting life, and others foreordained to everlasting death," and yet "neither is God the author of sin, nor is violence offered to the will of creatures."

Westminster Palace: *see* Parliament, Houses of.

Westminster School, formally SAINT PETER'S COLLEGE, a public (privately endowed) school for boys near Westminster Abbey in London. Its origins are obscure, but it probably began as a monastic school at about the time of the establishment of the abbey; in 1540 Henry VIII made it secular, and in 1560 it was refounded by Elizabeth I and extensively reorganized. The Public Schools Act of 1868 made the school autonomous.

Westmore FAMILY, family of Hollywood makeup artists credited with having introduced the art of makeup to the motion-picture industry.

Born in Great Britain, on the Isle of Wight, George Westmore (1879–1931) fought in the Boer War and, after marriage to a hometown friend, Ada Savage (died 1923), opened his first hairdressing salon. He moved to Canterbury and then to Canada and the United States, working as a hairdresser in various cities before gravitating to Los Angeles in 1917. There he soon got a job at the Selig Studio and es-

tablished the first studio makeup department in history; a few months later he moved to Triangle Studios, supervising the makeup for such stars as Mary Pickford, Douglas Fairbanks, Lillian and Dorothy Gish, Billie Burke, Norma Talmadge, and Theda Bara. During the 1920s, however, his own work came to be overshadowed by that of his sons; and a series of disappointments, together with an unhappy second marriage, led to his suicide in 1931.

All of his six surviving sons became heads or assistant heads of makeup departments of major studios. Montague George Westmore (1902–40), known as "Mont," first worked free-lance for such directors as Cecil B. deMille but eventually joined the studios of David O. Selznick, supervising makeup during the screen tests for as well as the filming of *Gone with the Wind* (1939). Percival Harry Westmore (1904–70), known as "Perc" (pronounced "Purse"), headed the makeup department of First National Pictures and then of the company that absorbed it, Warner Brothers, where he remained for 27 years, joining Universal Studios only late in life. Perc was also the chief administrator of the elegant salon on Sunset Boulevard, The House of Westmore (1935–65), though all the family were financially involved.

Perc's twin brother, Ernest Henry Westmore (1904–68), known as "Ern," worked first at First National and then became head of makeup at RKO; while there (1929–31) he won the first award ever given to a makeup artist by the Academy of Motion Picture Arts and Sciences, for his work on the film *Cimarron*. (The next award for makeup was not given until 1982.) Ern later supervised makeup at 20th Century-Fox Film Corporation. Walter James Westmore (1906–73), known as "Wally," headed the makeup department at Paramount Studios for 41 years (1926–67). Hamilton Adolph Westmore (1918–73), known as "Bud," worked at Paramount and 20th Century-Fox and then was makeup chief at Universal Studios for almost 24 years (1946–70). Frank Westmore (1923–85) was long associated with Paramount Pictures and wrote (with Muriel Davidson) *The Westmores of Hollywood* (1976).

Some third-generation Westmores also became prominent in the art of makeup—not only in theatrical makeup but also in therapeutic makeup for victims of facial burns, diseases, or accidents.

Westmorland, former county of northwestern England. Together with the neighbouring county of Cumberland to the north and west, it became part of the new county of Cumbria in the administrative reorganization of 1974.

Westmorland was always a sparsely inhabited county whose main economic activity was sheepherding. The area abounds in Bronze Age antiquities such as cairns and burial mounds, and the Romans built several major roads through the county. The area's subsequent Anglian, Danish, and Norse occupiers left few remains. The county of Westmorland assumed a distinct administrative form in the 12th century. The county played little role in English history, though it is said that a skirmish that took place there during the northern retreat of the Jacobite rebels in 1745 was "the last battle fought on English soil." The county town of Kendal became a prosperous centre for wool marketing and processing. The area has a number of old parish churches and country mansions, and there are Norman castles at Appleby, Brough, and Brougham.

Westmorland, Ralph Neville, 1st Earl of, 4TH BARON NEVILLE OF RABY, Neville also spelled NEVILL (b. *c.* 1364—d. Oct. 21, 1425, Raby Castle, Durham, Eng.), English noble who, though created earl by King Richard II, supported the usurpation of the crown by Henry IV and did much to establish the Lancastrian dynasty.

The eldest son of John, 3rd Baron Neville, he was knighted during a French expedition in 1380, succeeded to his father's barony in 1388, and was created Earl of Westmorland on Sept. 29, 1397. Further royal favours failed to command his allegiance, and in 1399 he joined his brother-in-law, Henry of Lancaster (later Henry IV), in securing the deposition of Richard II. As the new king's kinsman (by his second marriage, to Joan Beaufort, half sister to Henry) and as a useful counterbalance to the strength of the Percy family in the North, Neville could expect suitable rewards. In September 1399 he was made marshal of England and in October was granted for life the valuable honour of Richmond, Yorkshire. In 1403 he helped suppress the Percy rebellion in the North, and in 1405 he intercepted rebel forces at Shipton Moor, near York, and tricked them into surrender: the rising in Yorkshire thus lost much strength.

Neville had now become very experienced in Scottish affairs, having long been a warden of the West March of Scotland, and was charged with the safekeeping of the northern border during Henry V's absences in France. Hence, he took no part in the Battle of Agincourt in 1415 (though Shakespeare thought he was present) or in later French campaigns but was a member of the Council of Regency under John, Duke of Bedford, in 1415.

Weston, Edward (b. May 9, 1850, near Wolverhampton, Staffordshire, Eng.—d. Aug. 20, 1936, Montclair, N.J., U.S.), British-born American electrical engineer and industrialist who founded the Weston Electrical Instrument Company.

Weston studied medicine at the insistence of his parents; but, after receiving his medical diploma in 1870, he went to New York City, where he was employed as a chemist. While working with an electroplating company, he decided that a generator would be more efficient than batteries as a source of power for electroplating. He subsequently invented and



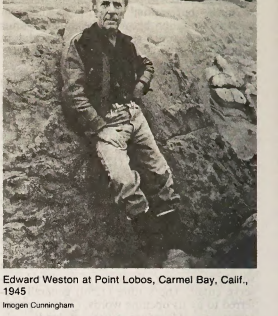
Edward Weston
By courtesy of Weston Instruments Division, a Schlumberger Company, Newark, N.J.

manufactured a highly successful electroplating dynamo.

Overshadowed by others in the field of lighting (arc and incandescent), Weston in 1886 turned his attention to the design and manufacture of electrical measuring instruments. In 1888 he organized the Weston Electrical Instrument Company, which became world famous for its high-quality electrical products. Weston became a U.S. citizen in 1923.

Weston, Edward (b. March 24, 1886, Highland Park, Ill., U.S.—d. Jan. 1, 1958, Carmel, Calif.), one of the most influential photographers of the 20th century, important for formulating a pictorial aesthetic that dominated American photography for several decades.

A camera enthusiast from boyhood, Weston began his professional career by opening a portrait studio in Tropico (now Glendale), Calif. His early work was in the style of the pictorialists, photographers who imitated Impressionistic paintings by suppressing detail and manipulating the image in the darkroom.



Edward Weston at Point Lobos, Carmel Bay, Calif., 1945
Imogen Cunningham

In 1915 Weston saw an exhibition of modern art that led him to reject the atmospheric effects of pictorial photographers in favour of a new emphasis on abstract form and sharp resolution of detail. Renouncing his former work, he set about formulating the aesthetics and techniques that formed the basis of his new style. His goal was realism. He worked with large-format cameras and small apertures to achieve the greatest possible depth of field and resolution of detail. He never used an enlarger, preferring to retain the fine detail and complete range of tones possible only with contact prints. He invariably printed the full negative, and he refused to manipulate the image in the darkroom. The result was sharp and realistic pictures that convey the beauty of natural objects through skillful composition and subtleties of tone, light, and texture.

In 1922 Weston traveled to New York City, where he met the photographers Alfred Stieglitz and Paul Strand. In 1923 Weston moved to Mexico, where the artists Diego Rivera, David Siqueiros, and José Orozco hailed him as a master of 20th-century art.

Back in California in 1927, Weston made a series of monumental close-ups of seashells, peppers, and halved cabbages, bringing out the rich textures of their sculpturelike forms. Two years later, he made the first of many photographs of the rocks and trees on Point Lobos, Calif., which were published in *The Art of Edward Weston* (1932). The same year, Weston joined Group *f*.64 (*q.v.*), whose single exhibition constituted a turning point in the history of American photography.

In 1936 Weston began a series of photographs of nudes and sand dunes at Oceano, Calif., which are often considered his finest work. The following year, he became the first photographer to receive a Guggenheim fellowship for experimental work and spent two years taking the photographs that appeared in *California and the West* (1940). After being stricken by Parkinson's disease, Weston realized he would soon be unable to work and made his last photographs on Point Lobos in 1948. They appeared in *My Camera on Point Lobos* (1950). The last 10 years of his life were spent supervising the printing of his best negatives. *Edward Weston: Fifty Years,*

containing a definitive collection of his photographs and a biography by Ben Maddow, was published in 1973, and *Edward Weston Nudes,* with a remembrance by Charis Wilson, was published in 1977.

Weston-super-Mare, town in Woodspring district, county of Avon, England, on the Bristol Channel. It is situated in a sandy bay between the promontory of Brean Down (now owned by the National Trust) and Worlebury Hill at the western end of the Mendip Hills. Weston-super-Mare has a fine beach and an extensive marine promenade, and it developed in the 19th century as a popular resort. Pop. (1981) 62,261.

Westphalia, German WESTFALEN, historic region of northwestern Germany, comprising (with the former state of Lippe) the present federal Land (state) of North Rhine–Westphalia and parts of the *Länder* (states) of Lower Saxony and Hesse.

The ancient Saxons were divided into three main groups: the Westphalians, the Angrians (German: Engern), and the Eastphalians (Ostfalen). The Westphalians, who had settled in the area of the Ems and Hunte rivers about AD 700, spread south almost as far as Cologne and in 775 resisted the advance of the Franks under Charlemagne. For about three centuries, in this region retained its separate identity in spite of the rise of the more powerful aggregated Saxon stem duchy. In the 12th century the old distinction between Westphalians and Angrians fell into disuse, and all Saxony west of the Weser River came to be called Westphalia.

The archbishops of Cologne received Westphalia as a duchy in 1180, but the duchy was in fact confined mainly to the area just north of Cologne. Numerous other political entities grew up in the region of Westphalia, among them the bishoprics of Münster, Paderborn, Osnabrück, and Minden; the countships of Waldeck, Schaumburg, Lippe, Tecklenburg, and Mark (with Limburg); the imperial city of Dortmund; and the abbey of Essen. In 1512 the Lower Rhine–Westphalian circle (*Kreis*) of the Holy Roman Empire was formed.

From the early 17th century, the Hohenzollern rulers of Brandenburg-Prussia gained territories in Westphalia and became predominant there in 1803, when they acquired Paderborn and most of Münster. At the same time, Hesse-Darmstadt acquired Cologne's part of Westphalia. Osnabrück went to Hanover and the rest of Münster to Oldenburg.

In 1807 Napoleon assigned most of traditional Westphalia to the Grand Duchy of Berg. The Kingdom of Westphalia, which he created for his brother Jérôme, was made up largely of Prussian and Hanoverian possessions between the Weser and the Elbe rivers and the greater part of electoral Hesse; its capital was Kassel. The Congress of Vienna in 1814–15 restored most of old Westphalia to Prussia, which then established a province of Westphalia with its capital at Münster. Lippe and Waldeck remained under sovereign princes; Hanover and Oldenburg were awarded their former lands. In the late 19th and early 20th centuries, the Ruhr valley became very densely populated and the single most heavily industrialized area in the world.

In 1946 the province of Westphalia, together with Lippe, was incorporated in the *Land* of North Rhine–Westphalia (*q.v.*). The north of the ancient Westphalia (most of it Prussian since 1866) went to the *Land* of Lower Saxony; and Waldeck (attached to Prussian Hesse since 1929) became part of the new *Land* of Hesse.

Westphalia, Peace of, the European settlements of 1648, which brought to an end the Eighty Years' War between Spain and the Dutch and the German phase of the Thirty Years' War. The peace was negotiated, from 1644, in the Westphalian towns of Münster and Osnabrück. The Spanish-Dutch treaty was signed on Jan. 30, 1648. The treaty of Oct. 24, 1648, comprehended the Holy Roman emperor Ferdinand III, the other German princes, France, and Sweden. England, Poland, Muscovy, and Turkey were the only European powers that were not represented at the two assemblies.

The delegates. The chief representative of the Holy Roman emperor was Count Maximilian von Trautmansdorff, to whose sagacity the conclusion of peace was largely due. The French envoys were nominally under Henri d'Orléans, Duke de Longueville, but the Marquis de Sablé and the Count d'Avaux were the real agents of France. Sweden was represented by John Oxenstierna, son of the chancellor of that name, and by John Adler Salvius, who had previously acted for Sweden at Hamburg. The papal nuncio was Fabio Chigi, later Pope Alexander VII. Brandenburg, represented by Count Johann von Sayn-Wittgenstein, played the foremost part among the Protestant states of the empire. On June 1, 1645, France and Sweden brought forward propositions of peace, which were discussed by the estates of the empire from October 1645 to April 1646. The settlement of religious matters was effected between February 1646 and March 1648. The war continued during the deliberations.

The decisions. Under the terms of the peace settlement, a number of countries received territories or were confirmed in their sovereignty over territories. The territorial clauses all favoured Sweden, France, and their allies. Sweden obtained western Pomerania (with the city of Stettin), the port of Wismar, the archbishopric of Bremen, and the bishopric of Verden. These gains gave Sweden control of the Baltic Sea and the estuaries of the Oder, Elbe, and Weser rivers. France obtained sovereignty over Alsace and was confirmed in its possession of Metz, Toul, and Verdun, which it had seized a century before; France gained a firm frontier west of the Rhine River. Brandenburg obtained eastern Pomerania and several other smaller territories. Bavaria was able to keep the Upper Palatinate, while the Rhenish Palatinate was restored to Charles Louis, the son of the elector palatine Frederick V. Two other important results of the territorial settlement were the confirmation of the United Provinces of the Netherlands and the Swiss Confederation as independent republics, thus formally recognizing a status which those two states had actually held for many decades. Apart from these territorial changes, a universal and unconditional amnesty to all those who had been deprived of their possessions was declared, and it was decreed that all secular lands (with specified exceptions) should be restored to those who had held them in 1618.

Even more important than the territorial redistribution was the ecclesiastical settlement. The Peace of Westphalia confirmed the Peace of Augsburg (1555), which had granted Lutherans religious tolerance in the empire and which had been rescinded by the Holy Roman emperor Ferdinand II in his Edict of Restitution (1629). Moreover, the peace settlement extended the Peace of Augsburg's provisions for religious toleration to the Reformed (Calvinist) church, thus securing toleration for the three great religious communities of the empire—Roman Catholic, Lutheran, and Calvinist. Within these limits the member states of the empire were bound to allow at least private worship, liberty of conscience, and the right of emigration to all religious minorities and dissidents within their domains. These measures of toleration did not extend to non-Catholics in the hereditary lands of the house of Habsburg, however.

The difficult question of the ownership of spiritual lands was decided by a compromise. The year 1624 was declared the "standard year" according to which territories should be deemed to be in Roman Catholic or Protestant possession. By the important provision that a prince should forfeit his lands if he changed his religion, an obstacle was placed in the way of a further spread both of the Reformation and the Counter-Reformation. The declaration that all protests or vetoes of the Peace of Westphalia by whomsoever pronounced should be null and void dealt a blow at the intervention of the Roman Curia in German affairs.

The constitutional changes made by the treaty had far-reaching effects. For Germany, the settlement ended the century-long struggle between the monarchical tendencies of the Holy Roman emperors and the federalistic aspirations of the empire's German princes. The Peace of Westphalia recognized the full territorial sovereignty of the member states of the empire. They were empowered to contract treaties with one another and with foreign powers, provided that the emperor and the empire suffered no prejudice. By this and other changes the princes of the empire became absolute sovereigns in their own dominions. The Holy Roman emperor and the Diet were left with a mere shadow of their former power.

Not only was the central authority of the empire replaced almost entirely by the sovereignty of about 300 princes but the power of the empire was materially weakened in other ways. It lost about 40,000 square miles (100,000 square km) of territory and obtained a frontier against France that was incapable of defense. Sweden and France as guarantors of the peace acquired the right of interference in the affairs of the empire, and Sweden also gained a voice in its councils (as a member of the Diet). For many years Germany thus became the principal theatre of European diplomacy and war, and the natural development of German national unity was delayed. But if the Treaty of Westphalia pronounced the dissolution of the old order in the empire, it facilitated the growth of new powers in its component parts, especially Austria, Bavaria, and Brandenburg. The treaty was recognized as a fundamental law of the German constitution and formed the basis of all subsequent treaties until the dissolution of the Holy Roman Empire in 1806.

Westport, port town, West Coast local government region, northwestern South Island, New Zealand. It lies at the mouth of the Buller River. Coal and gold were discovered in the area in 1859, and the town was surveyed in 1862. Gold was exploited for only a half-century or so, but coal mining (well developed by the 1870s) continues. The mines around Westport remain one of New Zealand's principal sources of bituminous coal. Other exports include dairy products and cement from local works. Westport also has breweries; furniture, coal gas, knitwear, hosiery, and flax plants; sawmills; fish canneries; and general-engineering and rail workshops. It is connected by rail and road with the coal mines and Seddonville to the northeast and with Greymouth to the southwest. Pop. (1988 est.) 4,640.

Westport, urban town (township), Fairfield county, southwestern Connecticut, U.S. It lies along Long Island Sound at the mouth of the Saugatuck River, just east of Norwalk. The area (Indian Saugatuck) was settled about 1648; it was renamed and detached from Fairfield, Norwalk, and Weston and incorporated as a separate town in 1835. It includes Saugatuck, the old shipping port, and Greens Farms and has many 18th-century houses. Westport is known for its artists' and writers' colony and is the headquarters of artists' correspondence schools. The Westport Country

Playhouse offers summer and pre-Broadway theatre. The town is mainly residential with some light manufactures. Pop. (1992 est.) 24,363.

westward movement, the populating (by Europeans) of the land within the continental boundaries of the mainland United States, a process that began shortly after the first colonial settlements were established along the Atlantic coast. The first British settlers in the New World stayed close to the Atlantic, their lifeline to needed supplies from England. By the 1630s, however, Massachusetts Bay colonists were pushing into the Connecticut River valley. Resistance from the French and the Indians slowed the movement westward, yet by the 1750s northern American colonists had occupied most of New England.

In the South, settlers who arrived too late to get good tidewater land moved westward into the Piedmont. By 1700 the Virginia frontier had been pushed as far west as the fall line—the point upstream at which the rivers emptying into the Atlantic became unnavigable. Some pioneers climbed beyond the fall line into the Blue Ridge Mountains, but the major flow into the backcountry regions of Virginia and the other southern Atlantic colonies went southward rather than westward.

Germans and Scots-Irish from Pennsylvania moved down the Shenandoah Valley, largely between 1730 and 1750, to populate the western portions of Virginia and the Carolinas. By the time of the French and Indian Wars, the American frontier had reached the Appalachian Mountains.

The British Proclamation of 1763 ordered a halt to the westward movement at the Appalachians, but the decree was widely disregarded. Settlers scurried into Ohio, Tennessee, and Kentucky. After the American Revolution, a flood of people crossed the mountains into the fertile lands between the Appalachians and the Mississippi River. By 1810 Ohio, Tennessee, and Kentucky had been transformed from wilderness into a region of farms and towns.

Despite those decades of continuous westward pushing of the frontier line, it was not until the conclusion of the War of 1812 that the westward movement became a significant outpouring of people across the continent. By 1830 the Old Northwest and Old Southwest—areas scarcely populated before the war—were settled with enough people to warrant the admission of Illinois, Indiana, Missouri, Alabama, and Mississippi as states into the Union.

During the 1830s and '40s, the flood of pioneers poured unceasingly westward. Michigan, Arkansas, Wisconsin, and Iowa received most of them. A number of families even went as far as the Pacific coast, taking the Oregon Trail to areas in the Pacific Northwest. In 1849 fortune seekers rushed into California in search of gold. Meanwhile, the Mormons ended their long pilgrimage in Utah.

Between the gold rush and the Civil War, Americans in growing numbers filled the Mississippi River valley, Texas, the southwest territories, and the new states of Kansas and Nebraska. During the war, gold and silver discoveries drew prospectors—and later settlers—into Oregon, Colorado, Nevada, Idaho, and Montana.

By 1870 only portions of the Great Plains could truly be called unsettled. For most of the next two decades, that land functioned as the fabled open range, home to cowboys and their grazing cattle from ranches in Texas. But by the late 1880s, with the decline of the range-cattle industry, settlers moved in and fenced the Great Plains into family farms. That settlement—and the wild rush of pioneers into the Oklahoma Indian Territory—constituted the last chapter of the westward movement. By the early 1890s, a frontier had ceased to exist within the 48 continental states.

Wet, Christiaan Rudolf de (b. Oct. 7, 1854, Smithfield District, Orange Free State [now in South Africa]—d. Feb. 3, 1922, Dewetsdorp district, S.Af.), Boer soldier and statesman, regarded by Afrikaner nationalists as one of their greatest heroes. He won renown as commander in chief of the Orange Free State forces in the South African War (1899–1902) and was a leader in the afrikaner rebellion of 1914.

As a young man de Wet saw action in the Sotho wars of the 1860s and again with the Transvaal Boers in their struggle for independence (1880–81). In peacetime, de Wet, though a reluctant politician, served in the Volksraad (parliament) of the Transvaal and later in that of the Orange Free State.

At the beginning of the South African War, he headed a militia unit, and his military ingenuity and daring soon led to his appointment as commander in chief of the Orange Free State forces. With British troops in possession of much of his country, de Wet switched to hit-and-run guerrilla tactics. His military feats and miraculous escapes became legendary. It was with considerable reluctance that he surrendered, and, as acting president of the Orange Free State for one day, he signed the Peace of Vereeniging (May 1902).

From 1907 to 1910 de Wet served as minister of agriculture in the Orange Free State and participated in the convention (1908–09) that framed the constitution of the Union of South Africa. After the split between Prime Minister Louis Botha and J.B.M. Hertzog, de Wet joined Hertzog in founding the National Party (1914). The breach widened with the outbreak of World War I, when de Wet opposed Botha's decision to conquer German South West Africa (now Namibia). De Wet's efforts to organize a rebellion led to his capture (December 1914) and a sentence of six years in prison for treason. After serving a year, however, he was released and allowed to live quietly on his farm.

wet collodion process, also called COLLODION PROCESS, early photographic technique invented by Frederick Scott Archer of England in 1851. To a solution of collodion (cellulose nitrate) Archer added a soluble iodide and coated a glass plate with the mixture. In the darkroom the plate was immersed in a solution of silver nitrate to form silver iodide. The plate, still wet, was exposed in the camera. It was then developed by pouring over it a solution of pyrogallic acid and was fixed with a strong solution of sodium thiosulfate, for which potassium cyanide was later substituted. Immediate developing and fixing were necessary because, after the collodion film had dried, it became waterproof and the reagent solutions could not penetrate it. A modification of the process, in which an underexposed negative was backed with black paper or velvet to form what was called an ambrotype, became very popular—as did also a version on black lacquered metal known as a tintype, or ferrotype.

wet gas, natural mixture of hydrocarbons that may be gaseous or both liquid and gaseous in the reservoir and that contains an appreciable proportion of compounds heavier than ethane (*e.g.,* propane or butane) that are condensable when brought to the surface. Such gases usually are characterized by the volume or weight of the condensables contained in a given volume of total gas produced. This figure, computed for volumes at 15° C (59° F) and 750 mm of mercury, is usually expressed either in gallons per 1,000 cubic feet or in grams per cubic metre; for a gas to be classified as wet, it must contain more than 0.3 gallon of condensables per 1,000 cubic feet of gas. The condensables are recovered, the propane being marketed as liquefied petroleum gas and the heavier hydrocarbons being made into gasoline. *Compare* dry gas.

Wetar Island, Indonesian PULAU WETAR, island in the Banda Sea, Maluku (*provinsi* ("province"), Indonesia. It lies 35 miles (56 km) north of and across the Wetar Strait from the northeastern coast of Timor. Wetar Island is 80 miles (130 km) long east-west and 28 miles (45 km) wide north-south; it is spread over an area of 1,400 square miles (3,600 square km). The island is surrounded by coral reefs and deep seas. In its interior, wild, rugged mountains covered with tropical rain forests rise to 4,632 feet (1,412 m). The climate is hot and moist, with heavy rainfall. The island is sparsely populated, and the principal occupation is subsistence agriculture, producing mainly sago. Deep-sea fishing is also important, and tortoiseshells are exported to those countries where their importation is still permitted. The population is mostly Papuan, and the dominant religion is Islām; some islanders are Christians. Roads connect the towns of Masapun and Iliwaki on the southern coast, Arwala on the eastern coast, and Lioppa, Laliki, and Wesiri on the northern coast.

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Wetaskiwin, city, central Alberta, Canada. It lies 44 miles (71 km) south of Edmonton. The missionary Father Albert Lacombe named the first settlement from a Cree Indian term meaning "place of peace," because it was there in 1867 that the warring Blackfoot and Cree Indians ended their fighting. The community developed as a grain-shipping centre after the arrival of the railroad (1891). Nearby is the Leduc oil field, discovered in 1947; the use of natural gas was an early enterprise, and there are local coal deposits. The Reynolds Museum of early farm machinery and transportation is in the city. Inc. village, 1900; town, 1902; city, 1906. Pop. (1991) 10,634.

Wethered, Joyce, married name LADY HEATHCOAT-AMORY (b. Nov. 17, 1901, Brook, Surrey, Eng.—d. Nov. 18, 1997, London), golfer, a natural stylist widely regarded as the greatest British woman player of her day.

Wethered and her brother Roger, who tied for the British Open title in 1921 but lost the playoff, learned the game as children. She was British Women's Open champion four times (1922, 1924, 1925, and 1929) and English native champion five consecutive years (1920–24). In addition to success in numerous mixed-foursome events, she was a regular international-tournament choice and played on the first Curtis Cup team against the United States in 1932. Representing a London store, she toured the United States as a professional in 1935, winning against Babe Zaharias.

In 1937 she married Sir John Heathcoat-Amory, with whom, at their home at Knightshayes Court, near Tiverton, Devon, she created a notable garden that was one of the leading British botanical collections.

Wethersfield, urban town (township), Hartford county, central Connecticut, U.S. It lies immediately south of Hartford, on the Connecticut River. Settled in 1634 by a group led by John Oldham of Massachusetts, and called Watertown, it is the oldest permanent English settlement in Connecticut. In 1637 it was renamed for Wethersfield, Eng.; it received a charter in 1662 and was incorporated in 1822. Until 1800 the village prospered as a port at the head of navigation on the Connecticut River. Wethersfield remained essentially agricultural until the mid-19th century, although small industries (brickmaking, tanning, sawmilling,

seed production) had flourished since colonial times. It is now mainly residential with light-industrial development. Many colonial homes remain, including the Joseph Webb House (1752), now a national historic shrine, and the site of the Yorktown Conference (May 1781) between General George Washington and the French general Count de Rochambeau. Pop. (1992 est.) 25,602.

wetland, terrestrial ecosystem characterized by poor drainage and the consequent presence most or all of the time of sluggishly moving or standing water saturating the soil. Wetlands are usually classified, according to soil and plant life, as bog, marsh, or swamp (*qq.v.*).

Wetmore, Alexander, in full FRANK ALEXANDER WETMORE (b. June 18, 1886, North Freedom, Wis., U.S.—d. Dec. 7, 1978, Maryland), American ornithologist noted for his research on birds of the Western Hemisphere.

As an employee of the Biological Survey of the U.S. Department of Agriculture, Wetmore was particularly interested in avian anatomy, osteology, fossil birds, migration, and taxonomy. He headed ornithological trips to Spain, many parts of South America, Panama, and almost every state in the United States. He wrote many of his articles and books while serving concurrently, after 1925, as assistant secretary of the Smithsonian Institution and director of the U.S. National Museum. In 1945 he became secretary of the Smithsonian. After his retirement in 1952, he continued to work there as a research associate. Wetmore published *The Migration of Birds* (1926), *A Checklist of the Fossil and Prehistoric Birds of North America and the West Indies* (1956), and three volumes (1965–72) of an unfinished four-volume work entitled *The Birds of the Republic of Panama.*

Wettach, Charles Adrien (clown): *see* Grock.

Wettin DYNASTY, major European dynasty, genealogically traceable to the start of the 10th century AD. Its earliest known ancestors were active in pushing Germany's frontier eastward into formerly Slav territory; and by the end of the 1080s two of their descendants, brothers, held not only the countship of Wettin (on a crossing of the Saale River downstream from Halle), but also, farther east, the margravate of Meissen (on the Elbe River). The Wettins of Meissen vastly enlarged their line's territory by becoming landgraves of Thuringia in 1264 and electors of Saxony in 1423.

Of major importance was the division of the Wettin dynasty into Ernestine and Albertine lines in 1485. The Albertines secured the electorate of Saxony from the Ernestines in 1547. The Ernestines retained thereafter some less important possessions in Thuringia which they constantly subdivided between themselves. Their possessions became known as the Saxon duchies and included Saxe-Weimar, Saxe-Coburg, Saxe-Eisenach, Saxe-Altenburg, and Saxe-Gotha, among others. In the 19th and 20th centuries the Ernestine Wettins of the Saxe-Coburg branch rose to unprecedented heights. One became king of the Belgians as Leopold I in 1831, and another, Albert, married the British queen Victoria in 1840 and was the ancestor of five successive British sovereigns (though the name Wettin was rarely cited in England, and that of the house of Saxe-Coburg-Gotha was officially changed, for the British, to the house of Windsor in 1917). Yet another Ernestine, Ferdinand, married Maria II of Portugal in 1836 and was the founder of the Portuguese royal house that reigned from 1853 to 1910. And finally, a fourth Ernestine became prince of Bulgaria in 1887 and king in 1908, as Ferdinand I, with his descendant reigning until 1946.

The Albertines were electors of Saxony from 1547 and kings from 1806 to 1918. They also provided two kings of Poland, Augustus II and Augustus III, between 1697 and 1763. *See also* Saxon duchies; Windsor, house of.

wetting agent, chemical substance that increases the spreading and penetrating properties of a liquid by lowering its surface tension—that is, the tendency of its molecules to adhere to each other. *See* detergent; surface-active agent.

Wettstein, Johann Rudolf (b. 1594, Basel, Switz.—d. April 1666, Basel), burgomaster of Basel who, at the close of the Thirty Years' War, represented the Swiss Confederation at the Congress of Westphalia (in Münster, 1647–48), where he secured European recognition of the confederation's independence and Habsburg renunciation of all claims to Swiss government.

A public notary, Wettstein entered the Venetian army in 1616 to escape his debts, wife, and family. Gradually gaining political prominence in Basel, he was elected burgomaster in 1645; he was officially chosen the following year to represent the Swiss Confederation at the impending peace conference at Münster. At the conference he won recognition of Swiss sovereignty and of his own diplomatic skill. Later, at Vienna (1650), he secured an imperial reaffirmation of complete Swiss autonomy.

In his capacity as burgomaster, Wettstein brutally suppressed a local peasant insurrection in 1653. He participated in the peace negotiations following the internecine Villmergen wars and opposed—ultimately without success—the continuing Swiss alliance with France.

WEU: *see* Western European Union.

Wewak, coastal town, northern Papua New Guinea, near the mouth of the Sepik River. Economic activities are limited due to primitive hinterland conditions, but there are some coffee and coconut plantations in the area. Wewak originated as an outlet for the Sepik goldfield (discovered in the early 1930s but now abandoned). It is a port of call for coastal and Australian shipping (cargo is ferried ashore), with an international airport. It is linked by road to Maprik, 40 miles (64 km) west, and thence south to Paguwi on the Sepik River. Pop. (1990) 23,224.

Wexford, Irish LOCH GARMAN, county in the province of Leinster, in the extreme southeast of Ireland. It is bounded on the east and south by the Irish Sea and from west to north by Counties Kilkenny, Carlow, and Wicklow. The Blackstairs Mountains—which have two main peaks, Blackstairs Mountain (2,402 feet [732 m]) and Mount Leinster (2,602 feet [793 m])—form a striking range rising from lowlands on all sides. Between the two main summits is the deep Scullogue Gap. Most of the county consists of a lowland between the mountains and the sea, with a maximum width of about 20 miles (32 km) and scattered hills of igneous rock and several hills over 1,000 feet (300 m) high. Much of the lowland is covered with glacial deposits, including the moraine formed during the last glaciation of Ireland. The coast is composed of wide, sweeping bays with rocky headlands, sand dunes, and cliffs.

Anglo-Norman adventurers landed in Wexford in 1169. By Tudor times (16th century), the northern area was dominated by the MacMurrough Kavanagh family. A continuous tradition of town life dates from Norse times. Wexford town as a fortified place was involved in several episodes of warfare: it was stormed by Oliver Cromwell's forces in 1649, and in May 1798 it was the scene of a major popular rising that met with defeat near Enniscorthy. In 1964 an estate on the slopes of Slieve Coillte, overlooking the River Barrow, was given to the government and was developed as the John F. Kennedy Park as a memorial to the former president of the United States.

Less than two-fifths of the population lives in towns and villages. The county council meets at Wexford, and there is a county manager. Wexford town is a borough, and Enniscorthy and New Ross are urban districts. Farming is the main occupation in the county, and most farms are of medium size, averaging 70–80 acres (28–32 hectares). About half the land is in pasture, and about two-fifths of the farmland is under cereal crops, half of it wheat. The chief economic staple is cattle, exported through Dublin or Waterford, and there is some dairying.

The chief industrial towns are Wexford, Enniscorthy, and New Ross. Rosslare is a seaside resort, with fine sandy beaches. From Rosslare harbour, the port of call for steamers from Fishguard, Wales, there are railways to Wexford town, Dublin, and Waterford. Area 908 square miles (2,351 square km). Pop. (1991 prelim.) 102,045.

Wexford, Irish LOCH GARMAN, seaport and county seat, County Wexford, Ireland, on the River Slaney. The name Wexford derives from the Norse settlement of Waesfjord. It was an early colony of the English, having been taken by Robert FitzStephen in 1169. The town received a charter in 1317, which was extended in 1411 by Henry IV and in 1558 by Elizabeth I; subsequent charters were granted in 1608 and 1686 by James I and James II, respectively. It was besieged and sacked by the forces of Oliver Cromwell in 1649 and captured and garrisoned for William III in 1690. Wexford lost its charter under the Municipal Corporations (Ireland) Act, 1840, but was granted another in 1846.

Some remains still exist of the old walls and of one of the five towers of the town. The deconsecrated Protestant church, alongside the ruins of the ancient abbey of St. Sepulchre, is said to occupy the spot on which the treaty was signed between the Irish and the English invaders in 1169. Wexford Harbour, formed by the Slaney estuary, is large, though a bar prevents the entrance of vessels drawing more than 12 feet (4 m); an artificial harbour was opened in 1906 at Rosslare, which is connected with Wexford by rail and is served by passenger vessels from Fishguard, Wales. Wexford's principal exports are livestock and agricultural produce. The town's industries are based on agriculture and light engineering. Wexford is a base for salmon- and sea-fishing districts, the centre of a tourist area, and the seat of the Roman Catholic diocese of Ferns. Pop. (1991 prelim.) 9,537.

Weyburn, city, southeastern Saskatchewan, Canada, on the Souris River. It was settled during the 1890s after the Soo Line Railroad from Estevan came through to Moose Jaw (92 miles [149 km] northwest). Tradition holds that the place-name originated from the Scottish *wee burn* ("small brook"), in reference to the Souris River, but the actual derivation is unclear. Weyburn has become a distributing point for a productive grain and mixed-farming region and is situated on one of Canada's most prolific oil fields. The city's manufactures include cables, plastics, steel and glass fibre products, and carbonated beverages; an industrial complex is at the city's airport. A provincial mental hospital, Weyburn Collegiate Institute (1913), Southeast Region Community College, and Western Christian College serve the community. Inc. village, 1900; town, 1903; city, 1913. Pop. (1991) 9,673.

Weyden, Rogier van der (Flemish), French ROGIER DE LA PASTURE (b. 1399/1400, Tournai, Fr.—d. June 18, 1464, Brussels), Flemish

painter who, with the possible exception of Jan van Eyck, was the most influential north-



"St. Luke Painting the Virgin," oil on panel by Rogier van der Weyden, *c.* 1435; in the Museum of Fine Arts, Boston

By courtesy of the Museum of Fine Arts, Boston, gift of Mr. and Mrs. Henry Lee Higginson

ern European artist of his time. Though most of his work was religious, he produced secular paintings (now lost) and some sensitive portraits.

Rogier was the son of a master cutler, and his childhood must have been spent in the comfortable surroundings of the rising class of merchants and craftsmen. He may even have acquired a university education, for in 1426 he was honoured by the city as "Maistre (Master) Rogier de la Pasture" and began his painting career only the next year at the rather advanced age of 27. It was then, on March 5, 1427, that Rogier enrolled as an apprentice in the workshop of Robert Campin, the foremost painter in Tournai and dean of the painters' guild. Rogier remained in Campin's atelier for five years, becoming an independent master of the guild on Aug. 1, 1432. From Campin, Rogier learned the ponderous, detailed realism that characterizes his earliest paintings, and so alike, in fact, are the styles of these two masters that connoisseurs still do not agree on the attribution of certain works. But the theory that the entire sequence of paintings credited to Campin (who, like Rogier, did not sign his panels) are actually from the brush of the young Rogier cannot be maintained. Careful study of secure works by Rogier and by his colleague in Campin's workshop, Jacques Daret, permit scholars to reestablish a basic series of works by the older master and to distinguish the style of these from that of Rogier.

Campin was not the only source of inspiration in Rogier's art. Jan van Eyck, the great painter from Bruges, also profoundly affected the developing artist, introducing elegance and subtle visual refinements into the bolder, Campinesque components of such early paintings by Rogier as "St. Luke Painting the Virgin." Although as an apprentice Rogier must certainly have met Jan van Eyck when the latter visited Tournai in 1427, it was more likely in Bruges, where Rogier may have resided between 1432 and 1435, that he became thoroughly acquainted with van Eyck's style.

By 1435, Rogier, now a mature master, settled in Brussels, the native city of his wife, Elizabeth Goffaert, whom he had married in 1426. The next year he was appointed city painter; and it was from this time that he began to use the Flemish translation of his name (van der Weyden). Rogier remained in Brussels the rest of his life, although he never completely severed his ties with Tournai. He was commissioned to paint a mural (now destroyed) for the town hall of Brussels showing famous historical examples of the administration of justice. During this same period, around 1435–40, he completed the celebrated panel of the "Descent from the Cross" for the chapel of the Archers' Guild of Louvain. In this deposition there is evident a tendency to reduce the setting of a scene to a shallow, shrinelike enclosure and to orchestrate a rich diversity of emotions. These devotional qualities are even more striking in Rogier's works of the 1440s such as the twin "Granada-Miraflores" altarpieces and the "Last Judgment Polyptych" in Beaune, Fr. (Hôtel-Dieu). In these the settings are stark, the figures are delicate Gothic types, and the action, though stilled, is exquisitely expressive. The removal of Rogier's art from concern with outward appearances and his return to medieval conventions is surprising; for it was during this decade that Rogier's international reputation was secured and commissions increased from noblemen such as Philip the Good, duke of Burgundy, and his powerful chancellor, Nicolas Rolin. Rogier may well have also been influenced by the writings of Thomas à Kempis, the most popular theologian of the era, whose "practical mysticism," like Rogier's painting, stressed empathetic response to episodes from the lives of Mary, Christ, and the saints.

Perhaps as an extension of a journey to install the "Last Judgment Altarpiece" in Rolin's chapel at Beaune or possibly to obtain a plenary indulgence for his daughter Margaret, one of Rogier's four children, who had died that year, the renowned painter visited Rome during the Jubilee of 1450. He was warmly received in Italy. Praise from the Humanist Bartolomeo Fazio and the eminent theologian Nicholas of Cusa is recorded. Rogier also received commissions from the powerful Este family of Ferrara and the Medici of Florence. He painted a portrait of Francesco d'Este (originally thought to be Leonello d'Este), and his painting of the Madonna and Child that still remains in Florence (Uffizi) bears the arms and patron saints of the Medici.

While on his pilgrimage, Rogier apparently tutored Italian masters in painting with oils, a technique in which Flemish painters of the time were particularly adept. He also seems to have learned a great deal from what he viewed. Although he was primarily attracted to the conservative painters Gentile da Fabriano and Fra Angelico, whose medievalizing styles paralleled his own, Rogier was also acquainted with more progressive trends. In the "St. John Altarpiece" and the "Seven Sacraments Triptych," executed between 1451 and 1455, shortly after Rogier's return north, his characteristic austerity is tempered by his recollection of the more robust Italian styles; and, in both, the panels are unified from a single point of view. Despite this enrichment, however, Rogier's conceptions remained essentially iconic: he pushed the figures into the foreground and isolated them from their surroundings as subjects for devotion.

The last 15 years of his life brought Rogier the rewards due an internationally famous painter and exemplary citizen. He received numerous commissions, which he carried out with the assistance of a large workshop that included his own son Peter and his successor as city painter, Vranck van der Stockt, a mediocre imitator. Even before his death, however, Rogier's impact extended far beyond his immediate associates. The influence of his expressive but technically less intricate style eclipsed that of both Campin and van Eyck. Every Flemish painter of the succeeding generation—Petrus Christus, Dirck Bouts, Hugo van der Goes, and Hans Memling (who may have studied in Rogier's atelier)—depended on his formulations; and, during the 16th century, Rogierian ideas were transformed and revitalized by Quinten Massys and Bernard van Orley. Rogier's art was also a vehicle for transporting the Flemish style throughout Europe, and during the second half of the 15th century his influence dominated painting in France, Germany, and Spain.

Nevertheless, the fame of Rogier van der Weyden quickly waned, and no painting by him had been signed or dated. By the end of the 16th century the biographer Carel van Mander had referred mistakenly to two Rogiers in *Het Schilderboek* (1603; "Book of Painters"), and by the middle of the 19th century his fame and art had all but been forgotten. Only through a meticulous evaluation of the documents have scholars over the past century been able to reconstruct Rogier's work and to restore the reputation of one of 15th-century Flanders' leading masters.

(H.L.Ke.)

MAJOR WORKS. "Madonna and Child in a Niche" (*c.* 1432; Kunsthistorisches Museum, Vienna); "Annunciation" (*c.* 1435; Louvre, Paris); "St. Luke Painting the Virgin" (*c.* 1435; Museum of Fine Arts, Boston); "The Altarpiece of the Virgin" ("Miraflores Altarpiece"; *c.* 1435–40s; Staatliche Museen Preussischer Kulturbesitz, Berlin, and Metropolitan Museum of Art, New York City); "The Altarpiece of the Virgin" ('Granada Altarpiece"; 1435–40s; Capilla Reale, Granada, Spain); "Madonna and Child in a Niche" (*c.* 1435; Prado, Madrid); "Descent from the Cross" (*c.* 1435–40; Prado); "Last Judgment Altarpiece" (*c.* 145 Hôtel-Dieu, Beaune, Fr.); "Braque Triptych" (*c.* 1450; Louvre); "Madonna and Child with Four Saints" (*c.* 1450; Städelsches Kunstinstitut, Frankfurt am Main); "The Deposition in the Tomb" (*c.* 1450; Uffizi, Florence); "Seven Sacraments Triptych" (*c.* 1451–55; Musée Royal des Beaux-Arts, Antwerp); "St. John Altarpiece" (*c.* 1455; Staatliche Museen Preussischer Kulturbesitz); "Bladelin Altarpiece" (*c.* 1455; Staatliche Museen Preussischer Kulturbesitz); "Crucifixion" (*c.* 1455; Johnson Collection, Philadelphia Museum of Art); "Columba Altarpiece" (*c.* 1460–64; Alte Pinakothek, Munich).

BIBLIOGRAPHY. No modern monographic study of Rogier van der Weyden has been written and in place of one, two less comprehensive works must serve: Erwin Panofsky, *Early Netherlandish Painting,* 2 vol. (1953); and M.J. Friedländer, *Early Netherlandish Painting,* vol. 2 (1967). Panofsky's chapter establishes a basic chronology and interprets Rogier's place in the history of Flemish painting. The Friedländer volume, a translation from the German updated in notes, is a basic catalogue raisonné and survey of Rogier's production. The documents pertaining to Rogier's life have been presented in G. Hulin de Loo, "Rogier van der Weyden," *Biographique nationale de Belgique,* vol. 27 (1938); and more recently, they were supplemented and interpreted in Theodore H. Feder, "A Reexamination Through Documents of the First Fifty Years of Rogier van der Weyden's Life," *Art Bulletin,* 48:416–431 (1966). Two special studies by K.M. Birkmeyer, "The Arch Motif in Netherlandish Painting of the Fifteenth Century," *Art Bulletin,* 42:1–20, 99–112 (1961), and "Notes on the Two Earliest Paintings by Rogier van der Weyden," *Art Bulletin,* 44:329–333 (1962), treat, respectively, Rogier's most characteristic iconographic innovation and his artistic origins. Shirley N. Blum, *Early Netherlandish Triptychs* (1969), has considered Rogier's multiple altarpieces and their patronage.

Weyerhaeuser, Frederick, original name FRIEDRICH WEYERHAEUSER (b. Nov. 21, 1834, Nieder Saulheim, Hesse—d. April 4, 1914, Pasadena, Calif., U.S.), U.S. lumber capitalist who put together a syndicate owning millions of acres of timberland, as well as sawmills, paper mills, and other processing plants.

An immigrant who left Germany when he was 18, Weyerhaeuser started in the lumber business as a sawmill worker in Rock Island, Ill. When the business failed in the panic of 1857, he and his brother-in-law bought it. While his partner ran their mill, Weyerhaeuser travelled through Wisconsin and Minnesota

buying stands of timber. He also began acquiring an interest, often a controlling interest, in many logging and milling operations. In 1872 he organized the Mississippi River Boom and Logging Co., a huge confederation that handled all the logs milled on the Mississippi.

In 1891, Weyerhaeuser moved to St. Paul, Minnesota, where he and his next-door neighbour, railroad tycoon James J. Hill, made one of the biggest land deals in U.S. history. In 1900 he bought from Hill 900,000 acres of timberland in the Pacific Northwest for $6 an acre, thus founding the Weyerhaeuser Timber Company, centred in Tacoma, Wash.

During his lifetime, the company purchased almost 2,000,000 acres of land in the northwest at an average cost of $8.80 an acre. In addition, the Weyerhaeuser syndicate managed his many interests and partnerships in both timberland and sawmills in other parts of the country. Weyerhaeuser never changed the names of firms that he controlled, but he was president of 16 lumber companies and a large shareholder in many others. One of the 30 mills in which he had an interest was the Potlatch, Idaho, mill, which would later become Potlatch Corporation. He also owned part of what is now Boise Cascade Corporation.

The Weyerhaeuser Company (as the company was renamed in 1959) is still a world leader in lumber sales.

Weygand, Maxime (b. Jan. 21, 1867, Brussels—d. Jan. 28, 1965, Paris), French army officer who in World War I served as chief of staff under Gen. (later Marshal) Ferdinand Foch and who in World War II, as commander in chief of the Allied armies in France, advised the French government to capitulate (June 12, 1940).

Born in Belgium but educated in France, he went in 1886 to Saint-Cyr, the French training school for officers, and graduated with high honours in 1888. He studied and then taught at the cavalry school at Saumur and, by 1914, had attracted the attention of Foch, who made him his chief of staff.

Between the wars, Weygand served as adviser to the Polish army fighting the Bolsheviks (1920), high commissioner in Syria (1923–24), and vice president of the Superior War Council of France and inspector general of the army (1931–35). On Jan. 21, 1935, he retired at the age of 68.

On May 20, 1940, he was recalled to assume command of the armies when France was already being overrun by German forces. He advised capitulation. In December 1941 he was put on a pension and retired to his country place at Grasse, near Cannes. After the Allied invasion of North Africa (1942) he sought to fly to Algiers but was caught by the Germans and imprisoned in an Austrian castle, Schloss Itter. He was released by U.S. troops on May 5, 1945, flown to Paris, and arrested at Gen. Charles de Gaulle's command. He was "rehabilitated" three years later, and de Gaulle, in his memoirs, would later write, "when on May 20, [1940, Weygand] had taken over the supreme command, it was too late, without any doubt, to win the battle of France."

Weyl, Hermann (b. Nov. 9, 1885, Elmshorn, near Hamburg—d. Dec. 8, 1955, Zürich), German-American mathematician who through his widely varied contributions in mathematics served as a link between pure mathematics and theoretical physics, in particular adding enormously to quantum mechanics and the theory of relativity.

As a student at the University of Göttingen (graduated 1908), Weyl came under the influence of David Hilbert. In 1913 he became professor of mathematics at the Technische Hochschule, Zürich, where he was a colleague of Albert Einstein. The outstanding characteristic of Weyl's work was his ability to unite previously unrelated subjects. In *Die Idee der Riemannschen Fläche* (1913; *The Concept of a Riemann Surface,* 1964) he created a new branch of mathematics by uniting function theory and geometry, thereby opening up the modern synoptic view of analysis, geometry, and topology.

The outgrowth of a course of lectures on relativity, Weyl's *Raum, Zeit, Materie* (1918; "Space, Time, Matter") reveals his keen interest in philosophy and embodies the bulk of his findings on relativity. He produced the first unified field theory for which the Maxwell electromagnetic field and the gravitational field appear as geometrical properties of space–time. The influence of these studies on differential geometry is exemplified best by his treatment of the Italian mathematician Tullio Levi-Civita's concept of parallel displacement of a vector. Weyl freed the concept from dependence on a Riemann metric and thus set the stage for the rapid development of projective differential geometry by Oswald Veblen of the U.S. and others.

From 1923 to 1938 Weyl evolved a general theory of continuous groups using matrix representation. He found that most of the regularities of quantum phenomena on the atomic level can be most simply understood using group theory. With the findings published in *Gruppentheorie und Quantenmechanik* (1928; "Group Theory and Quantum Mechanics"), Weyl helped mold modern quantum theory.

Weyl was appointed professor of mathematics at the University of Göttingen in 1930. The Nazi dismissal of many of his colleagues prompted him to leave Germany in 1933 and accept a position at the Institute for Advanced Study, Princeton, N.J.; he became a U.S. citizen in 1939. After his retirement in 1955, Weyl remained professor emeritus of the institute and divided his time between Princeton and Zürich. Weyl made original contributions in many areas of mathematics. His findings on the uniform distribution of numbers modulus 1 were fundamental to later progress in the analytic theory of numbers.

Weyler y Nicolau, Valeriano, MARQUÉS (marquess) DE TENERIFE (b. Sept. 17, 1838, Palma, Majorca—d. Oct. 20, 1930, Madrid), Spanish general who, as captain general of Cuba shortly before the outbreak of the Spanish–American War (1898), used stern antirebel measures that were exploited by U.S. newspapers to inflame public opinion against Spanish rule of Cuba.

Weyler entered the military early in life. He fought against the Cuban rebels (1868–72) and then returned to Spain to serve against the Carlists, Bourbon traditionalists. He was captain general of the Canary Islands (1878–83), of the Balearic Islands (1883), and of the Philippines (1888), where he helped suppress native uprisings. Eight years later he was sent to Cuba, also to quell insurgency. His harsh and energetic policies raised a storm of American protest, which helped lead to his recall in October 1897.

Weyler then held a variety of governmental posts and in 1921–23 was army commander in chief. In 1926 he took part in an abortive plot against the Primo de Rivera regime. At his death, his reputation as a severe and unyielding military man was undiminished.

Weymouth, urban town (township), Norfolk county, eastern Massachusetts, U.S., on Hingham Bay and the Weymouth Fore and Back rivers, just southeast of Boston. Settled in 1622 as the Wessaguscus (or Wessagusset) Plantation, it is the state's second oldest community, and it became the dispersal point for the earliest expeditions around Massachusetts Bay. Incorporated in 1635, it was named for Weymouth, Eng., and depended on farming and fishing (until water pollution ended the region's herring runs). Local bog iron (discovered in 1771) formed the basis of an early iron industry. Shoe manufacturing was begun in 1853. Weymouth, although primarily residential, has some industries, including the manufacture of fertilizer, lacquers, and electronic components. The township embraces the villages of South, North, and East Weymouth. There is a U.S. naval air station in South Weymouth. Pop. (1990) 54,063.

Weymouth, Thomas Thynne, 3rd Viscount: *see* Bath, Thomas Thynne, 1st marquess of.

Weymouth and Portland, district (borough), county of Dorset, England, on the English Channel. It covers 16 sq mi (42 sq km). Bronze Age weapons and Roman interments have been found on the site. Weymouth's first specific charter (1252) made it a free borough and port for all merchants, and trading soon began with Bayonne and Aquitaine in France. Weymouth sent six ships against the attacking Spanish Armada (1588), and at least one enemy ship was brought into the harbour. During the 17th and early 18th centuries, there was much trade with North America. By 1750 the port had declined to a fishing village, but its reputation as a seaside resort then grew, especially following a series of visits by the English king George III (reigned 1760–1820). During the 19th century, the port revived with the expansion of trade with the Channel Islands, lying across the English Channel near the French coast. South of Weymouth itself is the peninsular Isle of Portland (*see* Portland, Isle of), culminating in a point at the Bill of Portland. Pop. (1991 prelim.) 61,000.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Weyprecht, Karl (b. Sept. 8, 1838, Bad König, near Erbach, Hesse-Darmstadt—d. March 29, 1881, Michelstadt, near Erbach, Ger.), Arctic explorer who discovered Franz Josef Land, an archipelago north of Russia, and who advanced a successful scheme for international cooperation in polar scientific investigations.

Under the sponsorship of the Austrian government, with Julius Payer as his lieutenant, Weyprecht took part in two Arctic expeditions that sought to find a northeast passage—a waterway from the Atlantic to the Pacific north of the Eurasian continental landmass. On the second of these expeditions (1872–74), his ship was caught in the polar ice and drifted for more than a year. On Aug. 30, 1873, he sighted Franz Josef Land and spent the next year exploring the region. He eventually abandoned his ship and, after journeying for 96 days by sledge and small boat, reached Novaya Zemlya, an archipelago south of Franz Josef Land.

Upon returning to Austria he proposed that interested governments establish one or more scientific stations where work could be done simultaneously according to a previous plan. The International Polar Commission that was formed organized the first International Polar Year (1882–83), with 11 countries establishing 12 stations in the Arctic and 2 in the Antarctic. The venture was followed by a second International Polar Year (1932–33) and the International Geophysical Year (1957–58). The best account of the Franz Josef Land expedition is usually considered to be Payer's *New Lands Within the Arctic Circle,* 2 vol. (1876). Weyprecht's publications include *Die Metamorphosen des Polareises* (1879; "Transformations of Polar Ice").

W.H., Mr., person known only by his initials, to whom the first edition of William Shakespeare's sonnets (1609) was dedicated:

To the onlie begetter of
These insung sonnets
Mr. W.H. all happinesse
And that eternitie
Promised
by
Our ever-living poet
Wisheth
The well-wishing
Adventurer in
Setting
Forth

The mystery of his identity has tantalized generations of biographers and critics, who have generally argued either that W.H. was also the "Fair Youth" to whom many of the sonnets are addressed or that he was a friend or patron who earned the gratitude of one or both parties by procuring Shakespeare's manuscript for the printer, Thomas Thorpe. Among the names offered for consideration are those of Henry Wriothesley, 3rd Earl of Southhampton, and William Herbert, 3rd Earl of Pembroke, with both of whom Shakespeare is believed to have had some connection, albeit slight. Also suggested are William Hatcliffe, who was "lord of misrule" during the celebrations at Gray's Inn (1587–88), and William Hall (a printer) and Sir William Harvey, both of whom could well have conveyed the manuscript to Thorpe. The ambiguity with which the dedication is expressed presents additional problems, for apparently the person in question was both "wished" eternity by Thorpe and "promised" it by Shakespeare.

Whaddon, George Villiers, Baron, Viscount Villiers: *see* Buckingham, George Villiers, 1st Duke of.

whale, any of the larger species of aquatic mammals belonging to the order Cetacea. The term whale can be used in reference to any cetacean, including porpoises and dolphins, but in general it is applied to those more than 3 m (10 feet) long. An exception is the 2.7-m dwarf sperm whale (*Kogia simus*), so called for its otherwise striking resemblance to its larger namesake. Whales are the most massive known animals, living or fossil, reaching a maximum size in the blue whale (*Balaenoptera musculus*) of perhaps more than 30 m and 200 metric tons (220 short [U.S.] tons).

A brief treatment of whales follows. For full treatment *see* MACROPAEDIA: Mammals: *Cetacea*.

Whales are distributed throughout the world's oceans and seas, from the Equator to the polar ice, except for the landlocked Caspian and Aral seas. They are mammals, and they share the defining traits of that group: they breathe air, are warm-blooded, give live birth, suckle their young on milk, and have hair. All are entirely aquatic, with specialized adaptations such as flippers and tail flukes for living in water. Whales must surface regularly to breathe, evacuating their lungs more completely than most mammals in an almost explosive breath known as a blow. Blows are visible because water vapour in the whale's hot breath condenses when the blow is released.

Whales, like other mammals, must regulate their body temperature. Hair, however, is restricted to the head, appearing mainly as isolated whiskers (vibrissae) near the mouth and blowhole. Their fat, called blubber, serves as an insulating layer to protect small whales from hypothermia. Large whales have the opposite problem in that they can produce too much heat; they possess elaborate thermoregulation mechanisms to prevent overheating.

Because of the restricted utility of vision underwater, whales use sound to perceive and interpret their environment and to communicate, sometimes over vast distances. Biologists have computed that the 10-hertz sounds of fin whales (*Balaenoptera physalus*), for example, can travel over 1,800 km (1,100 miles). Toothed whales can produce sounds and interpret their reflections via active echolocation. The extent to which baleen whales have this ability is unknown.

Following internal fertilization, female whales are pregnant for about a year. The young are relatively large when born—one-third to one-half the length of the mother. They are nursed for about six months on very rich milk containing almost 50 percent fat. Whales have one pair of nipples located at the rear of the abdomen near the genital opening.

The first fossil whales are known from rocks approximately 50 million years old (Early Eocene Epoch). These members of the extinct suborder Archaeoceti are the primitive whales from which modern whales are derived. They show many similarities to terrestrial mammals, including a differentiated dentition (heterodonty) consisting of incisors, canines, premolars, and molars. Archaeocetes gave rise to the living suborders: the baleen whales (suborder Mysticeti) and the toothed whales (suborder Odontoceti).

Mysticetes have baleen plates and take small prey by the mouthful, mainly in the form of drifting (planktonic) crustaceans such as copepods and krill, but they also occasionally consume small schooling fish or squid. One departure from this pattern is the gray whale (*Eschrichtius robustus*), which commonly eats shrimp and other bottom-dwelling creatures: it scoops up mud and strains it through the baleen plates, retaining its food. Odontocetes have simple teeth (homodonty) and pursue individual squid, fish, and other prey. The largest odontocete, the sperm whale (*Physeter catodon*), occasionally feeds on giant squid.

Humans have long utilized whales as a food resource, and until the latter half of the 20th century whales were hunted commercially. During the 18th and 19th centuries whale products included whale oil (*q.v.*), especially sperm oil (*q.v.*), as well as whalebone (baleen), spermaceti (*q.v.*), and ambergris (*q.v.*). In the 20th century the oils were used for making soap, margarine, and lubricants, whereas the meat and bones were processed into other products (*see* whaling).

whale-headed stork: *see* shoebill.

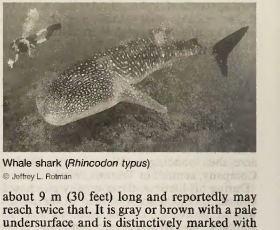
whale oil, also called train oil, oil that is obtained from whales, principally from their blubber.

From the 16th to the 19th century, the oil was important for soapmaking and as a fuel for lamps. In the 20th century, whale oil has often been converted into margarine and cooking fats. The paint and varnish and the printing-ink industries formerly used whale oil. Treated with sulfur, it provided extreme-pressure lubricants. Textile sizings and wax compositions could be made from the hardened oil. Fatty acids for soaps and fatty alcohols for cosmetics and detergents were derived by immersing the fats in alkalies.

Production of whale oil usually took place on large factory ships. The minced blubber and whalebone were cooked under steam pressure. Whale-liver oil was usually extracted by a solvent after digestion with alkali. Whale blubber yielded 50 to 80 percent oil by weight, whalebones 10 to 70 percent, and whale meat 2 to 8 percent. *See also* sperm oil; spermaceti.

Consult the INDEX *first*

whale shark (*Rhincodon typus*), gigantic but harmless shark (family Rhincodontidae) found worldwide but mainly in the tropics. The largest of living fishes, it often grows to about 9 m (30 feet) long and reportedly may reach twice that. It is gray or brown with a pale undersurface and is distinctively marked with small spots and narrow vertical lines of yellow or white. The whale shark has tiny teeth and feeds on plankton and small fishes. A sluggish animal, it generally swims slowly near the surface and has been hit by ships.



Whale shark (*Rhincodon typus*)
© Jeffrey L. Rotman

whalebird: *see* prion.

whalebone, also called baleen plate, series of horny plates in the mouth of the baleen whale (*q.v.*).

whaler, the blue shark (*q.v.*) or certain gray sharks of the family Carcharhinidae. *See* carcharhinid.

Whales, Bay of, former indentation in the Ross Ice Shelf, Antarctica. First seen by the British explorer Sir James Clark Ross in 1842 and visited by a fellow countryman, Ernest Henry (later Sir Ernest) Shackleton, in 1908, the Bay of Whales served as one of the most important centres of Antarctic exploration.

The natural bay, created by uneven advancement of the ice shelf, was the continent's most southerly open harbour in summer months and the site of several important bases, including those of the Norwegian explorer Roald Amundsen (1911) and the American explorer Richard E. Byrd (Little America I, 1928; II, 1933–34; III, 1940; IV, 1947; V, 1956). More than 10 miles (16 km) wide in 1911, the bay gradually narrowed until sometime in the early 1950s the advancing sheets collided and broke off the ice shelf, nearly obliterating the Bay of Whales and carrying away part of the Little America IV station. The Bay of Whales was entirely eliminated in 1987 when an iceberg 99 miles (159 km) long broke off from the Ross Ice Shelf.

whaling, hunting of whales for food, oil, or both. In some areas of the world, whaling dates to prehistoric times. Modern hunting so depleted whale populations around the world that new regulations and increased costs have reduced the industry to a tiny fraction of its former size.

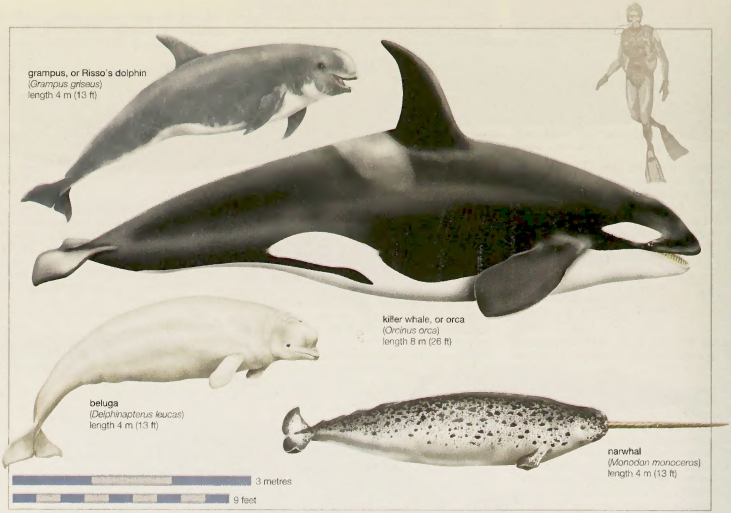
A brief treatment of whaling follows. For full treatment, *see* MACROPAEDIA: Fishing, Commercial.

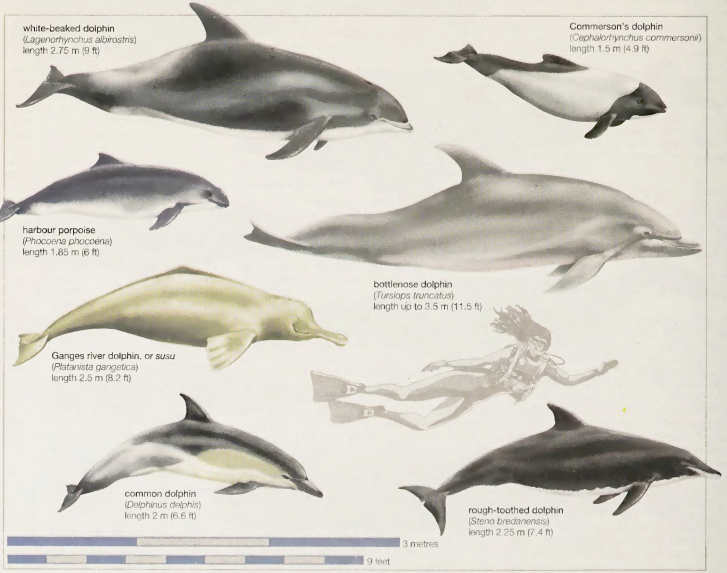
Evidence indicates that ancient Eskimo and North American Indians hunted whales as early as AD 100, finding in the large animals a plentiful source of food, fuel, and material for tools. In Europe the systematic hunting of whales began around the Bay of Biscay in the late Middle Ages. Basque whalers ventured great distances in pursuing schools of whales, arriving on the shores of Newfoundland and Iceland early in the 16th century. Some scholars have suggested that these transatlantic voyages began as early as 1372.

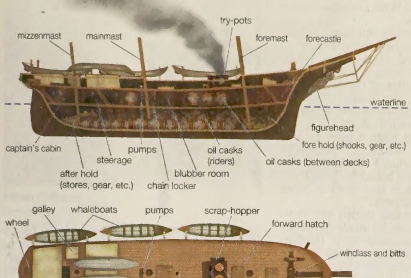
During the 17th century both the Dutch and the English built large whaling fleets. In one year the Dutch had an estimated 300 ships at sea with 18,000 seamen aboard. In the first decades of the 18th century, these fleets were forced to hunt in more distant waters around Greenland and the Davis Strait as the number of whales closer to home dwindled. Whaling vessels from the British North American colonies began to appear on

Whales


blue whale
(Balaenoptera musculus)
length 29.5 m (97 ft)
fin whale
(Balaenoptera physalus)
length 23 m (75 ft)
minke whale
(Balaenoptera acutorostrata)
length up to 10 m (33 ft)
sei whale
(Balaenoptera borealis)
length 14 m (46 ft)
bowhead, or Greenland right whale
(Balaena mysticetus)
length up to 20 m (66 ft)
northern right whale
(Eubalaena glacialis)
length up to 18 m (59 ft)
gray whale
(Eschrichtius robustus)
length up to 15 m (49 ft)
humpback whale
(Megaptera novaeangliae)
length 14 m (46 ft)
Baird's beaked, or giant bottlenose, whale
(Berardius bairdi)
length 13 m (43 ft)
sperm whale
(Physeter catodon)
length up to 19 m (62 ft)
3 metres
9 feet


grampus, or Risso's dolphin
(Grampus griseus)
length 4 m (13 ft)
killer whale, or orca
(Orcinus orca)
length 8 m (26 ft)
beluga
(Delphinapterus leucas)
length 4 m (13 ft)
narwhal
(Monodon monoceros)
length 4 m (13 ft)
3 metres
9 feet


white-beaked dolphin
(Lagenorhynchus albirostris)
length 2.75 m (9 ft)
Commerson's dolphin
(Cephalorhynchus commersonii)
length 1.5 m (4.9 ft)
harbour porpoise
(Phocoena phocoena)
length 1.85 m (6 ft)
bottlenose dolphin
(Tursiops truncatus)
length up to 3.5 m (11.5 ft)
Ganges river dolphin, or susu
(Platanista gangetica)
length 2.5 m (8.2 ft)
common dolphin
(Delphinus delphis)
length 2 m (6.6 ft)
rough-toothed dolphin
(Steno bredanensis)
length 2.25 m (7.4 ft)
3 metres
9 feet



Details of a typical early 19th-century whaling ship

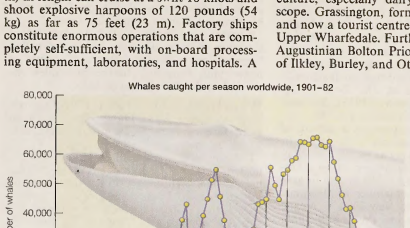
the Atlantic Ocean in the 18th century, and with them came an innovation that greatly extended the capabilities of whaling ships. Brick ovens called try-works were installed on ships and allowed whalers to boil and process the precious whale blubber (fat) into oil at sea and store it in barrels instead of hauling it to onshore facilities. With such capacities, whaling ships commonly stayed at sea for up to four years before returning with their cargoes.

Whaling in the 19th century expanded into the Pacific Ocean and northward toward the Arctic. Ships from the United States dominated the world industry, with a fleet of more than 700 ships by mid-century, mostly sailing out of New England (especially New Bedford, Mass., and Nantucket, Mass.).

Before the advent of modern whaling, the nearly universal method of whaling was the use of harpoons from open boats. Modern whaling had its start in the mid-19th century when a Norwegian, Svend Foyn, developed a gun that launched harpoons containing an explosive charge. For centuries, whalers had been restricted to such slower breeds of whale as the humpback, sperm, bowhead, and gray, because they were within a harpoon thrower's short range. Foyn's gun hurled a harpoon a greater distance. At a time when the slower breeds were becoming scarce, whalers could go after the faster-swimming blue, sei, and fin whales, whose populations had been previously undisturbed. The subsequent use of power craft aided in this development, and the methods have remained essentially the same.

Using helicopters, underwater sonar, and high-powered harpoon guns, the modern whaling industry was capable of enormous catches. Catcher boats of about 150 feet (45 m) in length can cruise at a swift 18 knots and shoot explosive harpoons of 120 pounds (54 kg) as far as 75 feet (23 m). Factory ships constitute enormous operations that are completely self-sufficient, with on-board processing equipment, laboratories, and hospitals. A blue whale, whose size may exceed the largest prehistoric dinosaur, could be flensed, dismembered, butchered, and pressure-cooked to produce oils and various meals in less than an hour.

Because of the large number of whales that were taken by modern methods, the whaling industry has been subjected to restrictive regulation in the mid-20th century in order to preserve whale species. The International Whaling Commission (IWC) instituted a moratorium on commercial whaling beginning in 1986, but a few countries (such as Japan, Iceland, and Norway) maintained reduced industries with whales caught for "scientific research." In 1992 Iceland withdrew from the IWC, and Norway resumed small-scale commercial whaling. In 1994 the IWC banned whaling south of Africa, Australia, and South America.



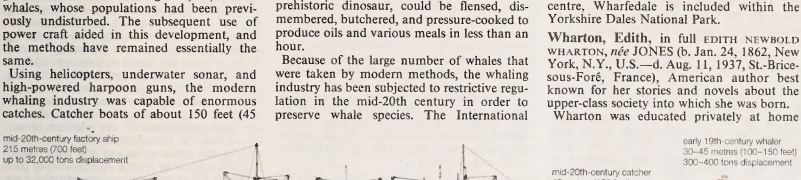
A moratorium on commercial whaling was finally imposed in 1986 after decades of overhunting had already depleted the populations of many whale species

Wharfe, River, river in eastern England that rises in the county of North Yorkshire and then flows 60 miles (97 km) southeast to become an important tributary of the River Ouse (which drains into the Humber, an estuary of the North Sea) a few miles south of York. Parts of the river form sections of the boundary between West Yorkshire and North Yorkshire. Its upper reaches, in the Pennines, lie in a steep, troughlike valley known as Wharfedale.

Wharfedale, upper valley of the River Wharfe within the Pennine uplands, in North Yorkshire and northern West Yorkshire, England, noted for its scenic attractions. The valley widens below the point where Litton Dale joins the main dale from the west, and agriculture, especially dairy farming, has more scope. Grassington, formerly a market centre and now a tourist centre, is the chief village of Upper Wharfedale. Further downstream is the Augustinian Bolton Priory (1155). The towns of Ilkley, Burley, and Otley lie in the lowest 8 miles (13km) of the dale. An important tourist centre, Wharfedale is included within the Yorkshire Dales National Park.

Wharton, Edith, in full EDITH NEWBOLD WHARTON, *née* JONES (b. Jan. 24, 1862, New York, N.Y., U.S.—d. Aug. 11, 1937, St.-Brice-sous-Foré, France), American author best known for her stories and novels about the upper-class society into which she was born.

Wharton was educated privately at home



Two generations of whaling vessels and their quarry drawn to scale

and in Europe. In 1885 she married Edward Wharton, a Boston banker, and a few years later resumed the literary career she had begun tentatively as a young girl. Her major literary model was Henry James, whom she knew, and her work reveals James's concern for artistic form and ethical issues.



Edith Wharton

By courtesy of the Yale University Collection of American Literature

The best of Wharton's early short stories were collected in *The Greater Inclination* (1899). Her novel *The Valley of Decision* was published in 1902, followed in 1905 by the critical and popular success of her novel *The House of Mirth,* which established her as a leading writer. In the next two decades—before the quality of her work began to decline under the demands of writing for women's magazines—she wrote such novels as *The Reef* (1912), *The Custom of the Country* (1913), *Summer* (1917), and *The Age of Innocence* (1920).

The Age of Innocence presents a picture of upper-class New York society in the 1870s. In the story Newland Archer is engaged to May Welland, a beautiful but proper fellow member of elite society, but he falls deeply in love with Ellen Olenska, a member of their circle who has returned to New York to escape her disastrous marriage to a Polish nobleman. Both lovers prove too obedient to conventional taboos to break with their upper-class social surroundings, however, and Newland feels compelled to renounce Ellen and marry May.

Wharton's best-known work is the long tale *Ethan Frome* (1911), which exploits the grimmer possibilities of the New England farm life she observed from her home in Lenox, Mass. The protagonist, the farmer Ethan Frome, is married to a whining hypochondriac but falls in love with her cousin, Mattie. As she is forced to leave his household, Frome tries to end their dilemma by steering their bobsled into a tree, but he only ends up crippling Mattie for life. They spend the rest of their miserable lives together with his wife on the farm.

Wharton's short stories, which appeared in numerous collections, among them *Xingu and Other Stories* (1916), demonstrate her gifts for social satire and comedy, as do the four novelettes collected in *Old New York* (1924). Among her later novels are *Twilight Sleep* (1927), *Hudson River Bracketed* (1929), and its sequel, *The Gods Arrive* (1932). Her autobiography, *A Backward Glance,* appeared in 1934. After 1907 Wharton lived in France, visiting the United States only at rare intervals, and in 1913 she was divorced from her husband.

Wharton's fiction examines the barriers of social convention that individuals must overcome while seeking happiness. She responds with irony to every symptom of social pretension and stupidity, and in her best novels she is able to raise the comedy of manners to the level of genuine tragedy.

Wharton (of Wharton), Thomas, 1st Marquess (b. August 1648, England—d. April 12, 1715, London), English peer who was one of the principal Whig politicians after the Revolution of 1688.

The son of Philip Wharton, 4th Baron Wharton, he became a member of the House of Commons in 1673 and remained an M.P. until he inherited his father's title in 1696. He was a strong supporter of the bill (1679–80) to exclude James, the Roman Catholic duke of York, from the succession. Wharton secretly corresponded with William of Orange and was one of the first English peers to join him at Exeter after his landing in England in November 1688. Wharton was also the author of the popular Whig ballad "Lilliburlero" ("Lilli Burlero"), which is said to have "sung James out of three kingdoms."

In reward for his services during the Revolution of 1688, William III made Wharton comptroller of the household from 1689 to 1702. During these years he served as the principal liaison between the king and the House of Commons and was the principal manager of Whig voting in the Commons. Upon her accession in 1702, Queen Anne dismissed Wharton from office because she disapproved of his morals. Wharton was nevertheless created an earl in 1706, and after Anne's death in 1714 he helped contrive the peaceful accession of the elector of Hanover to the English throne as George I. The new king made Wharton a marquess in 1715.

Wharton combined a dashing but rather dissolute private life—he has been called "the greatest rake of the Regency"—with an unswerving adherence to the principles enshrined in the Revolution of 1688.

Whately, Richard (b. Feb. 1, 1787, London, Eng.—d. Oct. 8, 1863, Dublin, Ire.), Anglican archbishop of Dublin, educator, logician, and social reformer.

The son of a clergyman, Whately was educated at Oriel College, Oxford, and took holy orders. While at Oxford, he wrote his satiric *Historic Doubts Relative to Napoleon Bonaparte* (1819), in which he attacked the stringent application of logic to the Bible by showing that the same methods used to cast doubt on the miracles would also leave the existence of Napoleon open to question.

Appointed principal of St. Alban Hall, Oxford, in 1825, he became professor of political economy at the university four years later. His treatise *Elements of Logic* (1826) became a standard textbook for several generations and was followed in 1828 by his *Elements of Rhetoric,* which also went into many editions.

In 1831 Whately was appointed archbishop of Dublin. He had supported (in 1829) the removal of political disabilities suffered by English Catholics, and together with the Catholic archbishop of Dublin, he devised a nonsectarian program of religious instruction as part of an Irish national school curriculum for both Protestant and Roman Catholic children. The scheme was unable to overcome the religious intransigence of the times and was soon abandoned.

Whately also took an interest in social questions: he served as president (1835–36) of the royal commission on the Irish poor, which called for major improvements in agriculture rather than the introduction of workhouses for the impoverished.

whatnot, series of open shelves supported by two or four upright posts. The passion for collecting and displaying ornamental knick-knacks, which appeared in the 18th century and was widespread in the 19th, stimulated the production in England and the United States of this whimsically named piece of furniture. The French version was called the étagère. Some examples contain drawers at the base; others have three sides of the upper shelf surmounted with an ornamental board.



Rosewood whatnot, English, 19th century; in the Victoria and Albert Museum, London

By courtesy of the Victoria and Albert Museum, London

The early versions, which appeared toward the end of the 18th century, were light and elegant in design, but as time went by the whatnot lent itself to some of the worst extravagances of ornament, with a wealth of fretwork and spirally twisted supports. Additional variations were the division of the lowest shelf into compartments and the production of triangular versions for fitting into corners.

wheat, cereal grass of the Gramineae (Poaceae) family and of the genus *Triticum* and its edible grain, one of the oldest and most important of the cereal crops.

Wheat is treated in several articles in the MACROPAEDIA. For treatment of its cultivation, *see* Farming and Agricultural Technology: *Crop-farming.* For the processing of wheat grain, *see* Food Processing: *Cereals and other starch products.*

The wheat plant has long, slender leaves, stems that are hollow in most varieties, and heads composed of varying numbers of flowers, ranging from 20 to 100. The flowers are grouped together in spikelets, each having two to six flowers. In most spikelets, two or three of the flowers become fertilized, producing grains. Of the thousands of varieties of wheat known, the most important are *Triticum aestivum,* used to make bread; *T. durum,* used in making pasta (alimentary pastes) such as spaghetti and macaroni; and *T. compactum,* or club wheat, a softer type, used for cake, crackers, cookies, pastries, and family flours.

Though grown under a wide range of climates and soils, wheat is best adapted to temperate regions with rainfall between 30 and 90 cm (12 and 36 inches). Winter and spring wheat are the two major types of the crop, with the severity of the winter determining whether a winter or spring type is cultivated. Winter wheat is always sown in the fall; spring wheat is generally sown in the spring but can be sown in the fall where winters are mild.

Some wheat is simply prepared by soaking and cooking the grain for use in porridge, broth, or pudding. Most food uses, however, require more processing. The grain is cleaned and then conditioned by the addition of water, so that the kernel breaks up properly. In milling, the grain is cracked and then passed through a series of rollers. As the smaller particles are sifted out, the coarser particles pass to other rollers for further reduction. About 72 percent of the milled grain is recovered as white flour. When a higher percentage is extracted, the flour is darker in colour. Flour made from the whole kernel is called graham flour and becomes rancid with prolonged storage because of the germ-oil content retained. White flour, which does not contain the germ, preserves longer.

The greatest portion of the wheat flour pro-



Wheat (*Triticum*)
Grant Heilman

duced is used for breadmaking. Wheats grown in dry climates are generally hard types, having protein content of 11–15 percent and strong gluten (elastic protein). The hard type produces flour best suited for breadmaking. The wheats of humid areas are softer, with protein content of about 8–10 percent and weak gluten. The softer type of wheat produces flour suitable for cakes, crackers, cookies, and pastries and household flours. Durum wheat semolina (from the endosperm) is used for making pastas, or alimentary pastes.

Although most wheat is grown for human food, and about 10 percent is retained for seed, small quantities are used by industry for production of starch, paste, malt, dextrose, gluten, alcohol, and other products. Inferior and surplus wheats and various milling byproducts are used for livestock feeds.

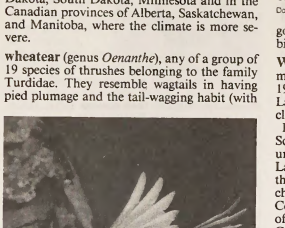
The composition of the wheat grain, a major source of energy in the human diet, varies somewhat with differences in climate and soil. On an average, the kernel contains 12 percent water, 70 percent carbohydrates, 12 percent protein, 2 percent fat, 1.8 percent minerals, and 2.2 percent crude fibres. A pound of wheat contains about 1,500 calories (100 grams contains about 330 calories). Thiamine, riboflavin, niacin, and small amounts of vitamin A are present, but the milling processes remove the bran and germ, where these vitamins are found in the greatest abundance.

More of the world's farmland is devoted to wheat than to any other food crop; in the late 20th century about 570,000,000 acres (230,000,000 hectares) were sown annually, with a total production of almost 600,000,000 metric tons. The world's largest producer is China, with an estimated annual yield of almost 100,000,000 metric tons. Other leading producers are the United States, Russia, India, Ukraine, France, Canada, Kazakhstan, and Turkey.

Wheat Belt, principal crop-growing region of Western Australia, occupying about 60,000 square miles (160,000 square km) in the southwestern section of the state. Served by the Perth-Albany Railway, the crescent-shaped belt is delineated on the west by a line drawn from Geraldton south through Moora, Northam, and Katanning to the western end of the Great Australian Bight. The eastern boundary of the belt bulges as far east as Southern Cross. The Wheat Belt receives as much as 20 inches (500 mm) of rainfall annually in the west, declining to 10 inches (250 mm) in the east. In addition to wheat, the area yields oats, barley, and wool. The Wheat Belt developed after the decline of gold mining in 1905 and was aided by the introduction of superphosphate fertilizers, new breeds of livestock, machinery, government loans, surveys, railway feeder-line construction, immigration, and "soldier settlement schemes" for military veterans after both World Wars.

Wheat Belt, the part of the North American Great Plains where wheat is the dominant crop. The belt extends along a north-south axis for more than 1,500 miles (2,400 km) from central Alberta, Can., to central Texas, U.S. It is subdivided into winter wheat and spring wheat areas. The southern area, where hard red winter wheat is grown, includes parts of the states of Kansas, Oklahoma, Texas, Nebraska, and Colorado. A hard red spring wheat is grown in parts of Montana, North Dakota, South Dakota, Minnesota and in the Canadian provinces of Alberta, Saskatchewan, and Manitoba, where the climate is more severe.

wheatear (genus *Oenanthe*), any of a group of 19 species of thrushes belonging to the family Turdidae. They resemble wagtails in having pied plumage and the tail-wagging habit (with



Common wheatear (*Oenanthe oenanthe*)
Eric Hosking

body bobbing). Wheatears are about 15 cm (6 inches) long and have comparatively short tails, often with T-shaped markings. Most are black and white or black and gray; some have yellow touches; and each has a white rear (modified to "whetear"). Wheatears are strong-flying residents of open, usually dry and rocky, regions of Eurasia and Africa. The common wheatear (*O. oenanthe*) breeds also in Alaska, Iceland, Greenland, and northeastern Canada.

wheatgrass (genus *Agropyron*), any of a number of species of wheatlike grasses in the family Poaceae, found throughout the North Temperate Zone. The plants are perennials, 30 to 100 cm (about 12 to 40 inches) tall; many have creeping rhizomes (underground stems).

The most important forage species are bluebunch wheatgrass (*A. spicatum*) and western wheatgrass (*A. smithii*). Crested wheatgrass (*A. cristatum*), desert wheatgrass (*A. desertorum*), and slender wheatgrass (*A. trachycaulum*) are



Crested wheatgrass (*Agropyron cristatum*)
Dorothea Woodruff

good forage plants and are often used as soil binders in the western United States.

Wheatley, John (b. May 24, 1869, Bonmahon, County Waterford, Ire.—d. May 12, 1930, Shettleston, near Glasgow, Scot.), British Labourite politician, champion of the working classes.

Educated in village schools in Lanarkshire, Scot., Wheatley worked in the coal mines until 1891. After serving two years on the Lanarkshire county council, he was elected to the Glasgow city council in 1912. He was also chairman of the Scottish National Housing Council. In 1922 he was elected as member of Parliament for the Shettleston division of Glasgow. As minister of health in the Labour government he was responsible for the Housing Act of 1924, which provided for a continuous building program over a period of 15 years, designed to secure the erection of 2,500,000 houses to be let at rents within the means of the working class population. After 1924 he turned more and more leftward, becoming thoroughly identified with revolutionary socialist views by the time of his death.

Wheatley, Phillis (b. *c.* 1753, Senegal, West Africa—d. Dec. 5, 1784, Boston, Mass., U.S.), the first black woman poet of note in the United States.

She was sold from a slave ship in Boston in 1761 to work for the family of John Wheatley, a merchant. The Wheatleys soon recognized her talents and gave her privileges unusual for a slave, allowing her to learn to read and write. At the age of 14 she began to write poetry, and her first published work, "An Elegiac Poem, on the Death of the Celebrated Divine . . . George Whitefield" (1770), attracted much attention. In 1773 her *Poems on Various Subjects, Religious and Moral* was published in England under the sponsorship of the Countess of Huntingdon, and Wheatley's reputation spread in Europe as well as in America. A poem published in 1776, dedicated to George Washington, brought her further acclaim.

The dissolution of the Wheatley family by death left Phillis Wheatley alone, and in April 1778 she married John Peters, a free black man who failed in business and apparently also failed to support Phillis and her children. At the end of her life she was working as a servant, and she died in poverty.

Wheatley's poetry, largely concerned with morality and piety, was conventional for its

time. Her significance stems from the attention that she drew to her successful education. Her poems were reissued in the 1830s by Abolitionists eager to prove the human potential of blacks.

Wheaton, city, seat (1867) of Du Page County, northeastern Illinois, U.S., western suburb of Chicago. The first settlers (1837) were two brothers, Warren and Jesse Wheaton, from Pomfret, Conn. The site was laid out in 1853 after the arrival (1849) of the Galena and Chicago Union Railroad (now the Chicago and North Western), which stimulated residential growth.

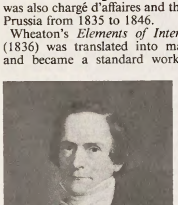
Wheaton has become a centre of religious activity. Notwithstanding the presence there of the headquarters of the Theosophical Society of America, the city, together with nearby Carol Stream, is sometimes referred to as the "Protestant Vatican of the Midwest" for its denominational and interdenominational religious activities, mainly evangelical Christian in character. Wheaton College, which originated there in 1860 as the Illinois Institute (organized in 1853 by the Wesleyan Methodist Church), has long been a prominent evangelical Christian liberal arts college. Wheaton is the headquarters of the large and influential National Association of Evangelicals, and numerous smaller evangelical groups are located there. The conservative, influential journal *Christianity Today* is published there.

The Robert R. McCormick Museum and Gardens and the Cantigny War Memorial Museum are nearby. Inc. village, 1859; city, 1890. Pop. (1990) 51,464.

Wheaton, Henry (b. Nov. 27, 1795, Providence, R.I., U.S.—d. March 11, 1848, Dorchester, Mass.), American maritime jurist, diplomat, and author of a standard work on international law.

After graduation from Rhode Island College (now Brown University) in 1802, Wheaton practiced law at Providence from 1806 to 1812. He moved to New York City in 1812 to become editor of the *National Advocate.* Two years later he was appointed a division judge advocate of the U.S. Army. In 1815 he published *A Digest of the Law of Maritime Captures and Prizes.* He served as a justice of the Marine Court (1815–19) and, in 1816, he was also appointed a reporter of the U.S. Supreme Court in Washington, D.C., where he was distinguished for the learnedness of his annotations. His diplomatic career began in 1827 with an appointment to Denmark, where he served as chargé d'affaires until 1835. He was also chargé d'affaires and then minister to Prussia from 1835 to 1846.

Wheaton's *Elements of International Law* (1836) was translated into many languages and became a standard work. *Histoire du progrès du droit des gens en Europe* (1841) was expanded and translated into English as *History of the Law of Nations in Europe and America* (1845). His *History of the Northmen* (1831) aroused European interest in Scandinavian history.



Wheaton, detail of a portrait by George Healy; in the Rhode Island Historical Society, Providence

By courtesy of the Rhode Island Historical Society, Providence

Wheatstone, Sir Charles (b. Feb. 6, 1802, Gloucester, Gloucestershire, Eng.—d. Oct. 19, 1875, Paris), English physicist who invented the Wheatstone bridge, a device that accurately measured electrical resistance and became widely used in laboratories.

He was appointed professor of experimental philosophy at King's College, London, in 1834, the same year that he used a revolving mirror in an experiment to measure the speed of electricity in a conductor. The same revolving mirror, by his suggestion, was later used in measurements of the speed of light. Three years later, with Sir William Fothergill Cooke of England, he patented an early telegraph. In



Wheatstone, detail of a chalk drawing by Samuel Laurence; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

1843 at the suggestion of the British mathematician Samuel Christie, he constructed the Wheatstone bridge and popularized its use.

His own inventions include the concertina, a type of small accordion, and the stereoscope, a device for observing pictures in three dimensions still used in viewing X-rays and aerial photographs. He initiated the use of electromagnets in electric generators and invented the Playfair cipher, which is based on substituting different pairs of letters for paired letters in the message. He was knighted in 1868.

wheel, a circular frame of hard material that may be solid, partly solid, or spoked and that is capable of turning on an axle.

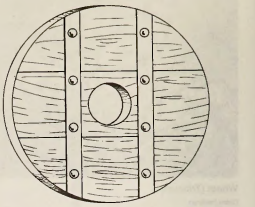
A Sumerian (Erech) pictograph, dated about 3500 BC, shows a sledge equipped with wheels. The idea of wheeled transportation may have come from the use of logs for rollers, but the oldest known wheels were wooden disks consisting of three carved planks clamped together by transverse struts.

Spoked wheels appeared about 2000 BC, when they were in use on chariots in Asia Minor. Later developments included iron hubs (centerpieces) turning on greased axles, and the introduction of a tire in the form of an iron ring that was expanded by heat and dropped over the rim and that on cooling shrank and drew the members tightly together.

The use of a wheel (turntable) for pottery had also developed in Mesopotamia by 3500 BC.

The early waterwheels, used for lifting water from a lower to a higher level for irrigation, consisted of a number of pots tied to the rim of a wheel that was caused to rotate about a horizontal axis by running water or by a treadmill. The lower pots were submerged and filled in the running stream; when they reached their highest position, they poured their contents into a trough that carried the water to the fields.

The three power sources used in the Middle Ages—animal, water, and wind—were all exploited by means of wheels. One method of driving millstones for grinding grain was to



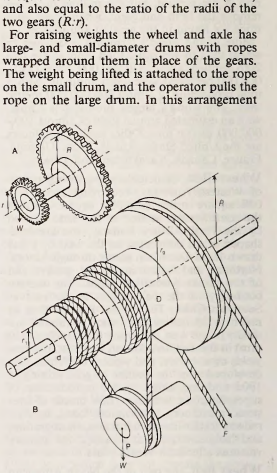
Wheel fashioned from wooden planks held together with metal battens

fit a long horizontal arm to the vertical shaft connected to the stone and pull or push it with a horse or other beast of burden. Waterwheels and windmills were also used to drive millstones.

Because the wheel made controlled rotary motion possible, it was of decisive importance in machine design. Rotating machines for performing repetitive operations driven by steam engines were important elements in the Industrial Revolution. Rotary motion permits a continuity in magnitude and direction that is impossible with linear motion, which in a machine always involves reversals and changes in magnitude.

wheel and axle, basic machine component for amplifying force. In its earliest form it was probably used for raising weights or water buckets from wells. Its principle of operation is demonstrated by the large and small gears attached to the same shaft, as shown at A in the illustration. The tendency of a force F applied at the radius R on the large gear to turn the shaft is sufficient to overcome the larger force W at the radius r on the small gear. The force amplification, or mechanical advantage, is equal to the ratio of the two forces (W:F) and also equal to the ratio of the radii of the two gears (R:r).

For raising weights the wheel and axle has large- and small-diameter drums with ropes wrapped around them in place of the gears. The weight being lifted is attached to the rope on the small drum, and the operator pulls the rope on the large drum. In this arrangement



Wheel and axle arrangements
(A) Large and small gears; (B) pulleys and ropes

the mechanical advantage is the radius of the large drum divided by the radius of the small drum. An increase in the mechanical advantage can be obtained by using a small drum with two diameters, r_1 and r_2, and a pulley block, P, as shown in sketch B in the illustration. When lifting a weight, the rope winds on the drum D and off the drum d.

A measure of the force amplification available with the system is the velocity ratio, or the ratio of the velocity (V_F) with which the operator pulls the rope at F to the velocity at which the weight W is raised (V_W). This ratio is equal to twice the radius of the large drum divided by the difference in the radii of drums D and d. Expressed mathematically, the equation is $V_F/V_W = 2R/(r_2 - r_1)$. The actual mechanical advantage W/F is less than this velocity ratio, depending on friction. A very large mechanical advantage may be obtained with this arrangement by making the pulleys D and d of nearly equal radius. *See also* block and tackle.

wheel animalcule (aquatic animal): *see* rotifer.

wheel lock, device for igniting the powder in a firearm such as a musket. It was developed in about 1515. The wheel lock struck a spark to ignite powder on the pan of a musket. It did so by means of a holder that pressed a shard of flint or a piece of iron pyrite against an iron wheel with a milled edge; the wheel was rotated and sparks flew. The principle was used in the design of the flint-and-wheel cigarette lighter.

wheel of life (Buddhism): *see* bhava-cakra.

wheel window (Gothic architecture): *see* rose window.

Wheeler, John Archibald (b. July 9, 1911, Jacksonville, Fla., U.S.), physicist, the first American involved in the theoretical development of the atomic bomb. He also originated a novel approach to the unified field theory.

The son of librarians, Wheeler first became interested in science as a boy reading scientific articles. He was educated at Baltimore City College and Johns Hopkins University, Baltimore, Md., where he received his doctorate in 1933. He also studied with Niels Bohr at the University of Copenhagen. He and Bohr wrote "The Mechanism of Nuclear Fission" (1939), a seminal treatise that singled out uranium-235 for use in the development of an atomic bomb.

Wheeler taught physics at the University of North Carolina before joining in 1938 the faculty at Princeton University, where during 1966–76 he was Joseph Henry Professor. In 1976 he was appointed professor of physics at the University of Texas at Austin, where from 1979 he held the Ashbel Smith chair of physics and in 1981 became Blumberg Professor of Physics.

Wheeler helped develop the hydrogen bomb at Los Alamos, N.M. (1949–51), and at Princeton was director (1951–53) of Project Matterhorn, which was instituted to design thermonuclear weapons. For his work on nuclear fission and the technology of plutonium production he was given the Fermi Award by the U.S. Atomic Energy Commission in 1968. From 1969 to 1976 he served as a member of the U.S. General Advisory Committee on Arms Control and Disarmament.

In later years he turned his attention to the study of unified field theory, the space-time continuum, and gravitation. His books include *Gravitation Theory and Gravitational Collapse* (1965), *Einstein's Vision* (1968), *Gravitation* (co-author; 1973), *Frontiers of Time* (1979), and *Quantum Theory and Measurement* (co-author; 1983). He was awarded the Niels Bohr International Gold Medal in 1982.

Wheeler, Joseph (b. Sept. 10, 1836, near Augusta, Ga., U.S.—d. Jan. 25, 1906, Brooklyn, N.Y.), Confederate cavalry general during the American Civil War.

Wheeler entered the U.S. cavalry from West Point in 1859 but soon resigned to enter the Confederate service. He commanded a brigade at the Battle of Shiloh (April 6–7, 1862), but soon afterward he returned to the cavalry arm, in which he won a reputation second only to Gen. Jeb Stuart's. After the action of Perryville he was promoted to brigadier general and, in 1863, to major general. Throughout the campaigns of Chickamauga, Chattanooga, and Atlanta, he commanded the cavalry of the Confederate Army in the west and was given the task of harassing Gen. William Tecumseh Sherman's army during its march to the sea. In the closing operations of the war, with the rank of lieutenant general, he commanded the cavalry of Gen. Joseph Johnston's weak army in North Carolina and was included in its surrender.

In 1898, during the Spanish–American War, Wheeler commanded the calvary in the actions of Guasimas and San Juan. He wrote *The Santiago Campaign* (1898).

Wheeler, Sir (Robert Eric) Mortimer (b. Sept. 10, 1890, Glasgow—d. July 22, 1976, Leatherhead, near London), British archaeologist, noted for his discoveries in Great Britain and India and for his advancement of scientific technique in archaeology. He was also a great popularizer of his subject, particularly on television.

It is possible that he derived his spectacular ability to present scholarly subjects in easily intelligible terms from his family. His mother's father was a professor and his father a journalist. After education at Bradford Grammar School and University College, London, and military service in World War I, Wheeler directed excavations of Roman remains in Essex in 1919–20. He received his Ph.D. from the University of London in 1920 and then conducted excavations in Wales (1921–27) and in Hertfordshire (1930–33), where he unearthed a pre-Roman settlement near St. Albans. Excavating at Maiden Castle in Dorset (1934–37), he found evidence of a settlement dating from the Neolithic Age, prior to 2000 BC. He conducted further excavations in Brittany and Normandy (1938–39).

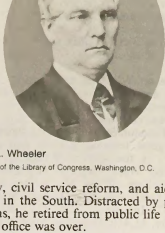
After serving in World War II Wheeler was made director-general of archaeology for the government of India (1944–47), and his research there threw important new light on the civilization of the Indus Valley. From 1948 to 1955 he held the chair of archaeology of the Roman Provinces at the University of London's Institute of Archaeology. He was knighted in 1952 and made a Companion of Honour in 1967. His other distinctions included being chairman of the Ancient Monuments Board for England, a trustee of the British Museum, president of the Society of Antiquaries, and a fellow of the Royal Society.

His numerous writings include *Archaeology from the Earth* (1954) and *Still Digging* (1955), an autobiography.

Wheeler, William A(lmon) (b. June 30, 1819, Malone, N.Y., U.S.—d. June 4, 1887, Malone), Republican vice president of the United States (1877–81) who, with Pres. Rutherford B. Hayes, took office by decision of an Electoral Commission (*q.v.*) appointed to rule on contested electoral ballots in the 1876 election.

A successful lawyer, Wheeler held several positions in New York state government in the 1840s and '50s, and served as a Republican member of the U.S. House of Representatives (1861–63). Returned to Congress in 1875, he was appointed to a committee investigating a disputed election in Louisiana and devised the "Wheeler compromise" by which governmental control of the state was shared by the two political parties.

Nominated for the vice presidency in order to lend sectional balance to the ticket, Wheeler ran on a platform favouring administrative



William A. Wheeler
By courtesy of the Library of Congress, Washington, D.C.

integrity, civil service reform, and aid to education in the South. Distracted by personal problems, he retired from public life after his term in office was over.

Wheeler, William Morton (b. March 19, 1865, Milwaukee—d. April 19, 1937, Cambridge, Mass., U.S.), American entomologist recognized as one of the world's foremost authorities on ants and other social insects. Two of his works, *Ants: Their Structure, Development, and Behavior* (1910) and *Social Life Among the Insects* (1923), long served as standard references on their subjects.

Wheeler began his study of ants while he was a professor of zoology at the University of Texas at Austin (1899–1903), and he greatly extended the scope of his research after becoming curator of invertebrate zoology at the American Museum of Natural History in New York City (1903–08). His investigations dealt particularly with ant taxonomy, morphology, and distribution as well as with ecology, habits, and social relations. He discovered that the social behaviour of ants was among the most complex in the insect world, leading him to use the ant colony as a behavioural analogy for human civilization. His findings were based on firsthand observations of ant species collected from all over the world, including Morocco, the Galapagos, and the Canary Islands.

Later in his career (1930), Wheeler made an important study of the biology of the antlion, the larvae of the neuropteran family Myrmeleontidae. Of significance, too, were his contributions to economic, or applied, entomology while he was a professor at Harvard University (1908–34).

Wheeler–Howard Act (1934): *see* Indian Reorganization Act.

Wheeler Peak, highest point (13,161 ft [4,011 m]) in New Mexico, U.S., located in Taos County, 70 mi (113 km) north-northeast of Santa Fe, in the Sangre de Cristo Mountains and within the Carson National Forest. The peak was probably named for Maj. George M. Wheeler, who surveyed the area during the 1870s.

Wheeling, city, seat (1797) of Ohio County, in the northern panhandle of West Virginia, U.S., on the Ohio River (there bridged to Martins Ferry, Bridgeport, and Bellaire, Ohio). The site was settled in 1769 by the Zane family. The name Wheeling is supposedly derived from a Delaware Indian term meaning "head," or "skull," a reference to the beheading of a party of settlers. Ft. Fincastle, built there in 1774 and renamed Ft. Henry for Patrick Henry, was the scene (Sept. 11–13, 1782) of one of the last skirmishes of the Revolutionary War. Zane Grey wrote a novel (*Betty*

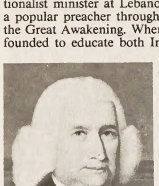
Zane) depicting the legendary heroism of his ancestor who braved gunfire to carry powder from an outlying cabin during that siege. The town's growth in the early 19th century as the western terminus of the Cumberland Road and as a port of entry was further stimulated by the arrival of the Baltimore and Ohio Railroad (1852). A pro-Unionist centre in the American Civil War, it served as seat of the restored government of Virginia in 1861. The Wheeling Conventions (1861–62) led to the formation of West Virginia, and Wheeling was twice the state capital (1863–70 and 1875–85).

The Greater Wheeling area, which includes Marshall and Belmont counties in Ohio, is well diversified industrially, with iron and steel works, coal and gas production, and a variety of manufactures including sheet metal, tinplate, glass, tobacco, pottery, and textiles.

The city is the seat of Wheeling College (1954) and West Virginia Northern Community College (1972). Nearby are Bethany College (1840) and West Liberty State College (1837). Inc. town, 1806; city, 1836. Pop. (2000) city, 31,419; Wheeling MSA, 153,172.

Wheelock, Eleazar (b. April 22, 1711, Windham, Conn. [U.S.]—d. April 24, 1779, Hanover, N.H., U.S.), American educator who was founder and first president of Dartmouth College.

Wheelock graduated from Yale in 1733, studied theology, and in 1735 became a Congregationalist minister at Lebanon, Conn. He was a popular preacher throughout the period of the Great Awakening. When a free school he founded to educate both Indians and whites



Wheelock, detail of an oil painting by Joseph Steward, 1793; in the collection of Dartmouth College, Hanover, N.H.

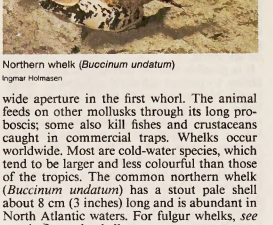
By courtesy of the trustees of Dartmouth College, Hanover, N.H.

failed for lack of funds, the governor of New Hampshire offered him a township (36 square miles [93 square km]) of land. With about 30 students, he and other settlers established the town of Hanover in 1770. The college he founded there was named Dartmouth in honour of the 2nd Earl of Dartmouth. For the remaining nine years of his life, including the turbulent Revolutionary War period, Wheelock worked for the college, supervising building, preaching, teaching, and raising funds.

Wheldon, Sir Huw Pyrs (b. May 7, 1916, Prestatyn, Flintshire [now Clwyd], Wales—d. March 14, 1986, London, Eng.), British broadcasting producer and executive who oversaw the British Broadcasting Corporation's (BBC's) television programming from 1965 to 1975.

Born into a Welsh-speaking family, Wheldon was educated at Friars School in Wales and earned a degree from the London School of Economics in 1938. After serving in the British army during World War II, he was director of the Arts Council of Wales from 1946 to 1948. He joined the BBC's publicity department in 1952 and soon switched to programming, in which he attracted notice with his children's programs and the "Monitor" arts-magazine program. He became head of the BBC's documentary programs in 1962 and also head of music (1963) before becoming controller of programs in 1965. In 1968 he became managing director of BBC Television. Under Wh. don's direction, the BBC attracted an international audience with such miniseries as *Civilisation, America, The Forsyte Saga,* and *The Ascent of Man.* He retired as managing director in 1975 but remained active, serving as the commentator in the miniseries *Royal Heritage* in 1977. He was knighted in 1976.

whelk, any marine snail of the family Buccinidae (subclass Prosobranchia of the class Gastropoda), or a snail having a similar shell. Some are incorrectly called conchs. The sturdy shell of most buccinids is elongated and has a



Northern whelk (*Buccinum undatum*)

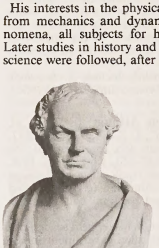
Ingmar Holmasen

wide aperture in the first whorl. The animal feeds on other mollusks through its long proboscis; some also kill fishes and crustaceans caught in commercial traps. Whelks occur worldwide. Most are cold-water species, which tend to be larger and less colourful than those of the tropics. The common northern whelk (*Buccinum undatum*) has a stout pale shell about 8 cm (3 inches) long and is abundant in North Atlantic waters. For fulgur whelks, *see* conch; for rock whelks, *see* murex.

Whewell, William (b. May 24, 1794, Lancaster, Lancashire, Eng.—d. March 6, 1866, Cambridge, Cambridgeshire), English philosopher and historian remembered both for his writings on ethics and for his work on the theory of induction, a philosophical analysis of particulars to arrive at a scientific generalization.

Whewell spent most of his career at Trinity College, Cambridge, where he studied, tutored, and served as professor of mineralogy (1828–32), professor of moral philosophy (1838–55), and college master (1841–66). He was also vice chancellor of the university (1842).

His interests in the physical sciences ranged from mechanics and dynamics to tidal phenomena, all subjects for his early writings. Later studies in history and the philosophy of science were followed, after 1850, by his writ-



Whewell, plaster cast of bust by Edward Hodges Baily, 1851; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

ings on moral theology and by an intensive analysis of the work of Immanuel Kant.

Whewell is best known for his *History of the Inductive Sciences, from the Earliest to the Present Time,* 3 vol. (1837), and *The Philosophy of the Inductive Sciences, Founded upon Their History* (1840), which later was expanded to three separate books: *History of Scientific Ideas,* 2 vol. (1858), *Novum Organon Renovatum* (1858), and *On the Philosophy of Discovery* (1860). The second of these books refers to Francis Bacon's *Novum Organum* (1620), dealing with inductive reasoning.

Although his work on the theory of induction was overshadowed by that of John Stuart Mill, Whewell's contribution lay in his resurrection of inductive reasoning as an important issue for philosophers and scientists alike. In particular, he stressed the need to see scientific progress as a historical process and asserted that inductive reasoning could be employed properly only if its use throughout history was closely analyzed.

Whewell's theological views, which gave rise to his ethical theories, have been assigned an importance secondary to his work in induction. Among his writings in moral philosophy are *The Elements of Morality, Including Polity* (1845) and *Lectures on Systematic Morality* (1846). Whewell also wrote sermons, poetry, essays, and several editions and translations of others' works.

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whey, watery fraction that forms along with curd when milk coagulates. It contains the water-soluble constituents of milk and is essentially a 5 percent solution of lactose in water, with some minerals and lactalbumin.

The whey is removed from the curd during the process of making cheese; then it is centrifuged to remove fat, concentrated or dried, and used for human food in processed cheese products, baking, and candy making. Whey is used for animal feed as a liquid, concentrate, or dry powder.

Whidbey Island, also spelled WHIDBY, island, part of Island county, northwest Washington, U.S., in Puget Sound. Approximately 40 miles (65 km) long, it is one of the largest offshore islands in the continental United States. Its chief towns are Oak Harbor, Coupeville (a preserved historic [1875] town), and Langley. The island was named for Joseph Whidbey, who, on June 2, 1792, as a member of a surveying team, discovered Deception Pass, a swift tidal strait separating Whidbey from Fidalgo Island, to the north, proving the body of land was an island. Deception Pass Bridge, built in 1935, connects Whidbey Island with Fidalgo Island. Ferries also provide access to the island, which has developed as a recreational area. Pop. (1997 est.) 63,655.

Whiddy Island, island in Bantry Bay, County Cork, Ireland. It lies 2 miles (3 km) west of Bantry, at the head of Bantry Bay. It is about 3.5 miles (5.5 km) from northeast to southwest, and about 1 mile (1.6 km) across. On it are ruins of a castle, Kilmore Church, and three 19th-century redoubts associated with a British naval station of that time. In 1968 an international oil corporation completed a crude-oil terminal on the western side of the island that was capable of catering to 300,000-ton tankers. Pop. (1991) 34.

Whig and Tory, members of two opposing political parties or factions in England, particularly during the 18th century. Originally "Whig" and "Tory" were terms of abuse introduced in 1679 during the heated struggle over the bill to exclude James, Duke of York (afterward James II), from the succession. Whig—whatever its origin in Scottish Gaelic—was a term applied to horse thieves and, later, to Scottish Presbyterians; it connoted nonconformity and rebellion and was applied to those

who claimed the power of excluding the heir from the throne. Tory was an Irish term suggesting a papist outlaw and was applied to those who supported the hereditary right of James despite his Roman Catholic faith.

The Revolution of 1688 greatly modified the division in principle between the two parties, for it had been a joint achievement. Thereafter most Tories accepted something of the Whig doctrines of limited constitutional monarchy rather than divine-right absolutism. Under Queen Anne, the Tories represented the resistance, mainly by the country gentry, to religious toleration and foreign entanglements. Toryism became identified with Anglicanism and the squirearchy and Whiggism with the aristocratic, landowning families and the financial interests of the wealthy middle classes.

The death of Anne in 1714, the manner in which George I came to the throne as a nominee of the Whigs, and the flight (1715) of the Tory leader Henry St. John, 1st Viscount Bolingbroke, to France, conspired to destroy the political power of the Tories as a party.

For nearly 50 years thereafter, rule was by aristocratic groups and connections, regarding themselves as Whigs by sentiment and tradition. The die-hard Tories were discredited as Jacobites, seeking the restoration of the Stuart heirs to the throne, though about 100 country gentlemen, regarding themselves as Tories, remained members of the House of Commons throughout the years of the Whig hegemony. As individuals and at the level of local politics, administration, and influence, such "Tories" remained of considerable importance.

The reign of George III (1760–1820) brought a shift of meanings to the two words. No Whig Party as such existed at the time, only a series of aristocratic groups and family connections operating in Parliament through patronage and influence. Nor was there a Tory Party, only Tory sentiment, tradition, and temperament surviving among certain families and social groups. The so-called King's Friends, from whom George III preferred to draw his ministers (especially under Lord North [afterward 2nd earl of Guilford], 1770–82), came from both traditions and from neither. Real party alignments began to take shape only after 1784, when profound political issues that deeply stirred public opinion were arising, such as the controversy over the U.S. War of Independence.

After 1784 William Pitt the Younger emerged as the leader of a new Tory Party, which broadly represented the interests of the country gentry, the merchant classes, and official administerial groups. In opposition, a revived Whig Party, led by Charles James Fox, came to represent the interests of religious dissenters, industrialists, and others who sought electoral, parliamentary, and philanthropic reforms.

The French Revolution and the wars against France soon further complicated the division between parties. A large section of the more moderate Whigs deserted Fox and supported Pitt. After 1815 and a period of party confusion, there eventually emerged the conservatism of Sir Robert Peel and Benjamin Disraeli, earl of Beaconsfield, and the liberalism of Lord John Russell and William Ewart Gladstone, with the party labels of Conservative and Liberal assumed by each faction, respectively. Although the label Tory has continued to be used to designate the Conservative Party, Whig has ceased to have much political meaning.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Whig Party, in U.S. history, major political party active in the period 1834–54 that espoused a program of national development but foundered on the rising tide of sectional antagonism. The Whig Party was formally organized in 1834, bringing together a loose coalition of groups united in their opposition to what party members viewed as the executive tyranny of "King Andrew" Jackson. They borrowed the name Whig from the British party opposed to royal prerogatives.

Jackson had shattered the National Republican Party with his victories in 1828 and 1832. His war against the Second Bank of the United States and his opposition to nullification in South Carolina, however, allowed Henry Clay to bring fiscal conservatives and southern states' rights proponents together in a coalition with those who still believed in the National Republican program of a protective tariff and federally financed internal improvements. Members of the Anti-Masonic Movement (*q.v.*) merged with the Whigs after the demise of the Anti-Masonic Party in the mid-1830s.

Allied almost exclusively by their common dislike of Jackson and his policies—and later by their hunger for office—the Whigs never developed a definitive party program. In 1836 they ran three presidential candidates (Daniel Webster, Hugh L. White, and William Henry Harrison) to appeal to the East, South, and West, respectively, attempting to throw the election into the House of Representatives. In 1840 they abandoned the sectional approach to nominate the military hero William Henry Harrison. The subsequent contest was devoid of issues, Harrison winning on the basis of incessant electioneering by his supporters in the "log cabin" campaign.

After capturing both the White House and Congress in 1840, the Whigs were poised to become the nation's dominant party and to enact Henry Clay's nationalistic program. Harrison died within a month of his inauguration, however, and his successor, John Tyler, proceeded to veto major Whig legislation—including re-creation of the Bank of the United States.

Clay, the nominee in 1844, lost the election when he misgauged the popularity of expansionism and opposed the annexation of Texas. By the late 1840s the Whig coalition was beginning to unravel as factions of "Conscience" (antislavery) Whigs and "Cotton" (proslavery) Whigs emerged. In 1848 the party returned to its winning formula by running a military hero—this time Zachary Taylor—for president. But the Compromise of 1850, fashioned by Henry Clay and signed into law by Millard Fillmore (who succeeded to the presidency on Taylor's death in 1850), fatally estranged the Conscience Whigs from their party.

Again turning to a former general, the Whigs in 1852 nominated Gen. Winfield Scott. The North and South had become so polarized over the slavery issue that the Whigs were no longer able to make a broad national appeal on the basis of "unalterable attachment to the Constitution and the Union." Scott collected just 42 electoral votes as many southern Whigs flocked to the banner of the states' rights oriented Democratic Party.

By 1854 most northern Whigs had joined the newly formed Republican Party. To the extent that the party continued to exist, it commanded support only in the border states and from conservatives who refused to take sides in the sectional conflict. Many of the last remaining Whigs found a niche in the Know-Nothing Party during the second half of the 1850s and then backed the Constitutional Union Party as the country split apart in 1860.

whimsey glass, also called FRIGGER, glass with no utilitarian purpose, executed to satisfy the whim of the glassmaker. Such offhand exercises in skill are almost as old as glassmaking itself. Some of the earliest pieces blown for fun are boots and hats made in Germany as early as the 15th century. Boots and shoes reached a high point of popularity



Whimsey glass walking sticks made in Warrington, Eng., at (left) the Orford Lane Glass Works, *c.* 1840, and (right) the Cockhedge Glass Works, *c.* 1857; in the Municipal Museum and Art Gallery, Warrington, Eng.

By courtesy of the Municipal Museum and Art Gallery, Warrington, Eng.; photograph, L. Waterhouse

in the 19th century, when they were made of every conceivable style of glass, blown or molded. Whimseys came to satisfy an increasing craving for souvenirs, especially of the numerous international trade exhibitions of the 19th century, and to be used eventually for advertising.

whinchat (*Saxicola rubetra*), Eurasian thrush named for its habitat: swampy meadows, called, in England, whins. This species, 13 cen-



Whinchat (*Saxicola rubetra*)

E. Breeze-Jones from Bruce Coleman Inc.

timetres (5 inches) long, one of the chat-thrush group (family Turdidae, order Passeriformes), is brown-streaked above and buffy below, with white patches on the eyebrows, wings, and tail. It has flycatcher-like habits and a brief, metallic song.

Whinnery, John Roy (b. July 26, 1916, Read, Colo., U.S.), U.S. electrical engineer

known for his work on microwave theory and laser experimentation.

After working in research at the General Electric Company (1937–46) Whinnery earned his Ph.D. (1948) from the University of California at Berkeley and began teaching electrical engineering there, serving as dean of the College of Engineering from 1959 to 1963. From 1963 to 1969 he was a consulting scientist to the National Aeronautics and Space Administration (NASA). During those years he also did research for Hughes Aircraft (1952–53) and Bell Telephone (1963–64). In 1970 he was named to the standing committee on thermonuclear research of the Atomic Energy Commission, and in 1980 he became a full professor at Berkeley.

Whinnery worked on microwave circuit theory during World War II, developing techniques for the use of microwave radar. From 1946 to 1952 he performed antenna experiments and contributed to the development of the analogue computer. Whinnery also worked on quantum and optical electronics and on the use of lasers in communications. In 1964 he proposed a lens that used gases for the focussing of light. His publications include *Fields and Waves in Modern Radio* (with S. Ramo; 1944) and *Introduction to Electronic Systems, Circuits, and Devices* (with D.O. Pederson and J.J. Struder; 1966).

whip scorpion, any of the 75 species of the order Uropygi (sometimes Thelyphonida) of the arthropod class Arachnida. They look like true scorpions, but the larger species have a whiplike telson, or tail—an organ of touch,



Vinegarroon (*Mastigoproctus giganteus*)
Bucky Reeves—The National Audubon Society Collection/Photo Researchers

devoid of a stinger. The second pair of appendages, the pedipalps, are spiny pincers; the third pair are long feelers. Whip scorpions secrete an irritating mist, which has a vinegarlike odour in *Mastigoproctus giganteus*, the vinegarroon (variably spelled) of the southern U.S. and Mexico. With its 65-millimetre ($2\frac{1}{2}$-inch) body it is the largest species.

Whip scorpions are commonest from India and Japan to New Guinea. Two genera occur in the New World.

whip-tailed ray, any of certain stingrays of the family Dasyatidae. *See* stingray.

whipbird, also called COACHWHIPBIRD, either of the two species of the Australian genus *Psophodes*, belonging to the songbird family Muscicapidae. They are named for the voice of the eastern whipbird (*P. olivaceus*): the male gives a long whistle and a loud crack, and the female answers instantly with "choo" sounds. This species is 25 centimetres (10 inches) long, with broad, graduated tail, and

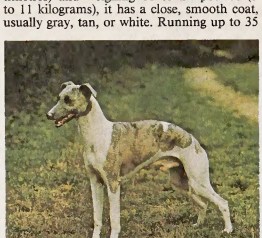


Eastern whipbird (*Psophodes olivaceus*)
Painting by H. Douglas Pratt

is dark green, with white cheeks. The other, and similar, species is rare.

whiplash, injury to the cervical spine and its soft tissues caused by forceful flexion or extension of the neck, especially that occurring during an automobile accident. It may involve sprain, fracture, or dislocation and may vary greatly in location, extent, and degree. Sometimes it is accompanied by concussion. Whiplash is characterized by pain, muscle spasm, and limited motion. Treatment includes protective support for the neck and back and sometimes the attachment of weights to the head or legs to stretch the injured muscles and relieve pressure on nerves.

whippet, hound breed developed in mid-19th-century England to chase rabbits for sport in an arena. The breed was developed from terriers and small English greyhounds; Italian greyhounds were later bred in to give the whippet a sleek appearance. A greyhound-like dog standing 18 to 22 inches (46 to 56 centimetres) and weighing 11 to 24 pounds (5 to 11 kilograms), it has a close, smooth coat, usually gray, tan, or white. Running up to 35



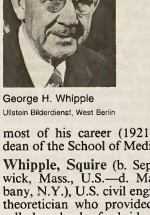
Whippet
Sally Anne Thompson—EB Inc.

miles (56 kilometres) per hour, the whippet is used for racing and is known in England as the "poor man's racehorse." It can also hunt small game and is typically quiet and even-tempered.

Whipple, George H(oyt) (b. Aug. 28, 1878, Ashland, N.H., U.S.—d. Feb. 1, 1976, Rochester, N.Y.), U.S. pathologist whose discovery that raw liver fed to chronically bled dogs will reverse the effects of anemia led directly to successful liver treatment of pernicious anemia by the U.S. physicians George R. Minot and William P. Murphy. This major advance in the treatment of noninfectious diseases brought the three men the Nobel Prize for Physiology or Medicine in 1934.

Whipple began in 1908 a study of bile pigments. This led to his interest in the body's manufacture of the oxygen-carrying hemoglobin, which is also an important constituent in the production of bile pigments. In 1920 he demonstrated that liver as a dietary factor greatly enhances hemoglobin regeneration in dogs. He also carried out experiments in artificial anemia (1923–25), which established iron as the most potent inorganic factor involved in the formation of red blood cells.

Whipple worked at Johns Hopkins University, Baltimore, and then the University of California, San Francisco, before moving to the University of Rochester, where he spent



George H. Whipple
Ullstein Bilderdienst, West Berlin

most of his career (1921–55) and was first dean of the School of Medicine and Dentistry.

Whipple, Squire (b. Sept. 16, 1804, Hardwick, Mass., U.S.—d. March 15, 1888, Albany, N.Y.), U.S. civil engineer, inventor, and theoretician who provided the first scientifically based rules for bridge construction.

After graduating from Union College, Schenectady, N.Y., in 1830, Whipple conducted surveys for several railroad and canal projects and made surveying instruments. In 1840 he invented a lock for weighing canal boats. In the next years he turned his attention to bridges and invented two new truss designs employing iron as well as timber; in 1853 he completed an iron railroad bridge of 146-foot (44-metre) span near West Troy (now Watervliet), N.Y. In the following year appeared his *Work on Bridge Building*, the first significant attempt to supply a theoretical means for calculating stresses in place of the rule-of-thumb methods then in general practice. The book, which he expanded and personally printed in 1869 under the title *An Elementary and Practical Treatise on Bridge Building*, facilitated the rational use of wrought and cast iron and was widely used in railroad engineering for decades.

whippoorwill (*Caprimulgus vociferus*), nocturnal bird of North America belonging to the family Caprimulgidae (*q.v.*) and closely resembling the related common nightjar of Europe. It is named for its vigorous deliberate call (first and third syllables accented), which it may repeat 400 times without stopping. It lives in woods near open country, where it hawks for insects around dusk and dawn; by day it sleeps on the forest floor or perches lengthwise on a branch. About 24 centimetres ($9\frac{1}{2}$ inches) long, it has mottled brownish plumage with, in the male, a white collar and white tail corners; the female's tail is plain and her collar is buffy.

The whippoorwill breeds from southeastern Canada throughout the eastern U.S. and from the southwestern U.S. throughout Mexico, wintering as far south as Costa Rica. In the middle of its range it is often confused with the chuck-will's-widow and the poorwill.

whiptail (lizard): *see* racerunner.

whipworm, any of certain worms of the genus *Trichuris*, class Nematoda (phylum Aschelminthes), especially *T. trichiura*, that are parasitic in the large intestine of man and other mammals. They are so named because of the whiplike shape of the body.

Infestation in humans, particularly in children, occurs through the ingestion of contaminated soil. The worm injects a fluid into the host's tissues and then eats the resulting dissolved tissues.

Whirlaway (foaled 1938), American racehorse (Thoroughbred) who in 1941 captured the U.S. Triple Crown—the Kentucky Derby, the Preakness Stakes, and the Belmont Stakes. A chestnut colt distinguished by an unusually long tail, he was sired by Blenheim II (an English-bred horse) out of Dustwhirl. Noted for his spectacular finishes, he won 32 of 60 races, finished out of the money only four times, and was the first horse to earn more than half a million dollars. He established a Kentucky Derby record (subsequently broken). Retired to stud in 1943 because of a leg injury, he sired 17 stakes winners.

whirligig beetle, any member of the approximately 700 species of the cosmopolitan insect family Gyrinidae (order Coleoptera). These beetles are usually seen in groups, spinning and whirling around on the surfaces of quiet ponds or lakes. Whirligig beetles prey on insects and other creatures that fall on the water surface. Their bodies are oval, flattened, and metallic bluish black in colour. The front legs are long and slim; the middle and hind pairs are short and flattened. They have well-developed wings and dive and swim underwater when attacked. The two pairs of compound eyes, one above and one below the water surface, provide simultaneous vision in both environments.

The female whirligig beetle deposits cylindrical eggs in parallel rows on underwater vegetation. The long, narrow larvae have only three pairs of true legs; the fringed gills on each abdominal segment, however, make them resemble centipedes. Hooks at the end of the abdomen anchor the larva when it captures food. At the pupal stage the larva emerges from the water, hangs upside down on shore vegetation by its hooks, and forms a pupal case from dirt and saliva. When disturbed, whirligig beetles exude a disagreeable-smelling milky liquid, which probably serves for protection; the fluid of *Dineutes americanus* smells like apples.

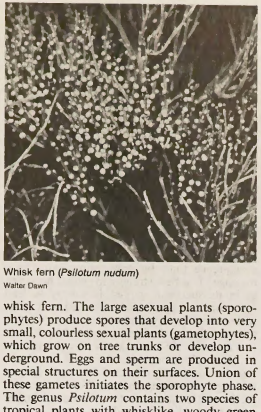
whirlpool, rotary oceanic current, a large-scale eddy that is produced by the interaction of rising and falling tides. Similar currents that exhibit a central downdraft are termed vortexes and occur where coastal and bottom configurations provide narrow passages of considerable depth. Slightly different is vortex motion in streams; at certain stages of turbulent flow, rotating currents with central updrafts are formed. These are called *kolks,* or boils, and are readily visible on the surface.

Notable oceanic whirlpools include those of Garofalo (supposedly the Charybdis of ancient legend), along the coast of Calabria in southern Italy, and of Messina, in the strait between Sicily and peninsular Italy. The Maelstrøm (from Dutch for "whirling stream") located near the Lofoten Islands, off the coast of Norway, and whirlpools near the Hebrides and Orkney islands are also well known. A characteristic vortex occurs in the Naruto Strait, which connects the Inland Sea (of Japan) and the Pacific Ocean.

whirlwind, mass of air circulating about a more or less vertical axis with less intensity than a tornado (*q.v.*). Examples include sand devils and dust devils.

whisk fern, any member of the genus *Psilotum* in the division Psilophyta.

A whisk fern has water- and food-conducting tissues but lacks true leaves and roots. Photosynthesis occurs in the aerial stems, and water and mineral absorption in the horizontal, underground, rootlike stems (rhizomes). There are two phases in the life cycle of a



Whisk fern (*Psilotum nudum*)
Walter Dawn

whisk fern. The large asexual plants (sporophytes) produce spores that develop into very small, colourless sexual plants (gametophytes), which grow on tree trunks or develop underground. Eggs and sperm are produced in special structures on their surfaces. Union of these gametes initiates the sporophyte phase. The genus *Psilotum* contains two species of tropical plants with whisklike, woody green stems and scalelike "leaves." One species, *P. nudum,* grows as far north as Florida and is cultivated as a greenhouse plant.

whiskey, also spelled WHISKY, any of several distilled liquors made from a fermented mash of cereal grains and including Scotch, Irish, and Canadian whiskeys and the various whiskeys of the United States. Whiskey is always aged in wooden containers, usually of white oak. The name, spelled without an *e* by the Scots and Canadians and with an *e* in Ireland and the United States, comes from the Celtic *usquebaugh* (Irish Gaelic *uisce beatha,* Scots Gaelic *uisge beatha,* both adaptations of the Latin phrase *aqua vitae,* meaning "water of life"). The earliest direct account of whiskey making is found in Scottish records dating from 1494.

The whiskeys produced in each country are distinctive in character because of differences in the method of production, the type and character of the cereal grains, and the quality and character of the water employed.

Straight whiskeys are unmixed or mixed only with whiskey from the same distillation period and distiller. Blended whiskeys include mixtures of similar products made by different distillers and in different periods (Scotch) and also whiskeys made with combinations of the neutral whiskeys (which have no distinctive flavour characteristics) and straight whiskeys (U.S. and Canada). Small quantities of other flavouring materials (*e.g.,* sherry, fruit juices) may be included in blends. Governments may require that some whiskeys be aged under their supervision for specific periods.

Scotch whiskeys are somewhat light in body, with a distinctive smoky malt flavour. They are made primarily from barley that is malted and then heated over a peat fire, the oily, acrid smoke of which flavours the malt. Variations among whiskeys of the Highlands, Lowlands, Campbeltown, and Islay regions are caused partly by differences in the amount of heating the malt receives. The flavoured malt is combined with water, producing a mash, and then fermented to make a beer. When the beer is distilled, it produces a whiskey containing 70 percent alcohol by volume (*i.e.,* 140 U.S. proof). This product is successively reduced with water to about 43 percent by volume.

Irish whiskeys taste much like Scotch but without the smoky quality. They are produced by methods similar to those for Scotch whisky, but the malt is not exposed to smoke during roasting. Irish whiskeys pass through three distillations and are sometimes blended with neutral grain whiskeys to produce a lighter-bodied product.

The Canadian whisky industry began in the early 19th century. Canadian whiskeys are light in body and flavour and are always blends of both highly flavoured and neutral grain whiskeys. They are made from mashes composed of combinations of corn, rye, wheat, and barley malt prepared according to the formula of the individual producer. Canadian whiskeys are usually aged for at least six years, then reduced with water to an alcoholic content of about 45 percent by volume before bottling.

In the United States, whiskey production began early in the 18th century. Major distillation centres are established in Kentucky, Pennsylvania, and Indiana. Their product is made with malt and other grains (usually corn or rye), producing a beer that is distilled to make a whiskey of 80 percent alcohol content by volume. This distillate, high in flavouring substances derived from the original raw materials, is reduced with water to about 50–52 percent alcohol and aged in unused charred white-oak barrels. Straight whiskeys may be stored in government-bonded warehouses.

Bourbon is characterized by the flavour of corn (maize), used as the main raw material. It was first produced in Bourbon county, Kentucky, and the name bourbon eventually became a general term for similar corn-mash whiskeys. Sour mashes, used mainly in bourbon production, are fermented with yeast, including a portion of previously fermented yeast; other whiskeys are made from sweet mashes, employing only fresh yeast.

In the United States, straight whiskeys are named for the grains predominating in the mash, with at least 51 percent required for whiskeys designated as straight. If a mash of at least 51 percent barley malt is employed, the product is straight malt whiskey; if rye malt is used, it is straight rye whiskey. Straight bourbon mashes contain at least 51 percent corn; straight corn-whiskey mashes contain at least 80 percent. Combinations of similar straight whiskeys of different distillation periods or from different distillers are designated as blended, rather than straight.

Whiskeys are consumed both unmixed and mixed in cocktails, punches, and highballs. The United States is the world's largest producer and consumer of whiskey.

Whiskey Rebellion (1794), in American history, uprising that afforded the new U.S. government its first opportunity to establish federal authority by military means within state boundaries, as officials moved into western Pennsylvania to quell an uprising of farmers rebelling against the liquor tax. Alexander Hamilton, secretary of the Treasury, had proposed the excise (enacted by Congress in 1791) to raise money for the national debt and to assert the power of the national government. Small farmers of the back country, who distilled and consumed whiskey in prodigious quantities, resisted the tax by attacking federal revenue officers who attempted to collect it.

Enforcement legislation touched off what appeared to be an organized rebellion, and in July of 1794 about 500 armed men attacked and burned the home of the regional tax inspector. The following month President George Washington issued a congressionally authorized proclamation ordering the rebels to return home and calling for militia from four neighbouring states. After fruitless negotiations, Washington ordered some 13,000 troops into the area, but opposition melted away and no battle ensued. Troops occupied the region and some of the rebels were tried, but the two

convicted of treason were later pardoned by the president.

Many Americans, particularly members of the opposition Jeffersonian Republican Party, were appalled by the overwhelming use of governmental force, which they feared might be a first step to absolute power. To Federalists, however, the most important result was that the national authority had triumphed over its first rebellious adversary and had won the support of the state governments in enforcing federal law within the states.

Whiskey Ring, in U.S. history, group of whiskey distillers (dissolved in 1875) who conspired to defraud the federal government of taxes. Operating mainly in St. Louis, Mo., Milwaukee, Wis., and Chicago, Ill., the Whiskey Ring bribed Internal Revenue officials and accomplices in Washington in order to keep liquor taxes for themselves. Benjamin H. Bristow, secretary of the Treasury, organized a secret investigation that exposed the ring and resulted in 238 indictments and 110 convictions. Allegations that the illegally held taxmoney was to be used in the Republican Party's national campaign for the reelection of President Ulysses S. Grant aroused the public. Though Grant was not suspected, his private secretary, Orville E. Babcock, was indicted in the conspiracy but was acquitted after Grant testified to his innocence.

whisky (carriage): *see* one-horse shay.

whisper, speech in which the vocal cords are held rigid, preventing the vibration that produces normal sounds. In whispering, voiceless sounds are produced as usual; but voiced sounds (*e.g.*, vowels) are produced by forcing air through a narrow glottal opening formed by holding the vocal cords rigid and close together. *See also* voice; vocal fry.

whist, card game belonging to a family that includes bridge whist, auction bridge, and contract bridge, each of which developed in succession from the original game of whist. The essential features of card games in the whist family are: four people usually play, two against two as partners; a full 52-card deck is dealt out evenly so that each player holds 13 cards; and the object of play is to win tricks, each trick consisting of one card played by each player. Before play begins, one suit may be designated trump, in which case any card in that suit beats any card of the other suits. In whist, trump is determined by turning up the last card dealt.

The game is generally conceded to have originated in England, and the name whist, or whisk, first appeared there in the early 17th century. At first whist was a game for the lower classes, but early in the 18th century it was taken up by gentlemen in London's coffeehouses. In 1742 the first book wholly devoted to it, Edmond Hoyle's *Short Treatise on Whist,* was published and became a best-seller. The game then became extremely popular throughout fashionable English society, spreading quickly to Europe and America and remaining for 150 years the king of card games (until it was supplanted by its successor, bridge whist).

Whist is played as follows. The two players facing each other are partners against the other two. The cards are dealt singly, and the last is turned up to determine the trump suit. The dealer takes this card into his hand when it becomes his turn to play to the first trick. The player at the left of the dealer leads by playing any one of his cards face upward on the table, and each player in turn, clockwise, contributes a card of the same suit if he can; if he cannot, he may play any card, including a trump. The four cards played constitute a trick, which is gathered up, or taken, by the side that played the highest card of the suit led or the highest trump. The winner of a trick leads to the next, and play continues until every card has been played. The side winning the most tricks scores a point for each odd trick (*i.e.*, each trick after the first six taken).

As far as strategy is concerned, the best results are achieved by winning tricks with the lowest sufficient card and by capturing high cards played by the opponents whenever possible. The players try to gauge the whereabouts of the unplayed cards and, by collaborating with their partners, to win tricks, not only with high cards and trumps but with low cards that become winners when all the higher cards in the suit have been played.

The development of an optimum strategy is difficult, for each player's hand is known only to himself, and information can be exchanged only by signaling—*i.e.*, playing one's cards in a sequence that, by convention, conveys a message. The best strategy in whist, however, as in its successor games, is simply to lead from one's longest and strongest suit. The widespread employment of this strategy led to a most valuable device, formulated by Robert F. Foster in 1889 and known as the rule of 11. This rule is based on the practice of leading the fourth-highest card of one's longest suit. By subtracting the number of the card led from 11, one knew the number of higher cards not held by the leader.

The preoccupation with increasingly elaborate signaling devices turned whist into a ritual, and by the late 19th century players were ready to adopt the new game of bridge whist, which was introduced in New York and London in 1893–94 and quickly supplanted whist as a fashionable game. By 1897 almost all the leading whist players had switched to bridge whist.

Bridge whist introduced several innovations into whist that allow more scope for the play of the intellect. In whist, the trump suit was determined simply by turning up the last card dealt to the dealer, and each player held and played his own hand. In bridge whist, by contrast, the trump suit is named by the dealer, or, at the dealer's option, by his partner. There is also the option of requiring that the hand be played without a trump suit (no-trump). The dealer's partner always becomes the dummy, and his hand, exposed after the opening lead is made, is played by the dealer.

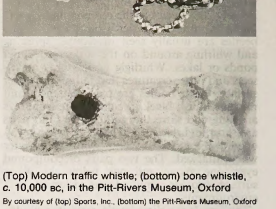
Bridge whist's scoring is more elaborate than that of whist, for, after the dealer (or his partner) has declared the trump suit, either of the opposing players can double, which means doubling the scoring values of the tricks. The side that wins the majority of the tricks in a hand scores, for each odd trick (any over the first six), the following: if spades are trumps, 2 points; clubs, 4 points; diamonds, 6 points; hearts, 8 points; and no-trump, 12 points; these values can be doubled and redoubled as previously determined. The first side to score 30 or more points wins a game, and the first side to win two games wins the rubber and a 100-point bonus.

The exposure of the dummy in bridge whist gave the other three players a basis for reasoning and inference that had been lacking in whist and thus made the play of the hand a much more cerebral activity. The new method of determining the trump suit introduced another element of volition, and the no-trump call brought with it a new range of tactical problems in the development of long suits.

The new game was known at first simply as bridge but was renamed bridge whist to distinguish it from auction bridge. The latter game was introduced in the first decade of the 20th century and had completely supplanted bridge whist in popularity by the 1920s. *See also* bridge.

Whist itself continues to have a following in Great Britain and parts of North America, but it is insignificant compared to that of contract bridge. Variations of whist include solo whist, Boston whist (Boston), and vint.

whistle, short flute having a stopped lower end and a flue that directs the player's breath from the mouth hole at the upper end against the edge of a hole cut in the whistle wall, causing the enclosed air to vibrate. It has no finger holes and sounds only one pitch. It was made originally in primitive societies from bird bones, and it is considered by many scholars to be the oldest flute type known. It is mainly used for signaling and, in many primitive societies, in music.



(Top) Modern traffic whistle; (bottom) bone whistle, *c.* 10,000 BC, in the Pitt-Rivers Museum, Oxford

By courtesy of (top) Sports, Inc., (bottom) the Pitt-Rivers Museum, Oxford

If a pellet is enclosed—as in a policeman's whistle—it interferes with the air vibration, causing a warbling sound. In a slide whistle (piston flute, or Swanee whistle), the lower end consists of a sliding stopper, allowing change of pitch. Longer, open flutes with the whistle's flue and lateral hole are called fipple, or whistle, flutes.

whistle flute: *see* fipple flute.

Whistlecraft, William and Robert: *see* Frere, John Hookham.

whistler (bird): *see* thickhead.

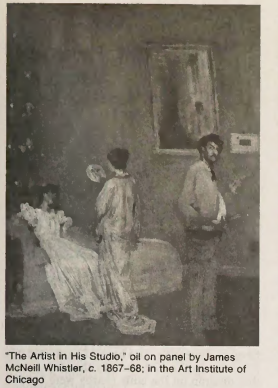
whistler (duck): *see* goldeneye.

whistler, also called WHISTLING ATMOSPHERIC, gliding high-to-low-frequency sound occasionally emitted by a sensitive audio-amplifier. It initially lasts about half a second, may be repeated at equal intervals, and grows progressively longer and fainter with time. The origin of these sounds in the atmosphere is lightning discharges, particularly the associated electromagnetic radiation with frequencies of 300 to 30,000 hertz.

These electromagnetic waves cannot be heard directly but are converted into audible sound waves of the same frequency range by the audioamplifier. They are propagated from one hemisphere to another in the ionized portions of the Earth's upper atmosphere (as high as 19,000 to 26,000 km [12,000 to 16,000 miles] at the magnetic equator). Led by the faster, higher-frequency waves, these signals move along the magnetic lines of force until they are reflected at the corresponding geomagnetic latitude in the opposite hemisphere. The arrival at the amplifier of the high-frequency component ahead of the lower-pitched sound accounts for the whistle, and the repeated reflections caused by dispersion and absorption of the waves are responsible for the subsequent fainter and longer whistle falls.

Studies of these dispersion effects have been used to determine the electron density at altitudes of 19,000 to 26,000 km, as well as daily, annual, and long-term variations of the electron density in the upper atmosphere.

Whistler, James (Abbott) McNeill (b. July 14, 1834, Lowell, Mass., U.S.—d. July



"The Artist in His Studio," oil on panel by James McNeill Whistler, c. 1867–68; in the Art Institute of Chicago

By courtesy of the Art Institute of Chicago, Friends of American Art Collection

17, 1903, London, Eng.), American-born artist noted for his paintings of nocturnal London, for his striking and stylistically advanced full-length portraits, and for his brilliant etchings and lithographs. An articulate theorist about art, he did much to introduce modern French painting into England. His most famous work is "Arrangement in Grey and Black, No. 1: The Artist's Mother" (1871–72; popularly called "Whistler's Mother").

Early years. James Abbott McNeill Whistler was born of Scottish-Irish ancestry. As a boy he spent some time in Russia at St. Petersburg, where his father was a civil engineer; after a short stay in England en route, he was back in the United States by 1849. He attended the United States Military Academy at West Point, but he soon abandoned the army for art.

Like many of his compatriots he was fascinated by Paris, where he arrived in 1855 to study painting and soon adopted a Bohemian lifestyle. He was drawn to the French modern movement, responding to the realism associated with the painters Gustave Courbet, Henri Fantin-Latour, and François Bonvin, all of whom he knew. The realistic streak in his art may be seen in such early works as "Self-Portrait" (*c.* 1857–58) and the *Twelve Etchings from Nature* (1858).

During the 1860s Whistler moved between England and Paris; he also visited Brittany (1861) and the coast near Biarritz (1862), where he painted with Courbet and evinced that love of the sea that was to mark a number of his later small oil studies and watercolours. In 1863 Whistler settled in London, where he found congenial themes on the River Thames, and the etchings that he did of such subjects garnered praise from the poet and critic Charles Baudelaire when they were exhibited in Paris.

The move to London. Whistler won considerable success in Paris when "Symphony in White No. 1: The White Girl" (1862) was shown at the Salon des Refusés in 1863. This famous painting shows that if he was an exponent of realism, he was also attracted by the Pre-Raphaelite movement, which had begun in England in 1848.

One of his chief claims to fame was his delight in the Japanese arts—then an avant-garde taste that, significantly, was to have many followers in his own country. Paintings such as "Rose and Silver: La Princesse du Pays de la Porcelaine" (1864) or "Caprice in Purple and Gold, No. 2: The Golden Screen" (1864) indicate his interest in the picturesque rather than the formal aspects of this style. "Symphony in Grey and Green: The Ocean" (1866–67), the result of a trip to Valparaiso, Chile, was, however, more Oriental in mood: the signature on this work is painted in an Oriental fashion. This style received its finest expression in "Old Battersea Bridge: Nocturne—Blue and Gold" (1872–75). His appreciation of Oriental art was complemented by one for earthenware Tanagra figurines from Hellenistic Greece, and their elegant forms influenced his figure painting and drawing; both the Oriental and Hellenistic strains were blended in a series of highly coloured sketches, *Six Projects.*

The 1860s and '70s were especially creative for Whistler. It was then that he began to give musical titles to his paintings, such as "Symphony" and "Harmony." In doing so he revealed a dependence on the theory of art for art's sake, which esteemed music as the most abstract of the arts, and on the belief in the "correspondences" between the arts associated with Baudelaire and the French poet Théophile Gautier. It should be emphasized, however, that Whistler was not a lover of music for its own sake. During this period he started to paint his nocturnes—scenes of London, especially of Chelsea, that have poetic intensity and a fin de siècle flavour. These were based on memory or on pencil sketches. For them he evolved a special technique by which paint, in a very liquid state he called a sauce, was stroked onto the canvas in fast sweeps of the brush, somewhat in the manner of Oriental calligraphy.

From the 1870s onward he was preoccupied by the problems of portrait painting, creating a number of masterpieces, "Arrangement in Grey and Black, No. 1: The Artist's Mother," "Miss Cicely Alexander: Harmony in Grey and Green" (1873), "Arrangement in Grey and Black, No. 2: Thomas Carlyle" (1873), and "Symphony in Flesh Colour and Pink: Mrs. Frederick R. Leyland," among others. These are paintings that underline his aestheticism, his liking for simple forms and muted tones, and his dependence on the 17th-century Spanish painter Diego Velázquez.

Whistler touched the artistic life of his time at many points. He erred in decorative work, as was shown by the stand he executed for the 1878 Paris exhibition (his collaborator was the architect E.W. Godwin) and later his frieze for the Grosvenor Gallery in London. Above all he painted the famous Peacock Room (begun 1876) for No. 49 Prince's Gate, London, the house of F.R. Leyland, a Liverpool shipping magnate. The decoration failed to please his patron, who felt Whistler had exceeded his commission, particularly in painting over some antique leather. The room was moved in 1919 to the Freer Gallery of Art. Whistler was also a force in book design.

During these years in London he came to know many of the most interesting artists of the day—such as Dante Gabriel Rossetti and Albert Moore—and he was a high priest of bohemianism, living for long with Jo Hiffernan, an Irish woman who served as a model to Courbet as well as to the artist himself. Although often short of money, he entertained considerably and was already becoming one of the most talked-of men in London.

A change occurred in his life in 1877 when he brought a libel suit against John Ruskin, the celebrated writer on aesthetics, for the latter's attack on "Nocturne in Black and Gold: The Falling Rocket" (1874). He won the case but received damages of only a farthing (the least valuable coin of the realm). The need to pay substantial costs occasioned his bankruptcy in 1879, and he was forced to move out of his charming home, the White House in Chelsea. He went to Venice with his mistress, Maud Franklin. He remained there for 14 months and soon became a centre of attraction among the many foreign artists who congregated in the city. He seldom painted in oils there, however, and spent most of his time producing pastels and watercolours, exquisite in their colouring. He had arrived with a commission to execute a series of etchings for the Fine Art Society. In all he made just more than 50 etchings of Venetian subjects, which are among the most striking graphic works of the time.

His etchings won him success in London when exhibited upon his return in 1880 and in 1883. He continued to paint portraits—those of Pablo de Sarasate, Lady Archibald Campbell, Théodore Duret, and Robert, Count de Montesquiou-Fezensac are among the finest—but with increasing difficulty, as he was obsessed by the problem of achieving perfection.

The challenge of his final period. Whistler faced many problems in later years. He may have felt that he was out of step with modern movements. For instance, by the 1890s Impressionism was a dominant style, but he himself, though keen on painting after nature, never used the radiant colours or technique of the Impressionists. He was happiest in painting small studies of townscape and seascape that reflect the influence of the 19th-century French painter Camille Corot. He made many etchings and lithographs, but—significantly at a time when colour lithographs were becoming popular—only three or four of his were in colour. His black-and-white lithographs, however, are delightful.

After his return from Venice, Whistler became a great figure in London life, seeking publicity and winning points against Oscar Wilde in controversy. In 1888 he married Beatrix Godwin, and he and his wife spent much time in Paris on the Left Bank. When Beatrix Whistler died in 1896, Whistler was deeply upset, and his final years were sad. Although he kept in touch with his contemporaries and ran an art school in Paris, his productive period was over.

In the early 1900s many excellent judges of art considered Whistler to be one of the leading painters of the day. Within a relatively short time, however, the reputation of this versatile artist suffered a decline, and only recently has Whistler begun to receive serious acclaim once again. (D.Su./Ed.)

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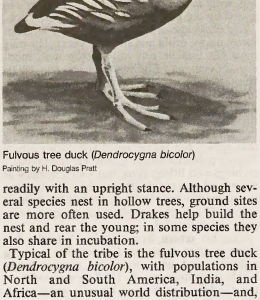
whistling duck, also called TREE DUCK (*Dendrocygna*), any of eight species of long-legged and long-necked ducks that utter sibilant cries and may make whirring wing sounds in flight; these distinctive ducks are separated from other members of the family Anatidae (*q.v.*; order Anseriformes) as a tribe Dendrocygnini. Whistling ducks are sociable though aggressive. The sexes are nearly identical in plumage

and behaviour, which includes mutual preening in some species. Whistling ducks fly with slow wingbeats and legs trailing. They sometimes perch in trees or on posts and walk

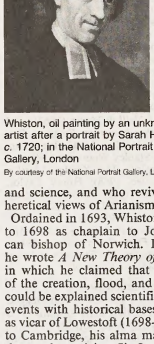


Fulvous tree duck (*Dendrocygna bicolor*)
Painting by H. Douglas Pratt

readily with an upright stance. Although several species nest in hollow trees, ground sites are more often used. Drakes help build the nest and rear the young; in some species they also share in incubation.

Typical of the tribe is the fulvous tree duck (*Dendrocygna bicolor*), with populations in North and South America, India, and Africa—an unusual world distribution—and, remarkably, without geographic variation. It is mallard-sized, with rusty brown body, white rump, and creamy stripes on the flanks.

Whiston, William (b. Dec. 9, 1667, Norton, Leicestershire, Eng.—d. Aug. 22, 1752, Lyndon, Rutland), Anglican priest and mathematician who sought to harmonize religion



Whiston, oil painting by an unknown artist after a portrait by Sarah Hoadly, *c.* 1720; in the National Portrait Gallery, London
By courtesy of the National Portrait Gallery, London

and science, and who revived in England the heretical views of Arianism.

Ordained in 1693, Whiston served from 1694 to 1698 as chaplain to John Moore, Anglican bishop of Norwich. During this period he wrote *A New Theory of the Earth* (1696), in which he claimed that the biblical stories of the creation, flood, and final conflagration could be explained scientifically as accounts of events with historical bases. After three years as vicar of Lowestoft (1698–1701), he returned to Cambridge, his alma mater, as assistant to the mathematician Sir Isaac Newton, whom he succeeded as professor in 1703.

From the works of early Christian writers, Whiston was led to Arianism, a doctrine that denied the divinity of Christ. Deprived of his professorship in 1710 because of his unpopular notions, Whiston organized a society for the revival of primitive Christianity, whose members met weekly in his London home (1715–17). Finally, in 1747, he left the Church of England to join the General Baptists. Among Whiston's other works are *The Accomplishment of Scripture Prophecies* (1708), *Primitive Christianity Revived,* 5 vol. (1711–12), a translation (1737) of the works of the Jewish historian Josephus, a revision (1745) of the King James Version of the New Testament, and his own *Memoirs* (1749–50).

Whitaker, Sir Frederick (b. April 23, 1812, Bampton, Oxfordshire, Eng.—d. Dec. 4, 1891, Auckland, N.Z.), solicitor, politician, and businessman who served twice as prime minister of New Zealand (1863–64; 1882–83). He was an advocate of British annexation in the Pacific and of the confiscation of Maori lands for settlement.

After studying law, Whitaker went to Sydney as a solicitor and then to Auckland (1841), where he sat as an unofficial member of the governor's Legislative Council and served in the militia (1845–46). He became Auckland's provincial solicitor (1853) and a member of the provincial executive, the first of several political posts that included lengthy service in the Legislative Council (1853–64; 1879–91) and the superintendency of Auckland (1865–67). He held the office of attorney general for more than 20 years between 1854 and 1891, twice serving while he was prime minister.

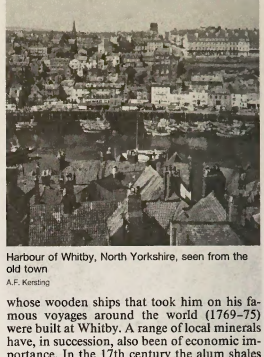
Whitaker was deeply involved in land speculation, and the policy of his first government was to suppress the Maori at crown expense, confiscate their land, and then develop it with the aid of a £3,500,000 British loan. After his second premiership he emerged as a strong advocate of British colonial expansion in the Pacific, a stance consistent with his business interests in Fiji and New Zealand.

An efficient rather than a popular leader, Whitaker expressed some liberalism in his advocacy of universal male suffrage (rather than restricting it to property owners), proportional representation, and an elective upper house. Knighted in 1884, Whitaker spent the last decade of his life practicing law.

Whitbread Book Award, any of a series of literary awards given to writers resident in the United Kingdom and Ireland for books published there in the previous year. Established in 1971 and sponsored by the British corporation Whitbread PLC, the awards are given annually and are administered by the British Booksellers Association.

Awards are given in five categories (novel, first novel, poetry, biography, and children's); in addition, from these winners one is chosen the Whitbread Book of the Year. A prize purse of £50,000 is shared among the winners. Among the grand-prize winners are poets Ted Hughes (1997, 1998) and Seamus Heaney (1996, 1999). Whitbread Book of the Year novelists have included William Trevor (1976, 1983, 1994) and Iris Murdoch (1974).

Whitby, town, borough of Scarborough, administrative county of North Yorkshire, historic county of Yorkshire, England. The old North Sea port town is clustered on the east side of the harbour at the mouth of the River Esk, where it breaches the forbidding cliff line. Opposite, on the West Cliff, Victorian seaside resort development took place. On the East Cliff, above the town, is an abbey founded as early as 656. The plowboy Caedmon, acclaimed as the first poet in the English language, died there in 680. Whitby prospered during the Middle Ages as a fishing port and was incorporated by the end of the 12th century. Herring has been its economic mainstay, and for a time it was an important whaling port. It has produced many fine sailors, most famous among them Capt. James Cook,



Harbour of Whitby, North Yorkshire, seen from the old town
A.F. Kersting

whose wooden ships that took him on his famous voyages around the world (1769–75) were built at Whitby. A range of local minerals have, in succession, also been of economic importance. In the 17th century the alum shales that outcrop on the cliffs nearby were burned with seaborne coal from Newcastle. Whitby ironstone was shipped to Tyneside before the discovery (in 1850) of the Cleveland ore field. Since the 1950s methane gas and deep-seated deposits of potash have been opened up in Eskdale, behind Whitby. The town serves an extensive, if thinly populated, farming area in Eskdale, set amid the North Yorkshire Moors. Its harbour and moorland surroundings attract many tourists. Pop. (1991) 13,640.

Whitby, Synod of, a meeting held by the Christian Church of the Anglo-Saxon kingdom of Northumbria in 663/664 to decide whether to follow Celtic or Roman usages. It marked a vital turning point in the development of the church in England.

Though Northumbria had been mainly converted by Celtic missionaries, there was by 662 a Roman party, which included Queen Eanfled, Bishop Wilfrid, and other influential people. The Celtic party was led by the bishops Colman and Cedd and Abbess Hilda. Two accounts of the synod survive, in Bede's *Ecclesiastical History of the English People* and in the life of Wilfrid by the monk Eddi. King Oswiu decided in favour of Rome because he believed that Rome followed the teaching of St. Peter, the holder of the keys of heaven. The decision led to the acceptance of Roman usage elsewhere in England and brought the English Church into close contact with the Continent.

White, Andrew Dickson (b. Nov. 7, 1832, Homer, N.Y., U.S.—d. Nov. 4, 1918, Ithaca, N.Y.), American educator who was the founder and first president of Cornell University.

After graduation from Yale in 1853, White studied in Europe for the next three years, serving also as attaché at the U.S. legation at St. Petersburg, Russia, in 1854–55. He returned to the United States to become professor of history and English literature at the University of Michigan, Ann Arbor. In 1865 White's dream of a state university for New York—based on liberal principles with reference to religion, coeducation, race, and the teaching of science unhampered by religious dogma—was realized when Cornell University, Ithaca, was chartered. As Cornell's first president, White devoted his energies and much of his wealth to assure its success and future growth.

White served on numerous government commissions and was U.S. minister to Germany (1879–81) and Russia (1892–94) and ambassador to Germany (1897–1902). In 1899 he was president of the U.S. delegation at the Hague Peace Conference. The most outstand-

ing of his works are *A History of the Warfare of Science with Theology in Christendom* (1896) and *Seven Great Statesmen in the Warfare of Humanity with Unreason* (1910).

White, Byron R., in full BYRON RAYMOND WHITE (b. June 8, 1917, Fort Collins, Colo., U.S.—d. April 15, 2002, Denver), associate justice of the United States Supreme Court (1962–93).

Before taking up the study of law in 1940, White achieved fame as a quarterback and halfback at the University of Colorado, earning the nickname "Whizzer." After graduating in 1938, he signed a one-year contract with the Pittsburgh Pirates (now Steelers) and during the 1938 season led the NFL in rushing. In 1939 White attended the University of Oxford as a Rhodes scholar but returned to the United States after the start of World War II. He then played with the Detroit Lions (1940–41) while attending Yale Law School, from which he graduated with honours in 1946.

White served for a year as law clerk to Chief Justice Fred M. Vinson before joining a law firm in Denver. In 1960 he was active in the presidential campaign of John F. Kennedy, an old friend, and in 1961 was made assistant attorney general under the president's brother Robert Kennedy. In 1962 President Kennedy appointed him to the U.S. Supreme Court. Despite his liberal political background, White's role on the court was generally described as moderate or relatively conservative. He dissented from many of the court's liberal rulings, including *Roe* v. *Wade* (1973), which legalized abortion nationwide, and *Miranda* v. *Arizona* (1966), which established a code of conduct for police during interrogations.

White, E.B., in full ELWYN BROOKS WHITE (b. July 11, 1899, Mount Vernon, N.Y., U.S.—d. Oct. 1, 1985, North Brooklin, Maine), American essayist and literary stylist.

White graduated from Cornell University, Ithaca, N.Y., in 1921 and was a reporter and freelance writer before joining *The New Yorker* magazine as a writer and contributing editor in 1927. He married Katherine Sergeant Angell, *The New Yorker*'s first fiction editor, in 1929, and he remained with the weekly magazine for the rest of his career. White collaborated with James Thurber on *Is Sex Necessary?* (1929), a spoof of the then-current sex manuals. He also contributed a monthly column to *Harper's* (1938–43) magazine.

In 1941 White edited with his wife *A Subtreasury of American Humor.* His three books for children—*Stuart Little* (1945), *Charlotte's Web* (1952), and *The Trumpet of the Swan* (1970)—are considered classics. In 1959 he revised and published a book by the late William Strunk, Jr., *The Elements of Style,* which became a standard style manual for writing in English. Among White's other works is *Points of My Compass* (1962). *Letters of E.B. White,* edited by D.L. Guth, appeared in 1976, his collected essays in 1977, and *Poems and Sketches of E.B. White* in 1981. He was awarded a Pulitzer Prize special citation in 1978.

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White, Edward Douglass (b. Nov. 3, 1845, near Thibodaux, La., U.S.—d. May 19, 1921, Washington, D.C.), ninth chief justice of the United States (1911–21), whose major contribution to U.S. jurisprudence was his "rule of reason" decision in 1911 that federal courts have since applied to antitrust cases.

The son of a judge, U.S. congressman, and Louisiana governor, White received a Roman Catholic Jesuit education and fought briefly for the Confederacy in the Civil War, after which he was trained in a New Orleans law office. Entering Louisiana politics as a Democrat, he was elected a state senator in 1874 and was appointed to the state Supreme Court



Edward Douglass White
By courtesy of the National Archives, Washington, D.C.

in 1878. Elected to the U.S. Senate in 1890, he was elevated to the U.S. Supreme Court by President Grover Cleveland in 1894.

As an associate justice, he formulated the concept of the "incorporation" of territories that the United States had acquired in 1898 by the Spanish-American War. In a concurring opinion in *Downes* v. *Bidwell* (1901), one of a group called the Insular cases, White argued that "incorporation" into the United States, by treaty or statute, determined the availability of constitutional safeguards to residents of a new U.S. possession. This vague criterion was adopted by a majority of the court in 1905 and was invoked to deny constitutional protection in Hawaii and the territories won from Spain, which were held to be "unincorporated."

Promoted to the chief justiceship by President William Howard Taft in 1910, White assumed office early the next year. In *Standard Oil Company of New Jersey* v. *United States* and *United States* v. *American Tobacco Company* (both 1911) he promulgated the idea that a restraint of trade by a monopolistic business must be "unreasonable" to be illegal under the Sherman Act. His failure to define a "reasonable" restraint, coupled with the imprecise brevity of the Sherman Act, made subsequent antitrust decisions very difficult to predict.

During World War I, White wrote two important decisions in favour of federal emergency powers. *Wilson* v. *New* (1917) sustained the Adamson Act of 1916, fixing minimum wages and maximum hours for railroad workers. Military conscription was upheld in the Selective Draft Law Case (*Arver* v. *United States,* 1917).

White, Edward H., II, in full EDWARD HIGGINS WHITE II (b. Nov. 14, 1930, San Antonio, Texas, U.S.—d. Jan. 27, 1967, Cape Kennedy, Fla.), first U.S. astronaut to walk in space.

White graduated from the U.S. Military Academy, West Point, N.Y., in 1952 and was commissioned a second lieutenant in the U.S. Air Force. He took flight training and served in a fighter squadron in Germany. In 1959 he received his M.S. in aeronautical engineering from the University of Michigan, Ann Arbor, and graduated from the Air Force Test Pilot School, Edwards Air Force Base, California.

White was selected in 1962 as a member of the second group of astronauts. He was chosen to join James A. McDivitt on the four-day orbital flight of Gemini 4, launched on June 3, 1965. During the third orbit White emerged from the spacecraft, floated in space for about 20 minutes, and became the first person to propel himself in space with a maneuvering unit. White was subsequently one of the three-man crew of Apollo 1 who in 1967 were the first casualties of the U.S. space program, killed during a flight simulation (the others were Virgil I. Grissom and Roger B. Chaffee).

White, Gilbert (b. July 18, 1720, Selborne, Hampshire, Eng.—d. June 26, 1793, Selborne), English naturalist and clergyman, author of *The Natural History and Antiquities of Selborne* (1789), the first work on natural history to attain the status of an English classic.

White was educated at Oriel College, Oxford (1740–43), and, although he remained a fellow there until his death, he spent most of his life in Selborne. In 1751, soon after he was ordained, White began a journal in which he noted observations made in his garden. This account was eventually published as a *Calendar of Flora and the Garden* (1765), followed by the more sophisticated *Naturalist's Journal,* begun in 1768. Publication of *The Natural History,* a composite of 110 of White's letters on the subject to his friends, concluded 20 years of intense effort. It was immediately met with the acclaim of major naturalists, who were impressed by White's methodical approach and keen sense of observation.

White, Helen Magill, *née* MAGILL (b. Nov. 28, 1853, Providence, R.I., U.S.—d. Oct. 28, 1944, Kittery Point, Maine), educator who was the first woman in the United States to earn a Ph.D. degree.

Magill received an A.B. from Swarthmore College (Swarthmore, Pa.) in 1873. In 1877, 16 years after the first Ph.D.'s in the United States were conferred on men (by Yale University), she earned a Ph.D. in Greek from Boston University, with a dissertation on Greek drama. For the next four years she studied classics at the University of Cambridge. On her return to the United States, Magill became a private school principal and, in 1883, was appointed director of the Howard Collegiate Institute of West Bridgewater, Mass., a women's college. From 1887 to 1888 she helped organize the annex for women at Princeton University. In 1890 Magill married Andrew Dickson White, the retired president of Cornell University. She ended her academic career as she accompanied him on his travels as minister to Russia (1892–94) and ambassador to Germany (1897–1903).

White, John (d. *c.* 1593, Kylemore, County Galway, Ire.), British artist, explorer, cartographer, and governor of the English settlement on Roanoke Island (now in North Carolina, U.S.).

In May 1577 White sailed on the ship *Aid* as part of an expedition to America commanded by Martin Frobisher. The expedition, sponsored by the Cathay Company in its search for precious metals and a northwest passage to Asia, sailed to Greenland and Baffin Island before returning to England in September 1577. The expedition discovered neither a northwest passage nor precious metals, but White drew some illuminating sketches of the lands and peoples encountered on the voyage.

In April 1585 White sailed on an expedition sponsored by Sir Walter Raleigh and commanded by Sir Richard Grenville that planted a settlement in July on Roanoke Island. White executed many paintings and sketches of the lands, native peoples, flora, and fauna of the region, and 23 of his paintings were used later to illustrate Thomas Hariot's *A Briefe and True Report of the New Found Land of Virginia.* The colony was abandoned in June 1586, and White returned to England.

In May 1587 White sailed with more than 100 colonists as governor of a second colony that Sir Walter Raleigh attempted to found in North America. The colony was established on Roanoke Island that July, but on Aug. 25, 1587, White returned to England. He arrived there in November, but, because of the approaching war with Spain, he was unable to secure a relief expedition immediately. When the expedition arrived at the island in August 1590, they found no trace of any colonists, including White's daughter and his granddaughter, Virginia Dare (*q.v.*). White retired to a

home in Ireland. In February 1593 he wrote an account of his final voyage to Virginia.

White, Leslie A(lvin) (b. Jan. 19, 1900, Salida, Colo., U.S.—d. March 31, 1975, Lone Pine, Calif.), American anthropologist best known for his theories of the evolution of culture and for the scientific study of culture that he called "culturology."

After serving in the U.S. Navy, White entered Louisiana State University, but after two years he transferred to Columbia University. He received his B.A. and M.A. in psychology from Columbia, and his Ph.D. in sociology from the University of Chicago. In his early career, White did fieldwork among the Keresan Pueblo Indians of the American Southwest. From 1930 to 1970 he taught at the University of Michigan, where he won great popularity as a teacher and lecturer. In the last years of his life he was associated with the department of anthropology of the University of California, Santa Barbara. His most important works include *The Evolution of Culture* (1959) and *The Concept of Culture* (1973, with Beth Dillingham).

White firmly supported cultural evolution along the lines laid down by the 19th-century writers Herbert Spencer, Lewis H. Morgan, and Edward Tylor, even when this view was in great disfavour. For White, cultural evolution was facilitated by technological development, particularly with regard to the increased harnessing of energy per capita. White's evolutionary views put him in conflict with the anti-evolutionary theories of Franz Boas and his supporters, who were then dominant in the field of cultural anthropology.

White considered his greatest contribution to anthropology to be his conception of culturology, outlined in a series of essays called *The Science of Culture* (1949). By culturology, White meant the application to culture of the organismic analogy of structure-function that Spencer had applied to society. This approach to culture was philosophically materialistic and nonreductionist.

White, Minor (b. July 9, 1908, Minneapolis, Minn., U.S.—d. June 24, 1976, Cambridge, Mass.), American photographer and editor, whose efforts to extend photography's range of expression made him one of the most influential creative photographers of the mid-20th century.

White took up photography while very young but set it aside for a number of years to study botany and, later, poetry. He began to photograph seriously in 1937. His early years as a photographer were spent working for the Works Progress Administration (WPA). Many WPA photographers were chiefly concerned with documentation. White, however, preferred a more personal approach.

In 1945 his photographic style was given its definitive form by study with Edward Weston and Alfred Stieglitz. From Weston, White learned the value of realism and tonal beauty in photographic prints, and from Stieglitz he learned the expressive potential of the sequence (a group of photographs presented as a unit) and the equivalent (a photographic image viewed as a visual metaphor). Both in his photographs and in his writing, White became the foremost exponent of the sequence and the equivalent.

In 1946 White moved to San Francisco, where he worked closely with the photographer Ansel Adams. Adams' zone system, a method of visualizing how the scene or object to be photographed will appear in the final print, formed the third major influence on White's work. The next year he succeeded Adams as director of the photography department of the California School of Fine Arts. He was editor of the photography magazine *Aperture,* which he and others founded in 1952, and *Image,* which he edited from 1953 to 1957.

White was a meticulous technician who was scrupulously faithful in his work to the tones and textures of nature. Nevertheless, he was one of the leading abstract photographers of the mid-20th century, often giving mystical interpretations to his photographs. In 1965 he became professor of creative photography at the Massachusetts Institute of Technology, Cambridge. Among his best-known books are two collections, *Mirrors, Messages, Manifestations* (1969) and *Minor White: Rites and Passages* (1978), with a biographical essay by James Baker Hall.

BIBLIOGRAPHY. Peter C. Bunnell, *Minor White: The Eye That Shapes* (1989).

White, Patrick (Victor Martindale) (b. May 28, 1912, London, Eng.—d. Sept. 30, 1990, Sydney, N.S.W., Australia), the most influential of a group of mid-20th-century writers in Australia, winner of the Nobel Prize for Literature in 1973.

White was born in London while his parents were there on a visit, and he returned to England (after 12 years in Australia) for schooling. He then worked for a time at his father's sheep ranch in Australia before returning to study modern languages at King's College, Cambridge. By the time he served in the Royal Air Force during World War II, he had already published some early work, traveled extensively, and been involved with the theatre. After 1945 he returned to Australia, but also lived intermittently in England and in the United States.

White's first novel, *Happy Valley* (1939), was set in New South Wales and showed the influence of D.H. Lawrence and Thomas Hardy. The material of White's later novels is distinctly Australian, but his treatment of it has a largeness of vision not limited to any one country or period. White saw Australia as a country in a highly volatile process of growth and self-definition, and his novels explore the possibilities of savagery to be found within such a context. His conception of Australia reflected in *The Tree of Man* (1955), *Voss* (1957), *Riders in the Chariot* (1961), *The Solid Mandala* (1966), and *The Twyborn Affair* (1979) is the product of an individual, critical, poetic imagination. His style is dense with myth, symbol, and allegory. His deepest concern is for man's sense of isolation and his search for meaning.

White wrote plays, including *The Season at Sarsaparilla* (produced 1962; published in *Four Plays,* 1965), *Night on Bald Mountain* (produced 1964), and *Signal Driver* (1982); short stories; the autobiographical *Flaws in the Glass* (1981); a screenplay; and a book of poems.

White, Pearl Fay (b. March 4, 1889, Green Ridge, Mo., U.S.—d. Aug. 4, 1938, Paris, Fr.), one of the most successful of the early American film stars, who gained international fame for her work in "chapter stories"—long-running melodramatic serials, such as *The Perils of Pauline.*

White left home at 18 to join a traveling theatre troupe. In 1910 she began her film career with the Powers Film Company in New York City. In the next 13 years she would make more than 100 comedies, serials, and westerns. She was first known for her work in such short slapstick comedies as "The Girl in the Next Room" and "Her Dressmaker's Bill." In 1914 she starred in a 20-episode serial for the American branch of the French film company Pathé Frères. *The Perils of Pauline* was the most successful example of its genre—the short-episode serial that emphasized suspense, danger, and the cliff-hanger ending that aimed at bringing the audience back for the next sequel. *The Perils of Pauline* made White an international movie star whose fame for a while eclipsed even that of Mary Pickford. Among the other serials she made were *The Exploits of Elaine* (1914–15), *The Iron Claw* (1916), and *The Black Secret* (1919–20).

In the 1920s, with the rise of the feature film, serials lost popularity, and White failed in her attempt to make the transition to the new genre. After 1923 she lived in Paris. She was married twice, to the actors Victor Sutherland, in 1907, and Wallace McCutcheon, in 1919.

White, Stanford (b. Nov. 9, 1853, New York, N.Y., U.S.—d. June 25, 1906, New York), American architect and the most imaginative partner in the influential architectural firm McKim, Mead, and White.



Madison Square Garden (demolished), New York City, designed by Stanford White, 1891

By courtesy of the Museum of the City of New York, the J. Clarence Davies Collection

Stanford White was the son of the essayist, critic, and Shakespearean scholar Richard Grant White. He was carefully trained as an architect by Henry Hobson Richardson. In June 1880 he joined Charles Follen McKim and William Rutherford Mead in founding a new architectural firm that soon became the most popular and prolific one in the country. Until about 1887 their organization concentrated on designing large country and seaside mansions in what was called the Shingle style. White designed one of the subtlest of these informally planned structures, the Casino (1881) at Newport, R.I. Subsequently, the partners, aided by their gifted draftsman Joseph Morrill Wells, led the American trend toward Neoclassicism and away from the more original styles then being developed in Chicago and elsewhere.

White excelled at designing gracefully proportioned structures set off by exquisite Italian Renaissance ornamentation. Among his more important commissions in New York City were the Madison Square Garden (1891), the Washington Memorial Arch (1891), the New York Herald Building (1892), and the Madison Square Presbyterian Church (1906). White was a versatile artist who designed jewelry, furniture, and a wide range of interior decorations. An enthusiastic and extroverted man, he was noted for his lavish entertainments. He was shot to death at Madison Square Garden by Henry Kendall ("Harry") Thaw, the jealous husband of the showgirl Evelyn Nesbit, with whom White had had a love affair.

BIBLIOGRAPHY. Charles C. Baldwin, *Stanford White* (1931, reprinted 1976), deals with White's architectural career. Paul R. Baker, *Stanny: The Gilded Life of Stanford White* (1989), examines his work and milieu.

White, T(erence) H(anbury) (b. May 29, 1906, Bombay, India—d. Jan. 17, 1964, Piraeus, Greece), English novelist, social historian, and satirist who was best known for his brilliant adaptation of Sir Thomas Malory's 15th-century romance, *Morte Darthur,* into a quartet of novels called *The Once and Future King.*

White was educated at Cheltenham College and at Cambridge. He taught at Stowe School (1930–36), and while there he attained his first real critical success with an autobiographical volume, *England Have My Bones* (1936). He afterward devoted himself exclusively to writing and to studying such recondite subjects as the Arthurian legends, which were to provide the material for his books. White was by nature a recluse, for long periods isolating himself from human society and spending his time hunting, fishing, and looking after his strange collection of pets.

The Once and Future King (1958) comprises *The Sword in the Stone* (1939), *The Queen of Air and Darkness*—first published as *The Witch in the Wood* (1940)—*The Ill-Made Knight* (1941), and *The Candle in the Wind*. *The Once and Future King* was adapted in 1960 into a highly successful musical play, *Camelot;* a motion picture, also called *Camelot* (1967), was based on the play. White's other works include *The Goshawk* (1951), a study of falconry, and two works of social history, *The Age of Scandal* (1950) and *The Scandalmonger* (1951).

White, Theodore H(arold) (b. May 6, 1915, Boston, Mass., U.S.—d. May 15, 1986, New York, N.Y.), American journalist, historian, and novelist, best known for his astute, suspenseful accounts of the 1960 and 1964 presidential elections.

The son of a lawyer, White grew up in Boston and graduated from Boston Latin School in 1932. After graduating from Harvard in 1938, he served as one of *Time* magazine's first foreign correspondents, being stationed in East Asia from 1939 to 1945. He then served as European correspondent for the Overseas News Agency (1948–50) and for *The Reporter* (1950–53). With this extensive background in analyzing other cultures, White was well equipped to tackle the American scene in *The Making of the President, 1960* (1961) and *The Making of the President, 1964* (1965). Accepted as standard histories of presidential campaigns, these books present their subjects by intelligently juxtaposing events and treating politicians as personalities rather than as symbols. White's approach elevated this type of history to an art form and won him the 1962 Pulitzer Prize for general nonfiction for *The Making of the President, 1960*. White went on to analyze the elections of 1968 and 1972 in later books.

White was the coauthor (with Annalee Jacoby) of *Thunder Out of China* (1946) and also wrote *Fire in the Ashes* (1953), *The Mountain Road* (1958), *Breach of Faith: The Fall of Richard Nixon* (1975), the autobiographical *In Search of History: A Personal Adventure* (1978), and *America in Search of Itself: The Making of the President, 1956–1980* (1982). His books convey a genuine excitement about American institutions and politics.

White, Walter (Francis) (b. July 1, 1893, Atlanta, Ga., U.S.—d. March 21, 1955, New York, N.Y.), foremost spokesman for blacks in the United States for almost a quarter of a century and executive secretary (1931–55) of the National Association for the Advancement of Colored People (NAACP). He waged a long and ultimately successful campaign against the lynching of blacks by white mobs in the United States.



Walter White, 1942

By courtesy of the Library of Congress, Washington, D.C.

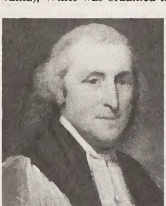
Despite his blond hair and blue eyes, denoting that only a fraction of his ancestry was Negroid, White chose to go through life as a black. At the age of 25 he joined the NAACP national staff as assistant executive secretary under James Weldon Johnson, whom he succeeded as executive secretary. White's principal objective became the abolition of lynching. Aided by his fair skin, he made on-the-spot investigations of more than a score of lynchings and race riots and conducted a vigorous, sustained drive for enactment of a federal antilynching law. Although no such law was enacted, the climate of public opinion was markedly changed by his investigations, exposés, and impassioned propaganda. In 1918, when he joined the NAACP staff, 67 persons, all but 4 of them blacks, were lynched. In the year of his death, 1955, there were only three recorded lynchings, and for the five previous years there had been none. Lynchings had become a rarity and were soon to disappear from the American scene.

In an early assault on discrimination in voting rights, White in 1930 almost single-handedly succeeded in influencing the Senate to reject by a 41–39 vote President Herbert Hoover's nomination of Judge John J. Parker of North Carolina for appointment to the U.S. Supreme Court. (Parker was on record as being opposed to black suffrage.) At the outbreak of World War II White assisted his colleague, labour leader A. Philip Randolph, in pressing for a U.S. Fair Employment Practices Committee (June 1941) that would act to ban discrimination in government and wartime industry.

White's writings include two fictionalized accounts of a Southern lynching: *Fire in the Flint* (1924) and *Rope and Faggot: A Biography of Judge Lynch* (1929). His autobiography, *A Man Called White,* was published in 1948.

White, William (b. April 4, 1748, Philadelphia, Pa. [U.S.]—d. July 17, 1836, Philadelphia), first bishop consecrated in England for the Protestant Episcopal Church in the United States, and first presiding bishop of that church.

Educated at the College and Academy of Philadelphia (later the University of Pennsylvania), White was ordained in England as an Anglican priest in 1772. During the U.S. War of Independence, after the Loyalist rector of Christ Church, Philadelphia, had returned to England, White received the position and held it until his death. After the war he also served as chaplain to the Continental Congress.



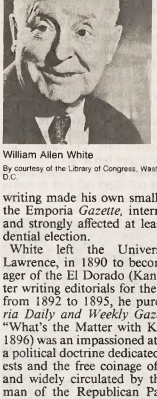
William White, detail from an oil painting by Gilbert Stuart; in the Pennsylvania Academy of the Fine Arts, Philadelphia

By courtesy of the Pennsylvania Academy of the Fine Arts, Philadelphia

In his pamphlet of 1782, *The Case of the Episcopal Churches in the United States Considered,* he noted that, before the Revolution, Americans went to England for ordination, and he suggested that if the American church could not obtain bishops from England it would have to establish its own episcopate. Although he favoured a continuation of the spiritual legacy of the Church of England, he preferred to sever jurisdictional connections with it and the crown. After the Revolution the scattered remnants of the Church of England in the United States organized as the Protestant Episcopal Church. White was sent to England for consecration as a bishop (1787). Soon after his return he became the first presiding bishop of the church (1787) and served a second time in the same capacity from 1795 until his death.

Highly influential in the development of the new church, White wrote on doctrinal matters and assisted in the revision of *The Book of Common Prayer* for use in the United States.

White, William Allen (b. Feb. 10, 1868, Emporia, Kan., U.S.—d. Jan. 29, 1944, Emporia), American journalist known as the "Sage of Emporia," whose mixture of tolerance, optimism, liberal Republicanism, and provincialism made him the epitome of the thoughtful small-town American. His editorial writing made his own small-town newspaper, the Emporia *Gazette,* internationally known, and strongly affected at least one U.S. presidential election.



William Allen White

By courtesy of the Library of Congress, Washington, D.C.

White left the University of Kansas, Lawrence, in 1890 to become business manager of the El Dorado (Kan.) *Republican.* After writing editorials for the *Kansas City Star* from 1892 to 1895, he purchased the *Emporia Daily and Weekly Gazette.* His editorial "What's the Matter with Kansas?" (Aug. 15, 1896) was an impassioned attack on populism, a political doctrine dedicated to agrarian interests and the free coinage of silver. Reprinted and widely circulated by the national chairman of the Republican Party, the editorial was credited with helping to elect William McKinley as president over William Jennings Bryan, the Democratic candidate and the hero of the populists.

In 1912 White repudiated the mainstream of Republicanism to support the "Bull Moose" faction (the Progressive Party) led by Theodore Roosevelt. "To an Anxious Friend," an editorial of July 27, 1922, advocating freedom of speech, won the 1923 Pulitzer Prize for editorial writing. In 1924 White unsuccessfully ran as an independent for governor of Kansas. He wrote several novels and short-story collections, biographies of Woodrow Wilson and Calvin Coolidge, and an autobiography (posthumous, 1946).

His son and successor as editor and publisher of the *Gazette,* William Lindsay White (1900–

73), served as a war correspondent and wrote one of the best-selling books of World War II, *They Were Expendable* (1942).

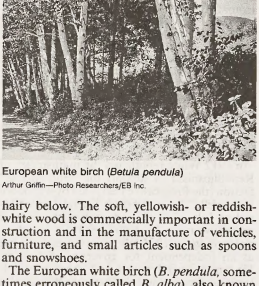
White, William Hale: *see* Rutherford, Mark.

White Australia Policy, the anti-Asian immigration policy initiated by the new Commonwealth of Australia in 1901. It reflected a long-standing and unifying sentiment of the various Australian colonies and remained a fundamental government policy into the mid-20th century.

Each of the Australian colonies had passed restrictive legislation as early as the 1860s. This was directed specifically at Chinese immigrants, but later a popular cry was raised against the increasingly numerous Japanese—especially after Japan's victory over China in the 1894–95 Sino-Japanese War—and against East Indians and Kanakas (South Pacific islanders) as well. Fear of military invasion by Japan, the threat to the standard of living presented by the cheap but efficient Asian labourers, and white racism were the principal factors behind the White Australia movement. In 1901 the Immigration Restriction Act (*q.v.*) of Australia effectively ended all non-European immigration by providing for entrance examinations in European languages. Supplementary legislation in 1901 provided for the deportation by 1906 of the country's Kanakas. Popular support for White Australia, always strong, was bolstered at the Paris Peace Conference in 1919 when the Australian delegation led the fight to defeat a Japanese-sponsored racial-equality amendment to the League of Nations Covenant. From about 1950 on, the policy became less stringent, first under Liberal governments and also (more markedly and remarkably) under Labor, from 1972 to 1975.

white birch, any of several species of ornamental and timber trees of the genus *Betula,* in the family Betulaceae. The trees are native to cool regions of the Northern Hemisphere and have white, peeling bark. The name white birch also refers to paper birch (*q.v.*).

One species of white birch, *B. pubescens,* is a tree about 18 m (60 feet) tall and is native to Eurasia. It has egg-shaped leaves, usually



European white birch (*Betula pendula*)
Arthur Griffin—Photo Researchers/EB Inc.

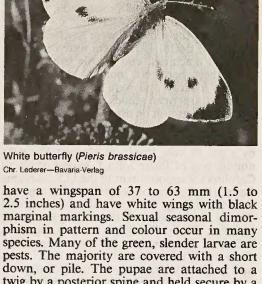
hairy below. The soft, yellowish- or reddish-white wood is commercially important in construction and in the manufacture of vehicles, furniture, and small articles such as spoons and snowshoes.

The European white birch (*B. pendula,* sometimes erroneously called *B. alba*), also known as silver birch or common birch, has slender, drooping branches and small, sharp-pointed leaves about 6 cm (2 inches) long. It may grow to a height of 15 m on light soils. The cut-leaved, purple-leaved, and weeping birches are popular ornamental varieties of European white birch.

The Japanese white birch (*B. platyphylla japonica*), an 18-metre tree native to eastern Asia, has broad leaves about 7 cm long; its hard, yellow-white wood is used for furniture and woodenware.

white blood cell: *see* leukocyte.

white butterfly, any of several members of the cosmopolitan insect family Pieridae (order Lepidoptera), which also includes the sulfur and orange-tip butterflies and contains more than 1,000 species. Adult white butterflies



White butterfly (*Pieris brassicae*)
Chr. Lederer—Bavaria-Verlag

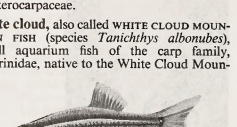
have a wingspan of 37 to 63 mm (1.5 to 2.5 inches) and have white wings with black marginal markings. Sexual seasonal dimorphism in pattern and colour occur in many species. Many of the green, slender larvae are pests. The majority are covered with a short down, or pile. The pupae are attached to a twig by a posterior spine and held secure by a girdle of silk.

One of the most common whites in North America is the European cabbage butterfly (*Pieris rapae*), whose larva is an important economic pest, attacking cabbage and related plants. It was introduced into North America in about 1860.

White Canon (religious order): *see* Premonstratensian.

white cedar, in the lumber trade, any American arborvitae (*q.v.*), some species of false cypress (*q.v.*), and McNab cypress, incense cedar (*q.v.*), and California juniper. Nonconiferous trees that are called white cedar include the chinaberry and some members of the flowering plant families Bignoniaceae, Celastraceae, Myristicaceae, Burseraceae, and Dipterocarpaceae.

white cloud, also called WHITE CLOUD MOUNTAIN FISH (species *Tanichthys albonubes*), small aquarium fish of the carp family, Cyprinidae, native to the White Cloud Moun-



Male white cloud (*Tanichthys albonubes*)
Painting by Karen Allan

tains (Pai-yün Shan) of Kwangtung province, China. The white cloud is a slender, hardy fish, about 4 cm (1.5 inches) long. It is greenish brown, with a silvery belly and red patches on its fins. On each side from head to tail, it has a gleaming stripe, brilliant blue in the young fish, golden in the adult. A rather popular fish, the white cloud is unaggressive and easily bred in captivity.

white-collar crime, crime committed by persons of relatively high social or economic status in connection with their regular occupations. White-collar crimes fall broadly into two categories: those illegal actions undertaken by perpetrators to make money for themselves; and those illegal actions undertaken principally to further the aims of their company or other organization. The most common crimes falling into the first category are embezzlement, misappropriation of funds, securities theft, bribery and kickbacks, insider trading, computer crime, and some types of fraud. The second category of crimes comprises a vast variety of illegal practices by corporations and other organizations: restraint of trade (*i.e.,* monopolies and price-fixing), misrepresentation in advertising, unfair labour practices, health or safety violations in the workplace, income-tax law violations, and various financial manipulations. The economic cost of white-collar crime in most industrial societies is thought to be much greater than the combined cost of larceny, burglary, auto theft, forgery, and robbery.

white corpuscle (biology): *see* leukocyte.

white dwarf star, any of a class of faint stars representing the endpoint of the evolution of intermediate- and low-mass stars. White dwarf stars, so called because of the white colour of the first few that were discovered, are characterized by a low luminosity, a mass on the order of that of the Sun, and a radius comparable to that of the Earth. Because of their large mass and small dimensions, such stars are dense and compact objects with average densities approaching 1,000,000 times that of water.

Unlike most other stars that are supported against their own gravitation by normal gas pressure, white dwarf stars are supported by the degeneracy pressure of the electron gas in their interior. Degeneracy pressure is the increased resistance exerted by electrons composing the gas, as a result of stellar contraction (*see* degenerate gas). The application of the so-called Fermi-Dirac statistics and of special relativity to the study of the equilibrium structure of white dwarf stars leads to the existence of mass-radius relationship through which a unique radius is assigned to a white dwarf of a given mass; the larger the mass, the smaller the radius. Furthermore, the existence of a limiting mass is predicted, above which no stable white dwarf star can exist. This limiting mass, known as the Chandrasekhar limit (*q.v.*), is on the order of 1.4 solar masses. Both predictions are in excellent agreement with observations of white dwarf stars.

The central region of a typical white dwarf star is composed of a mixture of carbon and oxygen. Surrounding this core is a thin envelope of helium and, in most cases, an even thinner layer of hydrogen. Only the outermost stellar layers are accessible to astronomical observations.

White dwarfs evolve from stars with an initial mass of up to three or four solar masses or even possibly higher. After quiescent phases of hydrogen and helium burning in its core—separated by a first red-giant phase—the star becomes a red giant for a second time. Near the end of this second red-giant phase, the star loses its extended envelope in a catastrophic event, leaving behind a dense, hot, and luminous core surrounded by a glowing spherical shell. This is the planetary-nebula phase. During the entire course of its evolution, which typically takes several billion years, the star will lose a major fraction of its original mass through stellar winds in the giant phases and through its ejected envelope. The hot planetary-nebula nucleus left behind has a mass of 0.5–1.0 solar mass and will eventually cool down to become a white dwarf.

White dwarfs have exhausted all their nuclear fuel and so have no residual nuclear energy

sources. Their compact structure also prevents further gravitational contraction. The energy radiated away into the interstellar medium is thus provided by the residual thermal energy of the nondegenerate ions composing its core. That energy slowly diffuses outward through the insulating stellar envelope, and the white dwarf slowly cools down. Following the complete exhaustion of this reservoir of thermal energy, a process that takes several additional billion years, the white dwarf stops radiating and has by then reached the final stage of its evolution and becomes a cold and inert stellar remnant. Such an object is sometimes called a black dwarf.

Because of their intrinsically low luminosities, white dwarf stars can be observed only within a few hundred parsecs (1 parsec = 3.26 light-years) from the Earth. They are occasionally found in binary systems, as is the case for the white dwarf companion to the brightest star in the night sky, Sirius (*q.v.*). White dwarf stars also play an essential role in the outbursts of novae and of other cataclysmic variable stars.

white-eye, any of the 80 to 85 species of birds of the Old World family Zosteropidae (order Passeriformes). They are so much alike that about 60 of them are often lumped in a single genus, *Zosterops.* White-eyes occur chiefly from Africa across southern Asia to Australia and New Zealand in warm regions.

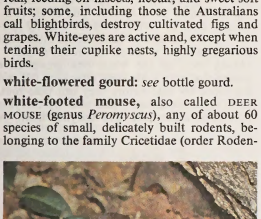


White-eye (*Zosterops*)
Bruce Coleman Ltd.

All of the white-eyes are short-tailed, short-winged birds about 11 cm (4.5 inches) long. The bill is fine and pointed, and the tongue is brush-tipped. The plumage is plain grayish, brownish, or yellow-green (sexes alike). Its main mark is the eye-ring of tiny, soft, usually white feathers. White-eyes are strictly arboreal, feeding on insects, nectar, and sweet soft fruits; some, including those the Australians call blightbirds, destroy cultivated figs and grapes. White-eyes are active and, except when tending their cuplike nests, highly gregarious birds.

white-flowered gourd: *see* bottle gourd.

white-footed mouse, also called DEER MOUSE (genus *Peromyscus*), any of about 60 species of small, delicately built rodents, belonging to the family Cricetidae (order Rodentia), found in a variety of habitats from Alaska to South America. Abundant animals, white-footed mice often outnumber any other mammals in an area. They are large-eyed mice, 8 to 17 cm (3 to 6.5 inches) long excluding the long tail, and they have soft fur and relatively large ears. Colour ranges from nearly white, through brown, to blackish; underparts and feet are usually white.



White-footed mouse (*Peromyscus*)
Ken Brate—Photo Researchers/EB Inc.

White-footed mice are nocturnal animals; they spend the day in burrows or in trees, in nests they construct of plant material. They eat both plant and animal matter. White-footed mice can breed continually throughout the year, the females bearing litters of about four after 21 to 27 days' gestation. Because these mice are clean, easily cared for, and prolific, they are often used as laboratory animals.

white fox: *see* Arctic fox.

white-fronted goose, also called SPECKLEBELLY, or LAUGHING GOOSE (species *Anser albifrons*), rather small, dark-bodied goose with white forehead, yellow bill, and irregular black patches on the belly; it is classified in the tribe Anserini of the family Anatidae (order Anseriformes). Breeding in the Arctic, the white-fronted goose, which exists in four or five races, is the most widely distributed of the so-called gray geese (*see* goose). It migrates as far south as Mexico, the Mediterranean Sea, India, and Japan. The European white-fronted goose (*Anser a. albifrons*) winters in western Europe, the British Isles, and Central Asia. The largest form, the tule goose (*A. a. gambelli*), winters only in the Sacramento Valley, California.

White House, formerly known as the Executive Mansion (1810–1902), the official office and residence of the president of the United States at 1600 Pennsylvania Avenue N.W. in Washington, D.C. The White House and its landscaped grounds occupy 18 acres (7.2 hectares). After the administration of George Washington (1789–97), who occupied presidential residences in New York and Philadelphia instead, every American president has resided at the White House. Originally called the "President's Palace" on early maps, the building was officially named the Executive Mansion in 1810 in order to avoid connotations of royalty. Although the name "White House" was commonly used from about the same time (because the mansion's white-gray sandstone contrasted strikingly with the red brick of nearby buildings), it did not become the official name of the building until 1902. It is the oldest federal building in the nation's capital.

A public competition was held in 1792 to choose a design for a presidential residence in the new capital city. Thomas Jefferson, later the nation's third president (1801–1809), using the pseudonymous initials "A.Z.," was among those who submitted drawings, but Irish American architect James Hoban won the commission (and a $500 prize) with his plan for a Georgian mansion in the Palladian style. The structure was to have three floors and more than 100 rooms and would be built in sandstone imported from quarries along Aquia Creek in Virginia. The cornerstone was laid on Oct. 13, 1792. Labourers, including local slaves, were housed in temporary huts built on the north side of the premises. They were joined by skilled stonemasons from Edinburgh, Scot., in 1793.

In 1800 the entire federal government was relocated from Philadelphia to Washington. John Adams moved into the still unfinished presidential mansion on November 1 and the next night wrote in a letter to his wife, Abigail Adams: "I Pray Heaven Bestow the Best of Blessings on This House and All that shall hereafter inhabit it. May none but Honest and Wise Men ever rule under this Roof." At the insistence of President Franklin Roosevelt



North portico of the White House, Washington, D.C.
Jake McGuire/Washington Stock Photo, Inc.

(1933–45), the quotation was inscribed on the fireplace of the State Dining Room immediately below George Healy's portrait of Abraham Lincoln. When Abigail Adams arrived in Washington several days later, she was disappointed with the residence. The first lady wrote, "there is not a single apartment finished. We have not the least fence, yard, or other convenience outside. I use the great unfinished audience room [East Room] as a drying room for hanging up the clothes."

The mansion quickly became a focal point of the new federal city and was symbolically linked to the United States Capitol by way of Pennsylvania Avenue. Following his inauguration in March 1801, Jefferson became the second president to reside in the executive mansion. In keeping with his ardent republicanism, he opened the house to public visitation each morning, a tradition that was continued (during peacetime) by all his successors. Construction continued on the building's interior, which still lacked ample staircases and suffered from a persistently leaky roof. During Jefferson's tenure, the White House was elegantly furnished in Louis XVI style (known in the United States as Federal style).

During the War of 1812 the building was burned by the British, and President James Madison (1809–17) and his family were forced to flee the city. Reconstruction and expansion began under Hoban's direction, but the building was not ready for occupancy until 1817, during the administration of President James Monroe (1817–25). Hoban's reconstruction included the addition of east and west terraces on the main building's flanks; a semicircular south portico and a colonnaded north portico were added in the 1820s.

The inauguration of Andrew Jackson (1829–37), the "people's president," attracted thousands of well-wishers to the nation's capital. As Jackson rode on horseback down Pennsylvania Avenue to the White House, he was surrounded by a frenetic throng of 20,000 people, many of whom attempted to follow him into the mansion to get a better look at their hero. A contemporary, Margaret Bayer Smith, recounts what happened next: "The halls were filled with a disorderly rabble...scrambling for the refreshments designed for the drawing room." Said Supreme Court Justice Joseph Story, "I was glad to escape from the scene as soon as possible." During his administration Jackson spent more than $50,000 refurbishing the residence, including $10,000 on decorations for the East Room and more than $4,000 on a sterling silver dinner and dessert set decorated with an American eagle. Subsequent changes to the building in the 19th century were relatively minor. The interior was redecorated during various presidential administrations and modern conveniences were regularly

added, including a refrigerator in 1845, gas lighting in 1849, and electric lighting in 1891.

Until the Civil War, most White House servants were slaves. Moreover, the wages of all White House employees—as well as the expenses for running the White House, including staging official functions—were paid for by the president. Not until 1909 did Congress provide appropriations to pay White House servants.

During the presidency of Theodore Roosevelt, the mansion's second-floor rooms were converted from presidential offices to family living quarters, not least in order to make room for the president's six children. Space was also needed for the children's exotic pets, which included raccoons, snakes, a badger, and a bear. To accommodate a growing presidential staff and to provide more office space for the president, the West Wing was constructed in 1902. More office space was made available with the building of the East Wing in 1942. (The East and West wings are connected to the main building by the east and west terraces.)

In 1948, during the presidency of Harry Truman (1945–53), the main building was discovered to be structurally unsound; during the next four years the entire interior was carefully rebuilt, though the original exterior walls were left standing. A second-floor balcony was likewise added on the south portico. The last major alterations to the White House were made in the 1960s by Jacqueline Kennedy, wife of President John F. Kennedy (1961–63), who collected and displayed items of historic and artistic value throughout its rooms.

The White House has a total of more than 130 rooms. The main building contains the presidential family's living quarters and various reception rooms, all decorated in styles of the 18th and 19th centuries. Parts of the main building are open to the public. The west terrace contains the press briefing room, and the east terrace houses a movie theatre. The presidential office, known as the Oval Office, is in the West Wing, as are the cabinet and press rooms; the East Wing contains other offices.

The White House is a unit of the National Capital Parks system and was accredited as a museum in 1988. It attracts more than 1.5 million visitors annually. (B.P.B./Ed.)

white lead, any of several white pigments used in exterior paints and containing inorganic compounds of lead (*q.v.*).

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White Lotus Rebellion (1796–1804), large-scale uprising in the mountainous regions of central China that contributed to the decline of the Ch'ing dynasty. The White Lotus society (Pai-lien chiao) was a religious cult already in existence in the 13th century. When the Manchu tribes of Manchuria (Northeast Provinces) conquered China 400 years later in the 17th century and proclaimed the Ch'ing dynasty, the White Lotus members dedicated themselves to the overthrow of the alien Manchus and to the return of the previous Ming dynasty (1368–1644). In the late 18th century, in response to famine, crowded conditions, and harassment from petty government officials, White Lotus leaders in central China began a rebellion. The dynasty eventually regained control of the regions by organizing local peasants into militia defense corps and offering amnesties to rebel fighters and rewards for the capture of their leaders.

white maple: *see* silver maple.

white mica, fine-grained variety of either of the silicate minerals muscovite and paragonite (*qq.v.*).

White Monk: *see* Cistercian.

white moss: *see* cushion moss.

White Mountains, segment of the Appalachian Mountains, U.S., extending 87 miles (140 km) across north-central New Hampshire and slightly into western Maine.



White Mountains, near Gorham, N.H.
Eric Carle—Shostal/EB Inc.

They contain the highest elevations in the northeastern United States. The loftiest peaks, mostly between 5,000 and 6,000 feet (1,500 and 1,800 m), occur in a linear series of distinct summits that are named for U.S. presidents and make up the Presidential Range. The highest point (6,288 feet [1,917 m]) is Mount Washington (*see* Washington, Mount), which is reached by a highway and cog railway. Other subranges include the Franconia Mountains and the Carter–Moriah and Sandwich ranges. Noteworthy features are the many rounded passes, locally termed notches, that were carved by mountain glaciers; the most scenic are Crawford, Dixville, Franconia, Kinsman, and Pinkham notches. The northeastern edge of the mountains is marked by the Ammonoosuc and Androscoggin river valleys.

White Nile River, Arabic AL-BAḤR AL-ABYAḌ, section of the Nile between Malakāl and Khartoum, The Sudan. It is formed by the confluence of the Mountain Nile (Baḥr al-Jabal) and the Sobat River above Malakāl and flows for about 500 miles (800 km) northeast and north past ar-Rank, Kūstī (railway bridge), ad-Duwaym, and Jabal al-Awliyā' (irrigation dam) to join the Blue Nile at Khartoum and form the Nile proper. This wide and shallow section of the river runs placidly along a small slope and is frequently fringed with swamps. The total length of the White Nile, including its major tributary, the Mountain Nile, is 1,295 miles (2,084 km).

white noise, in music, the effect of the complete range of audible sound-wave frequencies heard simultaneously, analogous to white light, which contains all the frequencies of the light spectrum. The sound of cymbals and snare drums has white-noise characteristics. Electronically synthesized white noise can be filtered so as to produce combinations of frequencies not obtainable on traditional musical instruments; or the white noise itself may be used as an element of music.

White noise is aperiodic sound (that is, its wave pattern is not uniform). Its constituent frequencies are of random amplitude and occur at random intervals.

white oak, any member of a group or subgenus (*Leucobalanus*) of North American ornamental and timber shrubs and trees of the genus *Quercus* in the beech family (Fagaceae). White oaks have smooth, bristleless leaves, sometimes with glandular margins, and acorns with sweet-tasting seeds that mature in one season. Bur oak and chestnut oak (*qq.v.*) are members of this group.

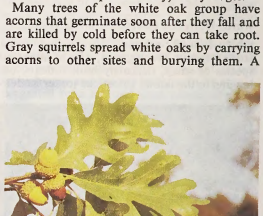
Specifically, the name white oak refers to *Quercus alba,* also called stave oak, which is one of the more important timber trees of the eastern United States. It is 18 to 45 m (60 to 150 feet) tall, with pale-gray, shallowly fissured, scaly bark. The glossy, bright green leaves, about 23 cm (9 inches) long and narrow toward the base, are divided almost to the midrib into seven or nine lobes; they turn wine red in autumn.

The Arizona white oak (*Q. arizonica*), which is about 18 m (60 feet) tall, is found in the southwestern United States on the slopes of canyon walls, at altitudes from 1,500 to 3,000 m (5,000–10,000 feet). Its narrow leaves are about 8 cm (3 inches) long and persist for one year.

The shrubby Gambel oak (*Q. gambelii*) may reach 4.5 m (15 feet) tall. The California white oak (*Q. lobata*), also called valley oak, is an ornamental and shade tree, often 30 m (100 feet) tall. It has graceful, drooping branches, many-lobed dark green leaves, and distinctive acorns about 5 cm (1.7 inches) long. The ash-gray to light-brown bark, slightly orange-tinted, is fissured into irregular cubes. The Oregon white oak (*Q. garryana*), sometimes shrubby but often more than 24 m (80 feet) tall, has wide-spreading branches; it is an important timber tree of the Pacific coastal region.

Other timber trees of the white oak group include the chinquapin oak, or yellow chestnut oak (*Q. muehlenbergii*), the overcup oak, or swamp post oak (*Q. lyrata*), the acorn of which is nearly covered by a deep cup; and the post oak (*Q. stellata*), the leaves of which have square-shaped central lobes. The dwarf chinquapin oak, or dwarf chestnut oak (*Q. prinoides*), is a shrub that forms dense thickets; it is a useful cover plant on dry, rocky ridges.

Many trees of the white oak group have acorns that germinate soon after they fall and are killed by cold before they can take root. Gray squirrels spread white oaks by carrying acorns to other sites and burying them. A



Acorns and leaves of white oak (*Quercus alba*)
John H. Gerard

decline in white oak reproduction is often associated with a decreasing squirrel population.

Timber from all members of the group is known as "white oak" in the lumber trade.

White Plains, city, seat (1778) of Westchester county, New York, U.S. It lies along the Bronx and Hutchinson rivers. Known to the Siwanoy Indians as Quarropas ("White Plains"), probably for the white balsam growing there, the site was sold twice (in 1661 and in 1683) by them to different groups, causing long litigation over the title and delays in the settlement of the area. An established community by 1735 within the Town (township) of Rye, White Plains became the centre of iron-mining activity in Westchester and also served as a crossroads for several transportation lines. The New York Provincial Congress met there on July 10, 1776, approved the Declaration of Independence, and proclaimed the creation of the state of New York. On Oct. 28, 1776, at the battle on Chatterton Hill (commemorated as White Plains National Battlefield Site), George Washington outmaneuvered the British general Lord Howe and was able to slip his troops away to fortified ideas farther north. The Elijah Miller House (1680), which served as Washington's headquarters, has been restored.

Connected by rail to New York City (21 miles [34 km] southwest) in 1844, White Plains grew as an urban core and a residential and retail-trade centre. A range of light manufactured goods are now produced, and there are corporate offices and headquarters for many firms. The city's educational institutions include the New York School for the Deaf (1817) and the Pace University at White Plains. The State University of New York College at Purchase (1967) is nearby. Inc. village, 1866; city, 1916. Pop. (1990) 48,718.

White River, river rising in the Boston Mountains, in northwestern Arkansas, U.S., and flowing northeast into southern Missouri, where it bends southeast and reenters Arkansas, continuing in a southerly direction to join the Arkansas River near its confluence with the Mississippi River, above Arkansas City. The river's descent in the upper course exceeds 25 feet (8 m) per mile. Through the Boston Mountains and the Ozark Plateau of southern Missouri, the White River is deeply entrenched in narrow gorges; much of its middle course is a valley more than 500 feet (150 m) deep. At Newport, Ark., the White emerges from the highlands onto the Mississippi River's floodplain, where the stream gradient is less than 3 feet (9 m) per mile, with many meanders, abandoned channels, and swampland. The river is 685 miles (1,102 km) long, drains 28,000 square miles (73,000 square km), and is navigable upstream to Batesville, Ark., for about 300 miles (480 km).

Major tributaries are the Buffalo River entering from the south and the Cache, Little Red, and North Fork rivers entering from the north. Bull Shoals Dam (1947), on the White River just north of Cotter, Ark., impounds Bull Shoals Lake, which extends 37 miles (60 km) upstream. Forsyth Dam impounds Lake Taneycomo, 5 miles (8 km) northeast of Branson, Mo.

White River, river rising on the Pine Ridge Escarpment in northwestern Nebraska, U.S., and flowing in a northeasterly direction into South Dakota. Passing across the northern boundaries of the Pine Ridge and Rosebud Sioux Indian reservations, it then turns east and empties into the Missouri River near Chamberlain, S.D., after a course of 325 miles (523 km). Around the White River's upper course, light rainfall, sparse vegetation, and geologic conditions have created the Badlands, where small intermittent tributaries have carved a labyrinth of pinnacles, valleys, slopes, and fantastic features into the soft-clay formations. Its lower course is a sand-filled, braided, meandering channel more than a mile wide. The river's drainage basin, which covers 10,200 square miles (26,400 square km), has deposits of manganese and fuller's earth, a claylike substance used in industry.

White Rock, city, southwestern British Columbia, Canada. It lies just southeast of Vancouver on the northern shore of Semiahmoo Bay, at the entrance to the Strait of Georgia. The city is named for a large white rock that, according to an Indian legend, was thrown across the water from Vancouver Island (to the west) by a sea god's son. The rock was used as a navigational aid by early mariners. White Rock is a Pacific port of entry directly northwest of Blaine, Wash., and part of the Vancouver metropolitan area. The site, laid out in 1905, soon became a vacation area. Peace Arch (1921) and International Park mark the western extremity of the U.S.-Canadian border. The city has a large retired-worker community. Pop. (1991) 16,314.

White Russia, former region of eastern Europe that is roughly coextensive with present-day Belarus (*q.v.*), or Belorussia.

White Russian language: *see* Belorussian language.

White Sands National Monument, national monument, an expanse of dazzling white gypsum sands in south-central New Mexico, U.S. The area is situated in the Tularosa Basin, between Alamogordo (northeast) and Las Cruces (southwest). Established in 1933, it covers 225 square miles (583 square km) lying between the San Andres Mountains (west) and the Sacramento Mountains (east). The sand constantly drifts into dunes 10 to 60 feet (3 to 18 m) high. In the southwest corner is Lake Lucero, a marsh encrusted with crystals created by the evaporation of gypsum-laden runoff water. The extensive Alkali Flats, to the north of the lake, are similarly created by underground water drawn to the surface. There is little plant life; the animals, mainly mice and lizards, are light-hued, blending with the sand. To the west is the San Andres National Wildlife Refuge. White Sands Missile Range lies to the southwest, and Holloman Air Force Base to the east.

white sanicle (plant): *see* white snakeroot.

White Sea, Russian BELOYE MORE, Beloye also spelled BELOJE, an almost landlocked extension of the Arctic Ocean indenting the shores of northwestern Russia. It is connected to the more northerly Barents Sea by a long, narrow strait known as the Gorlo (throat). The boundary between the two seas runs along a line joining Cape Kanin Nos and Cape Svyatoy Nos. The area of the White Sea is approximately 35,000 square miles (90,000 square km). Its mean depth is 200 feet (60 m), and its maximum depth is 1,115 feet (340 m) in the northeast part of the Kandalaksha Inlet.

The sea's irregular shape is formed by the large Kandalaksha, Onega, Dvina, and Mezen gulfs. The largest islands in the sea are Solovetskiye, at the entrance to Onega Bay; Morzhovy, at the entrance to the Gorlo Strait; and Mudyuga, at the entrance to Dvina Bay. The sea's northwest shores are bordered by steep cliffs; the southeast shores are low and flat. Rivers flowing into the sea include the Northern Dvina, Mezen, Onega, Vyg, Niva, Umba, Varzuga, and Ponoy.

The White Sea is situated on a continental shelf whose present form appears as a land's-end depression on the slope of the ancient structural block known as the Baltic Shield. The bottom of the sea is badly broken up. In the northwest lies the Kandalaksha Hollow with its sharply formed sides that apparently originated as a fault. In the southern portion is an elevation known as the Solovets Islands. Many small underwater elevations are found in the Onega Inlet. Sandy underwater ridges, created by inflowing currents, prevail in the Gorlo Strait, Voronka, and the Mezen mouth. The sea's chief hollow is separated from the Barents Sea by a sill 130 feet deep, which restricts deepwater exchange between the two bodies of water.

The White Sea contains more than 700 species of multicellular invertebrates, about 60 species of fish, and 5 species of marine mammals. The fishing industry is relatively small, however. Of greatest value as food are the lysun (a kind of Greenland seal) and herring.

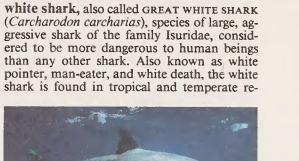
The region's economic value derives from the rich neighbouring land, which is heavily forested, and from the elaborate river network that connects remoter regions with the sea. The White Sea is an important route connecting the economically active portions of northwestern Russia with Russia's Far Eastern ports and with foreign countries. It is also linked to the water transportation system of European Russia by the White Sea–Baltic Canal, which empties into Lake Onega. Here it meets the Volga-Baltic Waterway, which facilitates shipping from the Baltic, Black, Caspian, and Azov seas. The principal ports along the White Sea are Arkhangelsk, Belomorsk, Onega, Mezen, Kem, Kandalaksha, and Umba. With the help of icebreakers in winter, navigation continues year-round.

White Sea–Baltic Canal, Russian BELOMORSKO-BALTIYSKY KANAL, system of rivers, lakes, and canals in northwestern Russia that connects the White Sea to Lake Onega, where it joins the Volga-Baltic Waterway (*q.v.*).

The White Sea–Baltic Canal is 141 miles (227 km) long, 23 miles (37 km) of which is manmade. It was constructed between 1930 and 1933, largely by penal labour. From Povenets, at the northern end of Lake Onega, the canal runs northward to Lake Vygozero (using seven locks), from which the canalized Vyg River (with 12 additional locks) leads to the White Sea.

Lake Onega unites the canal with the Volga-Baltic Waterway, through which ships can reach the Baltic Sea and the Volga River itself. The system, which can take ships of seagoing size, has both strategic and commercial significance, for it shortens the sea passage from St. Petersburg to Arkhangelsk by 2,500 miles (4,000 km). The principal cargo on the system is timber, much of it for paper mills and timber-working enterprises along the route.

white shark, also called GREAT WHITE SHARK (*Carcharodon carcharias*), species of large, aggressive shark of the family Isuridae, considered to be more dangerous to human beings than any other shark. Also known as white pointer, man-eater, and white death, the white shark is found in tropical and temperate regions of all oceans. It is noted, aside from its potential as a man-eater, for a voracious appetite and a diet that may include fishes, sea turtles, birds, sea lions, and ship's garbage.



White shark (*Carcharodon carcharias*)
© Jeffrey L. Rotman

It is a heavy-bodied shark with a crescent-

shaped tail and large, saw-edged, triangular teeth, and the white shark may attain a maximum length of about 11 m (36 feet). It is generally gray, bluish, or brownish, the colour shading suddenly into a whitish belly; large individuals are reported to be paler.

white snakeroot, also called WHITE SNAKE (*Eupatorium rugosum*), poisonous North American herb bearing flat-topped clusters of small white flower heads. It grows up to 1.5 m (5 feet) tall with 18-centimetre (7-inch) leaves opposite each other.

Cattle allowed to pasture on the plant may suffer muscular tremors (the "trembles"), weakness, constipation, and death. Persons who drink the milk of affected cows may experience milksickness, a condition marked by weakness, vomiting, and constipation.

White snakeroot belongs to the family Asteraceae, also called Compositae, in the order Asterales. Like other members of the large genus *Eupatorium,* it is sometimes called boneset, or thoroughwort.

White Springs, town, Hamilton county, northern Florida, U.S. It lies on the north bank of the Suwannee River at the site of some mineral springs, about 65 miles (105 km) west of Jacksonville.

The Timucua peoples considered the springs sacred, and warring tribes went there to enjoy the waters and settle their differences. Settlement began in 1835, and the town grew as a health resort. During the American Civil War the area was known as Rebels' Refuge because many coastal residents moved there to avoid the Union invasions. A fire destroyed much of the town in 1911.

Phosphate mining is a local industry. Timber is also important, as is agriculture. The Stephen Foster State Folk Culture Center is a 247-acre (100-hectare) park with a museum displaying dioramas, musical instruments, and Foster memorabilia; atop a 200-foot (60-metre) tower is a 97-bell carillon, on which the composer's works are performed daily. The National Stephen Foster Day Celebration (January) and the Florida Folk Festival (May) are annual events. Osceola National Forest is a few miles east. Inc. 1885. Pop. (2000) 819.

White Sulphur Springs, resort city, Greenbrier county, southeastern West Virginia, U.S., in the Allegheny Mountains (elevation 1,923 feet [586 m]), just east of Lewisburg. Settled about 1750, it developed as a health spa in the 1770s. The spring, for which the city is named, is on the grounds of the elegant Greenbrier Hotel, which was built by the Chesapeake and Ohio Railway in 1913. The Grand Central Hotel, known as the "Old White," which preceded the Greenbrier, served as headquarters and hospital to both sides during the American Civil War (1861–65) and also served as the summer home for a line of U.S. presidents from Andrew Jackson to Woodrow Wilson.

Blue Bend and Lake Sherwood recreation areas and Greenbrier State and Jefferson National forests are nearby. Organ Cave, where gunpowder was made during the American Civil War, is 10 miles (16 km) south. One of the first American golf courses was laid out in 1884 at Oakhurst, immediately to the north. Inc. 1839. Pop. (2000) 2,315.

white supremacy, beliefs and ideas asserting the natural superiority of the lighter-skinned, or "white," human races over other racial groups. The term *white supremacist* has been applied to some groups espousing ultranationalist, racist, or fascist doctrines.

From the 19th to the mid-20th century, the doctrine of white supremacy was largely taken for granted by political leaders and social scientists in Europe and the United States. In the 1850s the French writer and diplomatist Joseph-Arthur, comte de Gobineau, wrote about the superiority of the white race, maintaining that Aryans (Germanic peoples) represented the highest level of human development. According to 19th-century British writers such as Rudyard Kipling, Charles Kingsley, and Thomas Carlyle, it was the duty of Europeans—the "white-man's burden"—to bring civilization to nonwhite peoples through beneficent imperialism. These ideas were bolstered in the early 20th century by the new science of intelligence testing, which purported to show that Europeans were more intelligent than Africans.

In the United States in the era of slavery and during the subsequent period of legal racial segregation, white supremacy enjoyed broad political support, especially in the South. It also was widely accepted among ruling elites in contemporary European colonial regimes. The doctrine was associated in the United States with violent groups such as the Ku Klux Klan, though many nonviolent individuals and groups also believed fervently in white-supremacist ideas. By the mid-1950s, however, overtly racist doctrines fell into deep disfavour across much of the Western world.

As a result of hostility among some American whites toward the American Civil Rights Movement (*q.v.*) and Supreme Court decisions that invalidated many racially discriminatory laws, white supremacy underwent a revival in the United States in the late 1950s and '60s. White supremacists, as well as many social conservatives, were troubled by the U.S. government's adoption of or acquiescence in measures such as affirmative action, school busing, and rules against racial discrimination in the housing market. Their resentment contributed to the growth of groups and movements that actively preached white supremacy, including the traditional Ku Klux Klan, various neo-Nazi organizations, and the religious Christian Identity groups.

Nevertheless, white supremacists in the United States and throughout the world ultimately were unable to defend the laws that ensured white domination. The last regimes to institutionalize doctrines of white supremacy through comprehensive legislation were Rhodesia, which changed its name to Zimbabwe after its white minority finally ceded power in 1980, and South Africa, whose apartheid system was dismantled in the 1990s.

Despite the demise of segregationist and discriminatory laws throughout the Western world and in Africa, white supremacy has survived as a populist doctrine. In some countries, such ideas found expression in the programs of anti-immigrant political parties. For the most part, however, white-supremacist groups were increasingly confined to the political fringe.

(J.P.J./Ed.)

white-tailed deer, also called VIRGINIA DEER (*Odocoileus virginianus*), common woodland deer, family Cervidae (order Artiodactyla), ranging from southern Canada to South America. "White-tailed deer" refers to the white underside of the tail, which is held aloft like a signaling flag when the animal is alarmed or running. An important game animal, the white-tailed deer generally lives alone or in small groups; in winter, a number may gather together, trampling down the snow in an area that then is known as a deer "yard."



White-tailed deer buck (*Odocoileus virginianus*)
Karl H. Maslowski

The white-tailed deer tends to be larger in northern areas and can stand as high as 106 cm (3½ feet) at the shoulder and weigh up to 180 kg (400 pounds). The adult white-tailed deer has a bright reddish brown summer coat and a duller grayish brown winter coat; the underparts are white. The male has forwardly curved antlers that bear a number of unbranched tines.

Formerly greatly reduced in its range, particularly in the United States, by unrestricted hunting, the white-tailed deer had by the mid-20th century been restored to abundance by game management measures throughout North America. Of the many subspecies, the Key deer of Florida, smallest of the whitetails, stands 76 cm (30 inches) or less at the shoulder and weighs less than 23 kg (50 pounds); formerly close to extinction, the Key deer has recovered in population as a result of protective measures.

White Volta River, also called (in Burkina Faso) NAKAMBE RIVER, French VOLTA BLANCHE, headstream of the Volta River in West Africa. It rises north of Ouagadougou, in Burkina Faso, in a lowland between two massifs, and flows generally southward for about 400 miles (640 km) to empty into Lake Volta in Ghana, a large artificial reservoir created by the Volta River Project and extending just above the former confluence of the Black Volta (or Mouhoun) and White Volta rivers. Innumerable turns along its course gave rise to the name Volta (Portuguese: "Twist"). Its gradient is relatively gentle (about 2 feet per mile [40 cm per km]), and rainfall in its river valley is likewise relatively low.

white-water racing (canoeing): *see* wild-water racing.

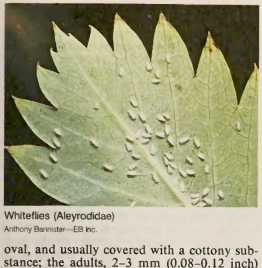
white whale, in common usage, any small, dolphinlike whale. The beluga (*q.v.*) is often called a white whale. The white whale depicted in the novel *Moby Dick,* by Herman Melville, was a sperm whale (*q.v.*).

whitefish, any of several valuable, silvery food fishes (family Salmonidae, or in some classifications, Coregonidae), generally found in cold northern lakes of Europe, Asia, and North America, often in deep water. Whitefish are like trout in having an adipose (fleshy) fin but have larger scales, weaker teeth, and smaller mouths. They eat insect larvae and other small animals and spawn in fall.

Lake whitefishes (*Coregonus*) are deep-bodied forms. The largest and most valuable, *C. clupeaformis,* is of the Great Lakes region and is known by such other names as Lake Superior whitefish, whiting, and shad. It averages about 2 kg (4.5 pounds) in weight.

Whitefish Bay, southeastern arm of Lake Superior, the centre of which forms the border of Ontario (Can.) and Michigan (U.S.). The bay, 30 miles (48 km) long (northwest to southeast) and 15 to 34 miles (24 to 55 km) wide, is fed by the Tahquamenon River and connects to the southeast with Lake Huron via the St. Marys River. Whitefish Point, a promontory on the west (Michigan) side of the bay's entrance, is an important landmark for shipping on the Great Lakes–St. Lawrence Seaway. Part of the bay's Michigan shoreline lies within the Hiawatha National Forest. The bay is noted for commercial fishing and tourism and was named because of the abundance of whitefish in its waters.

whitefly, any sap-sucking member of the insect family Aleyrodidae (order Homoptera). The nymphs, resembling scale insects, are flat,



Whiteflies (Aleyrodidae)
Anthony Bannister—EB Inc.

oval, and usually covered with a cottony substance; the adults, 2–3 mm (0.08–0.12 inch) long, are covered with a white opaque powder and resemble tiny moths. The four wings develop within the insect and evert during the last molt. These pests are abundant in warm climates and are found on houseplants and in greenhouses.

The citrus whitefly (*Dialeurodes citri*) is economically important, sucking sap from orange and date trees and producing honeydew, a sweet by-product of digestion, upon which a sooty fungus grows that ruins the fruit. Control is by oil or parathion sprays.

The citrus blackfly (*Aleurocanthus woglumi*) is well-established in Mexico and the West Indies. A sooty fungus that grows on the honeydew excreted by the citrus blackfly reduces the host plant's ability to photosynthesize.

The greenhouse whitefly (*Trialeurodes vaporariorum*) is one of the most abundant and destructive members of the family. It damages plants by reducing vigour and causing them to wilt, turn yellow, and die. Sprays that kill both adult and larval stages are necessary to control this pest.

Whitefriars Theatre, private London playhouse located in the priory of what had been the Whitefriars monastery on the north side of the Thames. Michael Drayton and Thomas Woodford converted the refectory hall to a private theatre in 1606, perhaps inspired by the conversion of the Blackfriars monastery to a theatre 30 years earlier. Although the price of admission was higher than that of public theatres, everyone had a seat. London's private theatres were often used by companies of child actors, and the Whitefriars was no exception. Children of the King's Revels occupied it from 1608 to 1609, succeeded by Children of the Queen's Revels from 1609 to 1613. In the latter year the Queen's Revels merged with an adult company, Lady Elizabeth's Men, but the merger dissolved in 1615, after which time the theatre may have been used by the Prince's Men. By 1629 the Whitefriars had been replaced by the Salisbury Court Theatre.

Whitehall, street in Westminster, London, between Trafalgar Square and Parliament Square, and by extension the cluster of short streets, squares, and governmental buildings adjoining it. Whitehall is the site of principal past and present government offices, the cenotaph war memorial, Downing Street (prime minister's residence), New Scotland Yard, the Horse Guards Parade, and the Banqueting House (1619–22) designed by Inigo Jones.

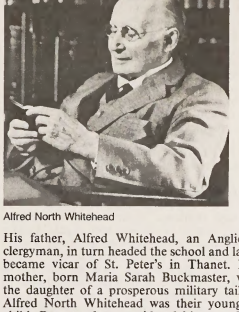
Whitehall Palace, former English royal residence located in Westminster, London, on a site between the Thames River and the present-day St. James's Park. York Place, the London residence of the archbishops of York since 1245, originally occupied the site.

Cardinal Wolsey enlarged the mansion and lived there until his fall, when Henry VIII acquired and reconstructed it, employed Hans Holbein the Younger in its decoration, and made it his principal residence. Inigo Jones designed a new palace for James I, but only the Banqueting House was completed (1622); this survived several fires, one of which (1698) destroyed most of the rest of the palace.

Whitehaven, Irish Sea port, Copeland district, administrative county of Cumbria, historic county of Cumberland, England. The Lowther family created a new port there in the 17th century as an outlet for shipping coal, especially to Dublin, from their local mines. For a time Whitehaven dominated the Irish Sea coal trade, had busy shipyards, and shared in the prosperous American tobacco trade. Following the decline of its old coal-based industries, modern chemical works and light industries injected some new life into the local economy. To the south are Calder Hall, Britain's oldest nuclear power station, and the nuclear fuel reprocessing plant at Sellafield. Pop. (1991) 26,542.

Whitehead, Alfred North (b. Feb. 15, 1861, Ramsgate, Isle of Thanet, Kent, Eng.—d. Dec. 30, 1947, Cambridge, Mass., U.S.), English mathematician and philosopher, who collaborated with Bertrand Russell on *Principia Mathematica* (1910–13) and developed a comprehensive metaphysical theory.

Background and schooling. Whitehead's grandfather Thomas Whitehead was a self-made man who started a successful boys' school known as Chatham House Academy.



Alfred North Whitehead

His father, Alfred Whitehead, an Anglican clergyman, in turn headed the school and later became vicar of St. Peter's in Thanet. His mother, born Maria Sarah Buckmaster, was the daughter of a prosperous military tailor. Alfred North Whitehead was their youngest child. Because they considered him too frail for school or active sports, his father taught him at home until he was 14, when he was sent to Sherborne School, Dorset, which was then one of the best schools in England. Whitehead received a classical education, showing a special gift for mathematics. Despite his over-protected childhood, he showed himself a natural leader. In his last year at school, he was head prefect, responsible for all discipline outside the classroom, and was a highly successful captain of games.

In 1880 Whitehead entered Trinity College, Cambridge, on a scholarship. He attended only mathematical lectures, and his interests in literature, religion, philosophy, and politics were nourished solely by conversation. It was not until May 1884, however, that he was elected to an elite discussion society known as the "Apostles." Whitehead did well in the Mathematical Tripos (honours examination) of 1883–84, won a Trinity fellowship, and was appointed to the mathematical staff of the college. His interest in James Clerk Maxwell's theory of electricity and magnetism (the subject of his fellowship dissertation) expanded toward a scrutiny of mathematical symbolism and ideas. Stimulated by pioneering works in modern algebra, he envisaged a detailed comparative study of systems of symbolic reasoning allied to ordinary algebra. He did not begin to write his *Treatise on Universal Algebra* (1898), however, until January 1891, one month after his marriage to Evelyn Willoughby Wade. She had been born in France, a child of impoverished Irish landed gentry, and educated in a convent. She was a woman with a great sense of drama and a real and unusual aesthetic sensibility, and she enriched Whitehead's life immensely.

Whitehead was at work on a second volume of his *Universal Algebra* from 1898 to 1903, when he abandoned it because he was busy on a related, large investigation with Bertrand Russell. He had spotted young Russell's brilliance when he examined him for entrance scholarships at Trinity College. In 1890 Russell was a freshman studying mathematics there, and Whitehead was one of his teachers. Gradually the two men became close friends. In July 1900 they went to the First International Congress of Philosophy in Paris, where they were impressed by the precision with which the mathematician Giuseppe Peano used symbolic logic to clarify the foundations of arithmetic. Russell at once mastered Peano's notation and extended his methods. By the end of 1900 he had written the first draft of his brilliant *Principles of Mathematics* (1903). Whitehead agreed with its main thesis—that all pure mathematics follows from a reformed formal logic so that, of the two, logic is the fundamental discipline. By 1901 Russell had secured his collaboration on volume 2 of the *Principles,* in which this thesis was to be established by strict symbolic reasoning. The task turned out to be enormous. Their work had to be made independent of Russell's book; they called it *Principia Mathematica.* The project occupied them until 1910, when the first of its three volumes was published. The "official" text was written in a notation, most of which was either taken from Peano or invented by Whitehead. Broadly speaking, Whitehead left the philosophical problems—notably the devising of a theory of logical types—to Russell; and Russell, who had no teaching duties, actually wrote out most of the book. But the collaboration was thorough, and Russell gave Whitehead an equal share of the credit. Whitehead's only large published piece employing the symbolism of the *Principia* is a masterly speculative memoir, "On Mathematical Concepts of the Material World" (1905).

Career in London. In 1903 Trinity College had given Whitehead a 10-year appointment as a senior lecturer, made him the head of the mathematics staff, and permitted his teaching career to run beyond the maximum of 25 years set by the college statutes. Yet Whitehead's future was uncertain: he had not made the sort of discoveries that cause a man to be counted an outstanding mathematician. (His interest was always philosophical, in that it was directed more toward grasping the nature of mathematics in its widest aspects and organizing its ideas than toward discovering new theorems.) There was, thus, little prospect of a Cambridge professorship in mathematics for him at the expiration of his Trinity lectureship. He did not wait for it to expire but moved to London in 1910, even though he had no position waiting for him there. His years of service at Trinity, however, had made him a fellow for life, entitled to twice the regular quarterly dividend paid to fellows. This was scarcely enough to support his family, but Evelyn Whitehead encouraged the venture.

In that first London year, Whitehead wrote the first of his books for a wide audience, *An Introduction to Mathematics* (1911), still one

of the best books of its kind. In 1911 he was appointed to the staff of University College (London), and in 1914 he became professor of applied mathematics at the Imperial College of Science and Technology.

In London Whitehead observed the education then being offered to the English masses. His own teaching had always elicited his pupils' latent abilities to the fullest. Perceiving that mathematics was being taught as a disconnected set of largely unfathomed exercises, Whitehead made occasional addresses on the teaching of mathematics. He stressed getting a living understanding of a few interrelated abstract ideas by using them in a variety of ways so as to develop an intimate sense for their power. Whitehead also perceived that literature was so taught as to preclude its enjoyment, that curricula were fragmented, and that teachers were handcuffed by the system of uniform examinations set by outside examiners. In 1916, as president of the Mathematical Association, he delivered the notable address "The Aims of Education: A Plea for Reform." Whitehead reminded youth's keepers that the purpose of education was not to pack knowledge into the pupils but to stimulate and guide their self-development. "Culture," he said, "is activity of thought, and receptiveness to beauty and humane feeling. Scraps of information have nothing to do with it." Whitehead's address became a classic in virtue of its unequalled clarity, vigour, and realism and its reconciliation of general with special education. It was followed by penetrating essays on such topics as the rhythm of freedom and discipline. Though Whitehead's essays on education had little effect on British practice, they inspired many teachers in Great Britain, the United States, and elsewhere.

From 1919 to 1924 Whitehead was chairman of the governing body of Goldsmiths' College, London, one of England's major institutes for training teachers. He also served as a governor of several polytechnic schools in London. In the University of London he became a member of the Senate, chairman of the Academic Council, and dean of the Faculty of Science. His shrewdness, common sense, and goodwill put him in great demand as a committeeman.

Whitehead was a pacific man but not a pacifist; he felt that the war was hideous but that England's part in it was necessary. His elder son, North, fought throughout the war, and his daughter, Jessie, worked in the Foreign Office. In 1918 his younger son, Eric, was killed in action, and after that it was only by immense effort that Whitehead could go on working. To Whitehead, Russell's pacifism was simplistic; yet he visited him in prison, remained his friend, and, as Russell later said, showed him greater tolerance than he could return.

During those years, Whitehead was also constructing philosophical foundations for physics. He was led to this by the way in which he wanted to present geometry—not as deduced from hypothetical premises about assumed though imperceptible entities (*e.g.*, points) but as the science of actual space, which is a complex of relations between extended things. From perceivable elements and relations, he logically constructed entities that are related to each other just as points are in geometry. That was only the beginning of his task, for Albert Einstein had revised the ideas of space, time, and motion. Whitehead was convinced that these three concepts should be based upon the general character of men's perception of the external world. In 1919 he published his *Enquiry Concerning the Principles of Natural Knowledge*; it was both searching and constructive but too philosophical and too complicated to influence physicists.

Whitehead had begun to have discussions of the perceptual basis of scientific knowledge with philosophers in 1915, and he followed up his *Enquiry* with a nonmathematical book, *The Concept of Nature* (1920). Though he rejected Idealistic views of the relation of nature to perceiving minds, neither was he a Realist of the school led by Russell and G.E. Moore. In maintaining that events are the basic components of nature and that passage, or creative advance, is its most fundamental feature—doctrines that foreshadowed his later metaphysics—Whitehead was somewhat influenced by Henri Bergson's antimechanistic philosophy of change. Yet he was something of a Platonist; he saw the definite character of events as due to the "ingression" of timeless entities.

Career in the United States. In the early 1920s Whitehead was clearly the most distinguished philosopher of science writing in English. When a friend of Harvard University, the historical scholar Henry Osborn Taylor, pledged the money for his salary, Harvard early in 1924 offered Whitehead a five-year appointment as professor of philosophy. He was 63 years old, with at most two more years to go in the Imperial College. The idea of teaching philosophy appealed to him, and his wife wholeheartedly concurred in the move. Harvard soon found that it had acquired more than a philosopher of science; it had acquired a metaphysician, one comparable in stature to Gottfried Leibniz and Georg Hegel.

Early in 1925, he gave a course of eight lectures in Boston, published that same year (with additions—among them his earliest writing about God) as *Science and the Modern World*. In it he dramatically described what had long engaged his meditation; namely, the rise, triumph, and impact of "scientific Materialism"—*i.e.*, the view that nature consists of nothing else but matter in motion, or a flux of purely physical energy. He criticized this Materialism as mistaking an abstract system of mathematical physics for the concrete reality of nature. Whitehead's mind was at home with such abstractions, and he saw them as real discoveries, not intellectual inventions; but his sense for the fullness of existence led him to urge upon philosophy the task of making good their omissions by reverting to the variety of concrete experience and then framing broader ideas. The importance of this book was immediately recognized. What perhaps impressed most readers was Whitehead's appeal to his favourite poets, William Wordsworth and Percy Bysshe Shelley, against the exclusion of values from nature.

In 1926, the compact book *Religion in the Making* appeared. In it, Whitehead interpreted religion as reaching its deepest level in humanity's solitude, that is, as an attitude of the individual toward the universe rather than as a social phenomenon.

In January 1927 the University of Edinburgh invited him to give a set of 10 Gifford Lectures in the ensuing academic year. For this, Whitehead drew up the complex technical structure of "the philosophy of organism" (as he called his metaphysics) and thought through his agreements and disagreements with some of the great European philosophers. It was characteristic of him to insist, against David Hume, that an adequate philosophical theory must build on "practice" and not be supplemented by it. The lectures reflected Whitehead's speculative hypothesis that the universe consists entirely of becomings, each of them a process of appropriating and integrating the infinity of items ("reality") provided by the antecedent universe and by God (the abiding source of novel possibilities). When, in June 1928, the time for delivering the lectures arrived and Whitehead presented this system in its new and difficult terminology, his audience rapidly vanished, but the publication of the lectures, expanded to 25 chapters, gave Western metaphysics one of its greatest books, *Process and Reality* (1929).

Whitehead had an unwavering faith in the possibility of understanding existence and a superb power to construct a scheme of general ideas broad enough to overcome the classic dualisms. But he knew that no system can do more than make an approach, somewhat more adequate than its predecessors, to understanding the infinitude of existence. He had seen the collapse of the long-entrenched Newtonian system of physics, and he never forgot its lesson. Henceforth dogmatic assurance, whether in philosophy, science, or theology, was his enemy.

Adventures of Ideas (1933) was Whitehead's last big philosophical book and the most rewarding one for the general reader. It offered penetrating, balanced reflections on the parts played by brute forces and by general ideas about humanity, God, and the universe in shaping the course of Western civilization. Whitehead emphasized the impulse of life toward newness and the absolute need for societies stable enough to nourish adventure that is fruitful rather than anarchic. In this book he also summarized his metaphysics and used it to elucidate the nature of beauty, truth, art, adventure, and peace. By "peace" he meant a religious attitude that is "primarily a trust in the efficacy of beauty."

Except for an insufficient familiarity with Karl Marx and Sigmund Freud, Whitehead was at home in both the scientific and the literary cultures of his time. Young people flocked to "Sunday evenings," which his wife skillfully managed. Here the spare, rosy-cheeked man, who might have been of average height if he had not been so stooped, talked to them in a high-pitched but gentle voice—talked not about his system but about whatever was on their minds, sharply illuminating it from a broad and historical perspective.

In his Harvard lectures, as in his books, Whitehead liked best to explore the scope of application of an idea and to show how intuitions that were traditionally opposed could supplement each other, which he did by dint of his own ideas. Most students found attendance at his lectures a great experience. Harvard did not retire him until 1937.

In his first years in the United States, Whitehead visited many eastern and midwestern campuses as a lecturer. Though he loved Americans, he remained always very much an Englishman. A Fellow of the Royal Society since 1903, he was elected to the British Academy in 1931. In 1945 he received the Order of Merit. After his death his body was cremated, and there was no funeral. His unpublished manuscripts and correspondence were destroyed by his widow, as he had wanted.

Assessment. Whitehead has not had disciples, though his admirers have included leaders in every field of thought. His educational and philosophical books have been translated into many languages. His metaphysics has been keenly studied, in the United States most of all. What is now called Whitehead's "process theology" is easily the most influential part of his system; and this is partly due to the influence of the U.S. philosopher Charles Hartshorne.

Whitehead's habit of helpfulness made him universally beloved. Though his courtesy was perfect, there was nothing soft about him; never contentious, he was astute, charitable, and quietly stubborn. He had a realistic, well-poised mind and a fine irony free of malice. Whitehead combined singular gifts of intuition, intellectual power, and goodness with firmness and wisdom. (V.Lo./Ed.)

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and six on education. Victor Lowe and Robert C. Baldwin (comps.), "Bibliography of the Writings of Alfred North Whitehead (with Selected Reviews)," in P.A. Schilpp (*op.cit.*), except for a few minor items and later reprints and translations, is complete. F.S.C. Northrop and Mason W. Gross (eds.), *Alfred North Whitehead: An Anthology* (1953), is a fine representative collection of essays and chapters from his books, 1906–38. Charles Hartshorne, *Whitehead's Philosophy: Selected Essays, 1935–1970* (1972), offers critical essays. Victor Lowe, *Understanding Whitehead* (1962), explains the development of Whitehead's thought. Ivor Leclerc, *Whitehead's Metaphysics* (1958, reissued 1975), is a clear exposition of his later thought. Personal accounts include Bertrand Russell, *Autobiography*, vol. 1 (1967), and his brief article, "Whitehead and *Principia Mathematica*," in *Mind*, 57:137–138 (1948); Lucien Price, *Dialogues of Alfred North Whitehead* (1954, reprinted 1977), which covers Whitehead's last 13 years and presents him as a sage; and William Ernest Hocking, "Whitehead As I Knew Him," in *Journal of Philosophy*, 58:505–516 (1961), by one of Whitehead's Harvard colleagues.

Whitehead, (John) Henry (Constantine) (b. Nov. 11, 1904, Madras, India—d. May 8, 1960, Princeton, N.J., U.S.), British mathematician who greatly influenced the development of homotopy theory (the theory of a special kind of mapping of topological spaces).

As a Commonwealth research fellow (1929–32), Whitehead studied under the American mathematician Oswald Veblen at Princeton University. Their collaborative publications include *The Foundations of Differential Geometry* (1932), now regarded as a classic.

Whitehead became tutorial fellow at Balliol College, Oxford, in 1933, and, after serving with various government departments during World War II, he became Waynflete professor of pure mathematics at Oxford.

Whitehead's work in differential geometry culminated in the paper "On the Covering of a Complete Space by the Geodesics Through a Point" (1935), containing pioneering contributions to this area of mathematics. He always retained his interest in geometry but soon focused on topology. He made substantial contributions to combinatorial homotopy and Stiefel manifolds and set up a school of topology at Oxford. He died while on sabbatical leave at the Institute for Advanced Study.

Whitehead, Robert (b. Jan. 3, 1823, Bolton-le-Moors, Lancashire, Eng.—d. Nov. 14, 1905, Beckett, Berkshire), British engineer who invented the modern torpedo.

In 1856, after serving an apprenticeship in Manchester and working in Marseille, Milan, and Trieste, he organized, with local capital, a marine-engineering works, Stabilimento Tecnico Fiumano, in Fiume (now Rijeka, Croatia). There he successfully designed and built engines for Austrian warships and began to work on a torpedo, which he completed in 1866. He then bought the firm and turned it into a manufacturer of torpedoes and accessories. In 1876 he improved his vehicles by using a servo-motor that gave them a truer course through the water, and he gradually increased their speed to 29 knots for 1,000 yards. In 1896 he used a gyroscope to control the course of a torpedo.

Whitehorse, city and capital (since 1952) of the Yukon Territory, Canada, on the Yukon (Lewes) River just below Miles Canyon and the former Whitehorse Rapids (now submerged beneath Schwatka Lake, created after 1958 by a hydropower dam). It is the Yukon headquarters of the Royal Canadian Mounted Police and is an important transportation centre on the Alaska Highway, linked by air to major North American cities. It has long been an outfitting base for anglers, big-game hunters, and trappers.

Whitehorse, perhaps so named because the white caps of the rapids on the Whitehorse River resembled the manes of white horses, was founded during the Klondike Gold Rush (1897–98) as a staging and distribution centre; it was the head of river navigation and became the northern terminus of the White Pass and Yukon Route (railway) from Skagway, which suspended service in 1982. McBride Museum in the city houses pioneer relics, and there are many historic log buildings including the Old Log Church Museum, the former Anglican Parish Church, where, for a concert in 1904, Robert W. Service (then parish secretary) composed "The Ballad of Dangerous Dan McGrew" but decided against reciting it because of its ribald character. During World War II, Whitehorse became a construction base for both the Alaska Highway (serving a string of airports) and a crude-oil pipeline from Norman Wells, N.W.T., to a local refinery (now closed). Whitehorse was incorporated as a city in 1950, and in 1971 its metropolitan area was expanded in the river valley to cover 162 square miles (420 square km). The mining economy, stimulated in the 1950s by a federal program of road construction and financial aid, declined in the 1980s. Government and tourism are the economic mainstays, and the population is increased by the seasonal influx of tourists. Pop. (1991) 17,925.

Whitelocke, Bulstrode (b. Aug. 6, 1605, London—d. July 28, 1675, Chilton Park, near Hungerford, Berkshire, Eng.), English republican lawyer, an influential figure in Oliver Cromwell's Commonwealth regime.

Whitelocke was the son of Sir James Whitelocke, a King's Bench judge, and became a barrister in 1626 and served in the Parliament of the same year. He was elected to the Long Parliament in 1640 and took a leading part in the impeachment and attainder (1641) of King Charles I's chief minister, Thomas Wentworth, Earl of Strafford. Yet he opposed the Grand Remonstrance of 1641, which John Pym had carefully engineered. At the outbreak of the Civil Wars in 1642, Whitelocke sided with Parliament against the Royalists; he was sent on three peace embassies to Charles I from 1643 to 1645.

Whitelocke became a commissioner of the Great Seal in 1648 and was elected to the Council of State on the formation of the Commonwealth in 1649. During the next 10 years he served three additional times as commissioner of the Great Seal. His official position enabled him to draft a new treason law and promote a bill for the use of English in legal proceedings. As ambassador to Sweden in 1653–54, he negotiated a treaty of friendship between England and Sweden. Although his resistance to Cromwell's proposed reform of the Court of Chancery led to his dismissal from the government in 1655, he headed the committee that in 1657 urged Cromwell to become king. Whitelocke's reputation for moderation—viewed by many as political vacillation—saved him from prosecution after the Restoration of King Charles II in 1660.

Whiteman, Paul (b. March 28, 1890, Denver, Colo., U.S.—d. Dec. 29, 1967, Doylestown, Pa., U.S.), American bandleader, called the "King of Jazz" for popularizing a musical style that helped to introduce jazz to mainstream audiences during the 1920s and 1930s.

Whiteman, who was originally a violinist, conducted a 40-piece U.S. Navy band in 1917–18 and then developed a hotel orchestra in California, which he took to New York City in 1920. He hired the best white jazz players, but he allowed little room for improvisation in his arrangements and greatly simplified jazz rhythms. He was successful as a cocomposer of popular songs during the 1920s and led his orchestra in Broadway musicals.

Whiteman commissioned George Gershwin's *Rhapsody in Blue* and conducted its premiere at Aeolian Hall, New York City, in 1924, with the composer as piano soloist. Whiteman also introduced the *Grand Canyon Suite* (1931) by Ferde Grofé, who had arranged the *Rhapsody*. The *Rhapsody* became Whiteman's theme, and he established the Whiteman Awards for compositions in a "symphonic jazz" style. The 1930 film *King of Jazz* was the first of four in which his orchestra appeared. Whiteman was the host of several national radio programs during the 1930s, wrote three books (*Jazz*, with Mary Margaret McBride, 1926; *How To Be a Bandleader*, with Leslie Lieber, 1941; *Records for the Millions*, 1948), and recorded extensively. His popularity waned in the late 1940s, but he came back as a television-series host in the 1950s and occasionally led bands up to the time of his death.

whitethroat (*Sylvia communis*), typical Old World warbler of the family Sylviidae (order Passeriformes); it breeds in western Eurasia



Whitethroat (*Sylvia communis*)
Frank Blackburn—The Natural History Photographic Agency

and northwestern Africa and winters in Africa and India. It is 14 cm (5½ inches) long, with red-brown wing patches and longish white-edged tail; the male is gray-capped and white-throated. It sings beautifully from dawn until dusk in woodland border and hedgerows.

whitework, embroidery worked in white thread on white material, originated in India and China and popular in the West since the Middle Ages as decoration for personal, table, and various church linens. Especially favoured in the 15th century as embellishment for underclothing, whitework, sometimes known as filet lace, a forerunner of real lace, was crafted by mounting strips of fine-gauge mesh in light wire frames and embroidering them for use as edgings and insertions.

The two main types are "open," in which holes are drawn or cut in fabric and then overcast, and "close," which is worked flat as in ordinary embroidery. Ayrshire whitework, a popular open type, was used mainly for dress materials in England and on the European continent from the late 1700s and relied on a buttonhole stitch to form geometrical or regularized flower patterns.

Whitfield, Mal, byname of MALVIN G. WHITFIELD (b. Oct. 11, 1924, Bay City, Texas, U.S.), American middle-distance runner, world-record holder for the 880-yard race (1950–54), for the 1,000-metre race (1953), and as a member of the U.S. team for the 4 × 440-yard relay race (1952–56) and the 4 × 880-yard relay race (1952).

Whitfield ran for Ohio State University (Columbus) and for Los Angeles State College. In the 1948 Olympic Games at London and the 1952 games at Helsinki, he won the gold medals in the 800-metre races, and in 1948 he won a gold medal as a team member of the 4 × 400-metre relay race. In the 1952 games he won a silver medal in the same event. He did not qualify for the U.S. Olympic team in 1956.

Whitfield, an Air Force sergeant, retired in 1956. He worked for the United States Information Agency and set up a training program and served as track coach for athletes in the new African nations.

Whitgift, John (b. *c.* 1530, Grimsby, Lincolnshire, Eng.—d. Feb. 29, 1604, London), archbishop of Canterbury who did much to strengthen the Anglican church during the last years of Elizabeth I and to secure its acceptance by her successor, James I. He was the first bishop to be appointed to the Privy Council by Elizabeth, who entirely trusted and supported him, insisting on his ministrations on her deathbed.



Whitgift, detail of a panel painting by an unknown artist; in Lambeth Palace, London

By courtesy of the Archbishop of Canterbury; photograph, Courtauld Institute of Art

Whitgift was the son of a prosperous merchant. He was ordained in 1560 and was appointed regius professor of divinity and chaplain to the queen in 1567. In 1571 he became prolocutor of the Lower House of Convocation. He was bishop of Worcester (1577–83) and vice president of the Marches of Wales (1577–80). As archbishop of Canterbury from 1583, Whitgift at once began to reverse the policy of attempted conciliation with the Puritans adopted by his predecessor, Edmund Grindal. He sent his chaplain to search out secret Presbyterianism and to discover those responsible for the Puritan Marprelate tracts. Once he had secured reasonable conformity, he did not persecute, as is shown by his later treatment of Thomas Cartwright.

Whitgift founded a hospital and a school at Croydon, where he is buried. His reply to those who sought to presbyterianize the Church of England, *An Answere to a Certen Libel Intituled, An Admonition to the Parliament* (1572), and his subsequent writings against Cartwright constitute his chief *Works,* which were edited by John Ayre (1851–53).

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Whithorn, royal burgh in Dumfries and Galloway region, southwestern Scotland. It lies on the peninsula between Luce and Wigtown bays. One of the oldest Christian centres in Britain, it was founded about AD 397 by St. Ninian, who built a small whitewashed stone church (hence Whithorn, or White House, from the Anglo-Saxon Huitaern) on the site of which a monastery was built about 1130. St. Ninian's Shrine was a popular place of pilgrimage until the Protestant Reformation. Robert I the Bruce visited it in 1329, James IV was a regular visitor, and Mary, Queen of Scots, made the last royal pilgrimage there in 1567. Pop. (1981) 983.

Whiting, city, Lake county, northwestern Indiana, U.S. It lies along Lake Michigan, in the Calumet industrial region, immediately southeast of Chicago. It originated in 1889, when the Standard Oil Company, unable to find a site in Chicago, constructed "the world's largest complete oil refinery" there. Whiting was the birthplace of the Standard Oil Company of Indiana and was for many years the capital of the oil empire. Though a highly industrialized city (with heavy emphasis on oil refining and chemicals), Whiting has remained small, its population declining from a peak of 10,880 in 1930. Calumet College of Saint Joseph (1951; Roman Catholic) is in Whiting. Inc. 1895. Pop. (1990) 5,155.

whiting (species *Gadus,* or *Merlangius, merlangus*), common marine food fish of the cod family, Gadidae. The whiting is found in European waters and is especially abundant in the North Sea. It is carnivorous and feeds on invertebrates and small fishes. It has three dorsal and two anal fins and a chin barbel that, if present, is very small. Its maximum length is about 70 cm (28 inches), and its colour is silvery with a distinctive black blotch near the base of each pectoral fin. Several species of the drum, or croaker, family (Sciaenidae) are also called whiting, among them the northern kingfish (*Menticirrhus saxatilis*).

Whitlam, Gough, in full EDWARD GOUGH WHITLAM (b. July 11, 1916, Kew, Vic., Australia), Australian politician and lawyer whose unsuccessful premiership (1972–75) of his country ended when he was dismissed by the governor-general.

Whitlam was educated at the University of Sydney (B.A., 1938; LL.B., 1946) and became a barrister in 1947. He was a member of Parliament from 1952 to 1978 and served as deputy leader of the Australian Labor Party from 1960 to 1967. He became his party's leader in 1967. Upon becoming prime minister of Australia in 1972, Whitlam ended military conscription, lowered barriers to Asian and African immigration, and promised more independence from the United States in foreign affairs. His government was troubled by administrative blunders and by rising inflation and unemployment, however, and by the summer of 1975 his government had lost the parliamentary support needed to pass government expenditure bills. When Whitlam steadfastly refused to call new elections to resolve the parliamentary deadlock, Australia's British-appointed governor-general dismissed him from office on Nov. 11, 1975, and appointed a caretaker administration led by the political opposition. It was the first time in 200 years that the British crown had exercised its right to remove an elected prime minister. In the general election that followed, the opposition Liberal–National Country Party coalition won a record majority of seats in Parliament. Whitlam subsequently resigned the party leadership.

In 1978 Whitlam resigned his seat in his nation's Parliament, retired from politics, and became a lecturer on political science and international relations at Australian National University at Canberra. In 1983 he was appointed Australian ambassador to UNESCO. Among his numerous publications are *Road to Reform: Labor in Government* (1975), *Labor Essays* (1980), and *The Cost of Federalism* (1983).

Whitley Council, also called JOINT INDUSTRIAL COUNCIL, in Great Britain, any of the bodies made up of representatives of labour and management for the promotion of better industrial relations. An original series of councils, named for J.H. Whitley, chairman of the investigatory committee (1916–19) who recommended their formation, were first instituted as a means of remedying industrial unrest. Many of them later developed into wage negotiating bodies.

The Whitley Council principle was extended and applied to nonindustrial sectors as well. Thus in 1919 a National Whitley Council was formed for the entire nonindustrial civil service in Britain.

Whitlock, Elizabeth, *née* KEMBLE (b. April 2, 1761, Warrington, Eng.—d. Feb. 27, 1836), noted actress in England and the United States.

The fifth child of Roger and Sarah Kemble, Elizabeth took naturally to the stage. She often went with her elder sisters Sarah Siddons and Frances Kemble Twiss to the Drury Lane Theatre, where she first appeared as Portia in 1783. She was an actress of great promise and was accounted an outstanding tragedienne, but she was eclipsed by the brilliant success of Sarah Siddons. Elizabeth married a theatre owner and manager, Charles Edward Whitlock, and accompanied him to the United States where, as Elizabeth Whitlock, she enjoyed a successful tour. She returned to an enthusiastic London reception at the Drury Lane Theatre in 1807 but thereafter was rarely seen on the stage.

whitlow grass, any plant belonging to either of two genera (*Erophila* and *Draba*), of the mustard family (Brassicaceae); some authorities believe that all these plants belong to one genus, *Draba.* The genus *Erophila* contains 10 European species, the genus *Draba* about 300 species distributed throughout the New World in the north temperate region, the Arctic, and mountainous areas. Common whitlow grass (*Erophila verna*), a low annual with small rosettes of narrow leaves, has clusters of white flowers at the ends of leafless stems and bears spear-shaped fruits on long stalks. It has many varieties and is naturalized from Europe in northern North America, where it grows on mountains, sandy ground, and rock walls. Yellow whitlow grass (*D. aizoides*) is similar but with yellow flowers; twisted, or hoary, whitlow grass (*D. incana*) and the smaller *D. norvegica* have leaves on the stems and white flowers with notched petals. All bloom in the spring.

Whitman, town (township), Plymouth county, eastern Massachusetts, U.S., just east of Brockton. The site was settled about 1670, and the town of South Abington (or Little Comfort) was formed and incorporated in 1875 from parts of Abington and East Bridgewater. The name was changed in 1886 to honour Augustus Whitman, a prominent citizen. Local mills squared white oak timbers from nearby forests for use in constructing the U.S. frigate *Constitution,* familiarly known as *Old Ironsides,* launched in 1797. Paul Revere, the patriot and craftsman, was an apprentice to a resident, Colonel Aaron Hobart, one of the first Americans to cast cannon and church bells. Leather products and poultry are now the town's main sources of income. Pop. (1990) 13,240.

Whitman, Marcus (b. Sept. 4, 1802, Rushville, N.Y., U.S.—d. Nov. 29, 1847, Waiilatpu, Oregon Territory [now in Washington, U.S.]), American physician, Congregational missionary to the Indians in the territories of present-day Washington and Oregon, and a pioneer who helped open the Pacific Northwest to settlement.

After practicing medicine in Canada and New York, Whitman in 1835 offered his services to the American Board of Commissioners for Foreign Missions. With another missionary, Samuel Parker, he was sent to investigate the possibilities for establishing missions in Oregon country, then jointly occupied by the United States and Great Britain. The friendly interest of the Flathead, Nez Percé, and other Indians they encountered in the territory of present-day Wyoming greatly encouraged the missionaries. Parker continued west, while Whitman returned to New York for additional recruits and assistance. There he married his fiancée, Narcissa Prentiss, who was also registered with the mission board. When the Whitmans set

out for the West, they were accompanied by another married couple, the Reverend Henry H. Spalding and his wife, Eliza, and two single men. The two wives were the first white women to cross the continental divide. The party reached Fort Vancouver (now Vancouver, Wash.) in September.

In 1836 Whitman founded a mission among the Cayuse Indians at Waiilatpu, 6 miles (10 km) west of present-day Walla Walla. The Spaldings established a mission among the Nez Percé at Lapwai, Idaho, 125 miles (200 km) northeast of Waiilatpu. The men helped the Indians build houses, till their fields, and irrigate their crops. They also taught them how to erect mills for grinding corn and wheat. The wives established mission schools. Progress was slow, however, and the board in 1842 decided to abandon its missions at Waiilatpu and Lapwai and concentrate on those in what is now the area of Spokane, Wash.

In response, Whitman in the winter of 1842–43 made a 3,000-mile (4,830-kilometre) journey on horseback to Boston to protest the board's decision. After persuading mission authorities to continue support of the Waiilatpu and Lapwai missions, he went to Washington to inform federal officials of conditions in Oregon country and the possibilities for settlement. Assured of federal aid for immigration, Whitman began his return journey. En route he joined a caravan of some 1,000 immigrants that later became known as the "great migration." It was through his determination and courage that the first wagons crossed the mountains to the Columbia River.

Although Whitman resumed his missionary work at Waiilatpu, he found the Indians apathetic. The more ceremonial form of worship conducted by Roman Catholic missionaries was attractive to the Indians, and competition for their conversion was introduced. Whitman's task was further complicated by the influence of lawless white newcomers.

Sensing a growing coldness toward him on the part of the Cayuse, Whitman resolved to relocate his family, but, before he could do so, an epidemic of measles broke out. Both white and Indian children were afflicted, and Whitman cared for them with equal concern. Because the white children recovered and many of the Indians (lacking any degree of immunity) died, he was suspected of practicing sorcery, in order to remove the Indians to make way for white settlers. On Nov. 29, 1847, the Indians attacked, killing 14 whites, including the Whitmans, and kidnapping 53 women and children. The Whitman Massacre directed national attention to the difficulties faced by settlers in the Far West and contributed to early passage of a bill to organize the Oregon Territory (1848). It also led directly to the Cayuse War, which did not end until 1850. Whitman Mission National Historic Site, near Walla Walla, commemorates these pioneers.

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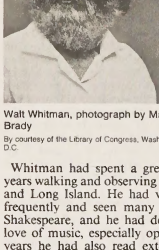
Whitman, Walt, in full WALTER WHITMAN (b. May 31, 1819, West Hills, Long Island, N.Y., U.S.—d. March 26, 1892, Camden, N.J.), American poet, journalist, and essayist whose verse collection *Leaves of Grass* is a landmark in the history of American literature.

Early life. Walt Whitman was born into a family that settled in North America in the first half of the 17th century. His ancestry was typical of the region: his mother, Louisa Van Velsor, was Dutch, and his father, Walter Whitman, was of English descent. They were simple farm people, with little formal education. The Whitman family had at one time owned a large tract of land, but it was so diminished by the time Walt was born that his father had taken up carpentering, though the family still lived on a small section of the ancestral estate. In 1823 Walter Whitman, Sr., moved his growing family to Brooklyn, which was enjoying a boom. There he speculated in real estate and built cheap houses for artisans, but he was a poor manager and had difficulty in providing for his family, which increased to nine children.

Walt, the second child, attended public school in Brooklyn, began working at the age of 12, and learned the printing trade. He was employed as a printer in Brooklyn and New York City, taught in country schools on Long Island, and became a journalist. At the age of 23 he edited a daily newspaper in New York, and in 1846 he became editor of the *Brooklyn Daily Eagle,* a fairly important newspaper of the time. Discharged from the *Eagle* early in 1848 because of his support for the Free Soil faction of the Democratic Party, he went to New Orleans, La., where he worked for three months on the *Crescent* before returning to New York via the Mississippi River and the Great Lakes. After another abortive attempt at Free Soil journalism, he built houses and dabbled in real estate in New York from about 1850 until 1855.



Walt Whitman, photograph by Mathew Brady

By courtesy of the Library of Congress, Washington, D.C.

Whitman had spent a great deal of his 36 years walking and observing in New York City and Long Island. He had visited the theatre frequently and seen many plays of William Shakespeare, and he had developed a strong love of music, especially opera. During these years he had also read extensively at home and in the New York libraries, and he began experimenting with a new style of poetry. While a schoolteacher, printer, and journalist he had published sentimental stories and poems in newspapers and popular magazines, but they showed almost no literary promise.

By the spring of 1855 Whitman had enough poems in his new style for a thin volume. Unable to find a publisher, he sold a house and printed the first edition of *Leaves of Grass* at his own expense. No publisher's name, no author's name appeared on the first edition in 1855. But the cover had a portrait of Walt Whitman, "broad shouldered, rouge fleshed, Bacchus-browed, bearded like a satyr." Though little appreciated upon its appearance, *Leaves of Grass* was warmly praised by the poet and essayist Ralph Waldo Emerson, who wrote to Whitman on receiving the poems that it was "the most extraordinary piece of wit and wisdom" America had yet contributed.

Whitman continued practicing his new style of writing in his private notebooks, and in 1856 the second edition of *Leaves of Grass* appeared. This collection contained revisions of the poems of the first edition and a new one, the "Sun-down Poem" (later to become "Crossing Brooklyn Ferry"). The second edition was also a financial failure, and once again Whitman edited a daily newspaper, the *Brooklyn Times,* but was unemployed by the summer of 1859. In 1860 a Boston publisher brought out the third edition of *Leaves of Grass,* greatly enlarged and rearranged, but the outbreak of the American Civil War bankrupted the firm. The 1860 volume contained the "Calamus" poems, which record a personal crisis of some intensity in Whitman's life, an apparent homosexual love affair (whether imagined or real is unknown), and "Premonition" (later entitled "Starting from Paumanok"), which records the violent emotions that often drained the poet's strength. "A Word out of the Sea" (later entitled "Out of the Cradle Endlessly Rocking") evoked some sombre feelings, as did "As I Ebb'd with the Ocean of Life." "Chants Democratic," "Enfans d'Adam," "Messenger Leaves," and "Thoughts" were more in the poet's earlier vein.

Civil War years. After the outbreak of the Civil War in 1861, Whitman's brother was wounded at Fredericksburg, and Whitman went there in 1862, staying some time in the camp, then taking a temporary post in the paymaster's office in Washington. He spent his spare time visiting wounded and dying soldiers in the Washington hospitals, spending his scanty salary on small gifts for Confederate and Unionist soldiers alike and offering his usual "cheer and magnetism" to try to alleviate some of the mental depression and bodily suffering he saw in the wards.

In January 1865 he became a clerk in the Department of the Interior; in May he was promoted but in June was dismissed because the secretary of the Interior thought that *Leaves of Grass* was indecent. Whitman then obtained a post in the attorney general's office, largely through the efforts of his friend, the journalist William O'Connor, who wrote a vindication of Whitman in *The Good Gray Poet* (published in 1866), which aroused sympathy for the victim of injustice.

In May 1865 a collection of war poems entitled *Drum Taps* showed Whitman's readers a new kind of poetry, moving from the oratorical excitement with which he had greeted the falling-in and arming of the young men at the beginning of the Civil War to a disturbing awareness of what war really meant. "Beat! Beat! Drums!" echoed the bitterness of the Battle of Bull Run, and "Vigil Strange I Kept on the Field One Night" had a new awareness of suffering, no less effective for its quietly plangent quality. The *Sequel to Drum Taps,* published in the autumn of 1865, contained his great elegy on President Abraham Lincoln, "When Lilacs Last in the Dooryard Bloom'd." His horror at the death of democracy's first "great martyr chief" was matched by his revulsion from the barbarities of war. Whitman's prose descriptions of the Civil War, published later in *Specimen Days & Collect* (1882–83), are no less effective in their direct, moving simplicity.

Later life. The fourth edition of *Leaves of Grass,* published in 1867, contained much revision and rearrangement. Apart from the poems collected in *Drum Taps,* it contained eight new poems, and some poems had been omitted. In the late 1860s Whitman's work began to receive greater recognition. O'Connor's *The Good Gray Poet* and John Burroughs' *Notes on Walt Whitman as Poet and Person* (1867) were followed in 1868 by an expurgated English edition of Whitman's poems prepared by William Michael Rossetti, the English man of letters. During the remainder of his life Whitman received much encouragement from leading writers in England.

Whitman was ill in 1872, probably as a result of long-experienced emotional strains related to his sexual ambiguity; in January 1873 his

first stroke left him partly paralyzed. By May he had recovered sufficiently to travel to his brother's home in Camden, N.J., where his mother was dying. Her subsequent death he called "the great cloud" of his life. He thereafter lived with his brother in Camden, and his post in the attorney general's office was terminated in 1874.

Whitman's health recovered sufficiently by 1879 for him to make a visit to the West. In 1881 James R. Osgood published a second Boston edition of *Leaves of Grass,* and the Society for the Suppression of Vice claimed it to be immoral. Because of a threatened prosecution, Osgood gave the plates to Whitman, who, after he had published an author's edition, found a new publisher, Rees Welsh of Philadelphia, who was shortly succeeded by David McKay. *Leaves of Grass* had now reached the form in which it was henceforth to be published. Newspaper publicity had created interest in the book, and it sold better than any previous edition. As a result, Whitman was able to buy a modest little cottage in Camden, where he spent the rest of his life. He had many new friends, among them Horace Traubel, who recorded his talk and wrote his biography. *The Complete Poems and Prose* was published in 1888, along with the eighth edition of *Leaves of Grass.* The ninth, or "authorized," edition appeared in 1892, the year of Whitman's death.

Leaves of Grass. Walt Whitman is known primarily for *Leaves of Grass,* though his prose volume *Specimen Days* contains some fine realistic descriptions of Civil War scenes. But *Leaves of Grass* is actually more than one book. During Whitman's lifetime it went through nine editions, each with its own distinct virtues and faults. Whitman compared the finished book to a cathedral long under construction, and on another occasion to a tree, with its cumulative rings of growth. Both metaphors are misleading, however, because he did not construct his book unit by unit or by successive layers but constantly altered titles, diction, and even motifs and shifted poems—omitting, adding, separating, and combining. Beginning with the third edition (1860), he grouped the poems under such titles as "Chants Democratic," "Enfans d'Adam" (later "Children of Adam"), "Calamus," "Poems of Joy," and "Sea-Drift." Some of his later group titles were highly connotative, such as "Birds of Passage," "By the Roadside," "Autumn Rivulets," "From Noon to Starry Night," and "Songs of Parting," suggesting a life allegory. But the poems were not arranged in order of composition, either within a particular group or from one group to another. After 1881 Whitman made no further shifts in groups or revisions of poems within the groups, merely adding the poems of "Sands at Seventy" and "Good-Bye My Fancy."

Under the influence of the Romantic movement in literature and art, Whitman held the theory that the chief function of the poet was to express his own personality in his verse. The first edition of *Leaves of Grass* also appeared during the most nationalistic period in American literature, when critics were calling for a literature commensurate with the size, natural resources, and potentialities of the North American continent. "We want" shouted a character in Henry Wadsworth Longfellow's *Kavanagh* (1849), "a national literature altogether shaggy and unshorn, that shall shake the earth, like a herd of buffaloes thundering over the prairies." With the same fervour, Whitman declared in his 1855 preface, "Here are the roughs and beards and space and ruggedness and nonchalance that the soul loves." In *Leaves of Grass* he addressed the citizens of the United States, urging them to be large and generous in spirit, a new race nurtured in political liberty, and possessed of united souls and bodies.

It was partly in response to nationalistic ideals and partly in accord with his ambition to cultivate and express his own personality that the "I" of Whitman's poems asserted a mythical strength and vitality. For the frontispiece to the first edition, Whitman used a picture of himself in work clothes, posed nonchalantly with cocked hat and hand in trouser pocket, as if illustrating a line in his leading poem, "Song of Myself": "I cock my hat as I please indoors and out." In this same poem he also characterized himself as:

> Walt Whitman, an American, one of the roughs, a kosmos,
> Disorderly fleshy and sensual . . . eating drinking and breeding,
> . . . Divine am I inside and out, and I make holy whatever I touch or am touched from . . .

From this time on throughout his life Whitman attempted to dress the part and act the role of the shaggy, untamed poetic spokesman of the proud young nation. For the expression of this persona he also created a form of free verse without rhyme or metre, but abounding in oratorical rhythms and chanted lists of American place-names and objects. He learned to handle this primitive, enumerative style with great subtlety and was especially successful in creating empathy of space and movement, but to most of his contemporaries it seemed completely "unpoetic." Both the content and the style of his verse also caused Whitman's early biographers, and even the poet himself, to confuse the symbolic self of the poems with their physical creator. In reality Whitman was quiet, gentle, courteous; neither "rowdy" (a favourite word) nor lawless. In sexual conduct he may have been unconventional, though no one is sure, but it is likely that the six illegitimate children he boasted of in extreme old age were begotten by his imagination. He did advocate greater sexual freedom and tolerance, but sex in his poems is also symbolic—of natural innocence, "the procreant urge of the world," and of the regenerative power of nature. In some of his poems the poet's own erotic emotions may have confused him, but in his greatest, such as parts of "Song of Myself" and all of "Out of the Cradle Endlessly Rocking," sex is spiritualized.

Whitman's greatest theme is a symbolic identification of the regenerative power of nature with the deathless divinity of the soul. His poems are filled with a religious faith in the process of life, particularly those of fertility, sex, and the "unflagging pregnancy" of nature: sprouting grass, mating birds, phallic vegetation, the maternal ocean, and planets in formation ("the journey-work of stars"). The poetic "I" of *Leaves of Grass* transcends time and space, binding the past with the present and intuiting the future, illustrating Whitman's belief that poetry is a form of knowledge, the supreme wisdom of mankind.

Reputation. At the time of his death Whitman was more respected in Europe than in his own country. It was not as a poet, indeed, but as a symbol of American democracy that he first won recognition. In the late 19th century his poems exercised a strong fascination on English readers who found his championing of the common man idealistic and prophetic.

Whitman's aim was to transcend traditional epics, to eschew normal aesthetic form, and yet by reflecting American society to enable the poet and his readers to realize themselves and the nature of their American experience. He has continued to hold the attention of very different generations because he offered the welcome conviction that "the crowning growth of the United States" was to be spiritual and heroic and because he was able to uncompromisingly express his own personality in poetic form. Modern readers can still share his preoccupation with the problem of preserving the individual's integrity amid the pressures of mass civilization. Scholars in the 20th century, however, find his social thought less important than his artistry. T.S. Eliot said, "When Whitman speaks of the lilacs or the mockingbird his theories and beliefs drop away like a needless pretext." Whitman invigorated language; he could be strong yet sentimental; and he possessed scope and inventiveness. He portrayed the relationships of man's body and soul and the universe in a new way, often emancipating poetry from contemporary conventions. He had sufficient universality to be considered one of the greatest American poets. (A.N.J./G.W.Al./Ed.)

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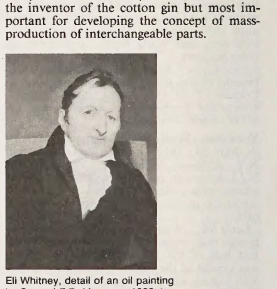
Whitney, Eli (b. Dec. 8, 1765, Westboro, Mass.—d. Jan. 8, 1825, New Haven, Conn., U.S.), American inventor, mechanical engineer, and manufacturer, best remembered as the inventor of the cotton gin but most important for developing the concept of mass-production of interchangeable parts.



Eli Whitney, detail of an oil painting by Samuel F.B. Morse, *c.* 1822; in the Yale University Art Gallery, New Haven, Conn.

By courtesy of the Yale University Art Gallery, gift of George Headley, Yale 1901

Whitney's father was a respected farmer, who served as justice of the peace. In May 1789 Whitney entered Yale College, where he learned many of the new concepts and experiments in science and the applied arts, as technology was then called. After graduation in the fall of 1792, Whitney was disappointed twice in promised teaching posts. The second offer was in Georgia, where, stranded, without employment, short of cash, and far from home, he was befriended by one Catherine Greene. Phineas Miller, a young man of Whitney's age, Connecticut-born and Yale-educated, managed Mulberry Grove, Greene's splendid plantation. Miller and Whitney became friends.

At a time when English mills were hungry for cotton, the South exported a small amount of the black-seed, long-staple variety. Though it could easily be cleaned of its seed by passing it through a pair of rollers, its cultivation was limited to the coast. A green-seed, short-staple variety, on the other hand, that grew in the interior resisted cleaning; its fibre adhered to the seed. Whitney saw that a machine to clean the green-seed cotton could make the South prosperous and make its inventor rich. He set to work and constructed a crude model. Whitney's cotton gin had four parts: (1) a hopper to feed the cotton into the gin; (2) a revolving cylinder studded with hundreds of short wire hooks, closely set in ordered lines to match fine grooves cut in (3) a stationary breastwork that strained out the seed while the fibre flowed through; and (4) a clearer, which was a cylinder set with bristles, turning in the opposite direction, that brushed the cotton from the hooks and let it fly off by its own centrifugal force.

After perfecting his machine he secured a patent (1794), and he and Miller went into business manufacturing and servicing the new gins. However, the unwillingness of the planters to pay the service costs and the ease with which the gins could be pirated put the partners out of business by 1797.

The planters' ability to defeat lawsuits brought against them by Whitney for infringement of patent rights and their mounting wealth apparently induced a sense of guilt at denying the inventor any reward: in 1802 the state of South Carolina agreed to pay $50,000, half the sum asked by Miller & Whitney for the patent rights. The action was followed by similar settlements with North Carolina, Tennessee, and, finally and reluctantly, Georgia. Miller & Whitney grossed about $90,000; the partners netted practically nothing. When Congress refused to renew the patent, which expired in 1807, Whitney concluded that "an invention can be so valuable as to be worthless to the inventor." He never patented his later inventions, one of which was a milling machine.

Whitney learned much from his experience. He knew his own competence and integrity, which were acknowledged and respected. He redirected his mechanical and entrepreneurial talents to other projects in which his system for manufacturing guns was applicable. In 1797 the government, threatened by war with France, solicited 40,000 muskets from private contractors because the two national armories had produced only 1,000 muskets in three years. Twenty-six contractors bid for a total of 30,200. Like the government armories, they used the conventional method whereby a skilled workman fashioned a complete musket, forming and fitting each part. Thus, each weapon was unique; if a part broke, its replacement had to be especially made.

Whitney broke with this tradition with a plan to supply 10,000 muskets in two years. He designed machine tools by which an unskilled workman made only a particular part that conformed precisely, as precision was then measured, to a model. The sum of such parts was a musket. Any part would fit any musket of that design. He had grasped the concept of interchangeable parts. "The tools which I contemplate to make," he explained, "are similar to an engraving on copper plate from which may be taken a great number of impressions perceptibly alike."

But 10½ years passed before Whitney delivered his 10,000 muskets. He constantly had to plead for time while struggling against unforeseen obstacles, such as epidemics and delays in supplies, to create a new system of production. Finally, he overcame most of the skepticism in 1801, when, in Washington, D.C., before President-elect Thomas Jefferson and other officials, he demonstrated the result of his system: from piles of disassembled muskets they picked parts at random and assembled complete muskets. They were the witnesses at the inauguration of the American system of mass production.

In 1817 Whitney married Henrietta Edwards, granddaughter of Jonathan Edwards. Of his four children, three survived, including Eli Whitney, Jr., who continued his father's arms manufactory in Hamden, Conn.

(J.Mir./Ed.)

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Whitney, Gertrude Vanderbilt, *née* VANDERBILT (b. Jan. 9, 1875, New York City—d. April 18, 1942, New York City), American sculptor and art patron, founder of the Whitney Museum of American Art in New York City.

A great-granddaughter of Commodore Cornelius Vanderbilt, she was born into wealth and social prominence—her father, Cornelius Vanderbilt, being a financier and art patron. At age 21 she married Harry Payne Whitney (1872–1930), a financier and sportsman.

From her early years she was interested in painting and, soon after her marriage, began the serious study of sculpture, with teachers in New York City and Paris. In 1907 she opened a studio in Greenwich Village and the following year won her first prize, for a sculpture of "Pan." Among her later notable creations were the "Aztec Fountain" (1912) for the Pan American Building and the "Titanic Memorial" (1914–31), both in Washington, D.C.; the "Victory Arch" (1918–20), the "Washington Heights War Memorial" (1921), and the "Peter Stuyvesant Monument" (1936–39), all in New York City; the "Saint-Nazaire Monument" (1924) in Saint-Nazaire, Fr.; and the "Columbus Memorial" (1928–33), in Palos, Spain. All her works were simple, direct, and largely traditional in character.

In 1929, believing that American modernists deserved greater recognition, she offered to donate to the Metropolitan Museum of Art her entire collection of about 500 works of American artists. The traditionalist director of the Metropolitan refused the offer, whereupon Whitney set about the next year founding her own institution, the Whitney Museum of American Art, which was founded in 1930 and opened in November 1931 in Greenwich Village (it moved in 1954 to West 54th Street and, then, in 1966 to West 75th Street and Madison Avenue). She also helped fund the Whitney Wing of the American Museum of Natural History in New York City.

Whitney, John Hay, byname JOCK WHITNEY (b. Aug. 17, 1904, Ellsworth, Maine, U.S.—d. Feb. 8, 1982, Manhasset, N.Y.), American multimillionaire and sportsman who had a multifaceted career as a publisher, financier, philanthropist, and horse breeder.

After attending Groton Preparatory School and Yale University (1922–26), he entered the University of Oxford; but, upon the death of his father in 1927, he returned to manage the vast family fortune. Meanwhile, he had become a keen sportsman and an internationally ranked polo player, joining the renowned Greentree polo team in 1924 and remaining an active player until the team broke up in 1940. He eventually took a leading role in many horse-breeding and racing organizations, and his own stables, Greentree, produced several notable winning racehorses.

Also interested in the arts and politics, Whitney invested in Broadway plays, including the long-running hit *Life with Father;* ventured into films with Pioneer Pictures, which demonstrated the value of Technicolor; and, in 1935, helped form the Selznick International Motion Picture Company, which, through Whitney's efforts, obtained screen rights to the novel *Gone with the Wind* even before its publication. He served as a trustee of the Museum of Modern Art in New York City from its inception in 1931 and himself eventually formed one of the finest art collections in the United States.

With the outbreak of World War II in Europe, Whitney joined Nelson Rockefeller and others in forming what eventually became the U.S. Office of the Coordinator of Inter-American Affairs. In 1942 he joined the Eighth U.S. Army Air Force as a captain in the Combat Intelligence Division and saw duty in England and the Mediterranean before being captured by the Nazis in southern France. He escaped and in 1945 was awarded the Legion of Merit. That year he became special adviser to the U.S. Department of State's Public and Cultural Relations Division and to the International Information Service, and in 1956 he was appointed U.S. ambassador to Great Britain, where he served until 1961.

In the years after World War II, Whitney also pursued business opportunities in the communications industry, acquiring interests in numerous newspapers, television and radio stations, and magazines. His greatest disappointment was his inability to revitalize the *New York Herald Tribune,* which he acquired in 1958 and which he served (1961–66) as publisher and editor in chief until the newspaper folded.

As a philanthropist, he set up in 1946 the John Hay Whitney Foundation, to which he contributed $1,000,000 annually, and in 1970 he donated $15,000,000 to his alma mater, Yale.

Whitney, Josiah Dwight (b. Nov. 23, 1819, Northampton, Mass., U.S.—d. Aug. 19, 1896, Lake Sunapee, N.H.), American geologist known for his studies of the regional geology of California.

Whitney was an independent consulting expert in mining from 1849 until 1854, when he was appointed chemist for the state of Iowa and professor of mineralogy at the University of Iowa. From 1860 until 1874 he was a member of the Geological Survey of California. He was appointed to the faculty of Harvard University in 1865 and in 1868 opened the Harvard School of Mines; from 1875 to 1896 he was a Sturgis-Hooper Professor of Geology at Harvard. Whitney led the expedition that in 1864 discovered the peak named in his honour, Mt. Whitney. He wrote *Metallic Wealth of the United States* (1854); *The Auriferous Gravels of the Sierra Nevada of California* (1880); and *Climatic Changes of Later Geological Times* (1882).

Whitney, Mount, highest peak (14,494 ft [4,418 m] above sea level) in the 48 coterminous U.S. states. It is the culminating summit of the Sierra Nevada, on the Inyo–Tulare

county line, at the east border of Sequoia National Park in eastern California. The peak was named for Josiah D. Whitney, and it was first climbed in 1873 by A.H. Johnson, C.D. Begole, and J. Lucas. Its summit is a gently sloping tablelike surface not yet dissected by erosion; its slopes are lined with avalanche chutes and blocks of granite and are devoid of glaciation. The Kern River Canyon is on the west, and precipitous streams enter Owens Valley on the east.

Whitney, William C., in full WILLIAM COLLINS WHITNEY (b. July 5, 1841, Conway, Mass., U.S.—d. Feb. 2, 1904, New York, N.Y.), U.S. secretary of the navy (1885–89) who played a major role in the post-Civil War rebuilding of the navy.

Admitted to the bar in 1865, Whitney practiced law in New York City and became active in local Democratic Party affairs. An opponent of Tammany Hall (the city Democratic organization), he joined Samuel J. Tilden in overthrowing the powerful but corrupt political boss William Marcy ("Boss") Tweed. From 1875 to 1882, Whitney was corporation counsel for the city of New York.

In 1884 he worked to promote the Democratic presidential candidacy of Grover Cleveland, who, upon taking office, appointed Whitney secretary of the U.S. Navy. During his four years in that post Whitney strengthened the U.S. fleet, which had been neglected after the North's victory in the Civil War. Under Whitney's leadership, naval appropriations were more than doubled. He undertook a major shipbuilding program, putting to sea the battleship *Maine* and others that were to figure prominently in the Spanish-American War (1898). With Cleveland's defeat, Whitney returned to New York, where, as a joint owner of the Metropolitan Traction Company, he was charter operator of the city's rapid-transit system. He continued to be active in party affairs but, as a Gold Democrat (*i.e.,* member of the party's anti-free-silver faction), declined to support the candidacy of William Jennings Bryan for president in 1896.

Whitney, William Dwight (b. Feb. 9, 1827, Northampton, Mass., U.S.—d. June 7, 1894, New Haven, Conn.), American linguist and one of the foremost Sanskrit scholars of his time, noted especially for his classic work, *Sanskrit Grammar* (1879).

As a professor of Sanskrit (1854–94) and comparative language studies (1869–94) at Yale University, Whitney conducted extensive research and published a number of works. These included editions and translations of the Vedas, the ancient Hindu sacred scriptures, written in the oldest form of Sanskrit. Whitney also contributed to the great Sanskrit dictionary of Otto von Böhtlingk and Rudolf von Roth.

Whitney also served as editor in chief of *The Century Dictionary: An Encyclopedic Lexicon of the English Language,* 6 vol. (1889–91), which in its time was one of the finest general-purpose dictionaries in the United States. He was also the editor of the 1864 edition of Webster's dictionary. Whitney wrote *The Life and Growth of Language* (1875; reprinted, 1977), *Essentials of English Grammar* (1877), and *Max Müller and the Science of Linguistics: A Criticism* (1892). His *Selected Writings,* edited by Michael Silverstein, was published in 1971.

Whitney, Willis Rodney (b. Aug. 22, 1868, Jamestown, N.Y., U.S.—d. Jan. 9, 1958, Schenectady, N.Y.), American chemist and founder of the General Electric Company's research laboratory, where he directed pioneering work in electrical technology and was credited with setting the pattern for industrial scientific laboratory research in the United States.

Whitney studied at the Massachusetts Institute of Technology, Cambridge, and earned his Ph.D. from the University of Leipzig in 1896. Upon joining General Electric, Whitney founded (1900) its research laboratory at Schenectady, N.Y., and was its director (1900–28) and later vice president in charge of research (1928–41). There he found, in 1902, that metallized carbon filament for incandescent lamps produced 25 percent more light than had earlier filaments. He also directed work that led to the development of the modern electric light bulb and to improvements in vacuum tubes. He developed an electrochemical theory of corrosion that was widely used in the analysis of corrosion reactions.

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Whitney Museum of American Art, collection in New York City of predominantly 20th-century American art, including painting, sculpture, and graphics. It was founded in 1930 by Gertrude Vanderbilt Whitney, a sculptor and promoter of American art. The museum opened at a Greenwich Village location in 1931 and moved to West 54th Street in 1954 before relocating to its present building.

Since 1966 the collection has been installed in a Madison Avenue building designed by Marcel Breuer. It contains the world's largest collection of paintings by Edward Hopper and has many sculptures by Alexander Calder and Louise Nevelson.

Consult the INDEX *first*

Whitstable, locality east of the Isle of Sheppey in Canterbury district, county of Kent, southeastern England. From Roman times it was known for the oysters gathered from the sea. In the Middle Ages Whitstable was a port and a stopping place for pilgrims to Canterbury (7 miles [11 km] southeast). In modern times it has grown as a seaside resort and residential town. Pop. (1981) 26,451.

Whitsunday (Christian festival): *see* Pentecost.

Whitsunday Island, largest of the Cumberland Islands, lying 6 miles (10 km) off the northeastern coast of Queensland, Australia, in the Coral Sea. An inshore, coral-fringed continental island, it measures 12 by 8 miles (19 by 13 km), has an area of 42 square miles (109 square km), and rises from steep cliffs of volcanic rock to Mount Whitsunday, 1,426 feet (435 m). The island lies between the coral formations of the Great Barrier Reef and the Whitsunday Passage, which is 20 miles (32 km) long and a minimum of 2 miles (3 km) wide. Both the island and the passage, which separates the Cumberlands from the mainland, were reached on Whitsunday (Pentecost) 1770 by the British navigator Captain James Cook. The explorer Matthew Flinders sailed through the passage in 1802. The island is well forested and once supported a timber industry. It is now a national park and resort, accessible from the mainland by launch.

Whittaker, Charles E., in full CHARLES EVANS WHITTAKER (b. Feb. 22, 1901, near Troy, Kan., U.S.—d. Nov. 26, 1973, Kansas City, Mo.), associate justice of the United States Supreme Court (1957–62).

Whittaker was admitted to the bar in 1923 and received his law degree the following year. In 1930 he became a partner in a Kansas City law firm, where he specialized in corporation law. In 1954 he was appointed federal judge for western Missouri, and in 1956 he was appointed to the U.S. Court of Appeals for the eighth circuit. The following year he was named to the U.S. Supreme Court to replace Stanley F. Reed. Whittaker served on the Supreme Court bench for five years, writing no major opinions. He is remembered for having cast the deciding vote with the conservative bloc in a number of decisions, many of which were reversed during or immediately after his tenure. He resigned in 1962 to return to private practice.

Whittaker, Sir Edmund Taylor (b. Oct. 24, 1873, Southport, Lancashire, Eng.—d. March 24, 1956, Edinburgh, Scot.), English mathematician who made pioneering contributions to the area of the special functions, which is of particular interest in mathematical physics.

Whittaker became a fellow of Trinity College, Cambridge, in 1896. After being elected a fellow of the Royal Society of London in 1905, he was appointed the following year professor of astronomy at the University of Dublin and Astronomer Royal of Ireland. He served as professor of mathematics at the University of Edinburgh from 1912 until his retirement in 1946. He was knighted in 1945.

Whittaker excelled not only in mathematics but also as a historian of science. His prolific mathematical contributions were in mathematical physics as well as in dynamical problems, and his work on differential equations and functions had great influence. His *A Course of Modern Analysis* (1902; 2nd ed., 1915) advanced the study of functions of a complex variable and their expansions and the study of special functions and their related differential equations. He discovered in 1902 the general solution of Laplace's equation and the following year originated the confluent hypergeometric function, which has found numerous uses and has developed an extensive literature.

In *A History of the Theories of Aether and Electricity, from the Age of Descartes to the Close of the Nineteenth Century* (1910), expanded in 1953 to include the first quarter of the 20th century, Whittaker showed the philosophic depth behind his mathematical thought. On the eve of the revolution in physics brought on by the theory of relativity, he published *A Treatise on the Analytical Dynamics of Particles and Rigid Bodies, with an Introduction to the Problem of Three Bodies* (1904), an epoch-making summary of classical dynamics. He also contributed pioneering work on the effects of the relativistic curved space on electromagnetic phenomena. Having adopted the Roman Catholic faith in 1930, he wrote several works on the relationship between science and natural theology.

Whitten Brown, Sir Arthur (aviator): *see* Brown, Sir Arthur Whitten.

Whittier, city, Los Angeles county, southern California, U.S. It lies at the foot of the Puente Hills. Part of the Rancho Paso de Bartolo Viejo (1847), the site was chosen in 1887 by Aquila H. Pickering for a Quaker community and named for the poet John Greenleaf Whittier. It developed as an agricultural and citrus-growing centre and was later caught up in the expansion of the Los Angeles metropolitan area. Whittier College (the alma mater of President Richard M. Nixon) was established in 1887 and Rio Hondo College in 1960. The Pio Pica State Historic Park contains the partially restored mansion of Pio Pica, who was the last Mexican governor of California. Inc. city, 1898. Pop. (1994 est.) 79,813.

Whittier, John Greenleaf (b. Dec. 17, 1807, near Haverhill, Mass., U.S.—d. Sept. 7, 1892, Hampton Falls, Mass.), American poet and Abolitionist who, in the latter part of his life, shared with Henry Wadsworth Longfellow the

distinction of being a household name in both England and the United States.

Born on a farm into a Quaker family, Whittier had only a limited formal education. He became an avid reader of British poetry, however, and was especially influenced by the Scotsman Robert Burns, whose lyrical treatment of everyday rural life reinforced his own inclination to be a writer.



Whittier, detail of a portrait by M.G. Torrey, 1835
By courtesy of Donald P. Wright

Whittier's career naturally divides into four periods: poet and journalist (1826–32), Abolitionist (1833–42), writer and humanitarian (1843–65), and Quaker poet (1866–92). At age 19 his poem "The Exile's Departure" was accepted by the Abolitionist William Lloyd Garrison for publication in the *Newburyport Free Press*. Garrison encouraged other poetic contributions from Whittier, and the two men became friends and associates in the Abolitionist cause. Whittier soon turned to journalism. He edited newspapers in Boston and Haverhill and by 1830 had become editor of the *New England Weekly Review* in Hartford, Conn., the most important Whig journal in New England. He also continued writing verse, sketches, and tales, and he published his first volume of poems, *Legends of New England*, in 1831. In 1832, however, a failed romance, ill health, and the discouragement he felt over his lack of literary recognition caused him to resign and return to Haverhill.

Deciding that his rebuffs had been caused by personal vanity, Whittier resolved to devote himself to more altruistic activities, and he soon embraced Garrisonian Abolitionism. His fiery antislavery pamphlet "Justice and Expediency" made him prominent in the Abolitionist movement, and for a decade he was probably its most influential writer. He served a term in the Massachusetts legislature, spoke at antislavery meetings, and edited the *Pennsylvania Freeman* (1838–40) in Philadelphia. In 1840 he returned to live in Amesbury with his mother, aunt, and sister.

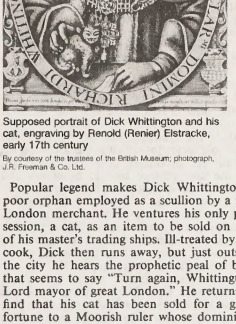
By 1843 Whittier had broken with Garrison, having decided that Abolitionist goals could be better accomplished through regular political channels. He became more active in literature, in which new avenues of publication were now open to him. In the next two decades he matured as a poet, publishing numerous volumes of verse, among them *Lays of My Home* (1843), *Voices of Freedom* (1846), *Songs of Labor* (1850), *The Panorama* (1856), and *Home Ballads and Poems* (1860). Among his best-known poems of this period is "Maud Muller" (1854), with its lines "Of all sad words of tongue and pen/ The saddest are these, 'It might have been' ". Most of his literary prose, including his one novel, *Leaves from Margaret Smith's Journal* (1849), was also published during this time, along with numerous articles and reviews.

Whittier's mother and his beloved younger sister died in the period from 1857 to 1864, but his personal grief, combined with the larger national grief of the Civil War, furthered his literary maturity. The publication in 1866 of his best-known poem, the winter idyll *Snow-Bound*, was followed by other triumphs in the verse collections *The Tent on the Beach* (1867), *Among the Hills* (1868), and *The Pennsylvania Pilgrim* (1872). Whittier's 70th birthday was celebrated at a dinner attended by almost every prominent American writer, and his 80th birthday became an occasion for national celebration.

After outgrowing the Romantic verse he wrote in imitation of Robert Burns, Whittier became an eloquent advocate of justice, tolerance, and liberal humanitarianism. The lofty spiritual and moral values he proclaimed earned him the title of "America's finest religious poet," and many of his poems are still sung as church hymns by various denominations. After the Civil War he changed his focus, depicting nature and homely incidents in rural life. Whittier's verse is often marred by sentimentality, poor technique, or excessive preaching, but his best poems are still read on account of their moral beauty and simple sentiments. He was not a literary figure of the highest stature but was nevertheless an important voice of his age.

Whittington, Dick, byname of RICHARD WHITTINGTON (d. March 1423, London, Eng.), English merchant and lord mayor of London who became a well-known figure in legend and traditional pantomime.

Whittington, who was the son of a knight of Gloucestershire, opened a mercer's shop in London that supplied velvets and damasks to such notables as Henry Bolingbroke (later King Henry IV). He then entered city politics and served three terms as lord mayor of London: 1397–99, 1406–07, and 1419–20. By 1400 Whittington had acquired immense wealth and commercial prestige. He made large loans to Kings Henry IV (ruled 1399–1413) and Henry V (ruled 1413–22) and bequeathed his vast fortune to charitable and public purposes.

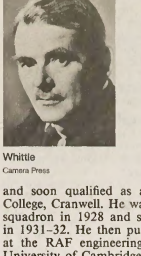


Supposed portrait of Dick Whittington and his cat, engraving by Renold (Renier) Elstracke, early 17th century
By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

Popular legend makes Dick Whittington a poor orphan employed as a scullion by a rich London merchant. He ventures his only possession, a cat, as an item to be sold on one of his master's trading ships. Ill-treated by the cook, Dick then runs away, but just outside the city he hears the prophetic peal of bells that seems to say "Turn again, Whittington, Lord mayor of great London." He returns to find that his cat has been sold for a great fortune to a Moorish ruler whose dominions are plagued with rats. Whittington marries his master's daughter, succeeds to the business, and subsequently becomes thrice lord mayor of London. The first recorded reference to the tale appears in 1605.

Whittle, Sir Frank (b. June 1, 1907, Coventry, Warwickshire, Eng.—d. Aug. 8, 1996, Columbia, Md., U.S.), English aviation engineer and pilot who invented the jet engine.

The son of a mechanic, Whittle entered the Royal Air Force (RAF) as a boy apprentice



Whittle
Camera Press

and soon qualified as a pilot at the RAF College, Cranwell. He was posted to a fighter squadron in 1928 and served as a test pilot in 1931–32. He then pursued further studies at the RAF engineering school and at the University of Cambridge (1934–37). Early in his career Whittle recognized the potential demand for an aircraft that would be able to fly at great speed and height, and he first put forth his vision of jet propulsion in 1928, in his senior thesis at the RAF College. The young officer's ideas were ridiculed by the Air Ministry as impractical, however, and attracted support from neither the government nor private industry.

Whittle obtained his first patent for a turbojet engine in 1930, and in 1936 he joined with associates to found a company called Power Jets Ltd. He tested his first jet engine on the ground in 1937. This event is customarily regarded as the invention of the jet engine, but the first operational jet engine was designed in Germany by Hans Pabst von Ohain and powered the first jet-aircraft flight on Aug. 27, 1939. The outbreak of World War II finally spurred the British government into supporting Whittle's development work. A jet engine of his invention was fitted to a specially built Gloster E.28/39 airframe, and the plane's maiden flight took place on May 15, 1941. The British government took over Power Jets Ltd. in 1944, by which time Britain's Gloster Meteor jet aircraft were in service with the RAF, going up against Germany's jet-powered Messerschmitt Me-262s.

Whittle retired from the RAF in 1948 with the rank of air commodore, and that same year he was knighted. The British government eventually atoned for their earlier neglect by granting him a tax-free gift of £100,000. He was awarded the Order of Merit in 1986. In 1977 he became a research professor at the U.S. Naval Academy, Annapolis, Md. His book *Jet: The Story of a Pioneer* was published in 1953.

Whittredge, Worthington, in full THOMAS WORTHINGTON WHITTREDGE (b. May 22, 1820, Springfield, Ohio, U.S.—d. Feb. 25, 1910, Summit, N.J.), American landscape painter who, unlike most of the Hudson River school painters, selectively composed his landscape scenes, rather than painting precise patches of nature.

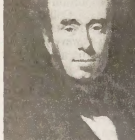
Though originally a house painter, Whittredge became a portraitist and also began painting landscapes. He spent five years in Düsseldorf and five years in Rome, where he posed for Emanuel Leutze, who painted him as Washington in "Washington Crossing the Delaware."

On his return to the U.S. (1859), the varied and rich American landscape awakened

his deepest sentiments. In 1865 he went on a 2,000-mile government inspection tour of the Rocky Mountains with the landscape painters John Frederick Kensett and Sanford R. Gifford. His observations on this journey resulted in huge canvases of vast panoramic views like "Crossing the Platte" (1870; Century Association, New York City). His most characteristic works are his poetic forest interiors with their depths of feathery fern and mossy rocks dappled with leaf-filtered light; *e.g.*, "The Trout Pool" and "Camp Meeting" (both in the Metropolitan Museum of Art, New York City). Whittredge did not paint landscapes for nature's sake alone but chose places he loved, giving his works a personal subject matter.

Whitworth, Sir Joseph, BARONET (b. Dec. 21, 1803, Stockport, Cheshire, Eng.—d. Jan. 22, 1887, Monte-Carlo), English mechanical engineer who won international recognition as a machine toolmaker.

After working as a mechanic for various Manchester machine manufacturers, Whitworth went to London in 1825 and at Maudslay & Company devised a scraping technique for making a true plane surface. Returning to Manchester in 1833, he opened his own tool-



Whitworth, detail of an oil painting by an unknown artist

By courtesy of the Science Museum, London

making business. Between 1840 and 1850 he produced an original measuring machine and a system of accurate dimensional standards or master gauges to go with it. Even the common screw was not overlooked. In 1841 Whitworth's standard screw threads were adopted by the Woolwich Arsenal.

By 1851 Whitworth's machine tools had become internationally known for their accuracy and quality. He had exhibited his screw cutting lathes, his planing, drilling, slotting, and shaping machines, and his millionth-part measuring machine. By 1866 his factory employed 700 men and was equipped with 600 machine tools. He also did pioneering work in ordnance, inventing a method for casting ductile steel to replace hard steel, which is subject to fracture.

Whitworth helped found the chair of engineering and laboratories at Owens College, Manchester. In 1868 he established the Whitworth scholarships, setting aside an annual sum of £3,000 for the purpose. In 1869 he was created a baronet.

WHO: *see* World Health Organization.

Whole Book of Psalmes, The: *see* Bay Psalm Book.

whole-tone scale, in music, scalar arrangement of pitches, each separated from the other by a whole-tone step, in contradistinction to the chromatic scale (half steps only) and the diatonic scale (intermixing whole and half-tone steps). In Western art music, the whole-tone scale is closely associated with the decline of functional harmony in the late 19th century.

Free of the sort of compelling harmonic implications traditionally associated with half-tone steps, especially in a diatonic context, whole-tone patterning greatly appealed to composers such as Claude Debussy who sought to represent relatively static impressions or moods, rather than dynamic processes or events, in their music. Early examples of the whole-tone scale in an as yet traditional harmonic context are found in certain compositions of Franz Liszt as well as in works by the Russian group of composers known as the Mighty Five.

wholesale price index, measure of changes in the prices charged by manufacturers and wholesalers. Wholesale price indexes measure the changes in commodity prices at a selected stage or stages before goods reach the retail level; the prices may be those charged by manufacturers to wholesalers or by wholesalers to retailers or by some combination of these and other distributors. In the United States, the index measures the price movements of all commodities flowing into primary markets of the United States—whether domestically produced or imported. Primary markets are those in which a good in a given stage of fabrication is first sold in substantial quantities. Because primary markets include goods of all degrees of fabrication, the same commodity is often priced at several stages of processing. Cotton, for example, is priced in the form of raw cotton, cotton yarn, cotton gray goods, cotton piece goods, and cotton clothing.

One of the earliest wholesale price indexes was produced for Great Britain in 1886, covering the period after 1846. The official wholesale price index in the United Kingdom, produced by the Board of Trade, goes back to 1871. In the United States, the first major effort to summarize wholesale price changes through index numbers was published in a report of the U.S. Senate in 1893. The present wholesale price index of the United States, maintained by the Bureau of Labor Statistics, has been computed for the period since 1890. In both the United Kingdom and the United States, economic historians have attempted to reconstruct wholesale price indexes for the 19th century that are superior to the early efforts.

The number and character of the commodities included in wholesale price indexes vary widely from country to country. In large industrial countries like the United Kingdom, the United States, and Germany, the commodities that are included usually number in the thousands; but for most countries it is much smaller, often only 100 or 200. The smaller numbers of products will serve well enough if only a general all-commodities index (or a few subindexes at most) is wanted. Greater numbers are required when many subindexes are desired. The United States, for example, publishes indexes for commodities classified according to stage of processing (crude materials, intermediate materials, and finished goods), according to the durability or nondurability of the products, and according to the economic sector for which goods are intended (consumers, producers, etc.). The commodities are also grouped into 15 categories and nearly 100 subgroups (fresh fruits, grains, etc.) and a large number of product classes (apples, bananas, barley, corn, etc.), for each of which monthly price indexes are published. In addition, there are a number of indexes for special commodity groups such as various categories of pharmaceutical preparations. The number of commodities included in the U.S. index has expanded from 250 when the index was started in 1902 to about 2,400 in the late 20th century. The new commodities have tended to be more highly fabricated and to have more stable prices, and they have therefore dampened the fluctuations in the index. One reason for the inclusion of more commodities was a gradual shift in the conception of the function of the index. Originally it was regarded as a measure of movements in the general price level, but as other indexes became available, such as the consumer price index, less reliance was placed on the wholesale price index for this purpose. At the same time, there was a growing demand for subindexes pertaining to particular classes of products for various business and analytical purposes.

Countries in which industrial production is not highly variegated usually have smaller numbers of product classifications; these serve to distinguish between price movements of domestic goods and price movements of imports and between those of food or agricultural products and those of industrial products. Raw materials and standardized products in early processing stages that are easy to price tend to be well represented in the wholesale price indexes of all countries; whereas more complex types of producers' goods, such as heavy electrical equipment, tend to be underrepresented or omitted even in the indexes of the advanced industrial countries. This is a source of upward bias in the general wholesale indexes since there is reason to believe that technological change has been particularly important in bringing about improvements in complex goods.

Price data used to construct the indexes are usually gathered from business firms by mail, less frequently from trade journals and trade associations, and also from government purchasing agents. Weights are generally based on relative sales volume. Data from censuses of production (manufacturing, mining, agriculture, etc.) are used for weights when they are available.

wholesaling, the selling of merchandise to anyone other than a retail customer. The merchandise may be sold to a retailer, a wholesaler, or to an enterprise that will use it for business, rather than individual, purposes. Wholesaling usually, but not necessarily, involves sales in quantity and at a cost that is significantly lower than the average retail price.

Wholesaling became particularly advantageous after the introduction of mass production and mass marketing techniques in the 19th century. Without wholesale organizations, large manufacturers would have to market their products directly to a great many retailers and/or consumers at high unit costs, and retailers or consumers would have to deal with a large number of manufacturers at great inconvenience.

There are three main categories of wholesalers: (1) merchant wholesalers, (2) manufacturers' sales branches, and (3) merchandise agents and brokers. The most important are the merchant wholesalers. These independent businesses buy merchandise in large quantities from manufacturers, process and store that merchandise, and redistribute it to retailers and others. Manufacturers' sales branches are businesses established by manufacturers to sell directly to retailers. They tend to be established by large companies which modify their products frequently and to whom rapid, accurate information on sales and suggestions for improvement are especially valuable. Merchandise agents and brokers sell complementary products of several manufacturers. Unlike merchant wholesalers and manufacturers' sales branches they ordinarily do not take title to the merchandise they handle. Rather, they simply arrange for shelf space and the display of merchandise of the manufacturers they represent. *See also* marketing.

For international statistical data on wholesale trade, *see* BRITANNICA BOOK OF THE YEAR.

whooping cough, also called PERTUSSIS, acute, highly communicable respiratory disease characterized in its typical form by paroxysms of coughing followed by a long-drawn inspiration, or "whoop," and ending with

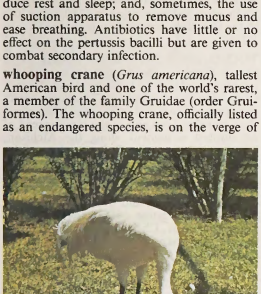
expulsion of clear, sticky mucus, and often vomiting. The disease was first adequately described in 1578; undoubtedly it had existed for a long time before that. About 100 years later, the name pertussis (Latin: "intensive cough") was introduced in England. In 1906 at the Pasteur Institute, the French bacteriologists Jules Bordet and Octave Gengou isolated the bacteria that cause the disease; first called Bordet–Gengou bacilli; later, *Hemophilus pertussis*; and still later, *Bordetella pertussis*.

After an incubation period of approximately one week, catarrhal symptoms develop, which resemble an ordinary upper respiratory infection, with a short dry cough that is worse at night. After one to two weeks the catarrhal stage passes into the distinctive paroxysmal period, variable in duration but commonly lasting four to six weeks. Serious complications include bronchopneumonia, suffocative attacks, and occasionally convulsions and indications of brain damage.

Whooping cough is worldwide in distribution and among the most acute infections of children. A vaccine that confers active immunity against whooping cough to children under six years of age is administered, preferably combined with tetanus and diphtheria toxoids and often with poliomyelitis vaccine as well; immunization is routinely begun during the first three months of infancy. A booster dose of pertussis vaccine should be given at 18 months of age, but not generally thereafter, because reactions to the vaccine may be troublesome in older children. Later vaccinations are in any case thought to be unnecessary, because the disease is much less severe when it occurs in older children, especially if they have been vaccinated in infancy.

Treatment includes frequent light feeding to offset the nutritional debility resulting from vomiting; administration of sedatives to induce rest and sleep; and, sometimes, the use of suction apparatus to remove mucus and ease breathing. Antibiotics have little or no effect on the pertussis bacilli but are given to combat secondary infection.

whooping crane (*Grus americana*), tallest American bird and one of the world's rarest, a member of the family Gruidae (order Gruiformes). The whooping crane, officially listed as an endangered species, is on the verge of



Whooping crane (*Grus americana*)
H. William Belknap

extinction; the Bureau of Sport Fisheries and Wildlife in the U.S. Department of the Interior is propagating captive whooping cranes in an attempt to increase the wild population, which numbered nearly 100 individuals in the early 1980s, with about 24 more in captivity.

The whooping crane is almost 150 centimetres (5 feet) tall and has a wingspread of about 210 centimetres (7 feet). It is white with black-tipped wings, black legs, and a bare red face and crown. It has a whooping call purported to be audible for two miles.

It is believed that such birds as the whooping crane have been declining in numbers for some time because of changing ecological conditions, and only partly from hunting and cultivation of land by man. Their gregariousness increases their vulnerability, and the high rate of infant mortality retards recovery of the population.

Whorf, Benjamin Lee (b. April 24, 1897, Winthrop, Mass., U.S.—d. July 26, 1941, Wethersfield, Conn.), U.S. linguist noted for his hypotheses regarding the relation of language to thinking and cognition and for his studies of Hebrew and Hebrew ideas, of Mexican and Mayan languages and dialects, and of the Hopi language.

Under the influence of Edward Sapir, at Yale University, Whorf developed the concept of the equation of culture and language, which became known as the Whorf hypothesis, or the Sapir–Whorf hypothesis. Whorf maintained that the structure of a language tends to condition the ways in which a speaker of that language thinks. Hence, the structures of different languages lead the speakers of those languages to view the world in different ways. This hypothesis was originally put forward in the 18th century by the German scholars Johann Gottfried von Herder and Wilhelm von Humboldt. It was espoused in the United States in the period preceding World War II by Sapir and then in the 1940s by Whorf. Whorf's formulation and illustration of the hypothesis excited considerable interest. On the basis of his research and fieldwork on American Indian languages, he suggested, for example, that the way a people view time and punctuality may be influenced by the types of verbal tenses in their language. Whorf concluded that the formulation of ideas is part of (or influenced by) a particular grammar and differs as grammars differ. This position and its opposite, that culture shapes language, have been mostly debated. *See also* ethnolinguistics.

whortleberry: *see* bilberry.

Who's Who, any of numerous biographical dictionaries that give brief and pertinent information about prominent living persons who are distinguished in a particular field or by official position or public standing and who have, in most cases, supplied data about themselves through publisher questionnaires. Among the most accessible primary sources for biographical information, *Who's Who* entries may include such personal facts as names of immediate family and salient data about education, business, and military experience; residential and business addresses usually appear. The accuracy of personal information is, however, susceptible to the respondent's whim and is rarely checked.

The first *Who's Who* was published in London (1849) as a handbook of titled classes, listing only names without biographical sketches. Since 1899 the format has been that of a biographical dictionary, with primarily British emphasis; annual and enlarged publication has continued. *Who's Who in America: A Biographical Dictionary of Notable Living Men and Women,* first published in Chicago (1899), is issued biennially, thoroughly revised. It is considered the standard, authoritative work of contemporary biography for the United States, and it has included, since 1974, some prominent persons from other countries and representatives to the United Nations. Published as supplements are U.S. regional *Who's Whos; Who Was Who,* listing deceased persons formerly in *Who's Who*; and the *International Who's Who.* In recent decades, national *Who's Whos* have proliferated in countries throughout the world. Similar biographical dictionaries have emerged focussing on special fields, *e.g.,* natural sciences, banking, government, and politics.

Whyalla, city and port, southern South Australia, on the east coast of Eyre Peninsula, opposite Port Pirie, northwest of Adelaide. It was created in 1901 by the Broken Hill Proprietary Company, Ltd. (BHP) as the Spencer Gulf terminus of a tramway bringing iron ore from the Middleback Ranges for use as a flux in the lead smelters at Port Pirie. Its name was changed in 1920 from Hummock Hill to Whyalla, an Aboriginal term meaning "place with deep water." Industrial development was stimulated by World War II. Whyalla exports iron ore and steel and had the largest shipyards in Australia until their operations ceased in 1978. It has blast furnaces, steelworks, heavy engineering works, and salt evaporation facilities for the manufacture of industrial chemicals. Lying in an arid region, the city obtains its water from the Murray River via a pipeline 223 mi (359 km) long, completed in 1944; a second, parallel pipeline was completed in 1966. In 1945, Whyalla came under a combined company and public administration. It became a city in 1961 and adopted full local government status in 1970. Pop. (1981) 29,962.

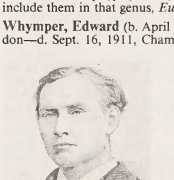
Whydah (Benin): *see* Ouidah.

whydah, also spelled WHIDAH, or WYDAH, also called WIDOWBIRD, any of several African birds that have long dark tails suggesting a funeral veil. They belong to two subfamilies, Viduinae and Ploceinae, of the family Ploceidae (order Passeriformes). The name is associated with Whydah (Ouidah), a town in Benin where the birds are common.

In the Viduinae, each species of the genus *Vidua* (probably eight or nine species, including those assigned by some authorities to the genera *Steganura, Hypochera,* or *Tetraenura*) is a social parasite, laying its eggs in the nests of a particular species of weaver finch for incubation and development. Males are mostly black and have four central tail feathers greatly elongated; body length is about 10 to 13 centimetres (4 to 5 inches). Common species are the pin-tailed whydah (*V. macroura*), the shaft-tailed whydah (*V. regia*), and the broad-tailed paradise whydah (*V. orientalis*), perhaps a race of the paradise whydah (*V. paradisaea*).

Male whydahs of the Ploceinae resemble the viduines. An example is the black whydah (*Coliuspasser ardens*), called red-collared whydah in eastern Africa. The male in Jackson's whydah (*C.,* sometimes *Drepanoplectes, jacksoni*), clears a dancing ground for himself, leaving a tall bunch of grass in the middle, and is visited there by females; the similarity to bowerbird behaviour is striking. Ploceine whydahs are not parasitic. Because they behave like bishop (*q.v.*) birds, some authors include them in that genus, *Euplectes.*

Whymper, Edward (b. April 27, 1840, London—d. Sept. 16, 1911, Chamonix, Fr.), En-



Whymper, engraving, 1881
BBC Hulton Picture Library

glish mountaineer and artist who was the first man to climb the Matterhorn (14,691 feet [4,478 metres]).

Privately educated, Whymper entered his father's wood engraving business and ultimately succeeded as head of it. He was sent to Switzerland in 1860 to make sketches for a book on the Alps and became a mountaineer thereafter. On his eighth attempt to scale the Matterhorn, on July 14, 1865, Whymper made the ascent by the Swiss ridge. On the descent, one member of his party slipped and pulled down three more—all four fell to their deaths. The rope broke, saving Whymper and two guides. This event is recorded in Whymper's *Scrambles Amongst the Alps* (1871; condensed as *Ascent of the Matterhorn*, 1879), which is illustrated with his own engravings.

In Ecuador (1880) he twice ascended Chimborazo, and he spent a night on the summit of Cotopaxi (19,347 feet [5,897 metres]), the world's highest continuously active volcano. He published *Travels Amongst the Great Andes of Ecuador* (1892), which contained much valuable information for geographers, geologists, and mountaineers. He also compiled two handbooks on the climbing of Chamonix (1896) and Zermatt (1897; both reprinted 1974). Whymper's last journeys were in the Canadian Rockies (1901–05).

Wiak Island (Indonesia): *see* Biak Island.

Wiart, Henri(-Victor), Comte Carton de: *see* Carton de Wiart, Henri(-Victor), Comte.

Wibert OF RAVENNA, Italian WIBERTO DI RAVENNA (antipope): *see* Clement (III).

Wicca, a predominantly Western movement whose followers practice witchcraft and nature worship and see it as a religion based on pre-Christian traditions of northern and western Europe. It spread through England in the 1950s and subsequently attracted followers elsewhere in Europe and the United States.

Origins and beliefs. Although there were precursors to the movement, the origins of modern Wicca can be traced to a retired British civil servant, Gerald Brousseau Gardner (1884–1964). Gardner spent most of his career in Asia, where he became familiar with a variety of occult beliefs and magical practices. He also read widely in Western esoteric literature, including the writings of the British occultist Aleister Crowley. Returning to England shortly before the outbreak of World War II, Gardner became involved in the British occult community and founded a new movement based on a reverence of nature, the practice of magic, and the worship of a female deity (the Goddess) and numerous associated deities (such as the Horned God). He also borrowed liberally from Western witchcraft traditions. Following the 1951 repeal of England's archaic Witchcraft Laws, Gardner published *Witchcraft Today* (1954), founded his first coven of followers, and, with input from its members, especially author Doreen Valiente, developed modern witchcraft into what today is known as Wicca. It spread quickly to the United States in the late 1960s, when an emphasis on nature, unconventional lifestyles, and a search for spirituality divorced from traditional religions were especially in vogue.

Covens, which ideally number 10 to 15 members and are entered through an initiation ritual, sometime align with one of many coven associations. As coven members master the practice of magic and become familiar with the rituals, they pass through two degrees of initiation. There is a third degree for those who wish to enter the priesthood. In Gardner's system priority is given to the priestess, and leaders in the Gardnerian community trace their authority through a lineage of priestesses back to Gardner's coven.

Despite variation within the Wiccan community, most believers share a general set of beliefs and practices. They believe in the Goddess, respect nature, and hold both polytheistic and pantheistic views. Most Wiccans accept the so-called Wiccan Rede, an ethical code that states "If it harm none, do what you will." Wiccans believe in meditation and participate in rituals throughout the year, celebrating the new and full moon, as well as the vernal equinox, summer solstice, and Halloween, which they call Samhain. Wiccan rites include invoking the aid of deities, practicing ceremonial magic, and sharing a ritual meal.

Most controversial to outsiders is that Wiccans call themselves *witches*, a term which most Westerners identify with Satanism. As a result, Wiccans are continually denying any connection with Satan or devil worship. Wiccans have also attempted to establish ties with other polytheistic (Hindu) and nature-oriented (Native American) religious communities.

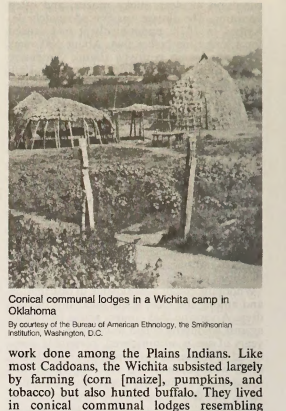
Later developments. By the 1980s there were an estimated 50,000 Wiccans in western Europe and North America. Although the growth rate slowed by the end of the decade, Wicca gained increasing social acceptance and diversified to include numerous variations on Gardner's original teachings and rituals. Moreover, new Wiccan groups emerged independent of the Gardnerians, including one led by Alexander Sanders (1926–88), the Dianic Wiccans who saw Wicca as a woman's religion, and the parallel Neo-Pagan movement, which also worshipped the Goddess and practiced witchcraft but eschewed the designation *witch*. A controversy developed in the United States in the 1960s and 1970s, when a faction of Wiccans broke with Gardner's notion that clothes inhibited magical workings and chose not to follow his practice of worshiping in the nude. Instead they donned ritual robes, claiming pre-Gardnerian sources for their beliefs, and called themselves Traditionalists.

As Wicca and Neo-Paganism moved into their second generation, belief faded in the notion that Gardner had inherited a set of witchcraft rituals and practices that had been passed on through a tradition with unbroken ties to pre-Christian paganism. Although many Wiccans once cited the work of Margaret Murray, including *The Witch-Cult in Western Europe* (1921) and her article "Witchcraft" published in the 14th edition of *Encyclopædia Britannica* (1929), in support of their belief in the ancient origins of their religion, they now generally recognize that Wicca began with Gardner and his associates.

As the 21st century began, Wiccans and Neo-Pagans were found throughout the English-speaking world and across northern and western Europe. Two international fellowships, the Pagan Federation and the Universal Federation of Pagans, now serve the larger Wiccan/Neo-Pagan community. (J.G.M.)

BIBLIOGRAPHY. J. Gordon Melton and Isotta Poggi, *Magic, Witchcraft, and Paganism in America*, 2nd ed. (1992), provides an overview of Wiccan literature. The best survey of the movement is Margot Adler, *Drawing Down the Moon*, rev. and expanded ed. (1986, reissued 1997); and entries on the major Wiccan groups in North America appear in J. Gordon Melton, *Encyclopedia of American Religions* (1999). On the British phase of the movement, see J.L. Bracelin, *Gerald Gardner* (1960); and Doreen Valiente, *The Rebirth of Witchcraft* (1989). Helpful volumes on North American Wicca include Aidan A. Kelly, *Crafting the Art of Magic* (1991–); and the several volumes published in the series Witchcraft Today and from Llewellyn Publications, the major publisher of Wiccan literature in America.

Wichita, North American Indian people of Caddoan linguistic stock who in their early history lived near the Arkansas River in present-day Kansas. They were encountered by the Spanish in the mid-16th century and became the object of the earliest missionary



Conical communal lodges in a Wichita camp in Oklahoma

By courtesy of the Bureau of American Ethnology, the Smithsonian Institution, Washington, D.C.

work done among the Plains Indians. Like most Caddoans, the Wichita subsisted largely by farming (corn [maize], pumpkins, and tobacco) but also hunted buffalo. They lived in conical communal lodges resembling haystacks and constructed of poles and thatch; on hunting expeditions they used skin tepees. More given to tattooing than most Plains Indians, they were known by other groups as the "tattooed people." They performed a ceremonial dance resembling the green corn festivals of the southeastern tribes.

By 1772 they were located near what is now Wichita Falls, Texas. During the Civil War they relocated in Kansas, and in 1867 they were removed to a reservation in Oklahoma. Their estimated population in 1780 was 3,200; in the late 20th century they numbered about 1,275.

Wichita, city, seat of Sedgwick County, south central Kansas, U.S., on the Arkansas River near the mouth of the Little Arkansas. Founded in 1864 as a trading post, it owed its early development to the Texas cattle trade along the Chisholm Trail and to the rapid spread of agricultural settlement along the Atchison, Topeka and Santa Fe Railway, then under construction.

The major economic activities of Wichita are aircraft construction, oil refining, grain processing and storage, and livestock marketing. Wichita is the home of Friends University (1898), Berean Christian College (1930), Kansas Newman College (formerly Sacred Heart College, 1933), and Wichita State University (1895). McConnel Air Force Base is nearby. The restored Cow Town is a replica of Wichita in the 1870s. Inc. city, 1871. Pop. (1999 est.) city, 335,562; Wichita MSA, 548,714.

Wichita Falls, city, seat (1882) of Wichita County, northern Texas, U.S., on the Wichita River in the Red River Valley, 115 miles (185 km) northwest of Fort Worth. Founded in 1876, it was named for the Wichita Indians and the low-water river falls that once existed there. After the arrival (1882) of the Fort Worth and Denver City Railroad it became a cattle centre.

With the local discovery of oil and gas fields in the 1900s, the city developed petroleum industries. Agriculture (cotton, grains, and cattle), based on the surrounding irrigated region, remains an important part of a balanced economy, which includes the manufacture of glass fibre products, clothing, and electronic components. Midwestern State University was established there as a junior college in 1922. Inc. 1889. Pop. (1999 est.) city, 98,919; Wichita Falls MSA, 136,493.

Wick, royal burgh (1589), fishing port, and seat of the district of Caithness, Highland region, Scotland. Wick developed rapidly during the herring boom of the 19th century. Since then herring fishing has declined and been replaced by the smaller whitefish industry. Several light manufacturing industries have been established, including the Caithness glass-blowing factory. Wick airport provides links with the Orkney and Shetland Isles and major cities to the south. Pop. (1991) 7,681.

wickerwork, furniture made of real or simulated osier (rods or twigs) plaited into appropriate shapes. The Egyptians made furniture of this kind in the 3rd millennium BC. A well-known example of Roman wickerwork is the chair on a 3rd-century-AD relief in the Rheinisches Landesmuseum at Trier, Ger., showing a woman at her toilet. Furniture of this kind provided the cheapest and most comfortable form of seating, though the material of which it was made has rendered it ephemeral, and knowledge of its early history can only be deduced in the main from illustrations and literary references.



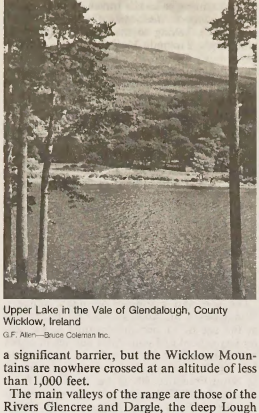
Roman wickerwork chair, detail from a stone relief showing a woman at her toilet, early 3rd century AD; in the Rheinisches Landesmuseum, Trier, Ger.

By courtesy of the Rheinisches Landesmuseum, Trier, Ger.

A simple open wickerwork, armless basket chair with a round seat—a type still produced—probably represents the historic shape; but more complex and specialized forms evolved in the 19th century. One particular form, with footrests, arms, and upholstered cushions, was evolved on the ocean liners that sailed to the tropics and was then adapted for domestic use. Although used predominantly for chairs, wickerwork was also employed for beds, cradles, and garden tables.

Wickham, William of: *see* Wykeham, William of.

Wicklow, Irish CILL MHANTÁIN, county in the province of Leinster, Ireland. It is bounded on the east by the Irish Sea and by Counties Wexford (south), Carlow and Kildare (west), and Dublin (north). County Wicklow includes much of the Leinster Chain mountain range, notably the Wicklow Mountains, and has fertile lowland areas. Much of its coast comprises rocky cliffs and excellent sand beaches. The main summits of the Leinster Chain are above 2,000 feet, with Lugnaquillia Mountain the highest at 3,039 feet (926 m); in places it is marked by waterfalls and river gorges. South of Lugnaquillia the range is not



Upper Lake in the Vale of Glendalough, County Wicklow, Ireland

G.F. Allen—Bruce Coleman Inc.

a significant barrier, but the Wicklow Mountains are nowhere crossed at an altitude of less than 1,000 feet.

The main valleys of the range are those of the Rivers Glencree and Dargle, the deep Lough (lake) Dan valley, and Glenmacnass, Glendasan, and Glendalough. The Avonmore is joined by the Avonbeg where it becomes the Avoca and is subsequently joined by the Aughrim. On the west side, the basin of the upper Liffey is filled largely with the Pollaphuca reservoir, which serves Dublin. Glaciation has strongly influenced the landscape of the county: some of the valleys have been deepened by ice, and many have moraines. Other glacial features include meltwater channels and deltas. Most of the farmland is on soils of glacial or meltwater origin, and improved land is found up to 1,000 feet or more in some valleys.

More than half the population lives in towns and villages. Bray is a seaside resort and residence for Dublin commuters, and an industrial centre. Greystones and Delgany are resorts and residential centres. Wicklow is a coastal market town with some industry. Arklow has some shipping, a pottery, and a strong market trade. A county council meets in Wicklow town, and there is a county manager. Arklow, Bray, and Wicklow are urban districts.

In the mountains the farms are generally small, with a few acres only given to oats and potatoes. Sheep are kept on the mountains. More than half the land is under crops or pasture. In the lower areas, mixed farming is general, with farms averaging about 70 acres (28 hectares). Crops include wheat, barley, and oats; beef and dairy cattle are raised, the former for the export trade or for the Dublin market. At Avoca, pyrites and low-grade copper ore have been mined with fluctuating intensity since the 1940s. There is a large fertilizer factory near Arklow. At Pollaphuca on the River Liffey a large hydroelectric project has been established. Area 782 square miles (2,025 square km). Pop. (1996) 102,000.

Wicklow Mountains, extensive mountain range in County Wicklow, Ireland, forming part of the Leinster Chain. The mountain area comprises a vast anticline (upwarp of rock strata), with granite exposed at the centre, and also slates and sandstones. Igneous intrusions form the Little Sugar Loaf (1,123 feet [342 m]) and the Great Sugar Loaf (1,654 feet [504 m]). The main summits of the range rise over 2,000 feet and consist of smoothly rounded granite hills, but the highest, Lugnaquillia (3,039 feet [926 m]), is capped with hard mica-schist rocks. There are many fine valleys in the range, including Glenmacnass, Glendasan, Glendalough, Glencree, and those of the Avonmore, Avoca, Aughrim, and Liffey rivers.

Wicksell, (Johan Gustaf) Knut (b. Dec. 20, 1851, Stockholm—d. May 3, 1926, Stocksund, Swed.), Swedish economist, the foremost in his generation and renowned for his pioneering work in monetary theory.

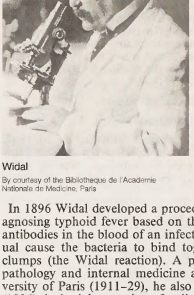
In *Geldzins und Güterpreise* (1898; *Interest and Prices,* 1936) he propounded an explanation of price-level movements by an aggregate demand–supply analysis focussed on the relations between prospective profit and interest rates. This made Wicksell a forerunner of modern monetary theory and anticipated the work of John Maynard Keynes in *A Treatise on Money* (1930). In *Über Wert, Kapital und Rente* (1893; *Value, Capital and Rent,* 1954), Wicksell emerged as an originator of the marginal productivity theory.

wickup (plant): *see* fireweed.

wicky (plant): *see* lambkill.

Wicliffe, John, Wicliffe also spelled WICLIF (English theologian): *see* Wycliffe, John.

Widal, (Georges-) Fernand-Isidore (b. March 9, 1862, Dellys, Alg.—d. Jan. 14, 1929, Paris), French physician and bacteriologist who made important contributions to the diagnosis, treatment, and prevention of many diseases.



Widal

By courtesy of the Bibliotheque de l'Academie Nationale de Medicine, Paris

In 1896 Widal developed a procedure for diagnosing typhoid fever based on the fact that antibodies in the blood of an infected individual cause the bacteria to bind together into clumps (the Widal reaction). A professor of pathology and internal medicine at the University of Paris (1911–29), he also recognized (1906) the body's retention of sodium chloride as a feature of nephritis (inflammation of the kidney) and cardiac edema (accumulation of excessive fluid in tissues as a result of heart disease), recommending salt deprivation in the treatment of both diseases. He demonstrated the increased fragility of red blood cells in cases of hemolytic jaundice and, with the French physician Georges Hayem, described the acquired form of the disease (the Hayem–Widal type, 1907). During World War I, Widal prepared an antityphoid–paratyphoid vaccine that appreciably reduced typhoid contagion among the allied armies.

Widener, George D. (b. Mar. 11, 1889, Philadelphia—d. Dec. 8, 1971, Chestnut Hill, Pa., U.S.), U.S. financier, breeder, owner and racer of Thoroughbred horses.

Scion of a wealthy Philadelphia family, Widener was educated privately and at the de-

Lancey School in Philadelphia. He managed the family's affairs and became a director of the Electric Storage Battery Company and of the Provident National Bank, Philadelphia.

In 1916, continuing the fondness for horses that was a family trait, Widener began to raise Thoroughbreds at Erdenheim Farm in Pennsylvania and also at Old Kenny Farm near Lexington, Ky. Among his best-known horses was Jaipur, who won the Travers Stakes and the Belmont Stakes in 1962. Other outstanding horses were Eight Thirty, Jamestown, What a Treat, and Bold Hour. Until his death at 82, Widener served as honorary chairman of the Jockey Club of New York City and of the New York Racing Association.

Widener, Peter A.B., in full PETER ARRELL BROWN WIDENER (b. Nov. 13, 1834, Philadelphia, Pa., U.S.—d. Nov. 6, 1915, Elkins Park, Pa.), American transportation magnate and philanthropist.

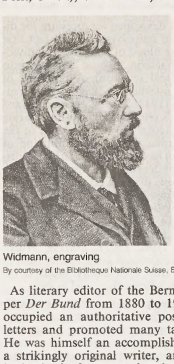
The son of poor parents, Widener began his working career as a butcher, eventually establishing a successful chain of meat stores. At the same time, he became active in Philadelphia politics, rising to the position of city treasurer in 1873. Later, making good use of his political connections, he and William L. Elkins gained control of Philadelphia's street railways, consolidating and modernizing the system in the process. They also invested in street railways in New York City, Chicago, and other cities as well as in public utilities around the United States—at their height presiding over holdings worth $1,500,000,000. Widener also participated in the organization of the United States Steel Corporation and the American Tobacco Company.

The possessor of a fortune estimated at $35,000,000, Widener donated more than $11,000,000 to various philanthropies, primarily in Philadelphia. His large art collection, which contained many masterpieces of European painting and a remarkable assemblage of Chinese porcelains and other decorative objects, was donated to the National Gallery, Washington, D.C., in 1942.

widgeon (duck): *see* wigeon.

Widin (Bulgaria): *see* Vidin.

Widmann, Joseph Viktor (b. Feb. 20, 1842, Nennowitz, Moravia, Austrian Empire [now in Brno, Czech Republic]—d. Nov. 6, 1911, Bern, Switz.), Swiss writer, editor, and critic.



Widmann, engraving
By courtesy of the Bibliotheque Nationale Suisse, Bern

As literary editor of the Bern daily newspaper *Der Bund* from 1880 to 1910, Widmann occupied an authoritative position in Swiss letters and promoted many talented writers. He was himself an accomplished though not a strikingly original writer, and he handled such classic forms as the short epic ("Buddha," 1869), the idyll ("Mose und Zipora," 1874), and iambic drama (*Oenone,* 1880) with charming ease. His travel books, notably *Spaziergänge in den Alpen* (1885; "Strolls in the Alps"), belong to the best of their kind; and his plays include *Maikäferkomödie* (1897; "May-bug's Comedy"), a pleasant and humorous allegory, and *Der Heilige und die Tiere* (1905; "The Saint and the Animals"), his profoundest work.

Widnes, locality in Halton district, county of Cheshire, England. It is situated on the north bank of the River Mersey at its lowest bridging point and on the southern periphery of the Liverpool metropolitan region. The modern town is a result of 19th-century industrial expansion and is a principal centre of the British chemical industry, owing largely to the proximity of the Cheshire salt fields and the Lancashire coalfield. Pop. (1981) 55,926.

Widor, Charles-Marie, in full CHARLES-MARIE-JEAN-ALBERT WIDOR (b. Feb. 21, 1844, Lyon, France—d. March 12, 1937, Paris), French organist, composer, and teacher.

The son and grandson of organ builders, Widor began his studies under his father and at the age of 11 became organist at the secondary school of Lyon. After studies in organ and composition in Brussels, he returned to Lyon (1860) to succeed his father as organist at Saint-François, where he remained for a decade. In 1870 the post of organist at Saint-Sulpice in Paris became vacant, and Widor was given the appointment for a year; he left it in 1934. He taught at the Conservatory in Paris, succeeding César Franck as professor of organ in 1890 and Théodore Dubois as professor of composition in 1896.

Among Widor's students at the Paris Conservatory were many of the most distinguished European organists active around the turn of the century, including Louis Vierne and Marcel Dupré. Albert Schweitzer studied organ under him, and Arthur Honegger and Darius Milhaud studied composition.

As a composer Widor is best remembered for his 10 symphonies for organ, although he also wrote two operas, a sizable body of ballet music, and various other vocal and orchestral works. Individual movements from many of his organ symphonies have become standard elements in recital repertory, most notably the "Toccata" from the *Fifth.* With Schweitzer, he edited the first five volumes of a definitive collection of J.S. Bach's works for organ.

widowbird: *see* whydah.

Widsith, Modern English FAR TRAVELER, Old English poem, probably from the 7th century, that is preserved in the Exeter Book, a 10th-century collection of Old English poetry. "Widsith" is an idealized self-portrait of a scop (minstrel) of the Germanic heroic age who wandered widely and was welcomed in many mead halls, where he entertained the great of many kingdoms. Because the heroic figures the minstrel claims to have visited range from the 4th to the 6th century, the poem is obviously a fictitious account; nevertheless, it is an ingenious compendium of the important figures in Germanic hero legend and a remarkable record of the scop's role in early Germanic society. *See also* Exeter Book.

Wied, Gustav, in full GUSTAV JOHANNES WIED (b. March 6, 1858, Holmegaard, near Nakskov, Den.—d. Oct. 24, 1914, Roskilde), Danish dramatist, poet, novelist, and satirist chiefly remembered for a series of what he called satyr-dramas.

Although Wied's satyr-dramas were meant to be read rather than performed, one, *Skærmydsler* (1901; "Skirmishes"), transcended the inherent difficulties of performance to become one of the great successes of the Royal Theatre. A few of his works, the play *Ranke Viljer og* $2 \times 2 = 5$ (1906; $2 \times 2 = 5$), and two collections of short stories, *Menneskenes Børn* (1894; *Children of Men*) and *En "Bohème"* (1894; *A Bohemian*), attained great popularity abroad. Wied committed suicide during the first year of World War I. His novels and bitterly humorous sketches still have considerable popularity in Denmark.

Wied-Neuwied, Maximilian, Prinz (prince) **zu,** in full ALEXANDER PHILIPP MAXIMILIAN, PRINZ ZU WIED-NEUWIED (b. Sept. 23, 1782, Neuwied, Prussia [now in Germany]—d. Feb. 3, 1867, Neuwied), German aristocratic naturalist, ethnographer, and explorer whose observations on a trip to the American West in the 1830s provide valuable information about the Plains Indians at that time.

Maximilian was the prince of the small state of Neuwied and served in the Prussian army. He undertook explorations in Brazil in 1815–17 and in North America in 1832–34. On the latter journey, he took with him the Swiss artist Karl Bodmer to record the landscapes and peoples they encountered. They traveled from Boston westward along the Ohio River to St. Louis, Mo., from where they traveled by steamboat up the Missouri River through what are now Missouri, Nebraska, South Dakota, North Dakota, and Montana. The westernmost point they reached on their journey was Fort McKenzie, a trading post in central Montana. Maximilian made copious notes of his contacts with the Mandan, Hidatsa, and other Indian tribes of the Missouri River area, while Bodmer made hundreds of superb watercolours and drawings of the landscapes and the Indians they encountered.

Maximilian's notes and Bodmer's pictures form an invaluable account of the language, dress, culture, and customs of several Indian tribes that subsequently almost disappeared owing to disease, war, and white encroachment on their lands. Maximilian wrote up his observations in *Reise in das innere Nord-America in den Jahren 1832 bis 1834,* 2 vol. (1839–41; *Travels in the Interior of North America*). An English translation of parts of his field journal was published in *People of the First Man: Life Among the Plains Indians in Their Final Days of Glory* (1976).

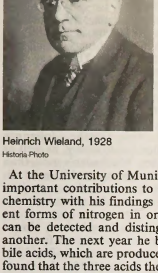
Wieland, Christoph Martin (b. Sept. 5, 1733, Oberholzheim, near Biberach [Germany]—d. Jan. 20, 1813, Weimar, Saxe-Weimar), poet and man of letters of the German Rococo period whose work spans the major trends of his age, from rationalism and the Enlightenment to classicism and pre-Romanticism.

Wieland was the son of a Pietist parson, and his early writings from the 1750s were sanctimonious and strongly devotional. During the 1760s, however, he discovered another, more sensual aspect of his nature and moved toward a more worldly, rationalistic philosophy. Although some of Wieland's work of this period includes erotic poetry, he began to find the balance between sensuality and rationalism that marked his mature writing. His *Geschichte des Agathon,* 2 vol. (1766–67; *History of Agathon*), which describes the process, is considered the first Bildungsroman, or novel of psychological development.

Between 1762 and 1766 Wieland published the first German translations of 22 of William Shakespeare's plays, which were to be influential models for Sturm und Drang ("Storm and Stress") dramatists. Wieland was professor of philosophy at Erfurt (1769–72) and was then appointed tutor to the Weimar princes. He was not a successful teacher but spent the rest of his life in or near the court circle as an admired man of letters. In 1773 he established *Der teutsche Merkur* ("The German Mercury"), which was a leading literary periodical for 37 years. Late in life, he considered himself a classicist and devoted most of his time to translating Greek and Roman authors. His allegorical verse epic *Oberon* (1780) foreshadows many aspects of Romanticism. This

presagement is ironic: Wieland was highly critical of the tenets of Romanticism, and the movement's foremost writers were largely contemptuous of his work.

Wieland, Heinrich Otto (b. June 4, 1877, Pforzheim, Ger.—d. Aug. 5, 1957, Munich), German chemist, winner of the 1927 Nobel Prize for Chemistry for his research on bile acids.



Heinrich Wieland, 1928
Historia-Photo

At the University of Munich Wieland made important contributions to structural organic chemistry with his findings (1911) that different forms of nitrogen in organic compounds can be detected and distinguished from one another. The next year he began research on bile acids, which are produced by the liver. He found that the three acids then isolated were of similar structure and were also structurally related to cholesterol.

His later work led him to believe that oxidation in living tissues is a matter of removing hydrogen atoms (dehydrogenation) and not of adding oxygen. This theory proved to be of great importance to physiology, biochemistry, and medicine.

Wielopolski, Aleksander, Hrabia (Count), MARGRABIA (margrave) GONZAGA MYSZKOWSKI (b. March 13, 1803, Sedziejowice, near Piñczów, Pol., Russian Empire—d. Dec. 30, 1877, Dresden, Ger.), Polish statesman who undertook a program of major internal reforms coupled with full submission to Russian domination in order to gain maximum national autonomy.

Born into an impoverished noble family, he studied law in Warsaw and philosophy in Germany. Returning to Poland, he brought a series of lawsuits against the purchasers of his family's ancestral estates. In 1831, during a revolt against Russian rule, the Polish insurrectionary government sent him to London to ask for aid, which was refused. When the revolt collapsed, he retired to private life.

In 1846 Wielopolski published a pamphlet in which he urged Poland to abandon all dreams of independence and submit to Russian rule. The Russians, pleased by his attitude, allowed him to enter the government, in which he sought with some success to gain more autonomy for Poland. When disturbances broke out in 1861, he was appointed to head the civil government in Poland. He then purged the administration of Russian officials, reformed the educational system, emancipated the Jewish minority, and relieved peasants of oppressive obligations to landowners.

At the same time Wielopolski relentlessly fought against revolutionaries. His order for the compulsory enrollment of all dissidents into the Russian Army precipitated another insurrection, finally crushed by the Russian Army. Wielopolski's program was wrecked, and he retired to private life in July 1863 and later emigrated to Saxony.

Wielkopolskie, *województwo* (province), southwestern Poland. It is made up of the former provinces (1975–98) of Poznań, Piła, Leszno, Konin, and Kalisz, as well as portions of Gorzów Wielkopolski, Zielona Góra, and Bydgoszcz. Mostly flat and relatively dry, the province is crossed by the Warta, Noteć, and Obra rivers. The major cities are Poznań, Kalisz, Konin, Piła, and Ostrów Wielkopolski. Agricultural products include milk, cereals, and sugar beets. Machinery, tobacco, and pharmaceuticals also are produced. Trade is centred in Poznań, the provincial capital. Brown coal (lignite) is extracted near Konin, where power stations and an aluminum smelter operate. The Piast Route, a tourist track associated with the beginnings of Polish history, runs through Lednica, Gniezno, and Trzemeszno, one of the earliest settlements in the region and the site of Poland's first monastery. The Warta and the Noteć rivers are used for inland shipping, and air travel is focused on Ławica international airport in Poznań. Area 11,516 square miles (29,826 square km). Pop. (2003 est.) 3,355,200.

Wieman, Carl E. (b. March 26, 1951, Corvallis, Ore., U.S.), American physicist who, with Eric A. Cornell and Wolfgang Ketterle, won the Nobel Prize for Physics in 2001 for creating Bose-Einstein condensate (BEC), a new ultracold state of matter.

After studying at the Massachusetts Institute of Technology (B.S., 1973), Wieman earned a Ph.D. from Stanford University in 1977. He then taught and conducted research at the University of Michigan in Ann Arbor until 1984, when he left for the University of Colorado.

Wieman's work on the Bose-Einstein condensate began in the late 1980s. This new state of matter, which had been predicted some 70 years earlier by Albert Einstein and the Indian physicist Satyendra Nath Bose, contains atoms so chilled and slow that they, in effect, merge and behave as one single large quantum entity. Working with Cornell, Wieman in 1995 used laser and magnetic techniques to slow, trap, and cool some 2,000 rubidium atoms to form a BEC. His work provided insight into the laws of physics and led to research on possible practical uses of BECs.

Wien, Wilhelm (Carl Werner Otto Fritz Franz) (b. Jan. 13, 1864, Gaffken, East Prussia—d. Aug. 30, 1928, Munich), German physicist who received the Nobel Prize for Physics in 1911 for his displacement law concerning the radiation emitted by the perfectly efficient blackbody. Because the accuracy of Wien's law declined for longer wavelengths, Max Planck was led further to his quantum theory of radiation.

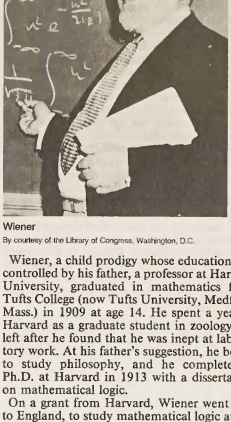
Although the radiation emitted from a blackbody is distributed over a wide range of wavelengths, there is an intermediate wavelength at which the radiation reaches a maximum. In 1893 Wien stated in his law that this maximum wavelength is inversely proportional to



Wien
Historia-Photo

the absolute temperature of the body. Wien was appointed professor of physics at the University of Giessen in 1899 and at the University of Munich in 1920. He also made contributions in the study of cathode rays (electron beams), X rays, and canal rays (positively charged atomic beams). His autobiography was published under the title *Aus dem Leben und Wirken eines Physikers* (1930; "From the Life and Work of a Physicist").

Wiener, Norbert (b. Nov. 26, 1894, Columbia, Mo., U.S.—d. March 18, 1964, Stockholm, Swed.), American mathematician who established the science of cybernetics. He attained international renown by formulating some of the most important contributions to mathematics in the 20th century.



Wiener
By courtesy of the Library of Congress, Washington, D.C.

Wiener, a child prodigy whose education was controlled by his father, a professor at Harvard University, graduated in mathematics from Tufts College (now Tufts University, Medford, Mass.) in 1909 at age 14. He spent a year at Harvard as a graduate student in zoology but left after he found that he was inept at laboratory work. At his father's suggestion, he began to study philosophy, and he completed a Ph.D. at Harvard in 1913 with a dissertation on mathematical logic.

On a grant from Harvard, Wiener went first to England, to study mathematical logic at the University of Cambridge under Bertrand Russell, and then to the University of Göttingen in Germany, to study with David Hilbert. On the advice of Russell, he also began a serious study of general mathematics, in which he was strongly influenced by Russell, by the English pure mathematician Godfrey Hardy, and to a lesser extent by Hilbert. He published his first paper in the mathematical journal *Messenger of Mathematics* in 1913 at Cambridge.

When World War I broke out, he tried to enlist but was rejected because of poor eyesight. In 1919, he was hired as an instructor by the mathematics department at the Massachusetts Institute of Technology (MIT), a department with no real tradition of scholarship or research at that time. It turned out, however, to have been the right move for Wiener, for he had entered upon an extremely productive period, just as MIT itself was beginning to develop into a great centre of learning in science and technology. Wiener remained on the MIT faculty until his retirement.

During the 1920s Wiener did highly innovative and fundamental work on what are now called stochastic processes and, in particular, on the theory of Brownian motion and on generalized harmonic analysis, as well as significant work on other problems of mathematical analysis. In 1933 Wiener was elected to the National Academy of Sciences but soon resigned, repelled by some of the aspects of institutionalized science that he encountered.

During World War II Wiener worked on the problem of aiming gunfire at a moving target. The ideas that evolved led to *Extrapolation, Interpolation, and Smoothing of Stationary Time Series* (1949), which first appeared as a classified report and established Wiener as a codiscoverer, with the Russian mathematician Andrey Kolmogorov, of the theory on the prediction of stationary time series. It introduced certain statistical methods into control and communications engineering and exerted great influence in these areas. This work also led him to formulate the concept of cybernetics.

In 1948 his book *Cybernetics; or, Control and Communication in the Animal and the Machine* was published. For a scientific book it was extremely popular, and Wiener became known in a much broader scientific community. Cybernetics is interdisciplinary in nature; based on common relationships between humans and machines, it is used today in control theory, automation theory, and computer programs to reduce many time-consuming computations and decision-making processes formerly done by human beings. Wiener worked at cybernetics, philosophized about it, and propagandized for it the rest of his life, all the while keeping up his research in other areas of mathematics.

After the war Wiener continued to contribute new ideas to widely divergent subjects, including mathematical prediction theory and quantum theory, providing the latter a possible solution to a difficulty that had been debated by the physicists Niels Bohr and Albert Einstein. Applying his theoretical description of Brownian motion to quantum phenomena, he showed how quantum theory, to the extent that it is based on probability, is consistent with other branches of science. A few weeks before his death, Wiener was awarded the National Medal of Science.

Wiener wrote many other works. He discussed the implications of mathematics for public and private affairs in *The Human Use of Human Beings* (rev. ed., 1954) and *God and Golem, Inc.: A Comment on Certain Points Where Cybernetics Impinges on Religion* (1964). Wiener also completed two volumes of autobiography, *Ex-Prodigy* (1953) and *I Am a Mathematician* (1956).

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Wiener Neustadt, city, Niederösterreich *Bundesland* (federal state), northeastern Austria. It lies near the Leitha River south of Vienna. Founded in 1194 by the Babenberg duke Leopold V, it was chartered in 1277 and had a mint at that time. It was most prosperous in the 15th century, when it was the residence of the Holy Roman emperor Frederick III, but it declined to such an extent in the 17th century that emigration was forbidden by imperial decree. The Reckturm, one of three towers surviving from the city's 13th-century fortifications, has become a museum. Notable buildings include the much-restored 13th-century cathedral (Liebfrauenkirche); the former Jesuit College (1737–43), now the town museum; the 13th-century castle where the Holy Roman emperor Maximilian I (1459–1519) was born and is entombed; and the Neukloster with the former Dominican church (13th century). The castle serves as the Theresian Military Academy (founded 1752). The considerable bomb damage that Wiener Neustadt suffered in World War II has led to much new construction, especially in housing. The city has technical and professional colleges and schools for the physically handicapped. Its important industries include metals, footwear, and textiles. Pop. (2001) 66,168.

Wieniawski, Henryk, Henryk also spelled HENRI (b. July 10, 1835, Lublin, Pol., Russian Empire [now in Poland]—d. March 31, 1880, Moscow, Russia), Polish violinist and composer, one of the most celebrated violinists of the 19th century.

Wieniawski was a child prodigy who entered the Paris Conservatory at age 8 and graduated from there with the first prize in violin at the unprecedented age of 11. He became a concert violinist at age 13 and began touring Europe with his brother Joseph, a pianist. His wide-ranging concert tours brought him international fame. In 1860 he was appointed violin soloist to the tsar of Russia, and from 1862 to 1869 he taught at the St. Petersburg Conservatory. In 1872–74 he toured the United States, playing with the pianist Anton Rubinstein, and he subsequently taught for a time at the Brussels Conservatory.

As a violinist Wieniawski was admired for his rich, warm tone, glowing temperament, and perfect technique. His own compositions for violin are Romantic in style and were intended to display his virtuosity. He composed two violin concerti, one in F-sharp Minor (Opus 14) and a quite popular one in D Minor (Opus 22). His other compositions include *Le Carnaval russe* (Opus 11), *Legende* (Opus 17), *Scherzo-tarantelle* (Opus 16), and études, mazurkas, and polonaises.

Wierzyński, Kazimierz (b. Aug. 27, 1894, Drohobyez, Austria-Hungary [now Drohobych, Ukr.]—d. Feb. 13, 1969, London, Eng.), a member of the group of Polish poets called Skamander.

Wierzyński moved to Warsaw after the restoration of Poland's independence at the close of World War I and became one of the foremost members of Skamander. His poetical debut was *Wiosna i wino* (1919; "Spring and Wine"), followed by *Wróble na dachu* (1921; "Sparrows on the Roof") and *Wielka Niedźwiedzica* (1923; "The Great She-Bear")—all inspired by carefree juvenile optimism. Of his interest in sports, he published in 1927 a collection of poems, *Laur Olimpijski* ("Olympic Laurel"), for which he won a special gold medal at the 1928 Olympic Games in Amsterdam. When World War II started he left Poland for Paris but in 1940 moved to Rio de Janeiro and later to Sag Harbor on Long Island, New York, where he lived for 20 years. In the 1960s he moved briefly to Rome and then to London.

In the 1930s and later in exile, the poet left the exuberance of his youth behind him and dealt with patriotic and religious themes. Among Wierzyński's collections of dolorous verse from this period are *Wolność tragiczna* (1936; "Tragic Freedom") and *Krzyże i miecze* (1946; "Crosses and Swords"). In his later poems—published in *Tkanka ziemi* (1960; "The Earth's Substance"), *Kufer na plecach* (1964; "A Trunk on My Back"), *Czarny polonez* (1968; "The Black Polonaise"), and other collections—he abandoned traditional metre and rhyme to use more modern poetic devices. He also wrote *The Life and Death of Chopin* (1949; Polish ed. *Życie Chopina,* 1953), with a foreword by Artur Rubinstein. Many of Wierzyński's poems appeared in English translation in *Selected Poems* (1959).

Wiesbaden, city, Darmstadt *Regierungsbezirk* (administrative district), capital of Hesse *Land* (state), southern Germany. It is situated on the right (east) bank of the Rhine River at the southern foot of the Taunus Mountains, west of Frankfurt am Main and north of Mainz. The settlement was known as a spa (Aquae Mattiacae) in Roman times. Its earthen fortifications (12 BC) were replaced by stone in AD 83, and a Roman wall (of which traces remain) was built about 370. The settlement subsequently became the site of a Franconian palace, and the name Wisibada ("Meadow Spring") first appeared in 829. It was made an imperial city in 1241, passed to the counts of Nassau in 1255, and became the capital of the principality of Nassau-Usingen in 1744. It was capital of the duchy of Nassau from 1806 until 1866, when it passed to Prussia; it then became capital of the district of Wiesbaden in Hesse-Nassau province. In 1946 Wiesbaden became the capital of the newly created *Land* of Hessen and incorporated Kastel, Amöneburg, and Kostheim (former right-bank suburbs of Mainz).

Wiesbaden is a rail junction, with varied industries. Important products include metal, concrete, electronics, machinery, transport equipment, and foodstuffs. There are also printing firms, publishing houses, and film studios. Wiesbaden is a wine centre, famous for its *Sekt* (German champagne).

As a spa, Wiesbaden was especially famous in the 18th and 19th centuries, when it was frequented by J.W. von Goethe, Johannes Brahms, and Fyodor Dostoyevsky, as well as various royal families. Wiesbaden's more than two dozen hot, saline springs and its mild climate, parklike setting, and other amenities continue to make it a popular resort and conference centre.

Although the city has a long history, almost no old architecture survives except from the Victorian period: the new town hall (1887), the Kaiser-Friedrich Baths (1913), the Greek Chapel (1855), and the castle (1840), which now houses the *Land* administration offices. The state theatre opened as an opera house and playhouse in 1894. The municipal museum houses an art gallery. Wiesbaden has various medical facilities, including a special rheumatism clinic and the German Diagnostic Clinic, and it is home for the Federal Statistical Office. The city also hosts an annual International Festival of Music, Ballet, and Drama (May) and is the site of a U.S. military base. Pop. (2002 est.) 271,076.

Wieschaus, Eric F. (b. June 8, 1947, South Bend, Ind., U.S.), American developmental biologist who shared the 1995 Nobel Prize for Physiology or Medicine, along with geneticists Edward B. Lewis and Christiane Nüsslein-Volhard (*qq.v.*), for discovering the genetic controls of early embryonic development. Working with Nüsslein-Volhard, Wieschaus expanded upon the innovative work of Lewis, who likewise based his studies on the fruit fly, or vinegar fly (*Drosophila melanogaster*), a popular species for genetic experiments.

Wieschaus graduated from the University of Notre Dame (B.S., 1969) and Yale University (Ph.D., 1974) and pursued postdoctoral work at the University of Zürich in Switzerland. He began working with Nüsslein-Volhard at the European Molecular Biology Laboratory (1978–81) in Heidelberg, W.Ger. In 1981 he joined the faculty of Princeton University as assistant professor, later becoming associate professor (1983) and full professor (1987).

With Nüsslein-Volhard at Heidelberg, Wieschaus examined mutations in 40,000 fruit fly families, discovering that about 5,000 of the fly's 20,000 genes are important to embryonic development and about 140 are essential. Their research, published in the English scientific journal *Nature* in 1980, generated the widely accepted model that three sets of genes control subdivision in the developing embryo: gap genes, a blueprint for general body development; pair-rule genes, which subdivide these general regions into body segments; and segment-polarity genes, which affect specific structures within these segments. Their work helped scientists to better understand congenital mutations in other animals, including humans.

Wiesel, Elie, byname of ELIEZER WIESEL (b. Sept. 30, 1928, Sighet, Romania), Romanian-born American novelist whose works provide a sober yet passionate testament of the destruction of European Jewry during World War II. He was awarded the Nobel Prize for Peace in 1986.

Wiesel's early life, spent in a small Hasidic community in the town of Sighet, was a rather hermetic existence of prayer and contemplation and was barely touched by the war. But in 1944 all the Jews of the town (annexed by Hungary in 1940), including Wiesel and the other members of his family, were deported by the Nazis to Auschwitz, where his mother and younger sister were killed. He was then sent as a slave labourer to Buchenwald, where his father was killed. After the war he settled in France, studied at the Sorbonne (1948–51), and wrote for French and Israeli newspapers. Wiesel went to the United States in 1956 and was naturalized in 1963. He was a professor at City College of New York (from 1972), and from 1976 he was professor of humanities at Boston College.

During his time as a journalist in France, he was urged by the novelist François Mauriac to bear witness to what he had experienced in the concentration camps. The outcome was Wiesel's first book, in Yiddish, *Un Di Velt Hot Geshvign* (1956; "And the World Has Remained Silent"), abridged as *La Nuit* (1958; *Night*), a semiautobiographical account of a young boy's spiritual reaction to Auschwitz. It is considered by some critics to be the most powerful literary expression of the Holocaust. His other works include *La Ville de la chance* (1962; *The Town Beyond the Wall*), a novel examining human apathy; *Le Mendiant de Jérusalem* (1968; *A Beggar in Jerusalem*), which raises the philosophical question of why people kill; *Célébration hassidique* (1972; *Souls on Fire*), a critically acclaimed collection of Hasidic tales; *Le Testament d'un poète juif assassiné* (1980; *The Testament*); *Le Cinquième fils* (1983; *The Fifth Son*); *Le Crépuscule, au loin* (1987; *Twilight*); and *L'Oublié* (1989; *The Forgotten*).

All of Wiesel's works reflect, in some manner, his experiences as a survivor of the Holocaust and his attempt to resolve the ethical torment of why the Holocaust happened and what it revealed about human nature. He became a noted lecturer on the sufferings experienced by Jews and others during the Holocaust, and his ability to transform this personal concern into a universal condemnation of all violence, hatred, and oppression was largely responsible for his being awarded the 1986 Nobel Prize for Peace.

Wiesel, Torsten Nils (b. June 3, 1924, Uppsala, Swed.), Swedish neurobiologist, corecipient with David Hunter Hubel and Roger Wolcott Sperry (*qq.v.*) of the 1981 Nobel Prize for Physiology or Medicine. All three scientists were honoured for their investigations of brain function, Wiesel and Hubel in particular for their collaborative studies of the structural and functional details of the visual cortex, located in the occipital lobes of the cerebrum.

Wiesel earned a medical degree from the Karolinska Institute in Stockholm in 1954. After remaining there for a year as an instructor in physiology, he accepted a research appointment at the Johns Hopkins University Medical School in Baltimore, Md., where his association with Hubel began. Wiesel moved, along with Hubel, to Harvard University in 1959 and was named the Robert Winthrop professor of neurobiology in 1974. He remained a Swedish subject.

Wiesengrund, Theodor, also called THEODOR WIESENGRUND ADORNO: *see* Adorno, Theodor Wiesengrund.

Wiesenthal, Simon (b. Dec. 31, 1908, Buczacz, Austria-Hungary [now Buchach, Ukraine]), founder and head (since 1961) of the Jewish Documentation Centre in Vienna. Wiesenthal was a longtime Nazi hunter who, with the cooperation of the Israeli, West German, and other governments, tracked down some 1,000 war criminals.

Wiesenthal received a degree in architectural engineering from the Technical University of Prague (1932) and settled in Lwów, Poland (now Lviv, Ukraine). When the city was seized by the Soviet Union in 1939, he had to close his "bourgeois" architectural practice but avoided being exiled to Siberia by bribing a commissar of the NKVD (Soviet secret police). After the Germans replaced the Soviet occupiers at Lwów in 1941, he was dragooned into forced labour and spent the last three years of the war miraculously evading death in a series of labour and concentration camps. Eighty-nine members of his and his wife's Jewish families were annihilated by the Nazis, but, after liberation in 1945, he and his wife, who had managed to pass as a Pole for much of the war, were reunited.

As soon as he had recovered his health, Wiesenthal began helping the U.S. Army gather evidence with which to prosecute Nazi war criminals. In Linz, Austria, in 1947, he and 30 volunteers opened the Documentation Centre on the Fate of Jews and Their Persecutors for the purpose of aiding Jewish refugees and providing evidence for war crimes trials. In 1954 the Linz office closed and its files were conveyed to Israel, but Wiesenthal continued on his own to ferret out former Nazis. Encouraged by the arrest of Adolf Eichmann in Argentina in 1960, he opened the Jewish Documentation Centre in Vienna in 1961 and, over the years, sought out Gestapo agents, SS officers, and other Nazis for trials, principally in West Germany. In 1967 he was primarily responsible for locating Fritz Stangl, the former commandant of the Treblinka and Sobibor death camps.

Wiesenthal wrote a number of books, including *KZ. Mauthausen* (1946; "Concentration Camp Mauthausen"), *Ich jagte Eichmann* (1961; "I Hunted Eichmann"), *Verjährung* (1964; "Statute of Limitations"), *The Murderers Among Us: The Simon Wiesenthal Memoirs* (1967), *Segel der Hoffnung* (1972; *Sails of Hope*), and *Der Fall Jaworska* (1975; "The Case of Jaworska").

Wieser, Friedrich von (b. July 10, 1851, Vienna, Austria—d. July 23, 1926, Sankt Gilgen), economist who was one of the principal members of the Austrian school of economics, along with Carl Menger and Eugen von Böhm-Bawerk.

Wieser attended the University of Vienna from 1868 to 1872 and then entered government service. Like his colleague, Böhm-Bawerk, Wieser was permitted to study under the three founders of the German school of historical economics—Karl Knies at Heidelberg, Wilhelm Georg Roscher at Leipzig, and Bruno Hildebrand at Jena. Menger's work exercised a profound influence upon Wieser. In 1884 he went to the University of Prague and in 1903 succeeded Menger at the University of Vienna. He subsequently occupied official positions and served as minister of commerce in the last government of the Austro-Hungarian Empire.

His two most important works are *Der natürliche Wert* (1889; "Natural Value") and *Grundriss der Sozialökonomik* (1914; "Foundations of Social Economy"). In the first of these he developed the Austrian-school theory of costs, building on Menger's subjective-value approach and introducing the concept of opportunity cost. In *Sozialökonomik* the principle of marginal utility is the starting point for an analysis of successively more elaborate systems of economic relationships.

wig, manufactured head covering of real or artificial hair worn in the theatre, as personal adornment, disguise, or symbol of office, or for religious reasons. The wearing of wigs dates from the earliest recorded times; it is known, for example, that the ancient Egyptians shaved their heads and wore wigs to protect themselves from the sun and that the Assyrians, Phoenicians, Greeks, and Romans also used artificial hairpieces at times.

It was not until the 16th century, however, that the wig again became a generally acceptable form of adornment or corrective for nature's defects, as in the case of Queen Elizabeth I. Men's perukes, or periwigs, for the first time since ancient Egypt, came into widespread use in the 17th century, after Louis XIII began wearing one in 1624. By 1665 the wig industry was established in France by the formation of a wigmakers guild.

The wig became a distinctive class symbol for more than a century. In the 17th century it attained its maximum development, covering the back and shoulders and flowing down the chest. During the same century, women also wore wigs, though less often than did men. Certain professions established specific wigs as part of their official costume; the practice is retained today only in some legal systems, notably that of the United Kingdom. Men's wigs in various forms were worn throughout the West in the 18th century, until the French and American revolutions swept away these and other symbols of social status.

From the 18th century, women wore wigs and hairpieces, but only surreptitiously. The popularity of women's naturally styled wigs in the 20th century, and candour about wearing them, increased substantially, especially after the development of wigs made from inexpensive synthetic hairs. In the Orient, wigs have been used rarely except in the traditional theatre of China and Japan.

Wigan, borough and district in the northwestern part of the metropolitan area of Greater Manchester, England. It lies along the River Douglas and the Leeds and Liverpool Canal. Neighbouring towns within the borough range from large industrial and commercial centres to small rural communities.

The traditional industries of the district are coal and cotton. Coal was being mined in the Wigan area by the 16th century, and the textile industry was at that time already well developed. Demand for coal increased in the 18th and 19th centuries, and by 1851 some 5,000 men and women were employed in the pits of what is now Wigan district. The mechanization of the textile industry in the late 18th century brought a considerable increase in the number of factories and the size of settlements. Industrialization was accelerated by the building of canals and railways to transport the area's coal, textiles, and heavy metals. Textiles and coal mining are still important, but in the period since 1945 there has been an influx of new industries—notably food processing, paper and packaging, and electrical and general engineering—which have broadened the economic structure. Area 77 square miles (199 square km). Pop. (2001) 301,417.

wigeon, also spelled WIDGEON, any of four species of dabbling ducks (family Anatidae), popular game birds and excellent table fare. The European wigeon (*Anas, or Mareca, penelope*) ranges across the Palaearctic and is occasionally found in the Nearctic regions. The American wigeon, or baldpate (*A. americana*), breeds in northwestern North America and winters along the U.S., Mexican, Central American, and Caribbean coasts, as well as on some inland waters. The white crown, green eye stripe, and brown back distinguish the male of this American species from the similar male European wigeon, which has a reddish

head, cream forehead, and gray back. Baldpates often graze like geese on young grasses, and they are fond of eelgrass, which they will steal from diving ducks such as the canvasback. The male Chiloë wigeon (*A. sibilatrix*) of South America helps raise the young—a rare trait among ducks. The Cape wigeon (*A. capensis*) of Africa is a nocturnal feeder.

Wiggin, Kate Douglas, *née* SMITH (b. Sept. 28, 1856, Philadelphia, Pa., U.S.—d. Aug. 24, 1923, Harrow, Middlesex, Eng.), American author who led the kindergarten education movement in the United States.

She was taught by her stepfather and attended private schools and a district school. In 1878 she headed the Silver Street Kindergarten in San Francisco—the first free kindergarten on the West Coast of the United States. In 1880 she organized the California Kindergarten Training School. Through her teaching and writing, she helped to spread the educational principles of Friedrich Froebel to American kindergarten proponents. She was married to Samuel B. Wiggin (d. 1889), a lawyer, in 1881 and to George Christopher Riggs, a New York businessman, in 1895.

Wiggin is also known as a prolific writer of children's literature, travel books, and educational texts. Her books include *The Birds' Christmas Carol* (1887), *Rebecca of Sunnybrook Farm* (1903), *Kindergarten Principles and Practice* (1896, with Nora A. Smith), and *The Republic of Childhood,* 3 vol. (1895–96). Her autobiography, *My Garden of Memory,* was published posthumously in 1923.

Wigglesworth, Michael (b. Oct. 18, 1631, Yorkshire?, Eng.—d. June 10, 1705, Malden, Mass. [U.S.]), British-American clergyman, physician, and author of rhymed treatises expounding Puritan doctrines.

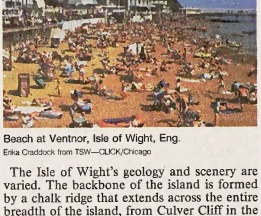
Wigglesworth emigrated to America in 1638 with his family and settled in New Haven. In 1651 he graduated from Harvard College, where he was a tutor and a fellow from 1652 to 1654 and again from 1697 to 1705. He preached at Charlestown, Mass., in 1653–54 and was pastor at Malden from 1656 until his death. In addition to his clerical duties, Wigglesworth practiced medicine and wrote numerous poems, including "A Short Discourse on Eternity," "Vanity of Vanities," and *God's Controversy with New England* (published 1871). The first two were appended to *The Day of Doom: or a Poetical Description of the Great and Last Judgment* (1662), a long poem in ballad measure using horrific imagery to describe the Last Judgment. Intended to edify Puritan readers, this work sold 1,800 copies within a year, an unusually high number in its time. Once the most widely read poet of early New England, Wigglesworth declined in popularity together with Puritanism and has since been considered a writer of doggerel verse. A modern edition of *The Day of Doom* prepared by Kenneth B. Murdock was published in 1929.

Wigglesworth, Sir Vincent (Brian) (b. April 17, 1899, Kirkham, Lancashire, Eng.—d. Feb. 11, 1994, Cambridge, Cambridgeshire), English entomologist, noted for his contribution to the study of insect physiology. His investigations of the living insect body and its tissues and organs revealed much about the dynamic complexity of individual insects and their interactions with the environment. His *Insect Physiology* (1934) is often considered the foundation for this branch of entomology.

After military service in France during World War I, Wigglesworth completed his education at the University of Cambridge and St. Thomas' Hospital in London. He lectured in medical entomology at the London School of Hygiene and Tropical Medicine and later was reader in entomology first at the University of London, then at Cambridge. In 1943 he was appointed director of the Agricultural Research Council Unit of Insect Physiology in Cambridge. He was knighted in 1964.

Among Wigglesworth's most significant discoveries were those concerned with metamorphosis, particularly the control of form and growth. In insects such as the South American blood-sucking bug *Rhodnius prolixis,* Wigglesworth was able to determine that a crucial growth hormone was produced in the neurosecretory cells of its brain, the first experimental demonstration of the function of such cells. He then discovered another hormone that actually prevented the development of adult characteristics in *R. prolixis* until the insect had reached the appropriate larval stage. Wigglesworth found that this hormone, which he called the juvenile hormone, was produced in the region of the endocrine gland known as the corpus allatum. He found that he could radically distort the developmental phases of his insect subjects by a selective manipulation of their hormonal levels. Finally, Wigglesworth was thus able to formulate a coherent theory of insect metamorphosis involving the selective activation by hormones of the insect's genetic components, which in turn determine its morphology and developmental character. Besides making these discoveries, Wigglesworth isolated the properties of various insect enzymes and the mechanism for the hatching of insect eggs.

Wight, Isle of, island and unitary authority, part of the historic county of Hampshire, lying off the south coast of England, in the English Channel. The island is separated from the mainland by a deep strait known as the Solent. The Isle of Wight is a diamond-shaped island extending 22.5 miles (36 km) from east to west and 13.5 miles (22 km) from north to south. Administratively, the Isle of Wight comprises a unitary authority, with its administrative centre at Newport.



Beach at Ventnor, Isle of Wight, Eng.
Erika Craddock from TSW—CLICK/Chicago

The Isle of Wight's geology and scenery are varied. The backbone of the island is formed by a chalk ridge that extends across the entire breadth of the island, from Culver Cliff in the east to The Needles in the west. This ridge is the thickest bed of chalk in the British Isles. The Needles are three detached masses of chalk that lie off the island's westernmost point and rise to about 100 feet (30 m). In the northern portion of the island, the chalk beds dip steeply beneath heavy soils that support oak woodlands. Southward, the chalk beds dip more gently, and there is a second range of downs in the extreme south of the island. The island's south coast is mostly cliffbound. Three rivers, the Eastern Yar, the Medina, and the Western Yar, flow northward into The Solent. The Medina almost bisects the island, and the Western Yar almost insulates the western Wight.

There are traces of human occupation of the island from the earliest times, but the Early Bronze Age seems to have been the period of most intense prehistoric settlement. There are also Roman remains, Vespasian having annexed the island in AD 43. The island was annexed to Wessex in 661 and subsequently bestowed on the king of Sussex. In 998 it was a headquarters of the marauding Danes. In 1377 the French so devastated the town of Newport (at the island's centre) that it lay uninhabited for two years. Charles I was imprisoned in Carisbrooke Castle in 1647–48 during the English Civil Wars. Osborne House, near Cowes, was a residence of Queen Victoria.

The Isle of Wight has a warm, mild climate and is one of the sunniest areas in the British Isles. Newport, at the head of the Medina Estuary, is now the island's main town, and Cowes, at the Medina's mouth, is the principal port and an internationally famous yachting centre. There are many holiday resorts—notably Freshwater, Yarmouth, Ryde, Sandown-Shanklin, and Ventnor—and tourism is one of the island's main economic bases. Boatbuilding, marine engineering, and the aerospace, plastics, and electronics industries are also important economically, and fruits and vegetables are grown on the southern part of the island. A major British maximum security prison is at Parkhurst, a suburb of Newport. Area 147 square miles (381 square km). Pop. (1998 est.) 127,000.

Consult the INDEX *first*

Wightman, Hazel Hotchkiss, *née* HAZEL VIRGINIA HOTCHKISS (b. Dec. 20, 1886, Healdsburg, Calif., U.S.—d. Dec. 5, 1974, Newton, near Boston, Mass.), American tennis player who dominated women's competition before World War I and was instrumental in organizing the Wightman Cup match between British and American women's teams.

The winner of 45 U.S. titles, she overpowered her opponents in the U.S. championship from 1909 to 1911, winning every event she entered in each year: the women's singles, the women's doubles, and the mixed doubles. She graduated from the University of California at Berkeley in 1911 and married George Wightman in 1912 (divorced 1940). She went on to win another singles title in 1919 and also won six doubles titles (1909–11, 1915, 1924, and 1928), the last two with Helen Wills.

In 1923 she donated a silver cup (the Wightman Cup) to the U.S. Lawn Tennis Association as a prize for an annual match between British and U.S. women's teams. She led the United States to victory in the first match, 7–0, and was team captain until 1948.

Wightman Cup, trophy awarded the winner of women's tennis matches held annually from 1923 to 1989 between British and American teams. A competition comprised five singles and two doubles matches. The cup itself was donated in 1923 by Hazel Hotchkiss Wightman (*q.v.*). The first contest, at Forest Hills, N.Y., on Aug. 11 and 13, 1923, was won by the United States. Matches were played in the United States in odd-numbered years and in Great Britain in even-numbered years. For winners, *see* Sporting Record: *Tennis.*

Wigman, Mary, original name MARIE WIEGMANN (b. Nov. 13, 1886, Hanover, Ger.—d. Sept. 18, 1973, West Berlin), German dancer, a pioneer of the modern expressive dance as developed in central Europe.

A pupil of Émile Jaques-Dalcroze and Rudolf Laban, she subsequently formulated her own theories of movement, often dancing without music or to percussion only. Although she made her debut as a dancer in 1914, her triumphant career as dancer-innovator-choreographer began after World War I. Her impact on dance throughout central Europe changed the course of dance history. Her pupils, numbering thousands, included Harald Kreutzberg, Yvonne Georgi, Margarethe Wallmann, and

Hanya Holm, the latter two exerting major influences on the development of American modern dance. She and her company toured the United States in 1930, and in 1931 a Wigman School was established in New York City under the direction of Holm, which, in 1936, became the Hanya Holm School. Wigman's works include *The Seven Dances of Life* (1918), *Totenmal* (1930), the entire opera *Orpheus and Eurydice* (1947) of Christoph Gluck, other operas, group works, and solos.

Wigmore, John Henry (b. March 4, 1863, San Francisco, Calif., U.S.—d. April 20, 1943, Chicago, Ill.), American legal scholar and teacher whose 10-volume *Treatise on the Anglo-American System of Evidence in Trials at Common Law* (1904–05), usually called *Wigmore on Evidence*, is generally regarded as one of the world's great books on law.

A Harvard graduate (B.A., 1883; LL.B., 1887), Wigmore taught at Keio University in Tokyo (1889–92) and at Northwestern University Law School, Chicago (from 1893; dean, 1901–29). He served as a colonel on the judge advocate general's staff during World War I and as an Illinois commissioner on uniform state laws (1908–24, 1933–43).

Wigmore, Roger Mortimer, 8th baron of: *see* March, Roger Mortimer, 1st earl of.

Wigner, Eugene Paul, Hungarian JENŐ PÁL WIGNER (b. Nov. 17, 1902, Budapest, Hung.—d. Jan. 1, 1995, Princeton, N.J., U.S.), Hungarian-born American physicist, joint winner, with J. Hans D. Jensen of West Germany and Maria Goeppert Mayer of the United States, of the Nobel Prize for Physics in 1963. He received the prize for his many contributions to nuclear physics, which include his formulation of the law of conservation of parity.

Wigner studied chemical engineering and received his Ph.D. from the Institute of Technology in Berlin in 1925. After serving as a lecturer there and at the University of Göttingen, he went to the United States. Apart from two years (1936–38) as professor of physics at the University of Wisconsin, he spent his academic life at Princeton University, serving as a professor of mathematical physics from 1938 until his retirement in 1971. He became a naturalized U.S. citizen in 1937. While still in Europe he had developed the principles involved in applying group theory to quantum mechanics and evolved the concept of the symmetry in space and time that marks the behaviour of subatomic particles. In 1936 he worked out the theory of neutron absorption, which later proved useful in building nuclear reactors.

In 1939, Wigner helped Leo Szilard persuade Albert Einstein to write the historic letter to President Franklin D. Roosevelt that set in motion the U.S. atomic-bomb project. During World War II he worked at the Metallurgical Laboratory at the University of Chicago, where he helped Enrico Fermi construct the first atomic pile. Wigner also conducted research on quantum mechanics, the theory of the rates of chemical reactions, and nuclear structure. His publications include *Gruppentheorie und Ihre Anwendung auf die Quantenmechanik der Atomspektren* (1931; *Group Theory and Its Application to the Quantum Mechanics of Atomic Spectra*), a classic text, and *Symmetries and Reflections* (1967).

Wigston, Oadby and (Leicestershire, Eng.): *see* Oadby and Wigston.

Wigtown, also called WIGTOWNSHIRE, former county, southwestern Scotland. Since the reorganization of 1975, it has been incorporated within Wigtown district, of Dumfries and Galloway region.

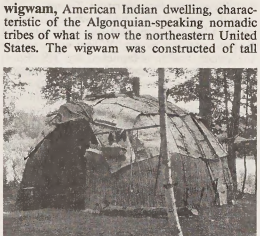
Hill forts and lake dwellings (crannogs) dating from the Iron Age abound in the area. During the early Middle Ages, Wigtown became the heart of Galloway, a district that was ruled by Scottish-Norse kings and that covered most of southern Scotland. In the 1120s Fergus, the ruler of Galloway, reconstituted the area's Anglian bishopric, which was first established in the 8th century, and he built a priory at Whithorn as the bishopric's cathedral. The lands of Fergus's descendants eventually passed by marriage to the Balliol family and then to the Douglases, who purchased the earldom of Wigtown about 1372. Under that family, the region, which had long been entitled to its own code of laws, came under the general law of Scotland in 1426. After the fall of the Douglases in 1455, the Kennedy family obtained a dominant influence in Wigtown. The region still has many castles dating from the 1470s to the early 17th century.

Wigtown, district, Dumfries and Galloway region, southwestern Scotland. Created by the reorganization of 1975, it includes the former county of Wigtown and the western part of the former county of Kirkcudbright. The district is in Scotland's extreme southwest.

In the western part of the district is the distinctive hammerhead peninsula of The Rhins (Norse: "Headlands"). The isthmus connecting The Rhins with the mainland is deeply indented by Luce Bay on the south and by Loch Ryan on the north. The central part of Wigtown occupies a southward-jutting peninsula bounded by Luce Bay and Wigtown Bay. The eastern part of the district is hilly.

The mild, damp climate favours pastoral rather than crop agriculture. Sheep raising predominates on the northeastern moors. Beef cattle are fattened on lower land, and many pigs are kept. The only significant cash crop is early potatoes. The numerous Ayr dairy cattle support several creameries, the main industry of the area. Sand and gravel are extracted on the isthmus. Stranraer is the seat of the district authority. Area 679 square miles (1,759 square km). Pop. (1995 est.) 29,680.

wigwam, American Indian dwelling, characteristic of the Algonquian-speaking nomadic tribes of what is now the northeastern United States. The wigwam was constructed of tall



Wigwam of the southwestern Ojibwa (Chippewa), Lac du Flambeau, Wis., 1933
Milwaukee Public Museum

saplings driven into the ground, bent over, and tied together near the top. This basic structure was covered with large overlapping mats of woven rushes or of sewn bark that were tied to the saplings, which came together to form a conical or dome shape.

Wihtred (d. April 23, 725), king of Kent who came to the throne in 690 after a period of anarchy.

Wihtred was not sole king until 692 at the earliest, for Bede, the 8th-century historian, states that Swaefred, king of the East Saxons, was joint ruler in this year. Wihtred, however, seems to have become sole king by 694. At his death, 31 years later, he left the kingdom to his sons Aethelberht, Eadberht, and Alric.

During the fifth year of his reign (probably 695), Wihtred issued a code of laws in a council held at a place called Berghamstyde (Barham?). Copies of this code still exist.

A grant of privileges to the Christian church, purportedly issued by Wihtred, follows the entry for the year 694 in the Anglo-Saxon Chronicle. Although scholars do not accept this grant as genuine, the claim that Wihtred issued such a document does illustrate his close ties with the church.

Wilamowitz-Moellendorff, Ulrich von, in full EMMO FRIEDRICH RICHARD ULRICH VON WILAMOWITZ-MOELLENDORFF (b. Dec. 22, 1848, Markowitz, Prussia [Germany]—d. Sept. 25, 1931, Berlin, Ger.), German classical scholar and teacher whose studies advanced knowledge in the historical sciences of metrics, epigraphy, papyrology, topography, and textual criticism.

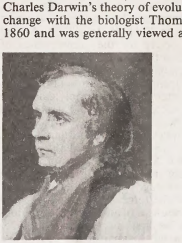
Educated at the universities of Bonn and Berlin, Wilamowitz-Moellendorff served in the Franco-German War (1870) and traveled through Italy and Greece. He taught successively at the universities of Berlin, Greifswald, and Göttingen before accepting the chair of Greek studies at Berlin in 1897.

Among Wilamowitz-Moellendorff's many books were studies and texts of the Greek tragedians, Homer and the *Iliad,* Hesiod, Pindar, Plato, and Aristotle. His *Griechisches Lesebuch* (1902; "Greek Reader"), which became a standard text, was influential in its emphasis on Hellenistic and later Greek writers, including the Church Fathers, as well as classical authors. In 1902 he became editorial director of the *Inscriptiones Graecae.* He also was editor of the series *Philologische Untersuchungen* (1880–1925; "Philological Investigations"). His last book was *Der Glaube der Hellenen* (1931–32; "The Religious Belief of the Greeks").

Wilberforce, Samuel (b. Sept. 7, 1805, London, Eng.—d. July 19, 1873, near Leatherhead, Surrey), British cleric, an Anglican prelate and educator and a defender of orthodoxy, who typified the ideal bishop of the Victorian era. He was a major figure in the preservation of the Oxford Movement, which sought to reintroduce 17th-century High Church ideals into the Church of England.

The son of the politician and antislavery philanthropist William Wilberforce, he was ordained an Anglican priest in 1829 and served as rector at Brighstone, Isle of Wight (1830–40), and at Alverstoke, Hampshire (1840–45). In 1845, during the critical period in the Oxford Movement when its leader John Henry Newman converted to Roman Catholicism, Wilberforce was appointed bishop of Oxford. Though only partially supportive of the aims of the Oxford Movement, he exerted his influence to prevent its disintegration.

A frequent critic of liberal bishops, dissenters, and biblical scholars, Wilberforce attacked Charles Darwin's theory of evolution in an exchange with the biologist Thomas Huxley in 1860 and was generally viewed as the loser of



Samuel Wilberforce, detail from a portrait by George Richmond; in the National Portrait Gallery, London
By courtesy of the National Portrait Gallery, London

the debate. Like others in the Oxford Movement, he encouraged the revival of religious communities within Anglicanism, and at Cuddesdon, in 1854, he founded one of the first Anglican theological colleges. He was briefly a chaplain to the House of Lords and from 1847 to 1869 served as lord high almoner to Queen Victoria. In 1869 he was named bishop of Winchester, and in 1870 he initiated the movement to modernize the language of the King James Version of the Bible, a project that resulted in the Revised Version (New Testament, 1881; Old Testament, 1885; Apocrypha, 1895). Among Wilberforce's numerous writings are (with his brother Robert) *The Life of William Wilberforce,* 5 vol. (1838), *Agathos, and Other Sunday Stories* (1840), and *The History of the Protestant Episcopal Church in America* (1844).

Wilberforce, William (b. Aug. 24, 1759, Hull, Yorkshire, Eng.—d. July 29, 1833, London), British politician and philanthropist who from 1787 was prominent in the struggle to abolish the slave trade and then to abolish slavery itself in British overseas possessions.



William Wilberforce, detail of an unfinished painting by Sir Thomas Lawrence, 1828; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

At Cambridge, where he became a close friend of the future prime minister William Pitt the Younger, Wilberforce was known as an amiable companion rather than an outstanding student. In 1780 both he and Pitt entered the House of Commons, and he soon began to support parliamentary reform and Roman Catholic political emancipation, acquiring a reputation for radicalism that later embarrassed him, especially during the French Revolution, when he was chosen an honorary citizen of France (September 1792). From 1815 he upheld the Corn Laws (tariffs on imported grain) and repressive measures against working-class agitation.

Wilberforce's abolitionism was derived in part from evangelical Christianity, to which he was converted in 1784–85. In 1787 he helped to found a society for the "reformation of manners" called the Proclamation Society (to suppress the publication of obscenity) and the Society for Effecting the Abolition of the Slave Trade—the latter more commonly called the Anti-Slavery Society. He and his associates—Thomas Clarkson, Granville Sharp, Henry Thornton, Charles Grant, Edward James Eliot, Zachary Macaulay, and James Stephen—were first called the Saints and afterward (from 1797) the Clapham Sect, of which Wilberforce was the acknowledged leader. In the House of Commons, Wilberforce was an eloquent and indefatigable sponsor of antislavery legislation. He achieved his first success on March 25, 1807, when a bill to abolish the slave trade in the British West Indies became law. This statute, however, did not change the legal position of persons enslaved before its enactment, and so, after several years in which Wilberforce was concerned with other issues, he and Sir Thomas Fowell Buxton urged (from 1821) the immediate emancipation of all slaves. In 1823 he aided in organizing and became a vice president of the Society for the Mitigation and Gradual Abolition of Slavery Throughout the British Dominions—again, more commonly called the Anti-Slavery Society. Turning over to Buxton the parliamentary leadership of the abolition movement, he retired from the House of Commons in 1825; the Slavery Abolition Act he had sought was passed one month after his death.

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Wilbrord, SAINT: *see* Willibrord, Saint.

Wilbur, Richard (Purdy) (b. March 1, 1921, New York, N.Y., U.S.), American poet associated with the New Formalist movement.

Wilbur was educated at Amherst College, Amherst, Mass., and Harvard University, where he studied literature. He fought in Europe during World War II and earned a master's degree from Harvard in 1947. With *The Beautiful Changes and Other Poems* (1947) and *Ceremony and Other Poems* (1950), he established himself as an important young writer. These early poems are technically exquisite and formal in their adherence to the convention of rhyme and other devices.

Wilbur next tried translating and in 1955 produced a version of Molière's play *Le Misanthrope,* which was followed by Molière's *Tartuffe* (1963), *The School for Wives* (1971), and *The Learned Ladies* (1978) and by Racine's *Andromache* (1982). In 1957 he won a Pulitzer Prize for poetry for *Things of This World: Poems* (1956), which was enthusiastically hailed as less perfect but more personal than his previous poetry. Wilbur wrote within the poetic tradition launched by T.S. Eliot, using irony and intellect to create tension in his poems. Some critics demanded more energy from his poems; this complaint was partially assuaged with the publication of *Advice to a Prophet and Other Poems* (1961), *Walking to Sleep* (1969), and *The Mind Reader: New Poems* (1976). He also wrote the lyrics for Leonard Bernstein's acclaimed musical comedy version of *Candide* (1957), children's books such as *Loudmouse* (1963) and *Opposites* (1973), and criticism, collected as *Responses: Prose Pieces 1953–1976* (1976). He was poet laureate of the United States in 1987–88.

Wilbye, John (baptized March 7, 1574, Diss, Norfolk, Eng.—d. September 1638, Colchester, Essex), English composer, one of the finest madrigalists of his time.

Wilbye was the son of a successful farmer and landowner. His musical abilities early attracted the notice of the local gentry; when one of them married Sir Thomas Kytson of nearby Hengrave Hall, Bury St. Edmunds, Wilbye became (*c.* 1595) resident musician there. The Kytsons treated him handsomely, leasing him a prosperous sheep farm in 1613; in time he came to own lands in Diss, Bury, and elsewhere. When, on the death of Sir Thomas' widow in 1628, the household broke up, Wilbye was employed by Kytson's younger daughter in Colchester.

Wilbye's fame rests on a mere 66 madrigals, all but two of them published in his volumes of 1598 and 1609 (republished in vol. 6 and 7 of *The English Madrigal School,* ed. by E.H. Fellowes, 1913–24). His achievement lies in the grave music of his "serious" madrigals, a style then largely unpracticed in England. The "new poetry" of the Italianizing poets Sir Philip Sidney and Edmund Spenser, which flourished from 1580 to 1600, found in Wilbye's settings its perfect musical equivalent. He was far more appreciative of literary excellence in choosing texts for his music than most of his fellow madrigalists, and he also set to music many translations of Italian verse.

Wilbye spread the general emotional purport of his text (usually amorous) over the whole composition; abrupt contrasts and changes of mood were abandoned in favour of a prevailing tone, and this gave his madrigals an artistic unity rarely attained by his English contemporaries. Wilbye was a master of rhythm, and his alert ear for prosody fills his music with passages in which the verbal accent is counterpointed against the musical metre. He also experimented with sequence, recurring refrains, and thematic development in such works as "Adieu, sweet Amaryllis" and the more complex "Draw on, sweet night." The latter and the well-known "Flora gave me fairest flowers" and "Sweet honey-sucking bees" display Wilbye's skill in vocal orchestration: the full number of voices is not kept in constant play, but for much of the time the composer writes for ever-changing smaller groups within the ensemble.

Wild, Jonathan (b. *c.* 1682, Wolverhampton, Staffordshire, Eng.—d. May 24, 1725, London), master English criminal of early 18th-century London, leader of thieves and highwaymen, extortionist, and fence for stolen goods.

Married while in his teens, Wild at about the age of 21 deserted his wife and child for the life of London, where he quickly learned the criminal trade while held in a debtors' prison. He was a master organizer, eventually directing a large array of thieves and felons and handling the distribution of spoils. Criminals who ignored or resisted his organization were frequently betrayed; some 120 men, it is said, went to the gallows on Wild's testimonies or leaks to the authorities. At last, after some 15 years of criminal lordship, Wild himself was arrested on a minor felony charge, found guilty, and hanged at Tyburn.

wild ass: *see* ass.

wild boar, also called WILD PIG, any of the wild members of the pig species *Sus scrofa* (family Suidae, order Artiodactyla), the ancestors of domestic pigs. *See* boar.

Wild Bunch, a collection of cowboy-outlaws who flourished in the 1880s and '90s in Wyoming, Colorado, Utah, and surrounding states and territories. Their chief hideouts were Hole in the Wall, a nearly inaccessible grassy canyon and rocky retreat in north-central Wyoming; Brown's Hole (now Brown's Park), a hidden valley of the Green River, near the intersection of the borders of Wyoming, Colorado, and Utah; Robbers' Roost, a region of nearly impenetrable rugged canyons in east-central Utah; and the Wilson W.S. Ranch near Alma, N.M. Each area had cabins and corrals; rustled horses and cattle could be grazed at Hole in the Wall and Brown's Hole.

On Aug. 18, 1896, according to local Western lore (the truth of which cannot be determined), over 200 outlaws from regional gangs gathered at Brown's Hole, where Butch Cassidy (*q.v.*) proposed to organize a Train Robbers' Syndicate, which became familiarly known as the Wild Bunch. Cassidy and Kid Curry contested for leadership, with the more amiable and more efficiently larcenous Cassidy winning out.

However, the outlaws never constituted a single organized gang. They paired off or grouped for individual robberies of banks, trains, and paymasters and for rustling horses or cattle. Aside from Cassidy and Kid Curry, other notables in the Wild Bunch were Elzy Lay (*q.v.*), Harry Longabaugh (the Sundance Kid; *q.v.*), Ben (the "Tall Texan") Kilpatrick,

George Sutherland ("Flat Nose") Curry, Will Carver, and O.C. ("Camilla") Hanks. Soldiers, Pinkerton detectives, and lawmen eventually captured or killed most of the Wild Bunch in the late 1890s and the early 20th century. A few—including Butch Cassidy and the Sundance Kid—renewed their outlaw careers in South America.

wild carrot (plant): *see* Queen Anne's lace.

wild cucumber, also called BALSAM APPLE (species *Echinocystis lobata*), climbing plant of the gourd family (Cucurbitaceae), native to eastern North America. The true balsam apple is *Momordica balsamina.*



Wild cucumber (*Echinocystis lobata*)
Jeanne White from The National Audubon Society Collection/Photo Researchers—EB Inc.

The wild cucumber has three to seven sharply lobed leaves; forked, coiled tendrils; six-petaled white flowers; and a fleshy, oval, four-seeded fruit that is covered with prickles. It is frequently planted to cover arbors and fences.

wild duck, in the Northern Hemisphere, common name for the mallard (*q.v.*).

wild flower, also spelled WILDFLOWER, any flowering plant growing without intentional human aid. Wild flowers are the source of all cultivated garden varieties of flowers. Although most wild flowers are native to the region in which they occur, some are the descendants of flowering plants introduced from other lands. The bright flowers characteristic of the Hawaiian Islands, for example, are nearly all native to other parts of the tropics and subtropics. Most were taken purposely to the islands for cultivation but spread rapidly into the fertile lowlands, displacing the less-colourful native species and leaving only the steep mountainsides to the original flora. In the lowlands of the United States and Europe most wild flower species are native; others are migrants.

Disturbance of the native flora by humans began in prehistoric times. For example, fires that escaped from the control of their human makers are thought to have burned off native vegetation and made way for aggressive species from the same or other areas. For instance, one of the best-known buttercups of northern Europe, *Ranunculus acris,* probably became more abundant and widespread as the forests were burned away. In the lowlands of northern Europe, this species probably became modified during the Stone Age into some new forms better adapted to habitats created by human actions. Two forms occurring in the northern United States and Canada, which had been introduced into eastern North America by the early 19th century, gradually spread across the continent, one becoming common in the state of Washington only within the 20th century.

The distinction of weeds from wild flowers depends upon the purpose of the classification. A weed is a plant that, from a human perspective, is out of place; that is, one growing where it is unwanted. Sunflowers are looked upon as weeds when growing in cultivated fields or on grazing land of the Great Plains of North America but as wild flowers in uncultivated valleys. The sunflower also is a crop plant cultivated for its seeds; in some places it is a garden flower.

There may be as many as 250,000 species of flowering plants, thousands of which are wild flowers. Relatively few occurring on one continent may be found on another, and individual parts of the same continent may have almost wholly different floras, for wild flowers and other plants are affected by many factors, especially moisture and temperature.

Moisture variation may be extreme on the opposite sides of the same mountain range. Temperature changes due to altitude or latitude are marked by corresponding variations in flora. Over long distances from north to south, even in such level areas as the plains that stretch between Saskatchewan and Texas, there is almost a complete change with latitude in wild flowers as well as other plants. Many tropical and subtropical species are limited in northward distribution by the occurrence of any frost.

The distribution of wild flowers and other plants is segregated roughly into those of the tropics and subtropics, the horse latitudes (at about latitude 30° north and south) of both hemispheres, the temperate regions of both the Northern and Southern Hemispheres, and the Arctic and Antarctic and the summits of mountain chains ranging to the southward.

Some wilderness areas and their native flora have been preserved in national, state or provincial, and local parks and monuments, particularly in the United States and Canada, but in general the once vast areas of wild flowers have not been preserved. These tracts of land were most vulnerable to human destruction because they were easily converted to cropland, grazing land, or settlements.

wild ginger (genus *Asarum*), any of about 75 species of perennial herbs of the birthwort family (Aristolochiaceae), distributed throughout North Temperate areas of the world. The leaves and underground stems (rhizomes) of some *Asarum* species give off a pleasant odour when bruised, and dried rhizomes are sometimes used as a substitute for ginger.

Canadian wild ginger, or snakeroot (*A. canadense*), grows about 15 to 30 cm (6 to 12 inches) tall in shady woods in eastern North America. It usually bears two heart-shaped, downy leaves and a single inconspicuous cup-shaped flower. The flower develops in the angle between two leafstalks at the surface of the ground and has three reddish brown lobes. This plant is a useful but coarse ground cover. European wild ginger, or asarabacca (*A. europaeum*), a creeping, hairy-stemmed plant with bell-shaped brown flowers, is native to Europe and Asia. It was formerly used in various medicines, particularly purgatives, and in snuff.



Canadian wild ginger (*Asarum canadense*)
W.H. Hodge

wild lavender: *see* chaste tree.

wild mango, also called DIKA (*Irvingia gabonensis*), tropical African tree, of the family Ixonanthaceae (Irvingiaceae), notable for its edible yellow fruit, which somewhat resembles the mango. The seed is rich in a fat used locally to make both bread and a type of butter. The wood is very hard and is used locally in building construction.

wild oat, any of several tufted annual grasses of the genus *Avena* (family Poaceae), native to Eurasia. Wild oats are sometimes cut for hay, and young plants provide forage for grazing animals.

The best-known species is *A. fatua,* which has become a common field and roadside weed in temperate Australia, North America, and southern Africa. It grows in small tufts about 0.9 to 1.2 m (3 to 4 feet) tall. Mature spikelets are bell-shaped, with bent, bristlelike projections.



Wild oats (*Avena fatua*)
Grant Heilman– EB Inc.

wild pig, also called WILD BOAR, any of the wild members of the pig species *Sus scrofa* (family Suidae, order Artiodactyla), the ancestors of domestic pigs. *See* boar.

wild pink (orchid): *see* dragon's-mouth.

wild pumpkin: *see* calabazilla.

wild radish, also called JOINTED CHARLOCK (species *Raphanus raphanistrum*), widespread annual weed of the mustard family (Brassicaceae), native to Eurasia and naturalized in North America. It is believed by some authorities to be the ancestor of the domestic radish (*R. sativus*). Wild radish has a stout taproot, a rosette of unequally divided leaves and very bristly flowering stalks 60 cm (2 feet) tall. The four-petaled flowers may be yellow, lilac, white, or violet. The fruits, borne below the flower head, are narrowly oval and constricted around the 4 to 10 seeds.

wild rice, also called INDIAN RICE, WATER RICE, or WATER OATS (species *Zizania aquatica*), coarse annual grass of the family Poaceae whose grain, now often considered a delicacy, has long been an important food of North American Indians. Despite its name, the plant

is not related to rice (*Oryza sativa*). Wild rice grows in shallow water in marshes and along the shores of streams and lakes in north-central North America. Natural stands of wild rice formerly provided a staple food of many Indians of the Midwest. Cultivated varieties of wild rice are now grown in man-made paddies in Minnesota and California, where the plants



Wild rice (*Zizania aquatica*)
W.H. Hodge

are planted and harvested on a large scale by mechanical means. Natural and cultivated stands also provide food and shelter for waterfowl and other birds.

The wild rice plant is about 1 to 3 m (3 to 10 feet) tall and is topped with a large, open flower cluster. The ripened grains, dark brown to purplish black, are slender rods 1 to 2 cm (0.4 to 0.8 inch) long. A closely related perennial, *Z. caducifolia* (or *Z. latifolia*), is cultivated as a vegetable in eastern Asia.

wild rye, also called LYME GRASS (genus *Elymus*), any of a group of about 50 species of



Canada wild rye (*Elymus canadensis*)
Alfred C. Tegethoff

perennial forage grasses in the family Poaceae that are native to temperate and cool parts of the Northern Hemisphere. Giant wild rye (*Elymus cinereus*), Virginia wild rye (*E. virginicus*), and Canada wild rye (*E. canadensis*) are the most widespread North American species.

Sea lyme, or dune, grass (*E. arenarius*) is a Eurasian species 0.6 to 2.5 m (2 to 8 feet) tall, with creeping rootstocks and flowers borne in dense terminal spikes resembling those of rye. It is used as a sand binder on coastal dunes.

wild-water racing, also called WHITE-WATER RACING, canoe or kayak racing down swift-flowing, turbulent streams called wild water (often "white water" in the United States). The sport developed from the riding of rapids in small boats and rafts, a necessary skill for explorers, hunters, and fishermen. Later it became an increasingly popular form of recreation in parts of Europe and the United States.

International competition, which dates from 1950, has been dominated by Europeans. Streams are graded for difficulty on a six-point scale, from those that are easily negotiable to those that may be attempted only at the risk of life. Contestants wear crash helmets and life jackets. They leave the starting point at intervals, and the person who covers a three- to eight-kilometre (two- to five-mile) course in the least time is the winner. Although they compete in separate classes, the canoes and kayaks used are quite similar—decked over completely except for a hole for the rider, who wraps a plastic spray skirt about his waist to keep out water.

Wild West show, theatrical extravaganza begun in 1883 by William Frederick "Buffalo Bill" Cody. Cody, an Indian scout and Western hero, first turned to acting and then to producing and promoting his own Wild West show. In 1887 his show was performed at Madison Square Garden, New York City, with a cast of 100 Indians; Annie Oakley, the sharpshooter; other trick riders, ropers, and shooters; and such wild animals as buffalo, elk, bear, moose, and deer.

The four-hour spectacle, including Indian war dances and an "attack" on a stagecoach, went on to tour England and Europe with such success that Queen Victoria saw the show three times.

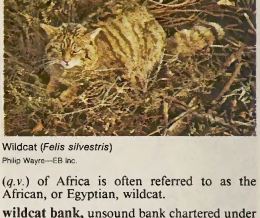
An early rival, Pawnee Bill, merged with Cody in 1908. After Cody died in 1917, his many followers kept alive the tradition of his Wild West shows.

wildcat (species *Felis silvestris*), a small wild member of the cat family (Felidae) native to Eurasia. The name wildcat is also used as a general term for feral domestic cats and for any of the smaller wild species of the cat family.

The European wildcat inhabits forested regions from Scotland through continental Europe to western Asia. It is similar to the domestic cat but has longer legs, a larger, flatter head, and a full, relatively short tail ending in a rounded (not pointed) tip. The coat is yellowish gray with dark stripes and bands in the striped tabby pattern; the tail is black-ringed. The adult wildcat is 50 to 80 cm (20 to 32 inches) long, excluding a 25- to 35-centimetre tail; it stands 35–40 cm (14–16 inches) high at the shoulder and weighs from 3 to 10 kg (6.6 to 22 pounds).

The European wildcat is a solitary, nocturnal animal that preys on birds and small mammals and is reported to raid farms, stealing poultry and lambs. It breeds once yearly (in spring) in continental Europe and twice (sometimes three times) yearly in Scotland. A litter consists of three to six kittens; the gestation period is 68 days. The wildcat interbreeds with the domestic cat. Certain authorities believe that the purity of the Scottish wildcat (one of the several races) is being threatened by interbreeding.

In North America, the lynx and bobcat (*q.v.*) are sometimes called wildcats. The Caffre cat



Wildcat (*Felis silvestris*)
Philip Wayre—EB Inc.

(*q.v.*) of Africa is often referred to as the African, or Egyptian, wildcat.

wildcat bank, unsound bank chartered under state law during the period of uncontrolled state banking (1816–63) in the United States. Such banks distributed nearly worthless currency backed by questionable security (*e.g.*, mortgages, bonds) and were located in inaccessible areas to discourage note redemption. Note circulation by state banks ended after the passage of the National Bank Act of 1863, which provided for the incorporation of national banks under federal law and the issue of bank notes on the security of government bonds. The term wildcat bank was subsequently applied to any unstable bank.

Wilde, Oscar (Fingal O'Flahertie Wills) (b. Oct. 16, 1854, Dublin, Ire.—d. Nov. 30, 1900, Paris, Fr.), Irish wit, poet, and dramatist whose reputation rests on his comic masterpieces *Lady Windermere's Fan* (1892) and *The Importance of Being Earnest* (1895). He was a spokesman for the late 19th-century Aesthetic movement in England, which advocated art for art's sake; and he was the object



Wilde, 1882
By courtesy of the William Andrews Memorial Library of the University of California, Los Angeles

of celebrated civil and criminal suits involving homosexuality and ending in his imprisonment (1895–97).

Wilde was born of professional and literary parents. His father, Sir William Wilde, was Ireland's leading ear and eye surgeon, who also published books on archaeology, folklore, and the satirist Jonathan Swift; his mother was a revolutionary poet and an authority on Celtic myth and folklore.

After attending Portora Royal School, Enniskillen (1864–71), Wilde went, on successive scholarships, to Trinity College, Dublin (1871–74), and Magdalen College, Oxford (1874–78), which awarded him a degree with

honours. During these four years, he distinguished himself not only as a classical scholar, a poseur, and a wit but also as a poet by winning the coveted Newdigate Prize in 1878 with a long poem, *Ravenna.* He was deeply impressed by the teachings of the English writers John Ruskin and Walter Pater on the central importance of art in life and particularly by the latter's stress on the aesthetic intensity by which life should be lived. Like many in his generation, Wilde was determined to follow Pater's urging "to burn always with [a] hard, gemlike flame." But Wilde also delighted in affecting an aesthetic pose; this, combined with rooms at Oxford decorated with objets d'art, resulted in his famous remark: "Oh, would that I could live up to my blue china!"

In the early 1880s, when Aestheticism was the rage and despair of literary London, Wilde established himself in social and artistic circles by his wit and flamboyance. Soon the periodical *Punch* made him the satiric object of its antagonism to the Aesthetes for what was considered their unmasculine devotion to art; and in their comic opera *Patience,* Gilbert and Sullivan based the character Bunthorne, a "fleshly poet," partly on Wilde. Wishing to reinforce the association, Wilde published, at his own expense, *Poems* (1881), which echoed, too faithfully, his discipleship to the poets Algernon Swinburne, Dante Gabriel Rossetti, and John Keats. Eager for further acclaim, Wilde agreed to lecture in the United States and Canada in 1882, announcing on his arrival in New York City that he had "nothing to declare but his genius." Despite widespread hostility in the press to his languid poses and aesthetic costume of velvet jacket, knee breeches, and black silk stockings, Wilde for 12 months exhorted the Americans to love beauty and art; then he returned to Great Britain to lecture on his impressions of America.

In 1884 Wilde married Constance Lloyd, daughter of a prominent Irish barrister; two children, Cyril and Vyvyan, were born, in 1885 and 1886. Meanwhile, Wilde was a reviewer for the *Pall Mall Gazette* and then became editor of *Woman's World* (1887–89). During this period of apprenticeship as a writer, he published *The Happy Prince and Other Tales* (1888), which reveals his gift for romantic allegory in the form of the fairy tale.

In the final decade of his life, Wilde wrote and published nearly all of his major work. In his only novel, *The Picture of Dorian Gray* (published in *Lippincott's Magazine,* 1890, and in book form, revised and expanded by six chapters, 1891), Wilde combined the supernatural elements of the Gothic novel with the unspeakable sins of French decadent fiction. Critics charged immorality despite Dorian's self-destruction; Wilde, however, insisted on the amoral nature of art regardless of an apparently moral ending. *Intentions* (1891), consisting of previously published essays, restated his aesthetic attitude toward art by borrowing ideas from the French poets Théophile Gautier and Charles Baudelaire and the American painter James McNeill Whistler. In the same year, two volumes of stories and fairy tales also appeared, testifying to his extraordinary creative inventiveness: *Lord Arthur Savile's Crime, and Other Stories* and *A House of Pomegranates.*

But Wilde's greatest successes were his society comedies. Within the conventions of the French "well-made play" (with its social intrigues and artificial devices to resolve conflict), he employed his paradoxical, epigrammatic wit to create a form of comedy new to the 19th-century English theatre. His first success, *Lady Windermere's Fan,* demonstrated that this wit could revitalize the rusty machinery of French drama. In the same year, rehearsals of his macabre play *Salomé,* written in French and designed, as he said, to make his audience shudder by its depiction of unnatural passion, were halted by the censor because it contained biblical characters. It was published in 1893, and an English translation appeared in 1894 with Aubrey Beardsley's celebrated illustrations.

A second society comedy, *A Woman of No Importance* (produced 1893), convinced the critic William Archer that Wilde's plays "must be taken on the very highest plane of modern English drama." In rapid succession, Wilde's final plays, *An Ideal Husband* and *The Importance of Being Earnest,* were produced early in 1895. In the latter, his greatest achievement, the conventional elements of farce are transformed into satiric epigrams—seemingly trivial but mercilessly exposing Victorian hypocrisies.

> I suppose society is wonderfully delightful. To be in it is merely a bore. But to be out of it simply a tragedy.
>
> I never travel without my diary. One should always have something sensational to read in the train.
>
> All women become like their mothers. That is their tragedy. No man does. That's his.
>
> I hope you have not been leading a double life, pretending to be wicked and being really good all the time. That would be hypocrisy.

In many of his works, exposure of a secret sin or indiscretion and consequent disgrace is a central design. If life imitated art, as Wilde insisted in his essay "The Decay of Lying" (1889), he was himself approximating the pattern in his reckless pursuit of pleasure. In addition, his close friendship with Lord Alfred Douglas, whom he had met in 1891, infuriated the Marquess of Queensberry, Douglas' father. Accused, finally, by the marquess of being a sodomite, Wilde, urged by Douglas, sued for criminal libel. Wilde's case collapsed, however, when the evidence went against him, and he dropped the suit. Urged to flee to France by his friends, Wilde refused, unable to believe that his world was at an end. He was arrested and ordered to stand trial.

Wilde testified brilliantly, but the jury failed to reach a verdict. In the retrial he was found guilty and sentenced, in May 1895, to two years at hard labour. Most of his sentence was served at Reading Gaol, where he wrote a long letter to Douglas (published in 1905 in a drastically cut version as *De Profundis*) filled with recriminations against the younger man for encouraging him in dissipation and distracting him from his work.

In May 1897 Wilde was released, a bankrupt, and immediately went to France, hoping to regenerate himself as a writer. His only remaining work, however, was *The Ballad of Reading Gaol* (1898), revealing his concern for inhumane prison conditions. Despite constant money problems he maintained, as George Bernard Shaw said, "an unconquerable gaiety of spirit that sustained him, and he was visited by such loyal friends as Max Beerbohm and Robert Ross, later his literary executor; he was also reunited with Douglas. He died suddenly of acute meningitis brought on by an ear infection. In his semiconscious final moments, he was received into the Roman Catholic church, which he had long admired. (K.Be.)

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wildebeest (antelope): *see* gnu.

Wildenvey, Herman, pseudonym of HERMAN THEODOR PORTAAS (b. July 20, 1886, Eikar, Norway—d. Sept. 27, 1959, Larvik), Norwegian poet whose sunny songs of simple sensual pleasure are unusual in the sombre history of Norwegian verse.

After returning from three years in the United States, Wildenvey published his first collection of verse, *Nyinger* (1907; "Bonfires"). He developed a technique of constructing his verse so as to give it a lightness matching its mood, as in such collections as *Kjærtegn* (1916; "Caresses"), *Hostens lyre* (1931; "The Lyre of Autumn"), and many others. He was able to extract fresh effects from language and give new life to the most hackneyed phrases. *Owls to Athens,* a selection of his poems in English translation, was published in 1935.

Wilder, Billy, original name SAMUEL WILDER (b. June 22, 1906, Sucha, Austria [now in Poland]—d. March 27, 2002, Beverly Hills, Calif. U.S.), Austrian-born American motion-picture scenarist, director, and producer known for films that humorously treat subjects of controversy and offer biting indictments of hypocrisy in American life.

Wilder attended Viennese schools, including the University of Vienna (which he left after a year), and then was a reporter in Vienna and in Berlin. His first film scenario was a collaboration on the semidocumentary *Menschen am Sonntag* (1929; "People on Sunday"), of which he was also codirector. For the next four years he wrote scripts for German and French films, then went to Hollywood, via Paris and Mexico. The advent of Adolf Hitler in 1933 and Wilder's Jewish background made emigration necessary.

He established his reputation as a director with *Double Indemnity* (1944), produced by Charles Brackett, with whom he had already written some screenplays. Wilder spent 1945 in Germany in charge of the U.S. Army's Psychological Warfare Division. Then, collaborating first with Brackett until 1950 and then with I.A.L. Diamond from 1957, he wrote the films that he directed and frequently produced, creating a series on subjects that had not been considered as acceptable screen material, including alcoholism (*The Lost Weekend,* 1945), prisoner-of-war camps (*Stalag 17,* 1953), and prostitution (*Irma La Douce,* 1963). A number of his films, such as *Sunset Boulevard* (1950) and *The Apartment* (1960), weighed the emptiness of modern life. Some of Wilder's greatest films were comedies, including *Sabrina* (1954), *The Seven Year Itch* (1955), *Love in the Afternoon* (1957), *Some Like It Hot* (1959), and *One, Two, Three* (1961).

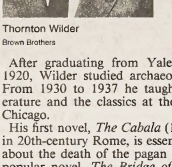
In 1986 the American Film Institute awarded him the Life Achievement Award, and in the 1988 Academy Awards he was given the Irving G. Thalberg Award.

Wilder, Laura Ingalls (b. Feb. 7, 1867, Lake Pepin, Wis., U.S.—d. Feb. 10, 1957, Mansfield, Mo.), American author of children's fiction based on her own youth in the American Midwest.

Wilder spent 12 years editing the *Missouri*

Ruralist before, at the urging of her daughter, she began to write. Her stories centred on the male unrest and female patience of pioneers in the mid-1800s and celebrated their peculiarly American spirit and independence. These were collected in *Little House in the Big Woods* (1932), *Farmer Boy* (1933), *Little House on the Prairie* (1935), *On the Banks of Plum Creek* (1937), *By the Shores of Silver Lake* (1939), *The Long Winter* (1940), *Little Town on the Prairie* (1941), and *These Happy Golden Years* (1943). In the 1970s and '80s a popular television series, *Little House on the Prairie,* was based on her stories.

Wilder, Thornton (Niven) (b. April 17, 1897, Madison, Wis., U.S.—d. Dec. 7, 1975, Hamden, Conn.), American writer, whose innovative novels and plays reflect his views of the universal truths in human nature.



Thornton Wilder
Brown Brothers

After graduating from Yale University in 1920, Wilder studied archaeology in Rome. From 1930 to 1937 he taught dramatic literature and the classics at the University of Chicago.

His first novel, *The Cabala* (1926), while set in 20th-century Rome, is essentially a fantasy about the death of the pagan gods. His most popular novel, *The Bridge of San Luis Rey* (1927), which was adapted for film and television, examines the lives of five persons who died in the collapse of a bridge in Peru in the 18th century. *The Woman of Andros* (1930) is an interpretation of Terence's *Andria.* Accused of being a "Greek" rather than an American writer, Wilder in *Heaven's My Destination* (1934) wrote about a quixotically good hero in a contemporary setting. His later novels are *The Ides of March* (1948), *The Eighth Day* (1967), and *Theophilus North* (1973).

Wilder's plays engage the audience in makebelieve by having the actors address the spectators directly and by discarding props and scenery. The Stage Manager in *Our Town* (1938) talks to the audience, as do the characters in the farcical *The Matchmaker* (1954). *The Matchmaker* was made into a film in 1958 and adapted in 1964 into the immensely successful musical *Hello, Dolly!,* which was also made into a film.

Wilder's other plays include *The Skin of Our Teeth* (1942), which employs deliberate anachronisms and the use of the same characters in various geological and historical periods to show that human experience is much the same whatever the time or place.

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Wilderness, Battle of the (May 5–7, 1864), in the American Civil War, first stage of a carefully planned Union campaign to capture the Confederate capital at Richmond, Va. Crossing the Rappahannock River near Fredericksburg, Va., early in May, General Ulysses S. Grant advanced with a Union army of 115,000 men. On May 5 he met a Confederate army of 62,000 troops under General Robert E. Lee. The confrontation occurred in dense thickets, called the Wilderness, where orderly movement was impossible and cavalry and artillery were almost useless. Burning brush killed many of the wounded. After indecisive but intense fighting for two days, Grant saw the futility of further hostilities in this area and moved on to do battle at Spotsylvania Court House, nearer Richmond.

Wildfowl Trust, The, centre of the world's largest collection of waterfowl. It was established in 1946 by Sir Peter Scott on 418 acres (169 hectares) along the River Severn near Slimbridge, Gloucestershire, Eng. Nearly a quarter of the land is fenced off for captive birds and breeding stock; the rest of the refuge is traditional wintering ground for many species of ducks and geese. In addition to accommodating true wildfowl (geese, ducks, and swans), the refuge maintains breeding colonies of four of the six known flamingo species and has a special pavilion for exotic ducks and various small birds. The refuge's collection numbers nearly 3,000 birds representing about 200 species; its breeding record is excellent. Greatest success has been with the Hawaiian goose, which had almost become extinct in the 1950s. Financial support comes from grants and from public attendance fees.

Wildgans, Anton (b. April 17, 1881, Vienna, Austria—d. May 3, 1932, Mödling, near Vienna), Austrian dramatist and poet known for his mystical dramas charged with the symbolic messages typical of German Expressionism.

The son of a judge, Wildgans became a lawyer but soon turned to writing. His childhood had been marred by his relations with his stepmother. His early poems, among which was the collection *Herbstfrühling* (1909; "Autumn-Spring"), sold well; they recall the themes of idealism and reality in the late romantic works of Hugo von Hofmannsthal. Wildgans' plays, such as the trilogy *Armut* (1914; "Poverty"), *Liebe* (1916; "Love"), and *Dies irae* (1918), begin in a realistic world that becomes less and less comprehensible and more and more concerned with feeling as the play goes on, culminating in a mystical, symbolic sensing of truth. As a counterpart to this trilogy of Viennese middle-class family life, he planned another of a mythological or religious character; only the first part, *Kain* (1920; "Cain"), was published. Wildgans directed the celebrated Vienna Burgtheater in 1921–22 and 1930–31. He also translated Italian and French poets into German. His own collected poems were published in 1929.

wildland fire, uncontrolled fire in a forest, grassland, brushland, or land sown to crops.

Fire danger in a wildland setting varies with weather conditions: drought, heat, and wind participate in drying out the timber or other fuel, making it easier to ignite. Once a fire is burning, drought, heat, and wind all increase its intensity. Topography also affects wildland fire, which spreads quickly uphill and slowly downhill. Dried grass, leaves, and light branches are considered flash fuels; they ignite readily, and fire spreads quickly in them, often generating enough heat to ignite heavier fuels such as tree stumps, heavy limbs, and the matted duff of the forest floor. Such fuels, ordinarily slow to kindle, are difficult to extinguish. Green fuels—growing vegetation—are not considered flammable, but an intense fire can dry out leaves and needles quickly enough to allow ready ignition. Green fuels sometimes carry a special danger: evergreens, such as pine, cedar, fir, and spruce, contain flammable oils that burst into flames when heated sufficiently by the searing drafts of a forest fire.

Tools for fighting wildland fires range from the standard equipment of urban fire departments to portable pumps, tank trucks, and earth-moving equipment. Firefighting forces specially trained to deal with wildland fires are maintained by public and private owners of forestlands. Such a force may attack a fire directly by spraying water, beating out flames, and removing vegetation at the edge of the fire to contain it behind a fireline. When the very edge is too hot to approach, a fire line is built at a safe distance, sometimes using strip burning or backfire to eliminate fuel in the path of the uncontrolled fire or to change the fire's direction or slow its progress. Backfiring is used only as a last resort.

Aircraft were first used in fighting wildland fires in California in 1919. Airplanes and helicopters are primarily used for dumping water, for observation, and occasionally for assisting in communication and transporting personnel, supplies, and equipment.

wildlife conservation, the regulation of wild animals and plants in such a way as to provide for their continuance as a natural resource. The term stands for the husbandry and use of natural resources by the present and succeeding generations. Aesthetic, sporting, economic, and ethical use of landscapes, game, minerals, animals, plants, soils, and water is thus implied in the concept. The term wildlife conservation has been used to include an everwidening group of animals—mammals, birds, fish, reptiles, amphibians, arthropods (such as the lobster), and mollusks (such as the oyster)—and includes plants as well. Certain aesthetically and economically important groups of animals have tended to dominate the list; but it is expanding as values broaden, interest in science grows, and increasingly subtle but important relationships among animals and plants are reported.

Animal-conservation problems vary widely depending on the type of animal (whether, for example, it is exploited primarily for commercial or recreational reasons, whether or not it is free to range over national boundaries) and on the social and economic conditions of various countries. In many countries, game animals are widely hunted by sportsmen, over both private and public lands; thus an outstanding factor in wildlife conservation in such regions is the licensing and supervision of hunters. Game birds and mammals whose migrations take them across national boundaries require an international conservation effort. Marine mammals and fish also present the need for international agreement and legislation because they live in waters that know no national boundaries and are exploited commercially by fishermen from many countries. Small mammals that are trapped for their furs must be protected by domestic laws, but seals are the subject of international agreement. Saltwater fish, exploited mainly for commercial reasons, are protected by international agreement; but the exploiters of freshwater fish, chiefly anglers who fish for recreation (except in such large inland water areas as the Great Lakes), are licensed and controlled domestically.

Ethical considerations appear to occupy a central position in wildlife-conservation thinking, but their development has been delayed by the fact that people for so many generations had to fight against nature. Although primitive people had a far more immediate stake in wildlife than modern people do, it is virtually certain that early humans had little concept of conserving game. The disappearance of the moa and the mammoth taught no lessons; the disappearance of the passenger pigeon did. Convinced of the enormous destructive power of humankind, pioneer conservationists of the early 20th century emphasized the ethical responsibility of their own generation to conserve natural resources for posterity. Modern ecologists perceive that na-

ture is a series of complex biotic communities of which the human species is an interdependent part; a spokesman for conservationists, Aldo Leopold, has argued that the Golden Rule applies to the land and to its animals as well as to people. Thus we find ourselves responsible for the fate of many products of nature, guided by a conservation tradition and code of conduct less than a century old.

The problem. During the past 2,000 years the world has lost, through extinction, well over 100 species or subspecies of mammals. Approximately two-thirds of these losses have occurred since the mid-19th century, most since the beginning of the 20th. In addition to those mammals already extinct, many others are vanishing or threatened.

The primary factor in the depletion of the world's fauna has been modern human society, operating either directly through excessive commercial hunting or, more disastrously, indirectly through invading or destroying natural habitats, placing firearms in the hands of people who previously were without them, or introducing to the native fauna of certain areas (Australia and various islands) more aggressive exotic (nonnative) mammals. Except in the West Indies, comparatively few species seem to have died out within the past 2,000 years from such natural causes as evolutionary senility, disease, or climatic change.

Persons interested in the conservation of wildlife recognize that much more is required than the mere protection of individual animals from destruction by shooting and other forms of direct action. Animal protection must begin with the conservation of the habitat—the area where animals feed, rest, and breed. This naturally involves the preservation of not only besides the animal population itself, including conservation of vegetation cover and soil. The comparatively new science of ecology focuses on the association of living things in natural communities and their mutual interdependence and on the possibility of preserving the conditions under which the variety and abundance of natural living forms may continue to exist. But the immense growth of the world's human population and its expanding economic needs, fostering the consequent extension and intensification of industry and agriculture, have encroached upon remaining natural habitats throughout the world. This has been accompanied by the introduction of new types of cultivation, by the drainage of marshes, by the general lowering of the water table, by pollution of rivers and lakes, by destruction of woodlands, and by indiscriminate use of insecticides and herbicides. In many parts of the world there has also been widespread destruction of forests and other great belts of natural vegetation.

Attitudes toward wild animals liable to be killed for food, oil, skins, feathers, or sport are undergoing considerable change in many countries of the world. An example of earlier attitudes is well illustrated by Great Britain, which passed through two centuries of so-called game protection, the original purpose of which was to create artificially high populations of grouse, partridge, pheasant, mallard, and other sporting species and, at the same time, to reduce the populations of such predators as the stoat, weasel, otter, wildcat, and badger, as well as birds of prey including owls. This alteration of the natural equilibrium had many other consequences, particularly in agriculture and forestry. The rabbit and wood pigeon population increased rapidly and caused widespread damage. In some places in Great Britain the landscape was changed by the planting of woods and the creation of other new areas, including artificial lakes for wildfowl—all with the purpose of creating larger populations of certain species for sport. Sport was the privilege of the affluent. There were strictly kept dates for the shooting of game species, and, most significant, there was very strict etiquette in shooting. Poaching was punished by heavy penalties and was kept under control. As a result, the game species did exceptionally well while the total wildlife resources experienced varied fortunes. The modern view is different: total wildlife conservation is rapidly replacing game protection.

Techniques. Wildlife-conservation techniques have counterparts in forestry and in soil, water, and landscape conservation. They include prohibitions, and controls, restoration, subsidy, sanctuary, and public ownership.

The oldest forms of prohibitions and controls are those that regulate hunting, fishing, and trapping. Although, as already stated, many early regulations resulted in misguided efforts aimed solely at increasing game populations, other early controls did play an important role in protecting wildlife. Especially useful were those limitations on hunting that protected animals during the breeding season. Bag limits—*i.e.*, limits on the number of animals that can be taken by an individual hunter, fisher, or trapper—also remain important conservation tools. Although modern limitations on hunting, fishing, and trapping have successfully adjusted available game supplies to mounting human populations in much of North America and Western Europe, they have been less successful in countries where the rural population is poverty-stricken and poorly fed. Moreover, the exploitation of migratory waterfowl has been successfully regulated only in North America, where, because few countries are involved, international treaties are easier to work out than they are elsewhere.

Among the most important modern legal tools in wildlife conservation are those laws that protect threatened and endangered species. In the United States, for example, the Endangered Species Act makes it illegal to hunt, trap, or collect endangered animals and plants. The act also tightly restricts the use of federal funds in projects that are likely to adversely affect endangered species, and it prohibits the importation of endangered species or products made from endangered species.

Perhaps equally important are those laws that mandate pollution controls; the resultant improvements in air and water quality enhance the prospects for wildlife (not to mention human) survival. The amelioration of habitats that have been damaged by pollutants is often a lengthy process, however, and in many cases the implementation of anti-pollution laws has been hampered by litigation and by lax enforcement.

Artificial methods of offsetting resource depletion include programs of population restocking and habitat restoration. Game farms and fish hatcheries, which provide stocks of popular game species, are long-established tools of wildlife management. Of more recent development are those programs designed to restock wild populations of endangered species with individuals raised in captivity. Captive rearing and release is part of the effort being made to save the endangered whooping crane of North America. A similar program has been undertaken in behalf of the California condor, another endangered North American bird. Such efforts depend not only on the successful rearing of the endangered species in captivity but also on the abiltiy of the released individuals to made the transition to life in the wild. An even more ambitious approach is the restoration of degraded habitats. Habitat restoration has frequently proved to be expensive, but its results are dramatic in the restoration of marshes, as is now evidenced in many of the national wildlife refuges in the United States.

The oldest types of subsidies are bounties on predators and crop-destroying species, which were offered at least as early as the Middle Ages in England. Some surviving bounties are deplored by ecologists but sponsored by politicians as a form of unofficial rural relief. In the United States, federal subsidies are intended to encourage municipalities to construct sewage works and farmers to retire land in the soil-bank program.

Sanctuaries—also called preserves, reserves, and refuges—have been prominent in wildlife conservation since the mid-19th century. With the large national parks, they have provided the protection and space critically needed in America and Africa by the larger predators and grassland-dwelling big game and the freedom from human interference needed by nesting birds during the breeding season; in the United States they also give migratory waterfowl at least partial relief from hunting pressure. In the United States, public ownership, which usually accompanies the establishment of sanctuaries, facilitates the management of wildlife food and cover resources to an extent seldom possible on privately owned lands.

Public ownership finds its soundest manifestations in the development of conservancies and in the preservation of wildlife in national parks, though government ownership of forests in Canada and the United States also helps maintain various species of wildlife.

Wildman, Sir John (b. *c.* 1621–23—d. June 4, 1693), English agitator, a fascinating Leveller who outlasted vicissitudes under three British kings and two protectors.

Wildman was of obscure ancestry. Educated at Cambridge, he first came into prominence in October 1647, when he helped to write *The Case of the Army* and the first *Agreement of the People.* These expressed the political program of the democratic republican, or Leveller, section of the army, which opposed all compromise with Charles I. In the debates that took place during 1647 in the general council of the army he defended this program against Henry Ireton and Oliver Cromwell. Afterward he violently attacked these two in *Putney Projects* and with John Lilburne (*q.v.*) agitated for the abolition of the monarchy and the House of Lords. He was thereupon imprisoned (January–August 1648). After his release he helped to draw up the second *Agreement of the People.* He acquiesced in the establishment of the Commonwealth and devoted most of his time to building up a considerable fortune by land speculation.

In 1654 he was returned to the first Protectorate Parliament, but his election was disallowed. Thereupon he began to conspire with malcontent army officers for a rising against Cromwell and was again imprisoned (February–July 1655). Thereafter he occupied himself chiefly in trying vainly to organize a Leveller and Royalist rising with Spanish aid and to get Cromwell assassinated.

After the restoration of Charles II, Wildman obtained great influence in the post office, but was again imprisoned (November 1661) for six years on suspicion of using it as a centre for republican plotting. He owed his release to the Duke of Buckingham, with whom he had intrigued before the Restoration and whom he continued to support. He was again imprisoned in 1683 on suspicion of complicity in the Rye House Plot. He took no active part in Monmouth's rebellion (1685) but afterward fled to Holland.

In 1688 he wrote the influential pamphlet *A Memorial of Protestants* and, returning to England with William of Orange (William III), became a member of the 1689 Convention Parliament. He was appointed postmaster general in April 1689 but fell once more under suspicion and was dismissed in February 1691. Nevertheless he was knighted in 1692.

Wilfrid, SAINT, also called WILFRID OF YORK (b. 634, Northumbria, Eng.—d. April 24, 709/710, monastery of Oundle, Mercia, Eng.; feast

day October 12), one of the greatest English saints, a monk and bishop who was outstanding in bringing about close relations between the Anglo-Saxon Church and the papacy. He devoted his life to establishing the observances of the Roman Church over those of the Celtic Church and fought a stormy series of controversies on discipline and precedent.

In 648 Wilfrid entered the celebrated monastery of Lindisfarne, off the coast of Northumberland. Later he went to Canterbury and then set out in 652 for Rome. Having spent three years in Lyon, Fr., he returned to Northumbria in 657/658. Soon he received a monastery at Ripon, Yorkshire, from King Oswiu's son, Alhfrith. He was ordained a priest in 663/664 by the Gaulish bishop Agilbert, for whom he acted as spokesman at the Synod of Whitby (664), successfully advocating the rejection of Celtic practices in favour of Roman. Alhfrith had him elected bishop of York, but Wilfrid refused to be consecrated by Celtic bishops and was therefore consecrated at Compiègne, Fr.

Meanwhile, Oswiu appointed St. Chad as bishop of York instead, and Wilfrid on his return lived (666–669) at Ripon. He was restored in 669, when Archbishop St. Theodore of Canterbury deposed Chad, and he thereby became primate of Northumbria. He built a monastery at Hexham and introduced the Benedictine Rule to the kingdom. In 677 Theodore divided Wilfrid's diocese, and Wilfrid appealed to Rome (the first English ecclesiastic to do so), where he arrived in 679 after having helped convert the Frisians (winter of 677–678). Pope St. Agatho and a Roman synod (October 679) ordered his restoration but accepted the division of his diocese on condition that he, with a local council, appoint the new bishops.

King Ecgfrith, Oswiu's successor, refused to obey the papal mandate, however, and apparently imprisoned Wilfrid, who finally took refuge in Sussex, Christianizing its people and founding a monastery at Selsey. In 685 he joined King Caedwalla of Wessex, who gave him a quarter of his conquests in the Isle of Wight. Aldfrith, Ecgfrith's successor, recalled him in 686/687. Although his deposition and its nullification following Agatho's injunctions were reissued by popes SS. Benedict II and Sergius I, Wilfrid still remained improperly restored. Demanding the fulfillment of his rights granted by Agatho, he spent 11 years in exile, acting as bishop in Mercia. A council was held in 702, but Wilfrid, refusing to promise unconditional acceptance of the Archbishop's rulings, went again to Rome, where his case was debated during 704. Though the Roman synod cleared Wilfrid of charges against him, it referred the question back to an English synod that met in Yorkshire in 705. Wilfrid, no longer insisting on York, was given his monasteries of Ripon and Hexham, becoming bishop of Hexham in 705 and retaining his monasteries in Mercia. He was buried at Ripon.

Wilfrid spread the knowledge of the Benedictine Rule, brought religious treasures from the Continent, and helped improve the chanting of the liturgy. He was a great builder at York, Ripon, and Hexham. He was one of the first to conceive the idea of Anglo-Saxons evangelizing the Germanic peoples. St. Willibrord, the apostle of Friesland and patron saint of Holland, was his devoted pupil, and he also consecrated St. Swithberht. In ecclesiastical policies, he fought steadily against the setting aside of papal authority by a local church subjected to secular power; rare for his time and place, he upheld utter papal supremacy. A life of Wilfrid by his disciple Eddi was translated into English in 1927 by B. Colgrave.

Wilhelm (German personal name): *see under* William.

Wilhelmina, German in full WILHELMINE FRIEDERIKE SOPHIE (b. July 3, 1709, Berlin—d. Oct. 14, 1758, Bayreuth, Upper Franconia), sister of Frederick the Great of Prussia and margravine of Bayreuth (from 1735).

She shared the unhappy childhood of her brother, whose friend and confidante she remained most of her life. She married Frederick, hereditary prince of Bayreuth, in 1731; when he became margrave in 1735, the pair set about making Bayreuth a miniature Versailles. They rebuilt the Bayreuth palace and the Bayreuth opera house, as well as other structures, and founded the University of Erlangen. The Margravine made Bayreuth one of the intellectual centres of Germany, surrounding herself with a little court of wits and artists which gained added prestige from the occasional visits of Voltaire and Frederick the Great. With the outbreak of the Seven Years' War, Wilhelmina's interests shifted from dilettantism to diplomacy. She acted as eyes and ears for her brother in southern Germany until her death.

Wilhelmina, in full WILHELMINA HELENA PAULINE MARIA (b. Aug. 31, 1880, The Hague—d. Nov. 28, 1962, Het Loo, Neth.), queen of The Netherlands from 1890 to 1948, who, through her radio broadcasts from London during World War II, made herself the symbol of Dutch resistance to German occupation.

The daughter of King William III and his second wife, Emma of Waldeck-Pyrmont, Wilhelmina became queen on her father's death (Nov. 23, 1890) under her mother's regency. She was inaugurated Sept. 6, 1898, at Amsterdam's Nieuwe Kerk and soon gained widespread popular approval. On Feb. 7, 1901, she married Duke Henry of Mecklenburg-Schwerin and gave birth to a daughter, Princess Juliana, on April 30, 1909. During World War I, Wilhelmina was influential in maintaining The Netherlands' neutrality.

When Germany invaded The Netherlands on May 10, 1940, Wilhelmina issued a proclamation of to her nation of "flaming protest" and a few days later left for England with her family and members of the Cabinet. Throughout the war, she exhorted her people over Radio Orange to maintain their spirit until the nation's liberation, and she was welcomed back with enthusiasm when the German occupation was ended in 1945. After abdicating the throne to Juliana on Sept. 4, 1948, because of poor health, Wilhelmina retired to her palace, Het Loo, near Apeldoorn. Her memoirs, *Eenzaam maar niet alleen* (1959; *Lonely but Not Alone,* 1960), reveal the deep religious feeling that dominated her life.

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Wilhelmina Gebergte, mountain range in central Suriname, forming part of South America's granitic Precambrian Guiana Shield, extending about 70 mi (113 km) from west to east. The range divides Suriname's western district of Nickerie from the eastern districts of Saramacca, Brokopondo, and Marowijne. The Wilhelmina Gebergte descends gradually into two lesser ranges of hills to the north—the Bakhuis Gebergte (west) and Emmaketen (east). To the south the range connects with the broad plateau formed by the Eilerts de Haan and Kayser ranges. The Wilhelmina Gebergte is itself a broad plateau region that reaches its highest point at Juliana Top (4,199 ft [1,280 m]). The terrain rises gradually from the coastal lowlands into grassland, becoming hilly and then densely forested with over 2,000 varieties of trees. The land on either side of the range is densely covered in tropical rain forest, exhibiting a profuse indigenous wildlife, including scarlet macaws, howler monkeys, and peccaries.

Wilhelmj, August (Emil Daniel Ferdinand Viktor) (b. Sept. 21, 1845, Usingen, Ger.—d. Jan. 22, 1908, London), German violinist whose most famous work is his arrangement of the air from Bach's orchestral Suite in D major, which became known as the "Air on the G String."

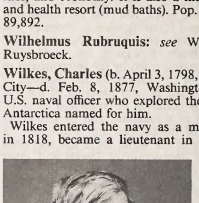
A prodigy, he gave his first concert at the age of nine in Wiesbaden. He studied with Ferdinand David at the Leipzig Conservatory from 1861 to 1863, and with Joachim Raff in Frankfurt in 1864. In 1865 he began his concert career, and eventually made a number of world tours. He was the concertmaster for the first performance of Wagner's *Ring* in Bayreuth in 1876. In 1885, at the invitation of the Sultan of Turkey, he played for the ladies of the Sultan's harem. He was appointed professor of music at the Guildhall School in 1894. Late in life, he became interested in the construction of violins.

Wilhelmshaven, city and port, Lower Saxony *Land* (state), northwestern Germany, on the Jadebusen, a North Sea inlet on the coast of Ostfriesland (East Frisia). Founded in 1853 by Wilhelm I on land bought by Prussia from Oldenburg, it was given its present name in 1869. In 1937 it was united with Rüstringen and returned to Oldenburg *Land.* As the principal naval base for the Prussian (later German) navy, it suffered heavy damage in World War II, and its naval installations were demolished or dismantled after 1945. A complete reorientation of its industry (formerly based on naval construction) followed. There is now an oil harbour connected by pipeline with Cologne, and industries include metalworking and the manufacture of machinery, equipment, and textiles. Wilhelmshaven is the site of the Max Planck Institute of Marine Biology, an ornithological station, a teachers' college, and institutes for geology, labour, politics, and economy. It is also a major tourist and health resort (mud baths). Pop. (1989 est.) 89,892.

Wilhelmus Rubruquis: *see* Willem van Ruysbroeck.

Wilkes, Charles (b. April 3, 1798, New York City—d. Feb. 8, 1877, Washington, D.C.), U.S. naval officer who explored the region of Antarctica named for him.

Wilkes entered the navy as a midshipman in 1818, became a lieutenant in 1826, and



Charles Wilkes, photograph by Mathew B. Brady

By courtesy of the Library of Congress, Washington, D.C.

in 1830 was placed in charge of the depot of instruments and charts from which the Naval Observatory and Hydrographic Office developed. From 1838 to 1842 he commanded an exploring and surveying expedition that took

him ultimately into the Antarctic Ocean and along the Antarctic barrier, where he reported land at a number of points in the region subsequently known as Wilkes Land. He visited islands in the Pacific, explored the West Coast of the United States, then recrossed the Pacific and reached New York in June 1842, having sailed completely around the world. He was advanced to the rank of commander in 1843. From 1844 to 1861 he prepared the report of his expedition, writing himself 7 of its 19 volumes.

Assigned to the "San Jacinto" during the U.S. Civil War (1861–65), Wilkes caused an international incident by stopping the British mail steamer "Trent" (Nov. 8, 1861) and removing two Confederate commissioners en route to Europe. His action was later disavowed by President Lincoln to avoid a break with Great Britain. Commissioned commodore in 1862, he commanded a squadron sent to the West Indies to protect U.S. commerce there. His actions brought protests of neutrality violations from several foreign governments, and he was court-martialled in 1864 for insubordination and conduct unbecoming an officer and suspended from duty. He was commissioned rear admiral, retired, on July 25, 1866.

Wilkes also wrote *Western America, Including California and Oregon* (1849); *Voyage Around the World* (1849); and *Theory of the Winds* (1856).

Wilkes, John (b. Oct. 17, 1725, London—d. Dec. 26, 1797, London), outspoken 18th-century journalist and popular London politician who came to be regarded as a victim of persecution and as a champion of liberty



John Wilkes, engraving from a manifesto commemorating his fight against general warrants and for the liberty of the press, 1768
By courtesy of the trustees of the British Museum; photograph, J.R. Freeman & Co. Ltd.

because he was repeatedly expelled from Parliament. His widespread popular support may have been the beginning of English Radicalism.

Early life. Wilkes was the second son of Israel Wilkes, a successful malt distiller. He was educated at an academy at Hertford and afterward privately tutored. His marriage on May 23, 1747, to Mary Meade, heiress of the manor of Aylesbury, brought him a comfortable fortune and an assured status among the gentry of Buckinghamshire.

A profligate by nature, Wilkes became a member of the congenial society of the "Medmenham Monks," members of the so-called Hell-Fire Club who met occasionally in the ruins of St. Mary's Abbey at Medmenham, Buckinghamshire, to indulge in debauchery and the performance of Black Masses. In 1754, at the suggestion of Earl Temple, Wilkes stood for election to Parliament for Berwick-upon-Tweed—unsuccessfully, despite his bribing a captain to land a shipload of opposition voters from London in Norway instead of at Berwick. In 1757, after an election campaign said to have cost him £7,000, much of it in bribes to voters, he was returned to Parliament for Aylesbury. Recklessly overspending, and ever deeper in debt, he hoped to retrieve his fortunes by political advancement.

The North Briton. In 1762, as author of a political newspaper, the *North Briton,* he began to give rancorous journalistic support to Earl Temple's campaign against the ministry of Lord Bute, not hesitating to evoke popular English hatred for the Scots and to write libellous innuendoes about Bute's relations with George III's mother. His incitement of anti-ministerial feeling was partly responsible for Bute's decision to retire in April 1763. Temple, equally hostile to the new ministry formed by George Grenville, encouraged Wilkes to publish (April 23) the now famous "No. 45" of the *North Briton,* a devastating attack upon ministerial statements in the King's speech, which Wilkes described as false. The new ministers, anxious to rid themselves of so vituperative a critic, and encouraged by the King's personal animus against the traducer of his mother, instituted immediate proceedings against him. A general warrant (one that did not name the persons to be arrested) was issued. Forty-eight persons were seized in the search for evidence before Wilkes himself was arrested. He was thrown into the Tower of London, but a week later, to the public delight, Lord Chief Justice Pratt ordered his release on the ground that his arrest was a breach of parliamentary privilege. Wilkes and others instituted actions for trespass against the secretary of state, the Earl of Halifax, and his underlings that led to awards of damages and established the illegality of general warrants. Assuming his immunity, Wilkes prepared to continue his campaign. Asked by a French acquaintance how far liberty of the press extended in England, he said: "I cannot tell, but I am trying to find out."

Expulsion from Parliament. A second attack on him was now more carefully prepared by Wilkes's former friend in the Medmenham set, Lord Sandwich, now secretary of state, who planned to strip Wilkes of immunity from prosecution by ousting him from Parliament. The government secured from Wilkes's private press the proof sheets of "Essay on Woman," an obscene parody on Alexander Pope's "Essay on Man," which had been written by Wilkes and Thomas Potter years before. Wilkes had commenced, but not completed, printing 12 copies, probably for the "Monks." At the start of the parliamentary session in November 1763, the essay was read by Sandwich to the House of Lords, who voted it a libel and a breach of privilege. At the same time the Commons, on a government motion, declared "No. 45" a seditious libel. During the Christmas vacation Wilkes, recovering from a wound sustained in a duel provoked by exchanges in the House, stole off to Paris to visit his daughter and decided not to return to face prosecution. On Jan. 20, 1764, the ministers carried the motion for his expulsion from the Commons. In February he was tried in absentia and found guilty of publishing a seditious libel ("No. 45") and an obscene and impious libel (the "Essay"). Sentence was deferred pending his return, and in due course he was pronounced an outlaw for impeding royal justice.

The Middlesex elections. For the next four years Wilkes pursued a profligate career on the Continent, chiefly in Paris, vainly hoping that a change of ministry would bring in friends who would secure him relief and advancement. The ministries of Rockingham, Chatham, and Grafton all failed him, and in 1767 his disappointments had led to a slashing attack on Chatham in his "Letter to the Duke of Grafton." Early in 1768, in desperation, his indebtedness making a longer stay in Paris unsafe, he staked all on the hazardous chance of securing reelection to Parliament and determined to stand for London as an opponent of the government in the name of public liberty. The ministers, perhaps unwisely, failed to arrange his immediate arrest. Though defeated in London, he was elected for Middlesex, amid a rising tide of popular antiministerial fervour. At the end of April he gave himself up to the authorities, and early in June his outlawry was reversed on a technical point. Then, waiving his privilege as a member of Parliament, he submitted to sentences totalling two years in jail and fines of £1,000 on the two charges on which he had been convicted in 1764.

Having made this gesture he wanted a pardon and restitution, and he was ready to bully the ministers if he did not get them. In the following months he published inflammatory squibs against their use of the military against rioters, and he attempted to reopen the whole question of his conviction by a petition to the Commons complaining of illegality in the proceedings against him. The ministers once more secured his expulsion from the Commons on Feb. 3, 1769. The popularity in the metropolis of his stand against the government ensured his reelection for Middlesex on February 16, and again on March 16 after a further expulsion, regardless of a Commons' resolution that he was incapable of being elected to serve in the present Parliament. After a last reelection, on April 13, the House declared his defeated opponent, Henry Luttrell, the duly elected member. Wilkes was finally expelled on inconclusive precedents and by a method undoubtedly fraught with danger to the constitution, since it set aside in the name of parliamentary privilege the right of the elector to choose his representative.

Career in London. Friends and sympathizers of Wilkes early in 1769 formed the Society for the Defence of the Bill of Rights to uphold his cause and pay his debts. During 1770 it became a political machine at his command. Shut out of Parliament he pursued his ambitions and his vendetta with the ministers in the City of London, becoming an alderman in 1769, sheriff in 1771, and lord mayor in 1774. It may be that expediency rather than principle made him embrace the radical program adopted in 1771 by the Bill of Rights men, which called for shorter Parliaments, a wider franchise, and the abolition of aristocratic "pocket boroughs." In 1771 he successfully exploited the judicial privileges of the city to prevent the arrest for breach of privilege of printers who reported parliamentary debates. As a magistrate of the city he frequently showed himself to be conscientious and enlightened, though he remained characteristically irresponsible in financial matters.

Reelected for Middlesex in 1774, after pledging himself to the radical program, he spoke on a number of occasions against the American Revolutionary War and once (1776) in support of parliamentary reform. He soon acquired a reputation for insincerity and was reported to have admitted that his speeches against the ministers were solely to retain his popularity in London. From about 1779 his popularity noticeably waned. In 1780, during the Gordon Riots against Roman Catholics, he took firm action to put down the rioters, from whom a few years before he had been glad to receive support. In Middlesex he re-

mained popular, being reelected on his radical platform in 1780 and in 1784. In 1782 the expunging from the Commons journals of the resolution of 1769 against him vindicated his defense of the rights of parliamentary electors. After 1784 the issues that had made him popular were cold, his fire was spent, and in 1790 he found so little support in Middlesex that he declined to fight the election. He died in London in 1797.

Character. Wilkes was extremely ugly, with a hideous squint, but had a charm that carried all before it. He boasted that it "took him only half an hour to talk away his face" and would declare that "a month's start of his rival on account of his face" would secure him the conquest in any love affair. He had a gift for the bon mot: once during his fight with George III's government, when invited to make up a table at cards, he replied: "Do not ask me, for I am so ignorant that I cannot tell the difference between a king and a knave." Sandwich's laughing assertion that Wilkes would die either of the pox or on the gallows brought the lightning response: "That depends, my lord, whether I embrace your mistress or your principles." When one of his city associates lost patience and declared in a rage, "I'll be your butt no longer"—"With all my heart," said Wilkes, "I never like an empty one." Loaded often with malice, his jokes told against his enemies but also lost him friends. As an opposition journalist and pamphleteer he was hard-hitting and incisive, but he lacked either voice or talent for debate in the House of Commons. His real achievement lay in extending the liberties of the press. His challenge led to the court findings that general warrants as hitherto used by government against the press were illegal, and he effectively destroyed the power of the Houses of Parliament to exact retribution for the reporting of parliamentary debates. (I.R.C.)

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Wilkes-Barre, city, seat (1786) of Luzerne county, northeastern Pennsylvania, U.S. It lies in the Wyoming Valley and along the Susquehanna River, 18 miles (29 km) southwest of Scranton. Wilkes-Barre is the hub of a metropolitan district embracing about 30 contiguous municipalities.

Its permanent settlement began in 1769 when Major John Durkee, a veteran of the French and Indian Wars, settled a band of Connecticut colonists in the Wyoming Valley under grants issued by the Susquehanna Company. He named the town for John Wilkes and Isaac Barré, British politicians who were defenders of the American colonies in Parliament. The community survived the Pennamite-Yankee Wars, fought (1769–84) between Pennsylvania and Connecticut settlers over rival land claims, and conflicts with the Tories and Iroquois Indians during the American Revolution, which culminated in the slaughter of settlers in the Wyoming Massacre (July 3, 1778). The punitive American expedition of 1779, led by General John Sullivan against the Iroquois, was formed at Wilkes-Barre. Further trouble between warring settlers occurred, but by 1805 Connecticut had relinquished all its claims.

The major growth of the community came with the development of the coal industry in the early 19th century, which brought transportation facilities and an influx of European immigrants. Coal mining waned from the 1930s, and the city developed a highly diversified economy with manufactures including footwear, pencils, glass, boilers, furniture, toys, steel fabrications, airplane parts, and electronic equipment. Wilkes-Barre is the seat of Wilkes University (1933), King's College (1946), College Misericordia (1924), and the Wilkes-Barre campus of Pennsylvania State University (1916). Harvey Lake and Pocono mountain resorts are nearby. A flooding of the Susquehanna River in 1972 resulted in widespread property damage. Inc. borough, 1806; city, 1871. Pop. (1994 est.) city, 45,645; (1995 est.) Scranton–Wilkes-Barre–Hazleton MSA, 635,559.

Wilkes Land, region in Antarctica, bordering the Indian Ocean between Queen Mary and George V coasts (100°–142°20′ E). The region is almost entirely covered by a featureless ice cap averaging from 6,000 to 9,500 feet (1,800 to 2,900 m) above sea level. First sighted (1838–42) by the U.S. naval commander Charles Wilkes, for whom the land is named, it was not explored until the late 1940s. Included in the region are the coasts of Clarie, Banzare, Sabrina, Budd, and Knox, which are all claimed by Australia; and Adélie Coast, which is claimed by France. Australia, France, and the United States maintain stations along the Wilkes Land coasts.

Wilkie, Sir David (b. Nov. 18, 1785, Cults, Fife, Scot.—d. June 1, 1841, at sea near Gibraltar), British genre and portrait painter and draftsman known for his anecdotal style.

Wilkie, who had studied in Edinburgh, entered the Royal Academy schools in London in 1805, exhibited there from 1806, and was elected a royal academician in 1811. His first important painting, "Pitlessie Fair" (1804; National Gallery of Scotland, Edinburgh), was a genre picture in the Dutch manner owing much to the works of David Teniers the Younger and Adriaen van Ostade. It set the style that Wilkie was to pursue for the next 20 years, in which he recorded humble rural interiors and their occupants with shrewd character observation and keen attention to detail. His genre pictures achieved such success that the "Chelsea Pensioners Reading the Gazette of the Battle of Waterloo," when exhibited in the Royal Academy exhibition of 1822, had to be protected by barriers from the crowds of admirers.

A crucial change in his style occurred in 1825–28, when for reasons of health he visited Italy, Germany, Switzerland, and Spain. Particularly impressed by the Spanish painters Velázquez and Murillo, he developed a broader and bolder style and a stronger use of colour. This second manner was regretted by many of his contemporaries, who missed his earlier genre style, but the history paintings and portraits that Wilkie did at this time have a Romantic boldness that appeals to modern viewers.

Wilkie succeeded Sir Thomas Lawrence as painter to the king in 1830 and was knighted in 1836. In 1840 he visited the Holy Land to familiarize himself with the true background to religious painting, thereby anticipating William Holman Hunt. He died on the return journey, and his burial at sea is commemorated in J.M.W. Turner's painting "Peace: Burial at Sea."

Wilkins, Sir George Hubert (b. Oct. 31, 1888, Mount Bryan East, S. Aus., Australia—d. Dec. 1, 1958, Framingham, Mass., U.S.), Australian-born British explorer who advanced the use of the airplane and pioneered the use of the submarine for polar research.

An early aviator, Wilkins accompanied the explorer-ethnologist Vilhjalmur Stefansson in the Canadian Arctic (1913–16), was second in command of the British Antarctic expedition to Graham Land (1920–21), and also



Sir George Wilkins
BBC Hulton Picture Library

was naturalist on Sir Ernest Shackleton's last Antarctic expedition (1921–22). In 1926 he began a series of trial flights to test the feasibility of air exploration of the then unknown Arctic region north of Point Barrow, Alaska. On April 16, 1928, he and his copilot flew over unknown seas from Point Barrow to the Svalbard (Spitsbergen) archipelago north of Norway, completing the 2,100-mile (3,400-kilometre) journey in 20½ hours. For this feat he was knighted. In the Antarctic (December 1928), he flew 600 miles (970 km) south from Deception Island, across Graham Land, and discovered several new islands. In 1931 he took the U.S. submarine *Nautilus* and navigated it under the Arctic Ocean to latitude 82°15′ N. He was the manager of Lincoln Ellsworth's U.S. Antarctic expedition (1933–39) and subsequently acted as consultant and geographer to the U.S. armed services.

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Wilkins, Mac (b. Nov. 15, 1950, Eugene, Ore., U.S.), American world-record-holding discus thrower (1976–78). He was the first man ever to break the 70-metre barrier.

Wilkins took part during his college years (1969–73) at the University of Oregon (Eugene) in all weight-throwing events—discus, hammer throw, shot put, and javelin—which earned him the nickname "Multiple Mac." In 1973 he won the Amateur Athletic Union (AAU) championship in the discus and was second in 1974 and 1975.

Wilkins set the world record in April of 1976 and a week later, in May, broke his own record three times, the farthest throw being 70.86 m (232 feet 6 inches). In the 1976 Olympic Games at Montreal he won the gold medal. In 1980 Wilkins achieved a throw of 70.98 m (233 feet), then the second farthest ever. The U.S. boycott of the Olympic Games in Moscow that year (in protest of the Soviet invasion of Afghanistan) prevented him from defending his title, but he won a silver medal in the 1984 Olympics at Los Angeles.

Wilkins, Mary Eleanor (writer): *see* Freeman, Mary Eleanor Wilkins.

Wilkins, Maurice, in full MAURICE HUGH FREDERICK WILKINS (b. Dec. 15, 1916, Pongaroa, N.Z.), New Zealand-born British biophysicist whose X-ray diffraction studies of deoxyribonucleic acid (DNA) proved crucial to the determination of DNA's molecular structure by James Watson and Sir Francis Crick. For this work the three scientists were jointly awarded the 1962 Nobel Prize for Physiology or Medicine.

Wilkins, the son of a physician (who was originally from Dublin), was educated at King Edward's School, Birmingham, Eng., and St. John's College, Cambridge. His doctoral thesis, completed for Birmingham University in 1940, contained his original formulation of the electron-trap theory of phosphorescence and thermoluminescence. He participated for two years during World War II in the Manhattan Project at the University of California, Berkeley, working on mass spectrograph sep-

aration of uranium isotopes for use in the atomic bomb.

Upon his return to Great Britain, Wilkins lectured at the University of St. Andrews, Scotland. In 1946 he joined the Medical Research Council's Biophysics Unit at King's College, London; in 1955 he became its deputy director. From 1970 to 1980 he served as the unit's director. There he began the series of investigations that led ultimately to his X-ray diffraction studies of DNA. He later applied X-ray diffraction techniques to the study of ribonucleic acid.

At King's College proper, Wilkins was professor of molecular biology (1963–70), of biophysics (1970–81), and emeritus professor thereafter.

Wilkins, Roy (b. Aug. 30, 1901, St. Louis, Mo., U.S.—d. Sept. 8, 1981, New York, N.Y.), black American civil-rights leader who served as the executive director (1955–77) of the National Association for the Advancement of Colored People (NAACP). He was often referred to as the senior statesman of the U.S. Civil Rights Movement.

After graduation from the University of Minnesota, Minneapolis (1923), Wilkins became a reporter and later managing editor of the *Kansas City Call,* a newspaper serving the black community. Joining the staff of the NAACP in 1931, he edited its official publication, *The Crisis,* between 1934 and 1949 and simultaneously directed the NAACP antidiscrimination program across the United States.

Appointed to the NAACP's highest administrative post during the early stage of the Civil Rights Movement, Wilkins directed the organization on a course that sought equal rights for blacks through legal redress. In August 1963 he helped organize and later addressed the historic civil rights March on Washington. Devoted to the principle of nonviolence, he rejected racism in all its forms, including black separatism. Nevertheless, the pressure of black activist groups prompted the NAACP, under his leadership, to diversify its activities to include nonviolent direct action and to extend legal aid to other, frequently more militant, groups.

Wilkins was made director emeritus of the NAACP in 1977.

Wilkinson, Sir Geoffrey (b. July 14, 1921, Todmorden, Yorkshire, Eng.—d. Sept. 26, 1996, London), British chemist, joint recipient with Ernst Fischer of the Nobel Prize for Chemistry in 1973 for their independent work in organometallic chemistry.

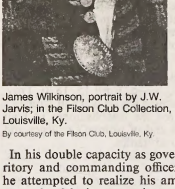
After studying at the Imperial College of Science and Technology, University of London, Wilkinson worked with the Atomic Energy Project in Canada from 1943 to 1946. He taught at the University of California at Berkeley (1946–50), the Massachusetts Institute of Technology (1950–51), and Harvard University (1951–55) before returning in 1956 to the Imperial College in London, where he became professor emeritus in 1988. Wilkinson was knighted in 1976. He wrote (with F.A. Cotton) the classic textbook *Advanced Inorganic Chemistry* (1962).

Wilkinson discovered many new isotopes as a result of his research into the products of atomic fission reactions during the 1940s. In 1951 he read about a puzzling, newly synthesized compound called dicyclopentadienyliron (now called ferrocene). He correctly deduced that this compound's structure consists of a single iron atom sandwiched between two five-sided carbon rings to form an organometallic molecule. Wilkinson went on to synthesize a number of other "sandwich" compounds, or metallocenes, and his researches into this previously unknown type of chemical structure earned him the Nobel Prize. His research on metal-to-hydrogen bonding, particularly his discovery of Wilkinson's catalyst, a homogeneous hydrogenation catalyst for alkenes, had widespread significance for organic and inorganic chemistry and proved to have important industrial applications.

Wilkinson, James (b. 1757, Calvert county, Md. [U.S.]—d. Dec. 28, 1825, Mexico City, Mex.), American soldier and adventurer, a double agent whose role in the Aaron Burr conspiracy still divides historians.

Wilkinson served in the U.S. War of Independence (1775–83) as adjutant general under General Horatio Gates (1777–78). In 1784 he settled in Kentucky, where he was active in the movement for independent statehood. In 1787 he took an oath of allegiance to Spain and began intrigues to bring the western settlements of Kentucky under the influence of the Louisiana authorities. Until 1800 he received a Spanish pension and was officially known as "Number Thirteen."

At the same time, however, he worked against the Spaniards. In October 1791 he was given a lieutenant colonel's commission in the U.S. Army, and after the U.S. purchase of Louisiana he became governor of that portion of the territory above the 33rd parallel.



James Wilkinson, portrait by J.W. Jarvis; in the Filson Club Collection, Louisville, Ky.
By courtesy of the Filson Club, Louisville, Ky

In his double capacity as governor of the territory and commanding officer of the army, he attempted to realize his ambition to conquer the Mexican provinces of Spain and perhaps set up an independent government. In an agreement with Aaron Burr, he sent Zebulon M. Pike in 1806 to explore the most favourable route for the conquest of the Southwest. Wilkinson, however, betrayed Burr's plan to President Thomas Jefferson, reached an agreement with the Spaniards to neutralize the Texas frontier, placed New Orleans under martial law, and apprehended Burr. In the ensuing trial (for treason) at Richmond, Va., Burr was found not guilty. Wilkinson himself was under suspicion and subjected to a series of courts-martial and congressional investigations. Nevertheless, he succeeded so well in hiding traces of his duplicity that in 1812 he resumed his command at New Orleans and in 1813 was promoted to the rank of major general. Later in the same year, by making a fiasco of the campaign against Montreal during the War of 1812, he finally brought his military career to a dishonourable end. He obtained a Texas land grant shortly before he died in Mexico City.

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Wilkinson, John (b. 1728, Clifton, Cumberland, Eng.—d. July 14, 1808, Bradley, Staffordshire), British industrialist known as "the great Staffordshire ironmaster" who found new applications for iron and who devised a boring machine essential to the success of James Watt's steam engine.

At the age of 20 Wilkinson moved to Staffordshire and built Bilston's first iron furnace. It was at his father's factory at Bersham, Denbigh, Wales, that he constructed his new



John Wilkinson, oil painting by an unknown artist; in the Science Museum, London
By courtesy of the Science Museum, London

machine (1775) that could bore engine cylinders and cannon barrels with unequaled accuracy. Its precision enabled Watt to perfect his steam engine. Wilkinson, in turn, used the first steam engine built by Watt and James Moulton to drive a large air pump in his large-scale manufacture of wrought iron at Broseley, Shropshire.

Another Wilkinson innovation (1787) was an iron-hulled barge—a sensation at the time—to transport the heavy ordnance he was manufacturing for the government. Wilkinson taught the French how to bore cannon from solid castings; and he cast all the tubes, cylinders, and ironwork required for the Paris waterworks. Fittingly, he was buried in a cast-iron coffin of his own design.

will, also called TESTAMENT, legal means by which an owner of property disposes of his assets in the event of his death. The term is also used for the written instrument in which the testator's dispositions are expressed. There is also an oral will, called a nuncupative will, valid only in certain jurisdictions, but otherwise often upheld if it is considered a deathbed bequest.

A brief treatment of wills follows. For full treatment, *see* MACROPAEDIA: Inheritance and Succession.

A will is valid if it meets the formalities of the law, which usually, but not always, requires that it be witnessed. The advantage of having a will drawn by an attorney arises from his knowledge of what the law requires. A holograph will, for example, which is usually unwitnessed, is an instrument wholly written in the handwriting of the signer, and it may be accepted as legally binding upon the law to carry out its dispositions, barring the findings of anything that could render it invalid. A will may be considered invalid if, among other instances, the testator was mentally incapable of disposing of his property; if the will imposed unreasonable or cruel demands as a condition of inheritance; or if the testator did not have clear title to the bequeathed assets. Business partners often draw up "mutual wills" involving transfer of business assets upon the death of one partner. *See also* probate.

Willading, Johann Friedrich (b. 1641—d. Dec. 5, 1718), Swiss statesman who played a significant role in securing the transfer of the principality of Neuchâtel to the Prussian house of Hohenzollern (1707).

Descended from a Bernese patrician family, Willading had, by 1694, become the leader of Bern's anti-French party and for several years helped to secure asylum for fugitive French Huguenots. Between 1694 and 1707 he directed Bernese policy in the question of the

Neuchâtel succession, opposing the interests of France as represented by the claims of the Prince of Conti upon the principality. Before the adjudicating body, the "Tribunal of the Three Estates," and with widespread Swiss Protestant support, he successfully pressed the claims of King Frederick I of Prussia. Willading was frequently charged with diplomatic missions and regularly represented his canton in the Swiss Confederation Diet. During the last 10 years of his life, he served as *Schultheiss* (chief magistrate) for Bern.

Willaert, Adriaan (b. *c.* 1490, Bruges, Flanders?—d. Dec. 8, 1562, Venice), Flemish composer who contributed significantly to the development of the Italian madrigal, and who established Venice as one of the most influential musical centres of the 16th century.

Willaert studied law at the University of Paris but abandoned this in favour of music, studying with the composer Jean Mouton. In 1527 he became music director of St. Mark's, Venice, where he created a school that attracted musicians from all over Europe. His students included de Rore, Zarlino, and Andrea Gabrieli.

Willaert's madrigals show a gradual synthesis of the contrapuntal style of the Franco-Netherlandish school and the growing Italian emphasis on harmonic colour and expressiveness. His chansons reflect a similar development.

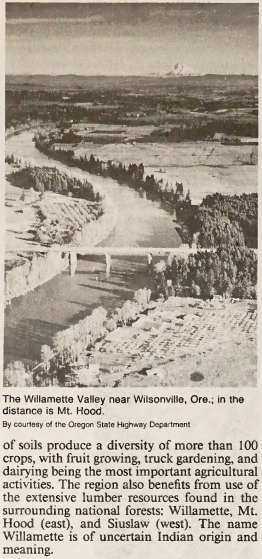


Adriaan Willaert, detail of a woodcut, 1559; in the Bayerische Staatsbibliothek, Munich
By courtesy of the Bayerische Staatsbibliothek, Munich

As a composer of sacred music he is known primarily for his motets. Probably inspired by the two opposing choir lofts at St. Mark's, he developed a style of polyphony in which two four-part choirs sing alternately, but occasionally combine in an eight-part section. This led directly to the polychoral writing that characterized Venetian music in the second half of the 16th century. Willaert was also one of the earliest composers to write purely instrumental works: canzoni, ricercari, and fantasies for organ and for instrumental ensembles.

Willamette River, river formed by the confluence of the Coast and Middle forks southeast of Eugene in western Oregon, U.S. It flows northward for 183 mi (295 km) past Corvallis, Albany, Salem, and Oregon City into the Columbia River near Portland. It is navigable downstream by steamer to Eugene. The drainage basin extends between the Cascade Range on the east and other Pacific Coast ranges on the west, forming the 30-mi-wide Willamette Valley, which holds the state's most populous cities. Tributaries have many dams, which regulate the flow of water for flood control and navigation and supply hydroelectric power to the region.

An eight-month growing season, an annual rainfall of 40 in. (1,000 mm), and a variety



The Willamette Valley near Wilsonville, Ore.; in the distance is Mt. Hood.
By courtesy of the Oregon State Highway Department

of soils produce a diversity of more than 100 crops, with fruit growing, truck gardening, and dairying being the most important agricultural activities. The region also benefits from use of the extensive lumber resources found in the surrounding national forests: Willamette, Mt. Hood (east), and Siuslaw (west). The name Willamette is of uncertain Indian origin and meaning.

Willard, Emma, *née* HART (b. Feb. 23, 1787, Berlin, Conn., U.S.—d. April 15, 1870, Troy, N.Y.), U.S. educator whose work in women's education spurred the establishment of high schools for girls and of women's colleges and coeducational universities.

In 1807 Willard became principal of a girls' academy at Middlebury, Vt., and in 1814 she opened a boarding school of her own. Her "Plan for Improving Female Education" (1819), first addressed to the New York state legislature, was an appeal for state aid in founding schools for girls and for educational equality for women. It was rejected by the legislature but found favour with Gov. De Witt



Emma Willard, portrait by an unknown artist; in the Emma Willard School Collection, Troy, N.Y.
By courtesy of the Emma Willard School, Troy, N.Y.

Clinton, who invited her to move her school to Waterford, N.Y. In 1821 the school was moved to Troy, which had offered a building and grounds, and was named the Troy Female Seminary (now called the Emma Willard School). In 1854, with the educator Henry Barnard, she represented the United States at the World's Educational Convention in London. She was the author of several widely used textbooks and a volume of poems.

Willard, Frances (Elizabeth Caroline) (b. Sept. 28, 1839, Churchville, N.Y., U.S.—d. Feb. 18, 1898, New York City), U.S. educator, reformer, and founder of the World's Woman's Christian Temperance Union (1883). An excellent speaker, a successful lobbyist, and an expert in pressure politics, she was a leader of the national Prohibition Party.



Frances Willard
By courtesy of the National Woman's Christian Temperance Union, Evanston

She was a teacher after graduation from the Northwestern Female College, Evanston, Ill., in 1859. In 1871 she became president of the new Evanston College for Ladies. When that school was absorbed by Northwestern University in 1873, she was appointed dean of women, a post she resigned in 1874 to become corresponding secretary of the newly founded National Woman's Christian Temperance Union (WCTU). From 1879 until her death she served as president of the national organization. She was also the first president of the worldwide WCTU. In addition to temperance, she advocated woman suffrage and safety codes for women in industry.

Willard, Jess (b. Dec. 29, 1881, Pottawatomie County, Kan., U.S.—d. Dec. 15, 1968, Los Angeles), U.S. prizefighter, world heavyweight boxing champion from April 5, 1915, when he knocked out Jack Johnson in 26 rounds in Havana, to July 4, 1919, when he was knocked out by Jack Dempsey in three rounds in Toledo, Ohio.

A wheat farmer in Kansas, Willard, at a comparatively advanced age, entered professional boxing in the "White Hope" era, when promoters were seeking white contenders for the title held by Johnson, a black who was the focus of much racial animosity. At 6 feet 6¼ inches, Willard was the tallest man to win the heavyweight championship.

Willard was not an active champion, defending the title successfully against Frank Moran (another leading "White Hope") in 1916, and subsequently fighting only a few exhibition matches until his bout with Dempsey. Aged 37, and not well trained, he was an easy mark for Dempsey's furious attack.

In 1923, at the age of 41, Willard returned to the ring. He scored one knockout and then fought well against the powerful Luis Angel Firpo before being knocked out in the eighth round. From 1911 to 1923 Willard had 36 bouts, winning 24, 20 by knockouts.

Willard, Simon (b. April 3, 1753, Grafton, Mass., U.S.—d. Aug. 30, 1848, Roxbury, Mass.), U.S. clockmaker, creator of the timepiece that came to be known as the banjo clock, and a member of a Massachusetts family of clockmakers designing and producing brass-movement clocks from 1765 to 1850.

Around 1780 Willard moved from Grafton,

where he had been apprenticed to a clockmaker, settling in Roxbury, near Boston, and working there until his retirement in 1839. He catered to a wealthy clientele, including Thomas Jefferson, making various types of clocks but specializing in pieces for churches, halls, and galleries. It is believed that he concentrated on producing accurate, simple movements and that the cases for his clocks were made by others.

On Feb. 8, 1802, Willard patented a spring-driven, pendulum clock housed in a case having a round top portion bearing the dial, an elongated central portion curving inward, and a rectangular base. It is possible that the shape of the case inspired the term banjo clock, a name Willard did not use.

Other items patented by Willard include a device for roasting meat, operated by a clock mechanism (1784), and an alarm clock (1819).

Willard's brother Benjamin (1743–1803) began manufacturing clocks in Grafton *c.* 1765 and was known for the quality of his tall-case clocks (a style later called grandfather clock). Another brother, Ephraim (1755–1805), apparently worked with Benjamin. The youngest brother, Aaron (1757–1844), also a clockmaker, worked in Roxbury until 1790, when he established a prosperous business in Boston, producing various types of clocks, including banjo styles usually having painted lower panels.

Simon's business was continued for several years by his son, Simon, Jr. (1795–1881). Aaron's son, also named Aaron (1783–1864), worked as a clockmaker until about 1850.

Willcocks, Sir William (b. Sept. 27, 1852, India—d. July 28, 1932, Cairo), British civil engineer who proposed and designed the first Aswān (Assuan) Dam and executed major irrigation projects in South Africa and Turkey.

In 1872 he entered the India's Public Works Department and in 1883 began work in the Egyptian Public Works Department. While serving as director general of reservoirs for Egypt, he completed studies and plans on the Aswān Dam, which was completed in 1902.

Willcocks retired from his Egyptian post in 1897 and four years later went to South Africa to plan irrigation systems for the arid regions. Part of his scheme was implemented and brought him a knighthood. He became head of irrigation for the Turkish government and in 1911 proposed a plan to bring water to the area of ancient Chaldea, now southern Iraq. As a result, the Hindiyah Barrage was built on the Euphrates River, near the site of ancient Babylon, and 3,500,000 acres were brought under irrigation.

Wille, Ulrich (b. April 5, 1848, Hamburg—d. Jan. 31, 1925, Meilen, Switz.), Swiss military leader and commander in chief of the Swiss Army during World War I who made major federal military reforms.

Wille studied the organization of the Prussian Army in Berlin and attempted various changes in the federal army along Prussian lines. He reorganized the process of recruit instruction and in 1881, while a lieutenant colonel, undertook the reform of the cavalry, subsequently publishing a new cavalry code (1892). The "Wille spirit" was often publicly attacked, however, and, when a military law favoured by him failed to win popular support (1895), he resigned his recently acquired positions as head and chief instructor of the army. In 1900, however, he resumed active service. At the outbreak of World War I, he was—in an act of doubtful constitutionality (August 1914)—named general and appointed commander in chief of the Swiss Army and directed the occupation of the frontiers until the war's end. He is generally credited with having replaced the old tradition of the Swiss citizens' army with the concept of strict military duty and discipline.

Willem (Dutch personal name): *see under* William, except as below.

Willem VAN RUYSBROECK, Latin WILHELMUS RUBRUQUIS, English WILLIAM OF RUBROUCK (b. *c.* 1215—d. *c.* 1295), French Franciscan friar whose eyewitness account of the Mongol realm is generally acknowledged to be the best written by any medieval Christian traveller. A contemporary of the English scientist and philosopher Roger Bacon, he was cited frequently in the geographical section of Bacon's *Opus majus*.

Willem was probably from the village of Rubrouck, near Saint-Omer, Fr. In 1253 King Louis IX of France (St. Louis), who was then at Acre, Palestine, dispatched him on an informal mission to the Mongol Empire. Departing from Constantinople on May 7, 1253, he and his party reached the Crimean town of Sudak. There they secured oxen and carts for their long trek across the steppes to the encampment of Batu Khan, the Mongol ruler of the Volga River region. Following their arrival five weeks later, they were ordered to begin a journey of some 5,000 miles to the court of the Great Khan at Karakorum in central Mongolia.

The Christians set off on horseback on Sept. 16, 1253, their route taking them north of the Caspian and Aral seas to the Talas River, to the Cailac Valley, and to the great plains of Mongolia, and came upon the Great Khan's camp, which lay about 10 days' journey south of Karakorum.

Willem and his companions were received courteously and remained with the Khan until about July 10, 1254. They followed a more northerly route on their outward journey, reaching Tripoli on Aug. 15, 1255, where they found that King Louis had returned to France in 1254.

Willem wrote about his Mongolian experiences for the French king. His narrative is free from legend and shows him to have been an intelligent and honest observer. Nothing is known about his later life, except that he was alive when Marco Polo returned from the East in 1295. After Bacon's copious use of the narrative, it was neglected, though five manuscripts survive. One copy was imperfectly reproduced by Richard Hakluyt in 1598 and 1599. A more recent Hakluyt Society edition is *The Journey of William of Rubruck to the Eastern Parts of the World, 1253–55* . . . (1900), prepared by W.W. Rockhill.

Where the same name may denote a person, place, or thing, the articles will be found in that order

Willem Lodewijk (Dutch statesman): *see* William Louis.

Willem Pretorius Game Reserve, game sanctuary in Orange Free State, South Africa, adjoining Allemanskraal Dam northeast of Bloemfontein. Established in 1956, it occupies 46 sq mi (120 sq km) in the Highveld plateau typical of the Orange Free State. It includes the Doringberg hills, a storage reservoir above the dam, and many deep ravines. The reserve is particularly known for its herds of black wildebeest; other wildlife include the white rhinoceros, giraffe, zebra, red hartebeest, impala and other antelopes, and varied birdlife. Recreational facilities have been developed.

willemite, white or greenish-yellow silicate mineral, zinc silicate, Zn_2SiO_4, that is found as crystals, grains, or fibres with other zinc ores in many deposits. Included are various localities in Sussex County, N.J., where it occurs in crystalline limestone and constitutes an important zinc ore; it was worked at Nutley for more than 100 years before the reserve was exhausted in 1954. Occurrences outside the United States include Belgium, Algeria, South West Africa/Namibia, and Greenland. Its brilliant green fluorescence led to its use in early television tubes. For detailed physical properties, *see* silicate mineral (table).



Willemite from South West Africa/Namibia

By courtesy of the Field Museum of Natural History, Chicago; photograph, John H. Gerard—EB Inc.

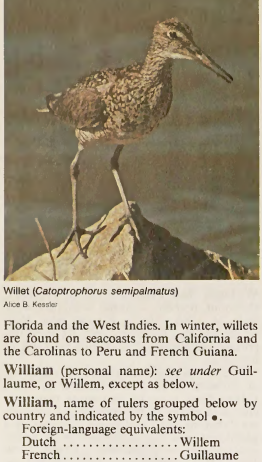
Willems, Jan Frans (b. March 11, 1793, Boechout, Brabant, Austrian Netherlands—d. June 24, 1846, Ghent), Flemish poet, playwright, essayist, polemicist, and the most important philologist of the Dutch language of his time.

Willems was appointed assistant city archivist of Antwerp in 1815 and registrar in 1821. During these years he also wrote plays, poems, and essays in the style of the *rederijkers* ("rhetoricians") and began his work as a philologist. His *Verhandeling over de nederduytsche tael- en letter-kunde* . . . (2 vol., 1819; 1820–24), is a milestone in the history of literary studies in The Netherlands. He published a modern Flemish translation of the 13th-century *Van den vos Reinaerde* ("Reynard the Fox") with an epoch-making introduction (1834), followed by a scholarly edition (1836), which won him fame abroad. In 1835 he moved to Ghent, where he became active as a scholar and leader of the Flemish national and Romantic revival. Among other activities, he founded the periodical *Belgisch museum* (1837–46), a repository of information on medieval Flanders.

Willemstad, chief town of Curaçao and capital of the Netherlands Antilles (*q.v.*) in the Caribbean Sea, on the southern coast in the southeastern corner of Curaçao. It is divided into two parts by the Sint Anna Baai (Saint Anne Bay) leading to Schottegat Harbour. The two halves, Punda and Otrabanda (Other Side), are joined by the Koningin Emma Brug, or Queen Emma Pontoon Bridge, built in 1888. A fixed bridge was completed in 1974.

The town has many Dutch-style gabled houses. Important buildings include Ft. Amsterdam, which once guarded the entrance to Schottegat Harbour and is now the seat of government; the Dutch Reformed Church (1769); and the Mikve Israel Synagogue (1732), the oldest in the Western Hemisphere. There is also an old slave market and the Curaçao Museum. Pop. (1970 est.) 50,000.

willet (*Catoptrophorus semipalmatus*), large, long-billed shorebird of America, belonging to the family Scolopacidae (order Charadriiformes). which also includes the snipes, turnstones, and curlews. The willet is named for its loud call. Willets are about 40 centimetres (16 inches) long and gray, with striking black and white wings. With the wings closed, they resemble the greater yellowlegs. Once a declining species, willets have revived under protection of their breeding places, around ponds, from southwestern Canada to Colorado and south to Mexico, and from Nova Scotia to



Willet (*Catoptrophorus semipalmatus*)
Alice B. Kessler

Florida and the West Indies. In winter, willets are found on seacoasts from California and the Carolinas to Peru and French Guiana.

William (personal name): *see under* Guillaume, or Willem, except as below.

William, name of rulers grouped below by country and indicated by the symbol •.

Foreign-language equivalents:
Dutch ..... Willem
French ..... Guillaume
German ..... Wilhelm
Italian ..... Guglielmo

Aquitaine

• **William IX** (b. Oct. 22, 1071—d. Feb. 10, 1127, Poitiers, Fr.), medieval troubadour, count of Poitiers and duke of Aquitaine and of Gascony (1086–1127), son of William VIII and grandfather of the famous Eleanor of Aquitaine.

William IX spent most of his life in warfare, including leading an unsuccessful Crusade to the Holy Land (1101–02) and battling the Moors near Cordova (1120–23). His fame rests chiefly, however, on his being the first poet in the Provençal language whose works have come down to us. His chansons, or songs, are boisterous, amorous, humorous, usually delicate but sometimes coarsely obscene and tend, in the fashion of courtly love, to idolize one's lady love.

• **William X** (b. 1099, Toulouse, Fr.—d. April 9, 1137, Santiago de Compostela, Spain), duke of Aquitaine and of Gascony (1127–37), son of William IX.

In 1131 he recognized the antipope Anaclet and supported him until 1134. In 1136 he ravaged Normandy. The following year he went on a pilgrimage to Santiago de Compostela in Galicia, where he died. His daughter, Eleanor of Aquitaine, inherited all his lands and, first, through her marriage to Louis VII of France, united Aquitaine with the Capetian line and, then, through her marriage to Duke Henry of Normandy (the future Henry II of England) united Aquitaine to the Plantagenet line.

England, Great Britain, United Kingdom

• **William I,** byname WILLIAM THE CONQUEROR, OF THE BASTARD, OF WILLIAM OF NORMANDY, French GUILLAUME LE CONQUÉRANT, OF LE BÂTARD, OF GUILLAUME DE NORMANDIE (b. c. 1028, Falaise, Normandy—d. Sept. 9, 1087, Rouen), duke of Normandy (as William II) from 1035 and king of England from 1066, one of the greatest soldiers and rulers of the Middle Ages. He made himself the mightiest feudal lord in France and then changed the course of England's history by his conquest of that country.

Early years. William was the elder of two children of Robert I of Normandy and his concubine Herleva, or Arlette, the daughter of a burgher from the town of Falaise. In 1035 Robert died when returning from a pilgrimage to Jerusalem, and William, his only son, whom he had nominated as his heir before his departure, was accepted as duke by the Norman magnates and his feudal overlord, King Henry I of France. William and his friends had to overcome enormous obstacles. His illegitimacy (he was generally known as the Bastard) was a handicap, and he had to survive the collapse of law and order that accompanied his accession as a child.

Three of William's guardians died violent deaths before he grew up, and his tutor was murdered. His father's kin were of little help; most of them thought that they stood to gain by the boy's death. But his mother managed to protect William through the most dangerous period. These early difficulties probably contributed to his strength of purpose and his dislike of lawlessness and misrule.

Ruler of Normandy. By 1042, when William reached his 15th year, was knighted, and began to play a personal part in the affairs of his duchy, the worst was over. But his attempts to recover rights lost during the anarchy and to bring disobedient vassals and servants to heel inevitably led to trouble. From 1046 until 1055 he dealt with a series of baronial rebellions, mostly led by kinsmen. Occasionally he was in great danger and had to rely on Henry of France for help. In 1047 Henry and William defeated a coalition of Norman rebels at Val-ès-Dunes, southeast of Caen. It was in these years that William learned to fight and rule.

William soon learned to control his youthful recklessness. He was always ready to take calculated risks on campaign and, most important, to fight a battle. But he was not a chivalrous or flamboyant commander. His plans were simple, his methods direct, and he exploited ruthlessly any advantage gained. If he found himself at a disadvantage, he withdrew immediately. He showed the same qualities in his government. He never lost sight of his aim to recover lost ducal rights and revenues, and, although he developed no theory of government or great interest in administrative techniques, he was always prepared to improvise and experiment. He seems to have lived a moral life by the standards of the time, and he acquired an interest in the welfare of the Norman church. He made his half brother, Odo, bishop of Bayeux in 1049 at the age of about 16, and Odo managed to combine the roles of nobleman and prelate in a way that did not greatly shock contemporaries. But William also welcomed foreign monks and scholars to Normandy. Lanfranc of Pavia, a famous master of the liberal arts, who entered the monastery of Bec about 1042, was made abbot of Caen in 1063.

According to a brief description of William's person by an anonymous author, who borrowed extensively from Einhard's Life of Charlemagne, he was just above average height and had a robust, thick-set body. Though he was always sparing of food and drink, he became fat in later life. He had a rough bass voice and was a good and ready speaker. Writers of the next generation agree that he was exceptionally strong and vigorous. William was an out-of-doors man, a hunter and soldier, fierce and despotic, generally feared; uneducated, he had few graces but was intelligent and shrewd and soon obtained the respect of his rivals.

New alliances. After 1047 William began to take part in events outside his duchy. In support of his lord, King Henry, and in pursuit of an ambition to strengthen his southern frontier and expand into Maine, he fought a series of campaigns against Geoffrey Martel, count of Anjou. But in 1052 Henry and Geoffrey made peace, there was a serious rebellion in eastern Normandy, and, until 1054 William was again in serious danger. During this period he conducted important negotiations with his cousin Edward the Confessor, king of England, and took a wife.

Norman interest in Anglo-Saxon England derived from an alliance made in 1002, when King Ethelred II of England married Emma, sister of Count Richard II, William's grandfather. Two of her sons, William's cousins once removed, had reigned in turn in England, Hardecanute (1040–42) and Edward the Confessor (1042–66). William had met Edward during that prince's exile on the Continent and may well have given him some support when he returned to England in 1041. In that year Edward was about 36 and William 14. It is clear that William expected some sort of reward from Edward and, when Edward's marriage proved unfruitful, began to develop an ambition to become his kinsman's heir. Edward probably at times encouraged William's hopes. His childlessness was a diplomatic asset.

In 1049 William negotiated with Baldwin V of Flanders for the hand of his daughter, Matilda. Baldwin, an imperial vassal with a distinguished lineage, was in rebellion against the Western emperor, Henry III, and in desperate need of allies. The proposed marriage was condemned as incestuous (William and Matilda were evidently related in some way) by the Emperor's friend, Pope Leo IX, at the Council of Reims in October 1049; but so anxious were the parties for the alliance that before the end of 1053, possibly in 1052, the wedding took place. In 1059 William was reconciled to the papacy, and as penance the disobedient pair built two monasteries at Caen. Four sons were born to William and Matilda: Robert (the future duke of Normandy), Richard (who died young), William Rufus (the Conqueror's successor in England), and Henry (Rufus' successor). Among the daughters was Adela, who was the mother of Stephen, king of England.

Edward the Confessor was supporting the Emperor, and it is possible that William used his new alliance with Flanders to put pressure on Edward and extort an acknowledgment that he was the English king's heir. At all events, Edward seems to have made some sort of promise to William in 1051, while Tostig, son of the greatest nobleman in England, Earl Godwine, married Baldwin's half sister. The immediate purpose of this tripartite alliance was to improve the security of each of the parties. If William secured a declaration that he was Edward's heir, he was also looking very far ahead.



William I the Conqueror (centre), detail from the Bayeux Tapestry, 11th century; in the Broderie-Tapisserie de Bayeux, Bayeux, Fr.
By courtesy of the Phaidon Press, publishers of "The Bayeux Tapestry" edited by Sir Frank Stenton

Between 1054 and 1060 William held his own against an alliance between King Henry I and Geoffrey Martel of Anjou. Both men died in 1060 and were succeeded by weaker rulers. As a result, in 1063 William was able to conquer Maine. In 1064 or 1065 Edward sent his brother-in-law, Harold, earl of Wessex, Godwine's son and successor, on an embassy to Normandy. William took him on a campaign into Brittany, and in connection with this Harold swore an oath in which, according to Norman writers, he renewed Edward's bequest of the throne to William and promised to support it.

When Edward died childless on Jan. 5, 1066, Harold was accepted as king by the English magnates, and William decided on war. Others, however, moved more quickly. In May Tostig, Harold's exiled brother, raided England, and in September he joined the invasion forces of Harald III Hardraade, king of Norway, off the Northumbrian coast. William assembled a fleet, recruited an army, and gathered his forces in August at the mouth of the Dives River. It is likely that he originally intended to sail due north and invade England by way of the Isle of Wight and Southampton Water. Such a plan would give him an offshore base and interior lines. But adverse winds detained his fleet in harbour for a month, and in September a westerly gale drove his ships up-Channel.

The Battle of Hastings. William regrouped his forces at Saint-Valéry on the Somme. He had suffered a costly delay, some naval losses, and a drop in the morale of his troops. On September 27, after cold and rainy weather, the wind backed south. William embarked his army and set sail for the southeast coast of England. The following morning he landed, took the unresisting towns of Pevensey and Hastings, and began to organize a bridgehead with between 4,000 and 7,000 cavalry and infantry.

William's forces were in a narrow coastal strip, hemmed in by the great forest of Andred, and, although this corridor was easily defensible, it was not much of a base for the conquest of England. The campaigning season was almost past, and when William received news of his opponent it was not reassuring. On September 25 Harold had defeated and slain Tostig and Harald Hardraade at Stamford Bridge, near York, and was retracing his steps to meet the new invader. On October 13, when Harold emerged from the forest, William was taken by surprise. But the hour was too late for Harold to push on to Hastings, and he took up a defensive position. Early the next day William went out to give battle. He attacked the English phalanx with archers and cavalry but saw his army almost driven from the field. He rallied the fugitives, however, and brought them back into the fight and in the end wore down his opponents. Harold's brothers were killed early in the battle. Toward nightfall the King himself fell and the English gave up. William's coolness and tenacity secured him victory in this fateful battle, and he then moved against possible centres of resistance so quickly that he prevented a new leader from emerging. On Christmas Day 1066 he was crowned king in Westminster Abbey. In a formal sense the Norman Conquest of England had taken place.

King of England. William was already an experienced ruler. In Normandy he had replaced disloyal nobles and ducal servants with his own friends, limited private warfare, and recovered usurped ducal rights, defining the feudal duties of his vassals. The Norman church flourished under his rule. He wanted a church free of corruption but subordinate to him. He would not tolerate opposition from bishops and abbots or interference from the papacy. He presided over church synods and reinforced ecclesiastical discipline with his own. In supporting Lanfranc, prior of Bec, against Berengar of Tours in their dispute over the doctrine of the Eucharist, he found himself on the side of orthodoxy. He was never guilty of the selling of church office (simony). He disapproved of clerical marriage. At the same time he was a stern and sometimes rough master, swayed by political necessities, and he was not generous to the church with his own property. The reformer Lanfranc was one of his advisers; but perhaps even more to his taste were the worldly and soldierly bishops Odo of Bayeux and Geoffrey of Coutances.

William left England early in 1067 but had to return in December because of English unrest. The English rebellions that began in 1067 reached their peak in 1069 and were finally quelled in 1071. They completed the ruin of the highest English aristocracy and gave William a distaste for his newly conquered kingdom. Since his position on the Continent was deteriorating, he wanted to solve English problems as cheaply as possible. To secure England's frontiers, he invaded Scotland in 1072 and Wales in 1081 and created special defensive "marcher" counties along the Scottish and Welsh borders.

In the last 15 years of his life he was more often in Normandy than in England, and there were five years, possibly seven, in which he did not visit the kingdom at all. He retained most of the greatest Anglo-Norman barons with him in Normandy and confided the government of England to bishops, trusting especially his old friend Lanfranc, whom he made archbishop of Canbury. Much concerned that the natives should not be unnecessarily disturbed, he allowed them to retain their own laws and courts.

William returned to England only when it was absolutely necessary: in 1075 to deal with the aftermath of a rebellion by Roger, earl of Hereford, and Ralf, earl of Norfold, which was made more dangerous by the intervention of a Danish fleet; and in 1082 to arrest and imprison his half brother Odo, bishop of Bayeux and earl of Kent, who was planning to take an army to Italy, perhaps to make himself pope. In the spring of 1082 William had his son Henry knighted, and in August at Salisbury he took oaths of fealty from all the important landowners in England, whosoever's vassals they might be. In 1085 he returned with a large army to meet the threat of an invasion by Canute II (Canute the Holy) of Denmark. When this came to nothing owing to Canute's death in 1086, William ordered an economic and tenurial survey to be made of the kingdom, the results of which are summarized in the two volumes of Domesday Book.

William was preoccupied with the frontiers of Normandy. The danger spots were in Maine and the Vexin on the Seine, where Normandy bordered on the French royal demesne. After 1066 William's continental neighbours became more powerful and even more hostile. In 1068 Fulk the Surly succeeded to Anjou and in 1071 Robert the Frisian to Flanders. Philip I of France allied with Robert and Robert with the Danish king, Canute II. There was also the problem of William's heir apparent, Robert Curthose, who, given no appanage and seemingly kept short of money, left Normandy in 1077 and intrigued with his father's enemies. In 1081 William made a compromise with Fulk in the treaty of Blancheland: Robert Curthose was to be count of Maine but as a vassal of the count of Anjou. The eastern part of the Vexin, the county of Mantes, had fallen completely into King Philip's hands in 1077 when William had been busy with Maine. In 1087 William demanded from Philip the return of the towns of Chaumont, Mantes, and Pontoise. In July he entered Mantes by surprise, but while the town burned he suffered some injury from which he never recovered. He was thwarted at the very moment when he seemed about to enforce his last outstanding territorial claim.

Death. William was taken to a suburb of Rouen, where he lay dying for five weeks. He had the assistance of some of his bishops and doctors, and in attendance were his half brother Robert, count of Mortain, and his younger sons, William Rufus and Henry. Robert Curthose was with the King of France. It had probably been his intention that Robert, as was the custom, should succeed to the whole inheritance. In the circumstances he was tempted to make the loyal Rufus his sole heir. In the end he compromised: Normandy and Maine went to Robert and England to Rufus. Henry was given great treasure with which he could purchase an appanage. William died at daybreak on September 9, in his 60th year, and was buried in rather unseemly fashion in St. Stephen's Church, which he had built at Caen. (F.Ba.)

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• **William II,** byname WILLIAM RUFUS, French GUILLAUME LE ROUX (b. *c.* 1056—d. Aug. 2, 1100, near Lyndhurst, Hampshire, Eng.), son of William I the Conqueror and king of England from 1087 to 1100; he was also de facto duke of Normandy (as William



William II, drawing by Matthew Paris from a mid-13th-century manuscript; in the British Library (Ms. Royal 14 cvii)

Reproduced by permission of the British Library

III) from 1096 to 1100. He prevented the dissolution of political ties between England and Normandy, but his strong-armed rule earned him a reputation as a brutal, corrupt tyrant. Rufus ("the Red"—so named for his ruddy complexion) was William's third (second surviving) and favourite son. In accordance with feudal custom, William I bequeathed his inheritance, the Duchy of Normandy, to his eldest son, Robert II Curthose; England, William's kingdom by conquest, was given to Rufus.

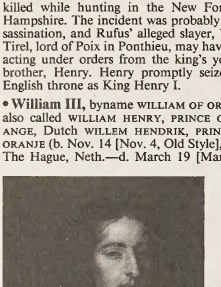
Nevertheless, many Norman barons in En-

gland wanted England and Normandy to remain under one ruler, and shortly after Rufus succeeded to the throne, they conspired to overthrow him in favour of Robert. Led by the Conqueror's half brother, Odo of Bayeux, Earl of Kent, they raised rebellions in eastern England in 1088. Rufus immediately won the native English to his side by pledging to cut taxes and institute efficient government. The insurgency was suppressed, but the king failed to keep his promises. Consequently, a second baronial revolt, led by Robert de Mowbray, Earl of Northumberland, broke out in 1095. This time William punished the ringleaders with such brutality that no barons dared to challenge his authority thereafter. His attempts to undermine the authority of the English church provoked resistance from St. Anselm, archbishop of Canterbury, who, defeated, left the country for Rome in 1097; Rufus immediately seized the lands of Canterbury.

Meanwhile, Rufus was engaged in military operations in Scotland, Wales, and particularly in Normandy. In 1091 he compelled King Malcolm III of Scotland to acknowledge his overlordship. Malcolm revolted in November 1093, but Rufus' forces quickly killed him near Alnwick, Northumberland. Thereafter, Rufus maintained the Scottish kings as vassals, and in 1097 he subjugated Wales.

William Rufus' chief interest, however, lay in the recovery of Normandy from the incompetent Robert. After waging war on Normandy for seven years (1089–96), Rufus reduced his brother to the role of a subordinate ally. When Robert left for a crusade in 1096, he mortgaged his kingdom to Rufus, who quickly added Maine to his possessions. In 1100 Rufus was shot in the back with an arrow and killed while hunting in the New Forest in Hampshire. The incident was probably an assassination, and Rufus' alleged slayer, Walter Tirel, lord of Poix in Ponthieu, may have been acting under orders from the king's younger brother, Henry. Henry promptly seized the English throne as King Henry I.

• **William III,** byname WILLIAM OF ORANGE, also called WILLIAM HENRY, PRINCE OF ORANGE, Dutch WILLEM HENDRIK, PRINS VAN ORANJE (b. Nov. 14 [Nov. 4, Old Style], 1650, The Hague, Neth.—d. March 19 [March 8],



William III, painting after W. Wissing; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

1702, London, Eng.), stadholder of the United Provinces of the Netherlands as William III (1672–1702) and king of Great Britain (1689–1702), reigning jointly with Queen Mary II (until her death in 1694). He directed the European opposition to Louis XIV of France and, in Great Britain, secured the triumph of Protestantism and of Parliament.

Early life. The son of William II, Prince of Orange, and of Mary, the daughter of Charles I of England, William was born at The Hague in November 1650, eight days after his father's death. As stadholder of five of the United Provinces of the Netherlands, William II had recently incurred the enmity of a powerful minority of a republican oligarchy that dominated the province of Holland and the city of Amsterdam. After his death this party determined to exclude the house of Orange from power, and the Act of Seclusion (1654) debarred the Prince of Orange and his descendants from holding office in the state.

William III's education, nevertheless, was, from the first, the training of a ruler. Contemporaries agree that he was a boy of great vivacity and charm, but frequent quarrels between his mother and his paternal grandmother disturbed his childhood and may have helped to breed the habit of reserve that was intensified by the difficulties of his later life. In 1660, after his uncle Charles II's restoration to the English throne, the Act of Seclusion was rescinded. Shortly afterward his mother died, leaving him to the guardianship of his grandmother and of his uncle Frederick William, elector of Brandenburg.

Early in 1666 he was made a ward of the States General, the representative assembly of the United Provinces. Under Johan de Witt, the grand pensionary of Holland, he acquired a specialized knowledge of public business. His exceptional promise and the popular devotion he had inherited made it impossible to deny him all advancement, but the Perpetual Edict (1667) decreed that the office of stadholder and captain general, formerly held simultaneously by the princes of Orange, should never again be held by the same person.

Stadholder. In 1671 it became clear that Louis XIV of France and Charles II of England were planning a joint attack on the United Provinces, and demands for William's appointment as captain general became insistent. He was appointed in February 1672, though at first with very limited authority. In March and April Charles and Louis declared war, and in June French troops crossed the Rhine River and overran three provinces in as many weeks. The Dutch navy was able to hold the English in check, but the army had been neglected and was ill-trained and ill-equipped. As a last expedient the polders, or low-lying areas, were flooded, and William, with his few unseasoned troops, was left to defend the "water line."

Panic broke out in the country, and there were angry demands for the prince's elevation to the stadholderate. The few dissenters were overruled, and on July 8 (New Style) he was proclaimed stadholder by the States General, later ratified by the provincial estates of the occupied provinces. One of his first acts, done with the States' approval, was to refuse the ruinous peace terms offered by the two kings. Civil disorders, however, were not over. On August 20 Johan de Witt and his brother, who were unjustly suspected of treachery, were murdered by an infuriated mob at The Hague. William was in no way implicated in the crime and was enraged when he heard of it, but, because of the number of the murderers and perhaps because of the general revolutionary situation, he failed to bring them to justice.

In a few weeks the country settled down and for a year held out almost alone. In the autumn of 1672 William had enlisted the aid of the Holy Roman emperor Leopold I and the elector of Brandenburg, and in 1673 Spain joined the alliance, but their help was not immediately effective. William, meanwhile, was steadily rebuilding his army and in September 1673 recaptured the key fortress of Naarden. He then moved swiftly into the territory of Cologne, joined his forces to those of the emperor, and on November 12 captured Bonn. The French, threatened with encirclement, hurriedly evacuated the United Provinces. Charles II and Louis's minor allies were forced to make peace early in 1674. Louis's Dutch adventure had failed and had turned half of Europe against him, but he still held many places in Germany and the Spanish Netherlands, so the war continued and spread into remoter parts of the continent. William's chief concern for the next four years was the command of the Dutch armies in Flanders, though Dutch domestic affairs and repeated attempts to find an acceptable peace formula took much of his time. Peace was finally made by a series of treaties in 1678 and 1679.

King of England. In November 1677 William had married his cousin Mary, daughter of James, Duke of York (later King James II of England). William himself stood fourth in the English succession, and this marriage with the heiress presumptive gave him added importance in England, though during Charles II's reign he took little English affairs was that of an anxious spectator rather than of a participant. During the 1680s Louis's numerous minor aggressions kept Europe in a continual state of tension, but William's efforts to build up a new coalition against him were repeatedly frustrated, largely by the activities of a small but powerful pro-French party in Holland and by the equivocal attitude of England. Eventually, however, the English king James II, a Roman Catholic, had so antagonized his subjects by his despotic and romanizing policies that by 1687 many of them were urging William to intervene. In 1688 the birth of a son to James, which opened the possibility of a Roman Catholic succession, finally brought matters to a head.

An invitation, signed by a representative selection of James's opponents, was dispatched on July 10 (Old Style), and on November 5 (November 15, New Style) William and his army landed at Brixham on Tor Bay in Devon and proceeded almost unopposed to London. James fled to France, and the so-called Convention Parliament, summoned in January 1689, declared that James had abdicated and offered the vacant throne, with an accompanying Declaration of Right, to William and Mary. They were proclaimed in February and crowned on April 21. The crown of Scotland was offered to them in the same month.

The Glen Coe massacre. The revolution in England had been accomplished almost without bloodshed, but in Scotland and Ireland there was armed resistance. This collapsed in Scotland in 1689, but the country remained troubled and unsettled throughout William's reign. In 1692 Alexander MacDonald of Glen Coe and some of his clansmen were murdered in cold blood for tardiness in taking the oath of allegiance to William. William ordered an inquiry but took no further action until in 1695 the Scottish Parliament demanded a public investigation. He then showed culpable leniency to the offenders, merely dismissing from his secretaryship Sir John Dalrymple, on whom responsibility for the massacre was finally placed. In Ireland war formally broke out in 1689, when James landed there with French support. But the successful defense of Londonderry and of Enniskillen, and William's own victory at the Battle of the Boyne on July 1, 1690, ensured the reconquest of Ireland and freed him to turn his attention to the European continent. Here, after a series of minor attacks on the empire, Louis XIV had invaded the Palatinate in 1688. The Dutch and the emperor concluded the Treaty of Vienna (May 1689) and declared war on Louis; over the next 18 months William's rare diplomatic skill brought into the alliance Brandenburg, Hanover, Saxony, Bavaria, Savoy, and Spain, as well as England, which became its linchpin.

From 1691 William spent much time campaigning on the continent with varying degrees of success; but by 1696 a number of

factors made both sides anxious for peace, and the Treaties of Rijswijk were signed in 1697. The question, vital for a European balance of power, of who was to succeed the childless king Charles II of Spain remained unsettled, however, and William had good cause to fear that the peace would be no more than a truce. The English Parliament, on the contrary, was convinced that it would be lasting, insisted on cutting down the size of the army, and resolutely turned its back on foreign affairs. William, in the hope of averting a new war, entered into two Spanish Partition treaties (1698–99) with Louis—measures that involved him in serious frictions with Parliament. But when the Spanish king died on Nov. 1, 1700, Louis, ignoring his agreements, accepted the crown of Spain for his grandson and soon showed that he had not relinquished his plans for French aggrandizement.

William, though hampered by English apathy, set himself to rebuilding the Grand Alliance and to preparing his two countries for the now inevitable conflict. In September 1701 the exiled James II died, and Louis XIV proclaimed his son king of England, contrary to his agreement in one of the Rijswijk treaties, and thus roused the English to an enthusiasm for war. William did not live to see this war declared. His health had long been declining, and in March 1702 he died. His plans for a European settlement were largely carried out by the Treaty of Utrecht (1713). His ideal, which he had pursued doggedly for 30 years, was an international order in which no single power was able to tyrannize the rest.

Assessment. Holland, by the time of William's death, was ceasing to be a great power, for reasons for which he cannot be held responsible. That it remained free, independent, and prosperous was in no small measure due to him. In England he remained to the last an alien, unpopular with the ruling classes, though the common people always looked on him as the Protestant hero and hailed his appearances with enthusiasm.

His reign was of great importance in the constitutional history of the country, and his own contribution to these developments was far from negligible. By moderation and good faith in his exercise of the royal prerogative, he preserved the crown and with it those elements of stability and continuity that have been the peculiar strength of Great Britain. William hated faction, and his influence brought to an end a long period of murderous party strife. He sponsored the reform of the currency and promoted the Irish linen trade. The Toleration Act (1689) fell short of his wishes, but in spite of many frustrations he did his utmost to promote religious toleration. In 1689, of his own free will, he granted independence to the judiciary, a grant later given statutory permanence by the Act of Settlement (1700–01).

Contemporaries acclaimed William a great soldier, although he was not, in fact, a very fortunate general. But the Dutch and British armies that Marlborough inherited to continue the war against Louis were at least in part his creation. Though a martinet with his soldiers, he won and kept their devotion by his personal bravery and his concern for their well-being. A life of gruelling public activities left him little leisure for other pursuits, but he deserves mention as a patron of the arts. On his private estates he was an enlightened lord of the manor in his concern for the welfare of his tenants and the maintenance of his lands; in his private charities he was particularly concerned to help refugees.

Though reserved in manner, and sometimes irritable and ungracious, partly as a result of ill health and overwork, he could also show himself kindly, courteous, and forbearing, and he had the gift of winning and keeping love. His wife, Mary, was devoted to him, and he to her, although he was not always an easy nor a strictly faithful husband. He became more withdrawn after the shock of her death in 1694. Of his mistress Elizabeth Villiers little is known, except that she was loyal, discreet, and apparently not unduly mercenary. A legend of William's homosexuality does not stand up to examination. (N.A.R.)

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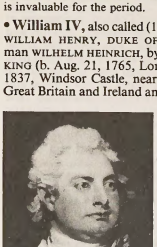
• **William IV,** also called (1789–1830) PRINCE WILLIAM HENRY, DUKE OF CLARENCE, German WILHELM HEINRICH, byname THE SAILOR KING (b. Aug. 21, 1765, London—d. June 20, 1837, Windsor Castle, near London), king of Great Britain and Ireland and king of Hanover



William IV, detail from a painting by Sir Martin Archer Shee; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

from June 26, 1830. Personally opposed to parliamentary reform, he grudgingly accepted the epochal Reform Act of 1832, which, by transferring representation from depopulated "rotten boroughs" to industrialized districts, reduced the power of the British crown and the landowning aristocracy over the government.

The third son of King George III, he entered the Royal Navy at the age of 13, fought in the American Revolution, and, while serving in the West Indies, formed a close friendship with the future naval hero Horatio (afterward Viscount) Nelson. When he left the sea in 1790, however, he had become unpopular with many other fellow officers and had angered his father by his numerous love affairs. Between 1794 and 1807 he had 10 illegitimate children (surnamed FitzClarence) by the Irish comedienne Dorothea Jordan. His marriage (July 11, 1818) to Princess Adelaide of Saxe-Meiningen produced two daughters, both of whom died in infancy. On William's death, therefore, the British crown passed to his niece Princess Victoria, and the Hanoverian crown passed to his brother Ernest Augustus, duke of Cumberland.

The Duke became heir presumptive on the death (Nov. 6, 1817) of Princess Charlotte Augusta, only legitimate child of his older brother, the Prince Regent (afterward King George IV, reigned 1820–30). In April 1827 the new prime minister, George Canning, revived for him the office of lord high admiral, but he was forced to resign in August 1828, when the Duke of Wellington was premier. After succeeding George IV as king, William proved to be less brilliant but also less selfish and more attentive to official business than his brother had been.

In May 1832 the prime minister, Charles Grey, the 2nd Earl Grey, asked the King to create at least 50 new peers to overcome the House of Lords majority hostile to parliamentary reform. At first William refused, but after Wellington had failed to form a Tory (Conservative) ministry, Grey's Whigs resumed office with the King's written promise to create enough peers to carry the Reform Bill. The Lords, sufficiently threatened, allowed the bill to pass. As a consequence of redistricting, Sir Robert Peel's Tories were unable to gain a Commons majority in the election of January 1835; and from April of that year the King had to deal with an uncongenial Whig premier, William Lamb, 2nd Viscount Melbourne, whom he had previously dismissed.

FLANDERS

• **William:** *see* William Clito.

GERMAN EMPIRE

• **William I,** German in full WILHELM FRIEDRICH LUDWIG (b. March 22, 1797, Berlin—d. March 9, 1888, Berlin), German emperor from 1871, as well as king of Prussia from 1861, a sovereign whose conscientiousness and self-restraint fitted him for collaboration with stronger statesmen in raising his monarchy and the house of Hohenzollern to predominance in Germany.

He was the second son of the future king Frederick William III of Prussia. In 1814 he fought at Bar-sur-Aube in the German War of Liberation against Napoleon I. Subsequently he devoted himself to the Prussian Army and military affairs. In 1840, on the accession of his childless elder brother, Frederick William IV, he became prince of Prussia and heir presumptive.

When revolution broke out in Berlin in March 1848, the conservative William's advocacy of force earned him the sobriquet of "Kartätschenprinz" (Prince of Grapeshot). After a brief exile in England, he returned to Prussia in June 1848, and in 1849 he commanded the troops sent to suppress an insurrection in Baden.



William I, detail from a portrait by Gustav Richter in the Nationalgalerie, Berlin

By courtesy of the Staatliche Museen zu Berlin, Germany

William's mistrust of constitutionalism was mitigated by the lessons of 1848, by his exposure to English political ideas, and by the influence of his consort, Augusta of Saxe-Weimar-Eisenach. (He married this witty and temperamental princess in 1829, after renouncing a youthful love affair with Eliza Radziwill.) Appointed military governor of Rhineland Province in 1849, he made his residence at Coblenz, a centre of opposition

to the reactionary policies of Berlin. He described Otto von Bismarck's ideas as "schoolboy's politics."

From October 1858 William was regent for his ailing brother, and, on Jan. 2, 1861, William succeeded to the Prussian throne. As regent he made himself popular by proclaiming a "New Era" of liberalism, but he appointed a ministry comprising pronounced conservatives as well as moderate liberals.

The problems raised for Prussia in 1859 by the wars for Italian independence were beyond his capacity: while he favoured an alliance with Austria against the France of Napoleon III, he insisted that Prussia have the supreme command on the Rhenish front; and the Austro-French armistice of Villafranca took him by surprise.

On internal affairs William's fundamental conservatism reasserted itself. Backed by his war minister, Albrecht von Roon, and by the chief of the military cabinet, Edwin von Manteuffel, the King insisted on a three-year term of military conscription, which the liberal lower chamber rejected in 1862. William thereupon was ready to abdicate but was dissuaded by Bismarck, whom he installed as prime minister during this crisis.

After the Prussian victory in the Seven Weeks' War against Austria in 1866, the King, despite their frequent disagreements, realized that Bismarck was more necessary to Prussia than he himself was. In 1870, when the Hohenzollern candidature to the Spanish throne was leading to the Franco-German War, William was far more cautious than Bismarck; during the war, he arbitrated between his chief advisers, Bismarck and Helmuth von Moltke. He was distressed by the *Kulturkampf* that Bismarck and the liberals conducted against the Roman Catholic Church, but in 1877, when Bismarck made his last appeal to be relieved of office, William answered: "Never."

William was so imbued with the traditions of the Prussian monarchy that it was painful for him to accept Bismarck's foundation of the German *Reich* and the imperial title, which came to him by a sham offer (arranged by Bismarck) from the German princes. William was acclaimed German emperor (not "emperor of Germany," which he thought more suitable) at Versailles, in conquered France, on Jan. 18, 1871. General indignation at the two attempts made on his life in 1878 (by Max Hödel on May 11 and by K.E. Nobiling, who seriously wounded him, on June 2) was expressed in popular support for Bismarck's anti-Socialist legislation.

The standard biography, *Kaiser Wilhelm I*, by Erich Marcks, was published in 1897 (9th ed., 1943).

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• William II, German in full FRIEDRICH WILHELM VIKTOR ALBERT (b. Jan. 27, 1859, Potsdam, near Berlin—d. June 4, 1941, Doorn, Neth.), German emperor (kaiser) and king of Prussia from 1888 to the end of World War I in 1918, known for his frequently militaristic manner as well as for his vacillating policies.

Youth and early influences. William was the eldest child of Crown Prince Frederick (later Emperor Frederick III) and Victoria, the eldest child of Britain's queen Victoria. He was born with a damaged left arm; the limb never grew to full size, and some historians have found the clue to his behaviour in this disability.

A more influential cause lay in his parentage. His father was honourable, intelligent, and considerate but had neither the will nor the stamina needed to dominate. That lack was not shared by his wife, who had acquired from



William II, detail of an oil painting by Paul Beckert, 1890; in the Nationalgalerie, Berlin

By courtesy of the Staatliche Museen zu Berlin, Germany

her father, the Prince Consort, seriousness of purpose and from her mother, emotion and obstinacy. Her intellect was hopelessly at the mercy of her feelings, and she took rapid likes and dislikes. She tried to force on her son the outlook of a 19th-century British Liberal and bring him up as an English gentleman. The result, however, was to make him sympathetic to those who were urging him to fulfill the ideal that the Prussian people had formed of a ruler—firm, brave, frugal, just and manly, self-sacrificing but also self-reliant.

Difficult as William's relations with his mother were, she left a deep and lasting mark on him. He was never able to shake off the respect instilled into him in the nursery for liberal values and habits of life. To be the tough warrior-king did not come naturally to him, yet this was the role to which he felt he must live up, and the result was that he overdid it. Inclination and a sense of duty (inculcated by a Calvinist tutor) were alternating in him continually, each managing to frustrate the other. The tension between the two, superimposed on his physical disability, is the ultimate explanation of his taut, restless, and irresolute character. In 1881 William married Princess Augusta Victoria of Schleswig-Holstein-Sonderburg-Augustenburg, a plain, unimaginative person with few intellectual interests and no talents, who bored him and encouraged his reactionary tendencies but all the same represented a point of stability in his life, besides presenting him with six sons and a daughter.

William as emperor. Seven years later, William's grandfather William I died at the age of 90. Liberals had long hoped, and conservatives feared, that when the Crown Prince came to the throne, he would alter the constitution by making the chancellor responsible to the Reichstag. But by the time Frederick became emperor, he was dying of cancer. Thus, William, who showed little sympathy for his parents in their bitter crisis, found himself kaiser at the age of 29.

In March 1890 William drove Bismarck into resigning as chancellor. Bismarck had found brilliant answers to the problems facing him when he first took office but in doing so had given the Prussian upper classes a veto on political change and had made France-Germany's implacable enemy. He was not at 75 the man to solve the problems he had largely brought about in creating the German Empire, so that William's action would have been justifiable if he himself had been in possession of a solution. As it was, however, he dropped vague plans for helping the working classes as soon as he ran into court opposition, and he allowed Bismarck's successors to decide against renewing his 1887 Reinsurance Treaty with Russia. Superficially, this decision again could be justified, but it opened the way for Russia in 1891 to make its alliance with France.

For four years after Bismarck's departure, Leo, Graf von Caprivi, as chancellor, tried unsuccessfully to find a policy that would be acceptable both to the Reichstag (lower house of the parliament) and to the ruling classes. He was followed by the aged prince Chlodwig von Hohenlohe-Schillingsfürst, who fared no better. In 1897 William appointed the debonair Bernhard, Fürst von Bülow, as foreign secretary and in 1900 made him chancellor; the intention was that Bülow would persuade the Reichstag to accept the policies that the Kaiser and the upper classes chose to adopt. This did little or nothing to bring about the political changes that Germany's very rapid industrialization called for. Instead, Bülow was allowed to divert attention by an exciting foreign policy.

Foreign policies. British anger had already been aroused by a telegram that, on the advice of his foreign secretary, William had sent in 1896 to Pres. Paul Kruger of the South African Republic, congratulating him on defeating the British-led Jameson raid; and alarm followed anger as the implications of the German Naval Bills of 1897 and 1900 sank in. The Kaiser often indignantly denied that Germany was challenging Britain's domination of the seas, but there is clear evidence that this was in fact the aim of Adm. Alfred von Tirpitz, whom he made secretary of the navy in 1897. When in 1904 Britain settled its outstanding disputes with France, the Kaiser, at Bülow's suggestion, went to Tangier the following year to challenge France's position in Morocco by announcing German support for Moroccan independence. His hopes of thereby showing that Britain was of no value as an ally to France were disappointed at the 1906 Algeciras Conference, at which the Germans were forced to accept French predominance in Morocco.

In 1908 William caused great excitement in Germany by giving, after a visit to England, a tactless interview to *The Daily Telegraph*, telling his interviewer that large sections of the German people were anti-English. He had sent the text beforehand to Bülow, who had probably neglected to read it and who defended his master very lamely in the Reichstag. This led William to play a less prominent role in public affairs, and, feeling that he had been betrayed by Bülow, he replaced him with Theobald von Bethmann Hollweg. Bethmann's attempts to reach agreement with Britain failed because Britain would not promise neutrality in a war between Germany and France unless Germany would limit its fleet. This the Kaiser and Tirpitz refused to allow. The Moroccan (Agadir) crisis of 1911, in which Germany again tried to intervene in Morocco against French encroachment, might have led to war if Germany (with the encouragement of the Kaiser) had not given way.

Role in World War I. World War I began as an attempt to save Austria-Hungary from collapse; it was transformed into a world conflict by Germany. William, having encouraged the Austrians to adopt an uncompromising line, took fright when he found war impending but was not able to halt the implementation of the mobilization measures that he had allowed his generals to prepare. During the war, although nominally supreme commander, he did not attempt to resist his generals when they kept its conduct in their own hands. He encouraged, instead of challenging, the grandiose war aims of the generals and of many politicians that ruled out all chance of a compromise peace. By the autumn of 1918 he realized that Germany had lost the war but not that this had made the loss of his throne inevitable. Refusing to abdicate, his hand was finally forced on November 9, when he was persuaded to

seek asylum in The Netherlands. He thus avoided captivity and perhaps death but also by this move made impossible the retention of a monarchy in Germany. He lived quietly as a country gentleman in The Netherlands until his death in 1941.

Assessment. William often bombastically claimed to be the man who took the decisions. It is true that the German constitution of 1871 put two important powers in his hands. First, he was responsible for appointing and dismissing the chancellor, the head of the civil government. Admittedly, the chancellor could only govern if he could get a majority in the Reichstag, but this limitation on the emperor's freedom of choice was more apparent than real, because most members of the Reichstag felt it their loyal duty to support whomever the Kaiser appointed. Secondly, the German Army and Navy were not responsible to the civil government, so that the Kaiser was the only person in Germany who was in a position to see that the policy followed by the soldiers and sailors was in line with that pursued by the civil servants and diplomats. Thus, British journalists and publicists had some justification when during and immediately after the war they portrayed the Kaiser as Supreme War Lord, and therefore the man who, more than anyone else, decided to make war.

As time passes, however, historians are increasingly coming to see William as an accomplice rather than an instigator. In the years after 1890 the German upper and middle classes would have wanted a larger say in the world's councils no matter who had been on the throne, and this "urge to world power" was almost bound to bring them into collision with some of the existing great powers. The chief real criticism to be made of the Kaiser is that, instead of seeing this danger and using his influence to restrain German appetites, he shared those appetites and indeed increased them, particularly by his determination to give Germany a navy of which it could be proud. He was a quick-witted, well-meaning man who went with the stream instead of having the vision and strength of judgment to stand out against it. (M.G.B.)

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Germany/Holy Roman Empire

• **William,** also called WILLIAM OF HOLLAND, German WILHELM VON HOLLAND (b. 1228—d. Jan. 28, 1256, near Hoogwoude, Holland), German king from Oct. 3, 1247, elected by the papal party in Germany as antiking in opposition to Conrad IV and subsequently gaining general recognition. As Williiam II he was also count of Holland, succeeding his father, Count Floris IV, in 1234.

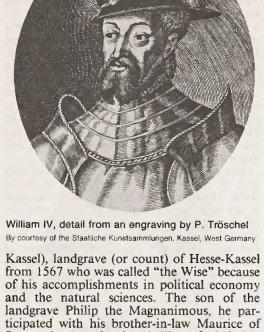
William was elected German king to succeed Henry Raspe (died Feb. 16, 1247), Pope Innocent IV's nominee to replace Conrad, whom the Pope had declared deposed in 1245. Although crowned at Aachen on Nov. 1, 1248, William was king of a minority of the German states until King Conrad decided, late in 1251, to leave Germany for Italy (where he became king of Sicily). On March 25, 1252, William was recognized as king by Albert, duke of Saxony, and by John and Otto, margraves of Brandenburg; further support came in 1254, from the Rhenish League of Cities.

William's growing strength in the Rhineland caused Archbishop Conrad of Cologne (who had crowned him) to plan his deposition in favour of Otakar II of Bohemia. That conspiracy (late 1254) was checked by Pope Alexander IV.

As count of Holland, William promoted the urban development of Haarlem, Delft, Middelburg, and Alkmaar, all of which became trading centres. While trying to secure his rule over the Frisians, he was killed in battle.

Hesse-Kassel

• **William IV,** byname WILLIAM THE WISE, German WILHELM DER WEISE (b. June 24, 1532, Kassel, Hesse-Kassel—d. Aug. 25, 1592,



William IV, detail from an engraving by P. Tröschel

By courtesy of the Staatliche Kunstsammlungen, Kassel, West Germany

Kassel), landgrave (or count) of Hesse-Kassel from 1567 who was called "the Wise" because of his accomplishments in political economy and the natural sciences. The son of the landgrave Philip the Magnanimous, he participated with his brother-in-law Maurice of Saxony in the princely rebellion of 1552 that liberated Philip from his five-year captivity by the Holy Roman emperor Charles V.

On the death of Philip (1567) the partition of the Hessian lands among his four sons left William with little basis for a forceful foreign policy. Domestically, he sought a compromise between Lutherans and Calvinists. He was an outstanding organizer and a skilled economist. The *Ökonomische Staat* (1585), a territorial survey compiled for him, is a model of administrative statistics.

William also pursued scientific studies and perhaps owes his lasting fame to his research in astronomy. On friendly terms with the great Danish astronomer Tycho Brahe, he constructed numerous astronomical instruments and calculated many stellar positions.

Luxembourg

• **William I–III:** *see* William I–III *under* William (Netherlands: kings).

• **William IV,** German in full WILHELM ALEXANDER (b. April 22, 1852, Biebrich, Nassau, Ger.—d. Feb. 25, 1912, Schloss Berg, near Luxembourg), grand duke of Luxembourg (1905–12), eldest son of grand duke Adolf of Nassau. Falling severely ill soon after his accession, he eventually on March 19, 1908, had his consort Maria Anna of Braganza named regent, or governor (*Statthalterin*). Also, having no sons and wishing to secure the succession of his daughters Marie-Adélaide and Charlotte, he had the Luxembourg Parliament allow succession in the female line.

Netherlands: stadholders

• **William I,** in full WILLIAM, PRINCE OF ORANGE, COUNT OF NASSAU, byname WILLIAM THE SILENT, Dutch WILLEM, PRINS VAN ORANJE, GRAAF VAN NASSAU, or WILLEM DE ZWIJGER (b. April 24, 1533, Dillenburg, Nassau—d. July 10, 1584, Delft, Holland), first of the hereditary stadholders (1572–84) of the United Provinces of the Netherlands and leader of the revolt of the Netherlands against Spanish rule and the Catholic religion.



William I, painting by Adriaan Thomasz Key, 1581; in the Mauritshuis, The Hague

By courtesy of the Foundation Johan Maurits van Nassau, The Hague

Family and inheritance. William, the eldest son of William, count of Nassau-Dillenburg, grew up in a cultivated Lutheran environment. Far richer than his father's ancestral possessions in the region of the Lahn River in Nassau were the estates that, since 1404, another branch of the family had obtained in Brabant and elsewhere in the Low Countries, where its main seat was at Breda. At the time of William's birth, the Brabant branch was represented by his father's elder brother Henry and by Henry's only son, Renê, who in 1530 had inherited from a maternal uncle the domains of the House of Chalon-Arlay, so becoming the greatest seigneur of the Franche-Comté and ruler of the Provençal principality of Orange. René of Orange was killed in 1544, leaving the combined wealth of the houses of Nassau-Breda and of Chalon-Orange to his cousin William, then aged 11.

In view of the importance of this heritage, the lord of the Burgundian Netherlands, the Habsburg emperor Charles V, stipulated that William's parents should renounce his guardian-

ship and that the young prince should be educated in his new fatherland as a Catholic. So William passed his formative years at Breda and Brussels, under the guidance of suitable tutors, and was duly imbued with the principles proper to a youth of his standing. French became his daily language, and he acquired a colloquial command of Dutch.

In spite of his immense landed property, his financial circumstances were straitened from the beginning. Scarcity of liquid assets continued to hamper him, even after his marriage (July 8, 1551) to a wealthy heiress, Countess Anne of Egmond-Buren, who brought him several additional baronies, mainly in Holland. These "structural" pecuniary straits he shared with most of his class and with the Burgundian government itself.

A favourite with Charles V and with the court at Brussels, the Prince faithfully discharged the social, military, and diplomatic duties that were expected of him. He continued to do so under Philip II, the Emperor's son and successor as king of Spain and lord of the Burgundian dominions. Together with his later enemies Antoine Perrenot de Granvelle, bishop of Arras, and the Duque de Alba, he was a negotiator of the Treaty of Cateau-Cambrésis (1559), which, in ending prolonged strife between Burgundy-Habsburg and France, released from French occupation his princedom of Orange and made the Netherlands accessible to Calvinist preachers from France. Philip II, at his accession in 1555, had admitted William to the Council of State, and, now before his departure to Spain, the King appointed him his stadholder (governor and commander in chief) in Holland, Zeeland, and Utrecht (August 1559) and afterward in Franche-Comté (February 1561).

Loyal opposition to the King's government. From about 1561 William, the prince of Orange, together with other great lords who felt themselves excluded from their rightful share in the country's government, began to protest openly against the conduct of the Brussels administration, in which Granvelle, the principal adviser of the regent Margaret, duchess of Parma, was the most powerful figure. At first religious questions were not prominent among the causes of discontent, but they gradually became so with the spread of Protestant ideas and the determination of Philip II not to tolerate any deviation from the strictest Catholic orthodoxy. The Prince and his associates, in varying degrees influenced by the comprehensive views of the Humanist Desiderius Erasmus, shared in this respect the feelings of the majority of their countrymen, who, while remaining conventional Roman Catholics, resented religious persecution. Besides, several of the nobles had, as had William, friends and parents among the Protestants. On Aug. 25, 1561, the Prince, a widower since 1558, reinforced his Lutheran and German connections by taking as his second wife Anna of Saxony.

In the mind of William, the prince of Orange, the religious issue gradually assumed paramount importance. In a sensational speech in the Council of State, he argued that it was not feasible to enforce religious unity and that it was not right for princes to presume to rule over the consciences of their subjects. But the King in October 1565 gave strict orders that the ordinances against heretics should be inexorably applied.

Consequently, the situation became increasingly dangerous. The leadership of the opposition was now taken over by a confederation of lesser nobles and gentlemen, some of them Calvinists, who were more desperate than the magnates and less averse to a violent solution; they and their followers soon came to be called the Gueux (Beggars). The great lords kept aloof, but William and a few others showed sympathy for the movement, with which the Prince was personally in touch through his brother, Count Louis of Nassau, a Lutheran with Calvinistic leanings. Orange persuaded the confederates not to resort to armed action but instead to petition the regent Margaret for a suspension of the decrees against Protestants. The Duchess did indeed promise a moderation of the antiheretical measures, but it was already too late for minor relaxations to avert trouble. Misery caused by the economic depression contributed to the violent explosions of religious fanaticism that shook the Low Countries in August 1566. Calvinist mobs forcibly entered churches, smashing the images and destroying the furnishings. Besides causing irreparable damage, these excesses had a threefold effect: peaceful coexistence of Catholics and Protestants became more difficult; the opposition movement was weakened because its responsible members felt it necessary to defend the church; and, finally, it caused King Philip to resort to force in an attempt to crush heresy and rebellion at one blow. To this end, in December 1566, he appointed the Duque de Alba as his captain general in the Netherlands.

Orange seems to have contemplated immediate active resistance but in the end did nothing because the popular hero Lamoral, graf van Egmond, stadholder of Flanders and Artois, would not support him. He allowed the Protestants, now openly rebellious, to hail him as their defender, but he upheld public order. As hereditary viscount of Antwerp he quelled an insurrection of the numerous Calvinists there, and he kept the city gates closed to rebels and government forces alike. He protested his loyalty to the king, yet he refused to take the new oath of unconditional obedience that the Regent required from all officeholders and prudently retired in April 1567 to the family seat at Dillenburg. Many thousands followed William's example or had preceded him; a general exodus to England, Germany, and France took place.

Open revolt and alliance with Calvinism. By May 1567 order was everywhere restored. Nevertheless, in August Alba entered Brussels at the head of a well-trained army and inaugurated a reign of terror. In September a special court, the Council of Troubles, was set up to try all cases of rebellion and heresy, and more than 1,000 executions took place (including those of the counts of Egmond and Hoorne). Orange, summoned to appear before the court, replied with a dignified *Justification* of his conduct. But his possessions in Philip's dominions were confiscated, and his son Philip William, a student at Louvain, was deported to Spain.

Once again the cause of liberty, no less than that of religion, was clearly seen to be at stake. The opposition, however secret, became much more widespread. The fighting Prince was justified in expecting a general rising when he should appear as a liberator. He saw his own fortunes irrevocably bound up with those of the Netherlands, and he no longer hesitated to proceed to military action. Though disappointed in his hopes of substantial support from the Lutheran German princes (he himself had reverted to the creed of his childhood) or from the emperor Maximilian II, he managed, mainly through the aid of his relatives, to raise a number of troops. In April 1568 two invasions of the Low Countries were inaugurated, but both badly miscarried. One of the attacking forces was destroyed by Alba on the banks of the Ems River. The Prince himself took the field in the beginning of October and marched toward Brabant, but the expected rising did not materialize, and he was obliged to retire to France. There he stayed for a time with the Huguenots, the Calvinist party then in rebellion against the royal government, before returning, in October 1569, to Germany. Count Louis remained in France as his personal representative. The abortive campaigns had at least popularized Orange as the champion against oppression. The Calvinists were ready to forgive him for failing to take up arms in 1566, while he had come to appreciate them as the hardcore of the resistance movement, though he disliked their Puritanism and intolerance. Moreover, Calvinism was an "international" power, and from its adherents in Germany and France he had hitherto received his most effective support. So a rapprochement took place, but it was not until 1573 that he finally joined the Reformed Church.

These were his darkest years. With Alba securely in power and his own designs frustrated, having lost a brother (Adolph) and many of his friends, and bereft of his son, his estates, and his offices, he was also harassed by financial difficulties and by the wayward conduct of his wife, Anna of Saxony, whom he divorced in 1571. Orangist propaganda was active, but military operations were mainly confined to the exploits of the Sea Beggars, who had taken to the sea to combat the King of Spain from foreign bases. Their blockading activities contributed to the economic malaise in the Netherlands and so to the discontent nourished by Alba's harsh administration. This was especially the case in the seafaring province of Holland.

For the summer of 1572 Orange planned a number of coordinated attacks, counting on help from France, but on April 1, well ahead of any officially planned move, a fleet of Sea Beggars, driven from English ports, surprised and captured the port of Brielle in Zuid-Holland. Their success triggered off the desired popular rising in Holland and Zeeland, most towns declaring themselves for the Prince, so that by July only Amsterdam, Middelburg, and two other towns in Zeeland remained in loyalist hands. By the initiative of Orange, the provincial States of Holland met at Dordrecht (July 19–23) and recognized the Prince as still being their *stadholder,* nominally on behalf of the King, and they themselves assumed an effective share in the government. Equal rights for Catholics and Calvinists were proclaimed, pending a decision by the States-General, the joint assembly of all the provinces.

Meanwhile, large parts of Gelderland and Friesland joined the revolt, as Alba and his army were retained in the south to counter the main attack, which had been launched from France. Louis of Nassau had captured Mons and was besieged there by the Spanish. Orange himself marched into Brabant, and several towns opened their gates to him. Hopes of French support were soon dashed, however, when the Massacre of St. Bartholomew's Day destroyed Huguenot influence at the French court. Louis was obliged to capitulate in September, and Orange disbanded his mercenaries. The fighting in the south had at least provided breathing space for the two rebellious northern provinces to consolidate their position. The Prince decided to join them, landing at Enkhuizen on October 21.

For four heroic years (1572–76), William, the prince of Orange, led the desperate resistance of the two maritime provinces against the Spanish armies sent to subdue them. Two more of his brothers—Louis and Henry—fell in a serious defeat near Nijmegen in April 1574. Meanwhile, his agents were active in the subdued provinces, in England, Germany, and France, and on June 12, 1575, he married Charlotte of Bourbon-Montpensier, a former abbess who had joined the Reformed Church. The Prince needed all his authority, tact, and tenacity of purpose to hold his followers together and prevent their pursuing divisive interests. He tried to check the excesses and mitigate the intolerance of the Protestants but was unable to maintain the equality of the Catholic and Reformed churches that he had previously advocated, and in 1573 Catholic

worship was forbidden. In the closer unions Orange brought about between the different parts of Holland (July 1575) and between Holland and Zeland (April 1576), he was recognized as "Chief and Supreme Authority" for the duration of the war, but liberty of worship was specifically excluded, though liberty of conscience was recognized.

The Prince's triumph. A temporary collapse of Spanish power in the Low Countries in 1576 gave the Prince a fresh chance. In the absence of a governor-general after the death of Alba's successor, Luis de Requesens y Zúñiga, and confronted with mutinous Spanish troops, the Council of State ventured to convene the States General. These, pretending to act in the name of the King but in fact usurping viceregal powers, immediately opened negotiations with the rebellious provinces. The Pacification of Ghent (Nov. 8, 1576) was the result. It has been supposed that Orange's influence and agents were primarily responsible for this achievement. Certainly this peace, supplemented by the first Union of Brussels (January 1577), heralded the realization of his ambitions and ideals: not only were his governorships confirmed and his possessions restored to him, but the union of the so-called 17 Netherlands under a national government seemed about to be accomplished. But the idea of a "common fatherland," though steadily growing, was not yet strong enough to overcome particularistic or religious divisions. Because of the Perpetual Edict of 1577, the treaty the States General concluded with the new governor-general, Don John of Austria, specified that the Roman Catholic religion was to be maintained all over the country, and because of the absence of provisions for the maintenance of the Pacification, the deputies of Holland and Zeeland left the assembly.

In July 1577, however, Don John attempted to renew hostilities, thus driving more and more people to support the Prince. Those towns of Holland and Zeeland that had always opposed Orange or had been recovered by Spanish arms now recognized his authority; the last to accede (February 1578) was Amsterdam. The town and province of Utrecht followed suit, and in Flanders, Brabant, Groningen, and elsewhere, the radical Orangists, mostly Calvinistic burghers and craftsmen, gained the upper hand. In September 1577 the States General, to which the representatives of Holland and Zeeland had now returned, invited Orange to come south to Brussels, where he was triumphantly received. Under his influence a new union came into being, providing for joint action by both Roman Catholics and Protestants against "the common enemy of the fatherland." Meanwhile, the States General, continuing to act with sovereign power, had formed a government headed by the young archduke Matthias, an Austrian nephew of King Philip. Matthias agreed to conditions laid down by the Prince guaranteeing a constitutional system of government. Moreover, in January 1578, Orange was commissioned to act as lieutenant general for Matthias.

The Prince's failure. Orange was now at the zenith of his career, but his triumph proved as short-lived as was the general union of the provinces. His failure to consolidate the newly won unity was primarily due to the excesses of his Calvinist supporters who forcibly introduced popular and intolerant regimes. Thus, the revolutionaries played into the hands of King Philip's new governor-general, Alessandro Farnese, Duke di Parma, the son of the former regent Margaret, who on Oct. 1, 1578, had taken office after the death of Don John.

The Catholic but still anti-Spanish reaction made itself felt first in the southern, French-speaking provinces. Not unnaturally, when seeking for help, their thoughts turned to France, but it was on the Prince of Orange's advice that the States General in August 1578 adopted the Catholic Duke d'Anjou, brother of Henry III of France, as "Defender of the Liberty of the Netherlands." Soon afterward, the formation of specific unions by smaller groups of provinces began to compromise the general union, which was irrevocably compromised in May 1579 when the Prince gave qualified support to the "Union of Utrecht," whose main promoter was his brother John, governor of Gelderland and a staunch Calvinist. On March 15 the Prince was outlawed by Philip II and a reward offered for his assassination. He answered the charges of treason with a vehement *Apologie,* written for him by his court chaplain, and he continued to put his trust in France. Against much Protestant opposition, he persuaded the States General in 1580 to give the Duke d'Anjou the hereditary sovereignty of the Netherlands, and in 1581 they solemnly renounced their allegiance to the king of Spain. Meanwhile, the provinces of Holland and Zeeland, unwilling to grant the French prince any direct authority, planned to create Orange their hereditary count.

Anjou, however, far from aiding the cause of liberty, added to the prevailing confusion. With great difficulty Orange effected his reconciliation with the States General. His own continuing reliance on France is shown by his fourth marriage (1583), to Louise de Coligny, a daughter of the murdered Huguenot leader the Count de Coligny.

As a result of the ban pronounced by Philip II, an attempt was made on the Prince's life at Antwerp in March 1582. With Parma advancing from the south, he retired in July 1582 to Holland, where he moved into his old quarters in a former convent at Delft. There, in 1584, he was shot by a fanatical Catholic, the Franc-Comtois Balthasar Gérard. His last words were a prayer for the people he had tried to lead for so long. The family seat of Breda being then in enemy hands, he was buried in the New Church at Delft.

(A.G.J./Ed.)

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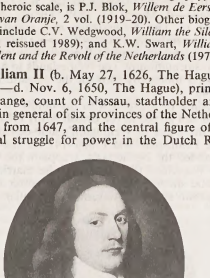
• William II (b. May 27, 1626, The Hague, Neth.—d. Nov. 6, 1650, The Hague), prince of Orange, count of Nassau, stadtholder and captain general of six provinces of the Netherlands from 1647, and the central figure of a critical struggle for power in the Dutch Re-



William II, detail of a painting by Gerrit van Honthorst; in the Rijksmuseum, Amsterdam

By courtesy of the Rijksmuseum, Amsterdam

public. The son of Frederick Henry, prince of Orange, he was guaranteed, in a series of acts from 1630 onward, succession to all his father's offices.

On May 12, 1641, William married Mary Stuart (1631–60), eldest daughter of Charles I of England. After his father's death (March 1647), William succeeded to the title of prince of Orange, to the stadtholdership of all the provinces except Friesland, and to the offices of captain general and admiral general of the Union.

Early in 1648 peace was concluded at Münster, ending the Eighty Years' War for Dutch independence. The treaty, however, was concluded despite William's wrathful opposition. He did not abandon his dynastic and military ambitions. He corresponded with the French government and planned to resume the war in order to conquer part of the Spanish Netherlands (now Belgium). He also supported his brother-in-law Charles II, hoping to restore him to the throne of England. The States (assembly) of Holland, fearing that William's high ambitions would lead to war, disbanded some of the troops paid by them (June 4, 1650). William then turned to the States General, most of whom were jealous of Holland's influence, which granted him extraordinary power. On July 30, William imprisoned six leading members of the States of Holland and ordered his army to march on Amsterdam. The attempt to occupy Amsterdam failed, but the States accepted a compromise. William then met much opposition in trying to implement his foreign policy. He died of smallpox before his influence could really be tested.

• William III: *see* William III (England, Great Britain, United Kingdom).

• William IV, Dutch in full WILLEM KAREL HENDRIK FRISO (b. Sept. 1, 1711, Leeuwarden, Neth.—d. Oct. 22, 1751, The Hague), prince of Orange and Nassau, general hereditary stadtholder of the United Netherlands.

The posthumous son of John William Friso of the house of Nassau-Dietz, William became stadtholder of Friesland and then later also of Groningen and of Gelderland, assuming his full functions in 1729–31. On March 25, 1734, he married Anne of Hanover (1709–59), eldest daughter of George II of Great Britain. By the extinction of other branches of the Ottonians of Nassau, he acquired a number of territories in Germany.

In April 1747, during the War of the Austrian Succession, the French invaded Dutch territory. A spontaneous popular movement arose, first in Zeeland, then in Holland, in Utrecht, and in Overijssel, for the elevation of William to the stadtholdership in these provinces, vacant since William III's death (1702), and to the ranks of captain general and admiral general. William was indeed appointed, and all his offices were made hereditary. The first man to be stadtholder of all seven provinces, William IV now had more power than any of his predecessors; but he proved incompetent as a leader, and peace was signed in 1748.

The Dutch people expected reforms to make the rule of the urban oligarchies in Holland less absolute. William, who was intelligent and industrious, made attempts to abolish the greatest abuses; but when he died, the most urgent problems were unsolved. He left a three-year-old son, William V.

• William V (b. March 8, 1748, The Hague, Neth.—d. April 9, 1806, Braunschweig [Germany]), prince of Orange and Nassau and general hereditary stadholder of the Dutch Republic (1751–95).

When his father, William IV, died (1751), he was but three years of age, and his mother, Anne of Hanover, acted as regent for him until her death (Jan. 12, 1759); then the provincial States (assemblies) acted as regents. Duke Louis Ernest of Brunswick-Wolfenbüttel (1718–88) acted as William's guardian and gained such influence that when William was declared of age in 1766, he asked the duke to remain as his adviser. On Oct. 4, 1767,

William married Wilhelmina of Prussia, sister of the future Frederick William II.



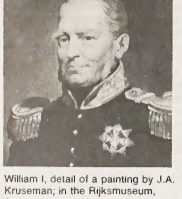
William V, detail of a painting by J.G. Ziesenis; in the Rijksmuseum, Amsterdam
By courtesy of the Rijksmuseum, Amsterdam

Politically and militarily incompetent, William pursued an Anglophile policy, arousing the hostility of large sections of the population. He was, moreover, unable to prevent the Anglo-Dutch War of 1780–84, stirring the vehement opposition of the Patriot Party (nationalists desiring reform). When the war was over, William left The Hague (1785), returning only after a Prussian force had expelled the Patriots (1787).

William's conservatism made all reforms impossible. In 1795, because of the French invasion, he left the Netherlands with his family (January 18) and emigrated to England. William was dismissed from his office as stadholder (February 23), and his rule was succeeded by the Batavian Republic (1795–1806). In November 1802 he went to his dynastic Nassau possessions in Germany.

Netherlands: kings

• **William I,** Dutch in full WILLEM FREDERIK (b. Aug. 24, 1772, The Hague—d. Dec. 12, 1843, Berlin), king of The Netherlands and grand duke of Luxembourg (1815–40) who sparked a commercial and industrial revival



William I, detail of a painting by J.A. Kruseman; in the Rijksmuseum, Amsterdam
By courtesy of the Rijksmuseum, Amsterdam

following the period of French rule (1795–1813), but provoked the Belgian revolt of 1830 through his autocratic methods.

The son of William V, prince of Orange, William married Wilhelmina, daughter of his uncle, Frederick William II of Prussia, in 1791 and emigrated with his family to England in 1795 after the French invasion of the Dutch Republic. He gained title to the bishopric of Fulda and other smaller areas in Germany in negotiations with the French emperor Napoleon I in 1802 but lost all his German titles in 1806, when he sided with Prussia against Napoleon. Except for some service with the Austrians against Napoleon in 1809, he lived in exile at the Prussian court until 1812.

After the Dutch revolt against French rule in 1813, William accepted the provisional government's offer to become sovereign prince of the Dutch Republic, and in 1815 he became king of the United Netherlands, which included Belgium, Liège, and the Grand Duchy of Luxembourg. He soon undertook an economic recovery program for the kingdom, founding a bank in 1822 to finance industrial expansion in Belgium and forming The Netherlands Trading Society in 1824 to facilitate long-distance commerce in the north. The Belgians, however, objected to the union with the northern Netherlanders because the two groups were given equal representation in the Parliament and charged equal taxes, although the Dutch had a far greater accumulated debt and a far smaller population.

The Belgian Catholic clergy were alienated by William's policy of state supremacy in ecclesiastical matters. He placed the universities of Ghent, Louvain, and Liège under state control and required seminary students to attend a new "philosophical college" at Louvain. The Belgians were further antagonized by the decision to make Dutch the administrative language throughout the kingdom and by the Dutch insistence on free trade when protection was needed by Belgian industries.

The Belgian Liberal and Catholic factions opposed to William's rule joined in 1828 (the "union of parties") and petitioned the King for political and religious reforms. Inspired by the revolution in Paris in July 1830, a rebellion broke out in Brussels the following month. After initial rebel military successes, a conference of the leading European powers decided in January 1831 that Belgium should be an independent state. William refused to accept the Belgian separation and anticipated renewed warfare. Aware that the Dutch people were increasingly opposed to his autocratic methods, he abdicated in October 1840 and spent the rest of his life in Berlin.

• **William II,** Dutch in full WILLEM FREDERIK GEORGE LODEWIJK (b. Dec. 6, 1792, The Hague—d. March 17, 1849, Tilburg, Neth.), king of The Netherlands and grand duke of Luxembourg (1840–49) whose reign saw the reestablishment of fiscal stability and the transformation of The Netherlands to a more liberal monarchy through the constitution of 1848.

Exiled to England with his family in 1795, William served in the British Army (1811–12) as the Duke of Wellington's aide-de-camp in the Peninsular War (1808–14); he also commanded the Netherlands troops in the Battle of Waterloo (1815). In 1816 he married the grand duchess Anna Pavlovna, sister of the Russian emperor Alexander I. Popular in the



William II, detail of a painting by J.A. Kruseman; in the Rijksmuseum, Amsterdam
By courtesy of the Rijksmuseum, Amsterdam

Belgian part of the United Kingdom of the Netherlands, he was sent to Brussels by his father, William I, after the outbreak of the Belgian Revolution of 1830. His concessions to the rebels failed to quell the revolt, and he retired to England until August 1831, when he returned to Belgium, leading a Dutch army to victory over the forces of the new king of the Belgians, Leopold I, before French intervention stopped his advance.

William II became king of The Netherlands in October 1840 on his father's abdication. Although he lacked William I's abilities as a statesman and financier, he was fortunate in his choice of F.A. van Hall as finance minister. Van Hall stabilized the public finances and, helped by profits from Dutch colonial ventures in the East Indies, achieved the country's first surplus in 70 years in 1847.

William was tolerant toward Roman Catholics and Separatists (dissident Calvinists), but was opposed by the Liberals who wanted a more representative form of government. Afraid that the European revolutionary movements of 1848 would sweep across The Netherlands also, he authorized the leading Liberal statesman, Johan Thorbecke, and his associates to draft a new constitution, approved in November 1848. The constitution expanded the power of the ministers and the National Assembly, established the principle of direct elections, and secured basic civil liberties. William died a few months later.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

• **William III,** Dutch in full WILLEM ALEXANDER PAUL FREDERIK LODEWIJK (b. Feb. 19, 1817, Brussels—d. Nov. 23, 1890, Apeldoorn, Neth.), conservative king of The Netherlands and grand duke of Luxembourg (1849–90)



William III, detail from an oil painting by Nikolaas Pieneman, 1849; in the collection of the Royal Military Academy, Breda, Neth.
By courtesy of the Iconographisch Bureau, The Hague

who was influential in forming Dutch ministries until 1868 but was unable to prevent Liberal control of the government.

The eldest son of King William II, William married his cousin Sophia, daughter of King William I of Württemberg, in 1839 and succeeded to the throne in 1849. He opposed the constitution of 1848, which created a parliamentary form of government, but was nevertheless forced to allow Johan Thorbecke, major proponent of the constitution, to head the new government. Thorbecke resigned in 1853 when William adopted, against the government's wishes, an anti-Catholic posture in the dispute over the proposed reestablishment of a Roman Catholic archbishop at Utrecht. Between 1862 and 1868 he was able to rule through the Cabinet.

In 1867 William tried to sell his sovereignty over Luxembourg to France but yielded to Prussia's demand that the area be independent. At the same time he incorporated part of Limburg into The Netherlands. Following the Luxembourg crisis, his influence in Parliament declined markedly. After his first wife died in

1877, he married Emma of Waldeck-Pyrmont (1879), who served as regent in 1890 during the king's illness. Wilhelmina, his daughter by Emma, succeeded to the throne of The Netherlands on his death.

Normandy

• William I, also called WILLIAM LONGSWORD, French GUILLAUME LONGUE-ÉPÉE (d. Dec. 17, 942, Picardy [France]), son of Rollo and second duke of Normandy (927–942). He sought continually to expand his territories either by conquest or by exacting new lands from the French king for the price of homage. In 939 he allied himself with Hugh the Great in the revolt against King Louis IV; through the mediation of the pope, the war ended, and Louis renewed William's investiture of Normandy (940). William, however, continued his territorial ambitions, especially northward. Drawn to a conference on an island in the Somme River, he was assassinated on the orders of the count of Flanders, Arnulf I.

• William II: *see* William I (England, Great Britain, the United Kingdom).

• William (III): *see* William II (England, Great Britain, the United Kingdom).

• William (III or IV): *see* William the Aetheling; William Clito.

Prussia

• William I–II: *see* William I–II (German Empire).

Scotland

• William I, byname WILLIAM THE LION (b. 1143—d. Dec. 4, 1214, Stirling, Stirlingshire, Scot.), king of Scotland from 1165 to 1214; although he submitted to English overlordship for 15 years (1174–89) of his reign, he ultimately obtained independence for his kingdom.

William was the second son of the Scottish Henry, Earl of Northumberland, whose title he inherited in 1152. He was forced, however, to relinquish this earldom to King Henry II of England (reigned 1154–89) in 1157. Succeeding to the throne of his elder brother, King Malcolm IV, in 1165, William joined a revolt of Henry's sons (1173) in an attempt to regain Northumberland. He was captured near Alnwick, Northumberland, in 1174 and released after agreeing to recognize the overlordship of the king of England and the supremacy of the English church over the Scottish church.

Upon Henry's death in 1189, William obtained release from his feudal subjection by paying a large sum of money to England's new king, Richard I (reigned 1189–99). In addition, although William had quarreled bitterly with the papacy over a church appointment, Pope Celestine III ruled in 1192 that the Scottish church owed obedience only to Rome, not to England. During the reign of King John in England, relations between England and Scotland deteriorated over the issue of Northumberland until finally, in 1209, John forced William to renounce his claims.

In his effort to consolidate his authority throughout Scotland, William developed a small but efficient central administrative bureaucracy. He chartered many of the major burghs of modern Scotland and in 1178 founded Arbroath Abbey, which had become probably the wealthiest monastery in Scotland by the time of his death. William was succeeded by his son Alexander II.

• William II: *see* William III (England, Great Britain, United Kingdom).

Sicily

• William I, byname WILLIAM THE BAD, Italian GUGLIELMO IL MALO (b. 1120—d. May 7, 1166, Palermo, kingdom of Sicily [Italy]), Norman king of Sicily, an able ruler who successfully repressed the conspiracies of the barons of his realm. His epithet was bestowed on him by his hapless enemies. He patronized science and letters and showed religious tolerance; among those who frequented his court were many Muslims.

The deaths of William's three elder brothers made him heir apparent in 1148. He was associated in kingship in 1151 with his father, Roger II, and was crowned king after Roger's death in the Cathedral of Palermo on Easter Sunday, April 4, 1154.

On the advice of his minister, Maione of Bari, William energetically pursued his father's policy of strengthening royal authority over the towns and the barons, who rallied around his cousin Robert of Loritello and looked to the German king Frederick I Barbarossa for help. When Frederick's projected expedition to Italy came to naught, the rebels sought support from the Byzantine emperor Manuel I Comnenus. In 1155 the Byzantines invaded southern Italy and overran Apulia, but William won a resounding victory at Brindisi and reconquered the province. He next settled his disputes with Pope Adrian IV in the Concordat of Benevento (1156), winning papal acknowledgment of his authority over all the territories that had come under Norman control.

The loss of the kingdom's African possessions (1158–60) weakened William's prestige, and the assassination of Maione in November 1160 exposed him to new danger from the conspiring barons, led by a Norman noble, Matteo Bonello. An attempt to depose him nearly succeeded, and rebellions broke out in Sicily and on the mainland. The royal palace in Palermo was plundered of its treasures, including the silver planisphere of the great Arab geographer al-Idrīsī, who was forced to flee Sicily as the island's Muslims became targets of mob attacks. But William quickly suppressed the disorders. He imposed stern punishment on the dissidents, who this time received no help from abroad. At his death his kingdom passed intact to his young son, William II.

• William II, byname WILLIAM THE GOOD, Italian GUGLIELMO IL BUONO (b. 1154—d. Nov. 18, 1189, Palermo, kingdom of Sicily [Italy]), the last Norman king of Sicily; under a regency from 1166, he ruled in person from 1171. He became known as William the Good because of his policy of clemency and justice toward the towns and the barons, in contrast with his father, William I the Bad.

After the regency of his mother, Margaret of Navarre, had ended, William II at first continued his father's policy of friendship with Pope Alexander III and with the Byzantine emperor Manuel I Comnenus. In 1172, however, the proposed marriage of William to Manuel's daughter Maria was thwarted by the emperor,



William II, detail of a mosaic, 12th century; in the Church of Monreale, Sicily

Alinari—Art Resource/EB Inc.

and William immediately turned against the Byzantines. In 1177 he concluded a truce with his father's old enemy, the German king Frederick I Barbarossa, who had been defeated by the Lombard League at Legnano in 1176 and no longer seemed dangerous to Sicily. Also in 1177, on February 13, William married Joan, daughter of King Henry II of England. After the death of Pope Alexander III in 1181, William felt freer to exploit disorders in the Byzantine Empire, and he sought even closer relations with Frederick I. William agreed that his aunt Constance should marry Frederick's son Henry (later Henry VI); because William's own marriage was childless, this betrothal (Oct. 29, 1184) gave Henry a strong claim to the Sicilian succession, an arrangement disliked by the Norman national party.

In June 1185 William commenced a great campaign against the Byzantines. His forces crossed Macedonia and captured Thessalonica (modern Salonika), but when his fleet was in sight of Constantinople (now Istanbul), his army was ambushed and defeated. William died while planning to join the Third Crusade.

William Clito, French GUILLAUME CLITON (b. *c.* 1101—d. July 28, 1128, Aalst, Flanders [now in Belgium]), count of Flanders and titular duke of Normandy (as William IV, or as William III if England's William Rufus' earlier claim to the duchy is not acknowledged).

Son of Duke Robert II Curthose (and grandson of William the Conqueror and Matilda of Flanders), William Clito was supported by Louis VI of France in claiming the duchy when his father was imprisoned (1106) by the English. Henry I of England, however, had his own son William the Aetheling recognized as heir to Normandy and, in 1119, decisively defeated Louis VI and Clito at Bremule. When the Aetheling was drowned (1120), Clito made further trouble in Normandy but died in 1128.

William de Hauteville, byname WILLIAM IRON ARM, Italian GUGLIELMO D'ALTAVILLA, or GUGLIELMO BRACCIO-DI-FERRO, French GUILLAUME DE HAUTEVILLE, or GUILLAUME BRAS DE FER (b. Hauteville-la-Guichard, Normandy [France]—d. 1046), Norman adventurer, the eldest of 12 Hauteville brothers, a soldier of fortune who led the first contingent of his family from Normandy to southern Italy. He undertook its conquest and quickly became count of Apulia.

William and his brothers Drogo and Humphrey responded (*c.* 1035) to an appeal for reinforcements in Italy by the Norman Rainulf of Aversa. William earned his sobriquet "Iron Arm" during the Norman-Byzantine siege of Muslim-occupied Syracuse (Sicily) when he charged and killed the emir of the city. He served as a captain of the Norman army that joined the Lombards in invading Apulia, in southern Italy, and was proclaimed count of Apulia in 1042. The title was confirmed later that year by Gaimar V, the Lombard prince of Salerno, who arranged a marriage between William and his own niece, daughter of the Duke of Sorrento. Emerging as the most powerful leader in southern Italy, William, allied with Gaimar, invaded Calabria (the toe of Italy) two years later. After his death, his brother Drogo was invested as count of Apulia.

William de la Mare (b. England—d. *c.* 1290), English philosopher and theologian, advocate of the traditional Neoplatonic-Augustinian school of Christian philosophy, and leading critic of the Aristotelian thought introduced by Thomas Aquinas.

A member of the Franciscan order, William became a master of theology at the University of Paris *c.* 1275 and subscribed to the Augustinian school as expressed by the celebrated

Italian Franciscan Bonaventure. While lecturing at Paris, William wrote his *Commentarium super libros sententiarum* ("Commentary on the Books of Sentences"—*i.e.*, annotations on Peter Lombard's 12th-century collection of patristic and early medieval theology). Reflecting his Augustinian intellectual development, William considered the knowing process to be the operation of an inherent power in the human spirit given by God at creation. According to William, man's intrinsic desire to reunite with God, and an inner enlightenment of the soul (illuminationism) by which eternal ideas are recognized, constituted the essence of human psychology.

On returning to England William wrote his chief work, *Correctorium fratris Thomae* (1278; "Corrective of Brother Thomas"), a critique of the writings of Thomas Aquinas. The introduction of Aristotelian thought into theology drew a volatile reaction from the traditional Neoplatonic thinkers, who had dominated Western thought since Augustine. Desirous of providing students with a guide to control these new thoughts, William chose 118 articles from Aquinas' writings, mostly from his celebrated *Summa theologiae* ("Sum of Theology"), and noted points at which Aristotelian influence produced concepts or interpretations contrary to orthodox formulas. Historians of philosophy, however, observe that William failed to analyze the basic questions causing conflict between Thomistic Aristotelians and Neoplatonists—*i.e.,* the distinction between essence and existence, time and eternity, matter and spirit.

William's *Correctorium* was approved for the entire Franciscan order in 1282, when the Franciscan minister general Bonagratia forbade the study of Aquinas' *Summa theologiae* except by scholars using the critical standard of William's *Correctorium*. After publication, the *Correctorium*, in a publicized polemic, was in turn corrected by Thomists, notably the English Dominicans Richard Clapwell and Thomas Sutton and the French Dominican John of Paris. Entitling their response *Correctorium corruptorii fratris Thomae* ("Corrective of the Corruptor of Brother Thomas"), the Thomists emphasized William's failure to comprehend both Aquinas and Aristotle. The surviving texts of the *Correctoria,* edited by P. Glorieux (1927), with comments by F. Pelster (1956), probably do not give William's original version but only preserve a revision that he completed *c.* 1284.

Of parallel importance were William's contributions to biblical studies. His *Correctio textus bibliae* ("Corrective of the Text of the Bible") and the *De Hebraeis et Graecis vocabulis glossarum bibliae* ("On the Hebrew and Greek Terms of Biblical Annotations") are considered among the most learned from the medieval period.

William LONGSWORD: *see* William I *under* William (Normandy).

William OF AUVERGNE, also called WILLIAM OF PARIS, OF WILLIAM OF ALVERNIA, French GUILLAUME D'AUVERGNE, or DE PARIS (b. after 1180, Aurillac, Aquitaine—d. 1249, Paris), the most prominent French philosopher-theologian of the early 13th century and one of the first Western scholars to attempt to integrate classical Greek and Arabic philosophy with Christian doctrine.

William became a master of theology at the University of Paris in 1223 and a professor by 1225. He was named bishop of the city in 1228. As such he defended the rising mendicant orders against attacks by the secular clergy, which impugned the mendicants' orthodoxy and reason for existence. As a reformer he limited the clergy to one benefice (church office) at a time if it provided them sufficient means.

William's principal work, written between 1223 and 1240, is the monumental *Magisterium divinale* ("The Divine Teaching"), a seven-part compendium of philosophy and theology: *De primo principio,* or *De Trinitate* ("On the First Principle," or "On the Trinity"); *De universo creaturarum* ("On the Universe of Created Things"); *De anima* ("On the Soul"); *Cur Deus homo* ("Why God Became Man"); *De sacramentis* ("On the Sacraments"); *De fide et legibus* ("On Faith and Laws"); *De virtutibus et moribus* ("On Virtues and Customs").

After the condemnation of Aristotle's *Physics* and *Metaphysics* in 1210 by church authorities fearful of their negative effect on the Christian faith, William initiated the attempt to delete those Aristotelian theses that he saw as incompatible with Christian beliefs. On the other hand, he strove to assimilate into Christianity whatever in Aristotle's thought is consistent with it.

Influenced by the Aristotelianism of Avicenna (Ibn Sīnā), an 11th-century Islāmic philosopher, and by the Neoplatonism of Augustine and the school of Chartres, William, nevertheless, was sharply critical of those elements in classical Greek philosophy that contradicted Christian theology, specifically on the questions of human freedom, Divine Providence, and the individuality of the soul. Against Avicenna's determinism, he held that God "voluntarily" created the world, and he opposed those proponents of Aristotelianism who taught that man's conceptual powers are one with the single, universal intellect. William argued that the soul is an individualized, immortal "form," or principle, of intelligent activity; man's sentient life, however, requires another activating "form."

The complete works of William of Auvergne, edited in 1674 by B. Leferon, were reprinted in 1963. A critical text of *De bono et malo* by J.R. O'Donnell appeared in 1954.

William OF AUXERRE, French GUILLAUME D'AUXERRE (b. *c.* 1150, Auxerre, Bishopric of Auxerre—d. Nov. 3, 1231, Rome), French philosopher-theologian who contributed to the adaptation of classical Greek philosophy to Christian doctrine. He is considered the first medieval writer to develop a systematic treatise on free will and the natural law.

Probably a student of the Parisian monk and Humanist Richard of St. Victor, William became a master in theology and later an administrator at the University of Paris. After a long career at the university, he was commissioned in 1230 to serve as French envoy to Pope Gregory IX to advise Gregory on dissension at the university. William pleaded the cause of the students against the complaints of King Louis IX.

In 1231 William was appointed by Gregory to a three-member council to censor the works of Aristotle included in the university curriculum to make them conform sufficiently to Christian teaching. Contrary to the papal legate Robert of Courçon and other conservatives, who in 1210 condemned Aristotle's *Physics* and *Metaphysics* as corruptive of Christian faith, William saw no intrinsic reason to avoid the rational analysis of Christian revelation. Confident of William's orthodoxy, Gregory urged the King to restore him to the university faculty so that he and Godfrey of Poitiers might reorganize the plan of studies. William fell ill and died before any of these projects were begun.

William's principal work is the *Summa super quattuor libros sententiarum* ("Compendium on the Four Books of Sentences"), usually called the *Summa aurea* ("The Golden Compendium"), a commentary on early and medieval Christian theological teachings assembled by Peter Lombard in the mid-12th century. Written between 1215 and 1220, the *Summa aurea,* in four books, selectively treated such theological matters as God as one nature in three persons, creation, man, Christ and the virtues, sacramental worship, and the Last Judgment.

William's emphasis on philosophy as a tool for Christian theology is evidenced by his critique of Plato's doctrine of a demiurge, or cosmic intelligence, and by his treatment of the theory of knowledge as a means for distinguishing between God and creation. He also analyzed certain moral questions, including the problem of human choice and the nature of virtue.

William also wrote a *Summa de officiis ecclesiasticis* ("Compendium of Church Services"), which treated liturgical, or common, prayer, sacramental worship, and the annual cycle of scripture readings and chants. This systematic study served as the model for the late-13th-century noted work on divine worship, Guillaume Durand's *Rationale divinorum officiorum* ("An Explanation of the Divine Offices"). The 16th-century edition of the *Summa aurea* was reprinted in 1965.

William OF CHAMPEAUX, French GUILLAUME DE CHAMPEAUX, Latin GUGLIELMUS DE CAMPELLIS (b. *c.* 1070, Champeaux, Fr.—d. 1121, Châlons-sur-Marne), French bishop, logician, theologian, and philosopher who was prominent in the Scholastic controversy on the nature of universals (*i.e.,* words that can be applied to more than one particular thing).

After studies under the polemicist Manegold of Lautenbach in Paris, the theologian Anselm of Laon, and the philosopher Roscelin at Compiègne, William taught in the cathedral school of Notre Dame, Paris, where he had Peter Abelard among his pupils. He became head of the school and archdeacon of Paris *c.* 1100, but retired in 1108, probably because of the violent polemics between him and Abelard over the doctrine of universals.

William withdrew to the nearby abbey of Saint-Victor, where—at the school he established with Anselm's aid—he taught rhetoric, logic, and theology, again having Abelard as his pupil. The abbey flourished under William's direction, contributing significantly to the mystical trend characteristic of St. Victor. He was consecrated bishop of Châlons-sur-Marne in 1113 and initiated a reform, becoming an advocate of clerical celibacy and a champion of orthodoxy and ecclesiastical investiture. In 1115 he ordained the great Bernard of Clairvaux, who probably studied under him.

William's surviving works are all theological. The fragmentary *De sacramento altaris* ("On the Sacrament of the Altar"), the possibly apocryphal *De origine animae* ("On the Origin of the Soul"), the *De essentia Dei* ("On the Essence of God"), and the *Dialogus seu altercatio cujusdam Christiani et Judaei de fide Catholica* ("A Dialogue or Argument of a Certain Christian and Jew on the Catholic Faith") are printed by J.-P. Migne in *Patrologia Latina* ("Works of the Latin Fathers"). His logical works are not extant. William's *Sententiae seu Quaestiones* ("Sentences or Questions") is an early systematization of classical Christian doctrine. Georges-Joseph Lefèvre's *Les Variations de Guillaume de Champeaux et la question des universaux* ("The Variations of William of Champeaux and the Question of Universals") appeared in 1898, followed by Heinrich Weisweiler's *Das Schrifttum der Schule Anselms von Laon und Wilhelms von Champeaux in deutschen Bibliotheken* ("The Writings of the School of Anselm of Laon and William of Champeaux in German Libraries") in 1936.

William OF CONCHES, French GUILLAUME DE CONCHES (b. *c.* 1100, Conches, Fr.—d. 1154), French Scholastic philosopher and a leading member of the School of Chartres.

A pupil of the philosopher Bernard of Chartres, he taught at Chartres and Paris and was tutor to Henry (later Henry II of England), son of Geoffrey Plantagenet.

William, a realist whose ideas leaned toward pantheism, gave an atomistic explanation of nature, the four elements (air, water, fire, earth) being regarded as combinations of homogeneous individual atoms. He wrote explanations of Plato's *Timaeus* and Boethius' *De consolatione philosophiae* ("The Consolation of Philosophy"), and composed two original works, *Philosophia Mundi* ("Philosophy of the World") and *Pragmaticon Philosophiae* ("The Business of Philosophy"). He is also considered to be the author of the *Summa Moralium Philosophorum* ("The Substance of the Ethical Philosophies"), the earliest medieval treatise on ethics.

William OF HIRSAU, German WILHELM VON HIRSAU (b. Bavaria—d. July 4, 1091, Württemberg, Duchy of Swabia), German cleric, Benedictine abbot, and monastic reformer, the principal German advocate of Pope Gregory VII's clerical reforms, which sought to eliminate clerical corruption and free ecclesiastical offices from secular control.

William was sent as a child to the monastic school of Sankt Emmeran in Gegensburg. In 1069 he was appointed abbot of the monastery of Hirsau in Württemberg, following the deposition of the Abbot Frederick; William, however, refused to take office until Frederick died in 1071. After a visit to Rome in 1075, William won from Gregory a decree exempting the abbey from the authority of the local bishop, who often represented political interests. In turn, William became the leading agent of the Gregorian reform in Germany. He supported the papacy in the investiture controversy, a dispute regarding the right of the pope to make ecclesiastic appointments without political interference. He was also severely critical of the German bishops who aligned themselves with the papacy solely because of their political and economic interests, observing that disentanglement from such interests was a major tenet of the reform.

With papal encouragement, William, in 1079, adapted for Hirsau the regimen and customs of Cluniac monasticism. William established an elaborate daily liturgy along the lines of that developed at the Benedictine abbey of Cluny in France. His *Constitutiones Hirsaugienses* ("Constitutions of Hirsau") went beyond his model, establishing a stricter discipline in common prayer and silence. In 1077 William instituted a new category of monks, the *fratres exteriores* (literally, "external brothers," *i.e.*, lay brothers), to perform manual tasks in the monastery; these monks assumed less stringent monastic vows than their clerical brethren and had a smaller role in liturgical worship. The practice spread to the Cluniac monasteries and eventually became the norm at Benedictine monasteries across Europe.

William's reforms proved so popular that he was compelled, in 1083, to construct a new monastery nearby to accommodate the increasing numbers of monks at Hirsau. Other abbeys became associated with Hirsau, transforming it into a major monastic centre; more than 100 houses following Hirsau's rule were established during William's lifetime.

In furthering the scholarly learning of Hirsau, William wrote *Dialogi de musica* ("Dialogues on Music") and *De astronomia* ("On Astronomy"). These treatises, together with the *Constitutiones Hirsaugienses*, are contained in the series *Patrologia Latina*, J.P. Migne (ed.), vol. 150 (1854). The primary source for the life of William is in the collection *Monumenta Germaniae Historica, Scriptores* ("Historical Records of Germany, Writers"), W. Wattenbach (ed.), vol. 12 (1856).

William OF HOLLAND: *see* William *under* William (Germany/Holy Roman Empire).

William OF MOERBEKE, French GUILLAUME DE MOERBEKE (b. *c.* 1215, Moerbeke, Brabant—d. *c.* 1286, Corinth, Greece), Flemish cleric, archbishop, and classical scholar whose Latin translations of the works of Aristotle and other early Greek philosophers and commentators were important in the transmission of Greek thought to the medieval Latin West.

William entered the Dominican priory at Ghent and later studied in Paris and Cologne, where he presumably worked with Albertus Magnus. After an assignment *c.* 1260 to the priory in Thebes, and in Nicaea, near Constantinople, he was appointed chaplain and confessor to Pope Clement IV (1265–68), and to five succeeding popes. A proponent of reunion between the Eastern and Western churches, William took part in the Council of Lyon (1274) as an adviser to Pope Gregory X. On April 9, 1278, Pope Nicholas III named him archbishop of Corinth, where he lived until his death. The neighbouring Greek village of Merbeke is a memorial to him.

At the urging of Thomas Aquinas, whom he knew at the Italian Dominican houses at Viterbo and Orvieto, William in 1260 made a literal Latin translation of Aristotle's *On the Heavens* and *Meteorology*. During the next two decades he translated parts of Aristotle's *Metaphysics, Politics, Rhetoric,* and *History of Animals,* together with cognate treatises on animal psychology and physiology, concluding in 1278 with *Poetics*. He revised existing Latin versions of other Aristotelian writings, including *On Memory and Recall, Physics, Posterior Analytics,* and possibly the *Nichomachean Ethics.*

The more important early commentaries on Aristotle's works that William also translated include those by Alexander of Aphrodisia (2nd century) on *Metaphysica* and *De sensu* (*On Sensation*), Ammonius Hermiae (5th century) on *Peri hermeneias* ("On Interpretation"), and those by Themistius (4th century) and John Philoponus (6th century) on *De anima* (*On the Soul*). Most of these translations were done in 1268.

William's translations of such leading early Neoplatonist writers as the 5th-century philosopher Proclus' *Elementatio theologica* (*Elements of Theology*), as well as his commentary on Plato's *Timaeus,* revealed to 13th-century Scholastic philosophers and theologians the Platonic basis of treatises formerly and incorrectly attributed to Aristotle. The discovery of this literature by Western philosophers also gave great impetus to Neoplatonism in the Middle Ages. Using a rigidly literal style, William rendered the Greek texts into Latin with a fidelity that not only helped his contemporaries grasp Aristotle's exact meaning but also established his translations as the standard for the medieval Latin world.

Other classical Greek texts that William translated include works of Ptolemy and Hippocrates' *De prognosticationibus aegritudinum secundum motum lunae* (*On Predicting Illnesses According to the Phases of the Moon*).

William OF NEWBURGH (b. 1136, Bridlington, Yorkshire, Eng.—d. *c.* 1198, Newburgh Priory), English chronicler who is remembered as the author of one of the most valuable historical works on 11th- and 12th-century England. He entered the Augustinian priory of Newburgh as a boy to study theology and history and apparently remained there the rest of his life, gaining information from travellers and from neighbouring abbeys.

Written at the request of Ernald, abbot of Rievaux, William's *Historia rerum Anglicarum* (1196–98; "History of English Affairs") covers the period from 1066 to 1198. William's erudition included knowledge of the classical writers Virgil, Horace, Cicero, and Livy; the early church historians Eusebius, Gregory, and Augustine; and the English chroniclers Bede, Henry of Huntingdon, Simeon of Durham, and Anselm of Canterbury. The history was primarily a compilation of other English chronicles, except for his original treatment of the period from 1154 to 1173.

William's dependence on oral tradition and legend resulted in some vagueness and error, but the history is extremely valuable both as a source of English domestic history, at that time overshadowed by news of the Crusades, and for its unusually acute commentary and critical analysis of cause and effect in the anarchic reign of King Stephen (1135–54).

William OF NORMANDY: *see* William I *under* William (England, Great Britain, United Kingdom).

William OF OCKHAM, Ockham also spelled OCCAM (theologian): *see* Ockham, William of.

William OF ORANGE: *see* William III *under* William (England, Great Britain, United Kingdom).

William OF PARIS: *see* William of Auvergne.

William OF RUBROUCK: *see* Willem van Ruysbroeck.

William OF SAINT-AMOUR, French GUILLAUME DE SAINT-AMOUR (b. *c.* 1200, Saint-Amour, Kingdom of Arles—d. September 1272, Saint-Amour), French philosopher and theologian who led the opposition at the University of Paris to the 13th-century rise of the newly formed mendicant religious orders.

A protégé of the Count of Savoy, who supported his doctoral studies in canon law and theology at the University of Paris, William was chosen dean of the theology masters *c.* 1250. During that period he wrote a significant commentary on the logical treatises *De Analytica priora et posteriora* ("On the Prior and Posterior Analytics") of Aristotle.

Disdaining the mendicant religious orders, William initiated the attack on their representatives and theological scholars at the university, notably the Franciscan Bonaventure and the Dominican Thomas Aquinas. At William's instigation, the university suspended the Dominican masters in the winter of 1254. He also obtained from Pope Innocent IV in July 1254 a decree limiting each religious order to one university master's chair. In November of the same year, Pope Innocent rescinded certain privileges of the orders to minister the sacraments.

The following month, however, the new pope, Alexander IV, abrogated these restrictions and ordered the masters at Paris to receive again the Dominicans into the university. William resisted these rulings and disputed the very legitimacy of the mendicant orders by relating their purpose to the apocalyptic teaching of Joachim of Fiore. Intending to taint the mendicants by association, William attacked Joachim's prophecy of a new theocratic age that would dispense with political and ecclesiastical structures. In 1255 William wrote the *Liber de Antichristo et ejusdem ministris* ("The Book of Antichrist and His Ministers"), in which he attempted to show that the Dominicans were the forerunners of the catastrophic age of Antichrist. After an investigation of the issue, Pope Alexander in June 1256 suspended William from all academic and ecclesiastical offices and sought his expulsion from France. Following a review of his case by the French bishops, which elicited a promise to correct in his writings whatever was contrary to church teaching, William, in September 1256, obtained the collaboration of other Parisian masters in a denunciation of the mendicant orders, the *De periculis novissimorum temporum* ("On the Dangers of Recent Times"). When this work also was condemned by Pope Alexander in October 1256, William presented a defense early in

1257 but was judged again to be in error and was exiled from France. On an appeal to Pope Clement IV, William was permitted to return to France late in 1266 and retired to his home at Saint-Amour. Although forbidden by the pope to continue the controversy with the religious orders, William maintained correspondence with his colleagues at Paris, who subsequently revived the polemic. The complete works of William of Saint-Amour were published in 1632.

William OF SAINT CARILEF, also called WILLIAM OF SAINT CALAIS, OR BISHOP WILLIAM (d. Jan. 2, 1096, Windsor, Eng.), Norman-French bishop of Durham (1081–96), adviser to William I the Conqueror, and chief minister to William II Rufus (1088).

Bishop William distinguished himself in his early years as a diligent and practical monk and abbot at the monasteries of St. Carilef (later named St. Calais) and St. Vincent, respectively. William I the Conqueror, taking notice of his abilities, made him bishop of Durham on Jan. 3, 1081, and retained him as a close adviser.

Upon ascending the throne, William II Rufus made Bishop William his chief minister (1088), an act that, in part, caused Odo of Bayeux (William the Conqueror's half brother) to rebel. Bishop William sided with Odo and, after Odo's defeat, was stripped of his see and castle and forced to take refuge in Normandy. After spending three years in exile, Bishop William succeeded in regaining the king's favour and recovered his bishopric and property.

For the next four years Bishop William devoted himself to the rebuilding of Durham Cathedral. He sided with the king against St. Anselm, archbishop of Canterbury, at the Synod of Rockingham (March 1095) and unsuccessfully advocated the archbishop's removal. Ailing, William was summoned to Windsor in late 1095 and died there shortly after his arrival.

William OF SAINT-THIERRY, French GUILLAUME DE SAINT-THIERRY (b. *c.* 1085, Liège, Lower Lorraine—d. probably Sept. 8, 1148), French monk, theologian, and mystic, leading adversary of early medieval rationalistic philosophy.

William studied under Anselm of Laon, a supporter of the philosophical theology (later called Scholasticism) advanced by St. Anselm of Canterbury. After entering a Benedictine abbey in Reims in 1113, William became thoroughly versed in scriptural and patristic writings. Elected abbot of the Abbey of Saint-Thierry, near Reims, in 1119, he expressed his preference for contemplation and writing rather than ecclesiastical administration, but he remained in office at the urging of his friend Bernard of Clairvaux. During that period William wrote two works fundamental to his theological system, *De natura et dignitate amoris* ("On the Nature and Dignity of Love") and *De contemplando Deo* ("On the Contemplation of God"). *De sacramento altaris* ("On the Sacrament of the Altar"), a treatise on the Eucharist, he dedicated to Bernard, who earlier had dedicated two of his own works to William.

From 1128 to 1135 William compiled several treatises and biblical commentaries attempting to synthesize the theology and mysticism of Western and Eastern Christianity, specifically an integration of the thought of St. Augustine, Origen, and Gregory of Nyssa. William's *Meditativae orationes* ("Meditative Prayers") expressed spiritual concerns with an intensity comparable to Augustine's in his *Confessions*. In 1135 he withdrew to the meditative life of the Cistercian Monastery of Signy in the Ardennes, where he addressed questions of the spiritual life and the problem of faith in his *Speculum fidei* (*The Mirror of Faith*) and *Aenigma fidei* ("The Enigma of Faith"), written in 1144. In the same year, after visiting the Charterhouse of Mont-Dieu, near Reims, he composed the *Epistola ad fratres de Monte Dei* ("Letter to the Brothers of Mont-Dieu"), called the "Golden Epistle" (Eng. trans., 1930), one of the most significant medieval works on the value of the contemplative life.

Elaborating the essential elements of his doctrine on mysticism, William proposed that the soul, although alienated from God, is also intrinsically empowered to experience a mystical "return" to its divine origin during its earthly existence, a return effected in stages. Thus is man progressively liberated from his material and temporal impediments, eventually undergoing an experiential knowledge of God by a process of reminiscence, understanding, and love.

The writings of William of Saint-Thierry are contained in the series *Patrologia Latina*, J.-P. Migne (ed.), vol. 180 (1890). His *Speculum fidei* was edited in an English version, *The Mirror of Faith*, by Geoffrey Webb and Adrian Walker in 1959.

William OF SALICETO: *see* Saliceto, William of.

William OF SENS, French GUILLAUME DE SENS (d. Aug. 11, 1180, France), French master-mason who built the first structure in the Early Gothic style in England.

William is one of the first cathedral architects to be known by name. Exact knowledge of his contribution was preserved in the report of an eyewitness, the monk Gervase, who described the destruction by fire (1174) of Canterbury Cathedral's choir and its subsequent rebuilding by William. He was already famous at that time as a leading builder and "most subtle artisan" of Sens, Fr. Called to Canterbury in 1175, he was given the task of using the remaining foundation of the choir and extending it toward the east.

William probably planned the whole choir, as well as other structural alterations, including the flying buttresses copied from Notre-Dame, which may still be seen on the north side. It is the interior design that is most significant, however. Here William introduced sexpartite vaulting, the form of the high arcades, and columns of stone in contrasting colours. His innovations at Canterbury are considered an early step toward the High Gothic practice of "dissolving" the walls between supporting vertices.

As work began on the vault of the eastern part of the choir, William was incapacitated by a fall from a scaffold. He probably continued to direct the work from his sickbed, but this was impractical, and so he gave up and returned to France, where he died. His successor, William the Englishman, seems to have followed his plans.

Because of similarity in design, especially in the construction of the choir, William is thought to have participated in building the Cathedral at Sens (begun 1130), one of the first churches in which Gothic architecture appears as a coherent style.

William OF TYRE (b. *c.* 1130, Syria—d. 1185, Rome), Franco-Syrian politician, churchman, and historian whose experiences in the Latin kingdom of Jerusalem inspired him to write a history of medieval Palestine.

Probably born to a French family that had settled in Frankish Syria during the 12th century, William was educated in France and Italy and knew Latin, Greek, and Arabic. He returned to Palestine in 1160 and was made archdeacon of Tyre in 1167. In the same year, he was sent on several diplomatic missions to Constantinople and Rome. Three years later he was made tutor to Baldwin, son of King Amalric I of Jerusalem. When Baldwin succeeded to the throne as Baldwin IV in 1174, he appointed William chancellor of the kingdom and archdeacon of Nazareth. He was promoted to archbishop of Tyre in June 1175 and in 1179 went to Rome to attend the third Lateran Council. On his return he was received by the Byzantine emperor Manuel I Comnenus in Constantinople.

William retired to Rome in 1183 after failing in his bid to be elected patriarch of Jerusalem (1180), taking the manuscripts of two books with him. His first, *Gesta orientalium principum* ("Acts of the Eastern Kingdoms"), a history of the Arab East, has been lost; but his second work, *Historia rerum in partibus transmarinis gestarum* ("History of Matters Done in Foreign Parts"), a history of the Latin kings of Jerusalem, has been preserved. It is a scholarly account of the history of the Latin East from 614 to 1184.

William OF WYKEHAM: *see* Wykeham, William of.

William RUFUS: *see* William II *under* William (England, Great Britain, United Kingdom).

William THE AETHELING, French GUILLAUME AETHELING (b. 1103—d. Nov. 25, 1120, at sea off Barfleur, Fr.), Anglo-Norman prince, only son of Henry I of England and recognized duke of Normandy (as William IV, or as William III if the earlier claim of his uncle, William Rufus, is not acknowledged). He succeeded his uncle, the imprisoned Duke Robert II Curthose.

In successful battles in Normandy and France, Henry I forced the Norman barons to give homage to his son William the Aetheling (1115); and in 1119 Pope Calixtus II, in an interview with Henry at Gisors, recognized both the rightful imprisonment of Duke Robert and the succession of William the Aetheling (excluding William Clito, the candidate of Louis VI of France). However, on the night of Nov. 25, 1120, the "White Ship" carrying William to England foundered as it left the port of Barfleur, with all lives lost save one. The notoriety of the wreck is due to the large number of the royal household on board, including not only the king's son and heir but also two royal bastards and several earls and barons. Its long-range significance lay in that it left Henry I without an heir, bolstered William Clito's claims in Normandy, and resulted in a period of anarchy after Henry's death.

William THE CONQUEROR, also called THE BASTARD: *see* William I *under* William (England, Great Britain, United Kingdom).

William THE LION: *see* William I *under* William (Scotland).

William THE MARSHAL: *see* Pembroke (and Striguil), William Marshal, 1st earl of.

William THE SILENT: *see* William I *under* William (Netherlands: stadholders).

William THE WISE: *see* William IV *under* William (Hesse-Kassel).

William, Fort, citadel of Calcutta, named after King William III of England. The English East India Company's main Bengal trading station was moved from Hooghly to Calcutta in 1690 after a war with the Mughals. Between 1696 and 1702 the first fort was built in Calcutta, with the nawab of Bengal's permission.

In 1700 Calcutta became a separate presidency accountable to London; until 1774 its governors, and thereafter until 1834 its governors-general, were given the added title "of Fort William in Bengal." In 1756 the fort was taken by Sirāj-ud-Dawlah, nawab of Bengal. After the recovery of Calcutta (1757), this fort was demolished and a new one constructed farther south, with an unobstructed field of fire. The latter fort, completed in 1773, still stands.

William and Mary, College of, a state coeducational university of liberal arts at Williamsburg, Va., U.S. The second oldest institution of higher education in the United States (after Harvard College), it was chartered in 1693 by cosovereigns King William III and Queen Mary II of England to develop clergymen and civil servants for the colony. The scholastic honour society Phi Beta Kappa was organized there as a social fraternity in 1776. Seven signers of the Declaration of Independence, including its author, Thomas Jefferson, Chief Justice John Marshall, and President James Monroe, were college alumni, as were President John Tyler, General Winfield Scott, and John Randolph subsequently. George Washington was the college's first American chancellor, from 1788 to 1799.

In the period after the U.S. War of Independence under the influence of the Enlightenment and the French Revolution, William and Mary reformed its curriculum. Two divinity professorships were dropped, and the study of law, political economy, history, mathematics, and modern languages, particularly French, was emphasized. Jefferson was instrumental in this process of secularization. William and Mary pioneered in the elective system (allowing students to choose their own programs). The modern college has a faculty of arts and sciences and schools of business administration, education, law, and marine science.

William and Mary style, style of decorative arts produced during the reign (1689–1702) of William III and Mary II of England. When William came to the English throne from the house of Orange, he encouraged many Dutch artisans to follow him. In addition to these craftsmen, Huguenot refugees from France worked in the cabinetmakers' and designers'



American colonial William and Mary furniture
(Left to right) Tall-backed caned maple chair, Massachusetts, 1700–25, with canvaswork embroidery (needlepoint) squab; burled walnut veneer high chest, probably from Massachusetts, 1700–10; and a walnut, pine, and butternut gate-leg table, New England, 1700–25; in the Henry Francis du Pont Winterthur Museum, Delaware
Courtesy, The Henry Francis du Pont Winterthur Museum, Delaware

shops of London during this time. Their influence was strongly felt under William, who was partial to the florid effects of French style.

The excesses of the heavy English Restoration mode, nonetheless, were tempered by a plainer fashion in decoration. A new, intimate style of life that created smaller rooms demanded a more modest scale of furniture. Comfort became important too, as attested by the upholstered needlepoint chair seats of the day.

Although the underlying contours of William and Mary furniture are quite simple, they are embellished with delicate ornament. Marquetry in ivory and coloured woods or metal inlay frequently is found in arabesque patterns resembling seaweed and spiders' webs.

Highboys and lowboys are major pieces for the period, and serpentine stretchers and spiral turnings are typical. Walnut superseded the use of oak as the basic wood of English cabinetry during this period, and a number of exotic woods such as acacia and olive, which reached the country via new East–West trade routes, were put to use in the veneers and inlays. Japanning, the popular Oriental lacquerwork, also remained in vogue.

Characteristic of William and Mary style are the scallop shell, C- and S-scrolls, and the acanthus leaf of classical tradition. Daniel Marot, a Huguenot, was designer general to the royal couple; but his work is overshadowed by the skillful inventions of Gerrit Jensen, the most fashionable furniture designer of his day, whose inspiration seems to have been mainly French.

William Henry, PRINCE OF ORANGE: *see* William III *under* William (England, Great Britain, United Kingdom).

William Louis, Dutch WILLEM LODEWIJK (b. March 13, 1560, Dillenburg, Hesse [Germany]—d. July 13, 1620, Leeuwarden, Neth.), count of Nassau, stadholder of Friesland, Groningen, and Drenthe, who with his cousin, Maurice of Nassau, prince of Orange, formulated the military strategy of the United Provinces of the Netherlands, or Dutch Republic (now The Netherlands), against Spain from 1588 to 1609. He formed, with Maurice and with Johan van Oldenbarnevelt, advocate of Holland, the triumvirate that ruled the Dutch Republic (1588–1618).

The eldest son of John, Count of Nassau, William was reared a Calvinist and educated at the University of Heidelberg. His military ability was first shown in 1579, when at the siege of Steenwijk he defeated Georges de Lalaing, Count of Rennenberg, then stadholder of the provinces of Friesland and Groningen, who had defected to the pro-Spanish forces. William Louis was appointed captain general and stadholder of Friesland in 1584.

After the States-General granted Maurice military control of the republic, William Louis rose in power as Maurice's chief military adviser. Reorganizing the army on principles of Roman military science, he led the republic's forces to a series of victories (1590–97) and drove the last Spanish troops from the republic in 1597. Groningen and Drenthe, two of the provinces that he cleared of Spanish forces, appointed him stadholder in 1594. When he and Maurice attempted to liberate the southern Netherlands from Spanish control, however, they met with little success; the net result of nine campaigns (1598–1606) was the capture of a few towns (Grave and Rheinberg in 1602; Sluis and Ardenburg in 1604).

Though Maurice opposed the Twelve Years' Truce with the Spanish Netherlands (1609–21), William worked actively for it. During the religious controversy over doctrines of predestination between the Gomarists (extreme Calvinists) and Arminians (Protestants opposed to the idea of complete predestination), he persuaded Maurice to support the Gormarists (1617). When the Arminian Oldenbarnevelt was sentenced to death, however, William Louis unsuccessfully tried to persuade Maurice to spare his life (1619).

William Rockhill Nelson Gallery of Art and Atkins Museum of Fine Arts: *see* Nelson Gallery of Art and Atkins Museum of Fine Arts.

William Tell (legendary hero): *see* Tell, William.

Williams, Allen Lane: *see* Lane, Sir Allen.

Williams, Bert (b. *c.* 1876, New Providence, Bahamas—d. March 4, 1922, New York City), American comedian who portrayed the slow-witted, shuffling black man that was then a standard role in vaudeville.

As a child Williams went to California with his family and worked in the mining and lumber camps of the West. In 1895 his partnership with George W. Walker began. They became one of the most successful comedy teams of their era; within a year they were appearing in New York City, where their song "Good Morning Carrie" became famous. In 1903 the partnership had graduated to full-scale musical comedy. The all-black show *In Dahomey* was a Broadway success and in London the following year played a command performance at Buckingham Palace. Other successes followed, notably *Abyssinia* (1906), *Bandanna Land* (1908), and *Mr. Lode of Koal* (1909). After Walker's death in 1909, Williams became a regular comic in the shows of Florenz Ziegfeld, starring in the *Follies* from 1910 through 1919 and writing much of his own material. Of his many musical compositions, "Nobody" (1905), with its wry, fatalistic lyric, is probably the best example of his work. *Nobody,* a biography by Ann Charters, appeared in 1970.

Williams, Betty, byname of ELIZABETH WILLIAMS (b. May 22, 1943, Belfast, N.Ire.), Northern Irish peace activist who, with Mairéad Corrigan, founded the Community for Peace People in 1976 and with her shared the 1976 Nobel Prize for Peace.

Williams, an office worker and wife and mother, took little part in public life until August 1976, when she witnessed an incident that moved her to speak out. An Irish Republican Army terrorist was shot by British troops while fleeing in a car; the car went out of control and struck several people, killing three children. Williams immediately began circulating petitions in Protestant neighbourhoods calling for an end to sectarian violence. This activity soon brought her into association with Mairéad Corrigan, an aunt of the slain children, who had been similarly galvanized into action. Together they founded the Community for Peace People to provide services for victims of the Northern Ireland conflict.

In 1978 Williams and Corrigan resigned their positions of leadership in the Community and by 1980 had become estranged. In 1982 Williams married and moved to Florida, U.S.

Williams, Daniel Hale (b. Jan. 18, 1858, Hollidaysburg, Pa.—d. Aug. 4, 1931, Idlewild, Mich.), American physician and founder of Provident Hospital in Chicago, credited with the first successful heart surgery.

Williams graduated from Chicago Medical College in 1883. He served as surgeon for the South Side Dispensary (1884–92) and physician for the Protestant Orphan Asylum (1884–93). In response to the lack of opportunity for blacks in the medical professions, he founded (1891) the nation's first interracial hospital, Provident, to provide training for black interns and the first school for black nurses in the United States. He was a surgeon at Provident (1892–93, 1898–1912) and surgeon in chief of Freedmen's Hospital, Washington, D.C. (1894–98), where he established another school for black nurses.

It was at Provident Hospital that Williams performed daring heart surgery on July 10, 1893. Although contemporary medical opinion disapproved of surgical treatment of heart wounds, Williams opened the patient's thoracic cavity without aid of blood transfusions or modern anesthetics and antibiotics. During the surgery he examined the heart, sutured a wound of the pericardium (the sac surrounding the heart), and closed the chest. The patient lived at least 20 years following the surgery. Williams' procedure is cited as the first recorded repair of the pericardium; some sources, however, cite a similar operation performed by H.C. Dalton of St. Louis in 1891.

Williams later served on the staffs of Cook County Hospital (1903–09) and St. Luke's Hospital (1912–31), both in Chicago. From 1899 he was professor of clinical surgery at Meharry Medical College in Nashville, Tenn., and he was a member of the Illinois State Board of Health (1889–91). He published several articles on surgery in medical journals. Williams became the only black charter member of the American College of Surgeons in 1913.

Williams, Emlyn, in full GEORGE EMLYN WILLIAMS (b. Nov. 26, 1905, Mostyn, Flintshire, Wales—d. Sept. 25, 1987, London, Eng.), Welsh actor and playwright, author of some highly effective, often macabre plays.

Williams was educated in Geneva and at Christ Church, Oxford. In the 1930s and '40s he wrote some immensely successful plays, which contained starring parts for himself. The best-known of these was *Night Must Fall* (performed 1935), in which he played the baby-faced killer, Danny, and which was later made into two film adaptations. Williams' other plays include *A Murder Has Been Arranged* (1930), *The Corn Is Green* (1938), also made into a film (1945), and *The Druid's Rest* (1944). He acted in many films and was also renowned for his public readings from the works of Charles Dickens, Dylan Thomas, and Saki. He wrote two volumes of autobiography, *George* (1961) and *Emlyn* (1973). His *Beyond Belief* (1967) and *Headlong* (1980) are adventure novels.

Williams, Eric, in full ERIC EUSTACE WILLIAMS (b. Sept. 25, 1911, Port of Spain, Trinidad—d. March 29, 1981, St. Ann's, near Port of Spain), first and longtime prime minister of independent Trinidad and Tobago (1962–81), who founded (1956) the People's National Movement (PNM) and led his country to independence.

Williams was educated at Queen's Royal College, Port of Spain, and at the University of Oxford, from which he received a B.A. in 1932 and a D.Phil. in 1938, with studies in history and political science. In 1939 he went to the United States and joined the faculty of social and political science at Howard University. While he was at Howard, Williams became associated with the Caribbean Commission that was established by the United States, Great Britain, France, and The Netherlands in an effort to coordinate the economic development of the Caribbean area. His aggressive, commanding role in the commission, however, tended to alienate the national powers, especially the United States, and in 1955–56 he organized the PNM party, which won the 1956 general elections. He became chief minister in the country's first party government, and, with the achievement of internal self-government in 1959, he served as premier. The PNM won the December 1961 elections by a landslide. Williams became prime minister of the colony and then of the new republic upon its achieving independence in August 1962. He made the country a republic in 1976.

As prime minister, Williams practiced what was called "pragmatic socialism," which stressed social services, improved education, and economic development through the cautious attraction of foreign investment capital. The policy was fruitful in making Trinidad and Tobago the wealthiest Commonwealth Caribbean nation. He was successively reelected and served as prime minister until his death.

Williams was the author of a number of books, among which were *The Negro in the Caribbean* (1942), *Capitalism and Slavery* (1944), *History of the People of Trinidad and Tobago* (1962), *British Historians and the West Indies* (1964), *Inward Hunger: The Education of a Prime Minister* (1969), and *From Columbus to Castro: The History of the Caribbean, 1492–1969* (1970).

Williams, Sir Frederic (Calland) (b. June 26, 1911, Stockport, Cheshire, Eng.—d. Aug. 11, 1977, Manchester), British electrical engineer who invented the Williams tube store, a cathode-ray-tube memory system that heralded the beginning of the computer age.

Educated at the University of Manchester and at Magdalen College, Oxford, Williams in 1939 joined the staff of the Bawdsey Research Station, University of Manchester, where he developed the first practical system of radar identification of friendly aircraft. His system was the forerunner of modern systems using intricate codes and varying radar frequencies. In the early 1940s he perfected the first fully automatic radar for use in fighter aircraft. In 1946 he invented the Williams tube. Although superseded by the magnetic-core memory, the Williams tube was used in first-generation digital computers throughout the world. Shortly thereafter he became professor of electrical engineering at the University of Manchester, where he developed his memory system further and applied it to early computers. He was knighted in 1976.

Williams, George Kofi Awoonor: *see* Awoonor, Kofi.

Williams, George Washington (b. Oct. 16, 1849, Bedford Springs, Pa., U.S.—d. Aug. 2, 1891, Blackpool, Eng.), American historian, clergyman, politician, lawyer, lecturer, and soldier who was the first person to write an objective and scientifically researched history of black people in the United States.

The son of a laborer, Williams enlisted at age 14 in the Union Army and fought in the Civil War. Upon leaving the army in 1868, he underwent training as a minister at the Newton Theological Institution and was ordained in 1874. In the following years he served as pastor of several churches, edited and published several short-lived journals, and served in the Ohio House of Representatives from 1879 to 1881. By this time he had become interested in the study of history, and after doing copious research he had his *History of the Negro Race in America from 1619 to 1880* published in 1882. There had been several previous works written on this subject by black historians, but Williams' work was the first relatively objective account that strove for historical accuracy rather than functioning as a work of black apologetics or propaganda. Williams' research for his next work, *A History of the Negro Troops in the War of the Rebellion* (1888), involved the gathering of oral histories from black Civil War veterans and the culling of newspaper accounts, both techniques which subsequently became basic resources in American historiography.

During the 1880s Williams worked on his books, practiced law, and gave lectures. In 1889 he became interested in the prospect of employing black Americans in the Congo Free State under the auspices of the Belgian king Leopold. But a visit to the Congo in 1890 shocked him into a realization of Leopold's brutal exploitation of the people of the Congo, and Williams spent the short remainder of his life publicizing the outrages that were being perpetrated there.

Williams, Hank, byname of HIRAM KING WILLIAMS (b. Sept. 17, 1923, Georgiana, Ala., U.S.—d. Jan. 1, 1953, Oak Hill, W.Va.), American singer and guitarist, a leading figure in country and western music who was also successful in the popular music market.

Williams began playing the guitar at the age of 8, made his radio debut at 13, and formed his first band, Hank Williams and his Drifting Cowboys, at age 14. His series of recordings in 1947 on the M-G-M label won for him national, then international, fame. His "Lovesick Blues" recording in 1949 was a smash hit, and he joined the Grand Ole Opry in Nashville that year. Among his best-selling recordings were "Cold, Cold Heart," "Your Cheatin' Heart," and "Hey, Good Lookin'." His death of an apparent heart attack may have been the result of drug and alcohol abuse. His son Hank Williams, Jr., sang his songs in a film biography, *Your Cheatin' Heart* (1964).

Williams, Jody (b. Oct. 9, 1950, Putney, Vt., U.S.), American activist who helped found the International Campaign to Ban Landmines (ICBL). In 1997 she and the coalition were named corecipients of the Noble Prize for Peace.

In 1984 Williams received a master's degree from Johns Hopkins School of Advanced International Studies in Washington, D.C. She was a co-coordinator of the Nicaragua-Honduras Education Project (1984–86) and deputy director of Medical Aid for El Salvador (1986–92). These interests brought her in contact with the Vietnam Veterans of America Foundation, which, along with five other organizations, helped to launch the ICBL in 1992, with Williams as the founding coordinator. Some 1,000 nongovernmental organizations from more than 60 nations soon joined the coalition, and their work led to the creation of the Mine Ban Treaty in December 1997.

Williams lectured widely on the dangers of land mines, publicizing the presence of tens of millions of unexploded antipersonnel mines in more than 70 nations, as well as a minefield casualty rate of 18,000 people a year, primarily civilians. In the early 21st century about 130 nations had ratified the Mine Ban Treaty, not including major mine-producing nations such as the United States, Russia, and China.

Williams is coauthor, with Shawn Roberts, of *After the Guns Fall Silent: The Enduring Legacy of Landmines* (1995), which examines the socioeconomic impact of land mine contamination in four nations.

Williams, Ralph Vaughan: *see* Vaughan Williams, Ralph.

Williams, Roger (b. 1603?, London, Eng.—d. Jan. 27/March 15, 1683, Providence, R.I.), English colonist in New England, founder of the colony of Rhode Island and pioneer of religious liberty.

The son of a merchant tailor, he was a protégé of the jurist Sir Edward Coke and was educated at Cambridge. In 1630 he left his post as chaplain to Sir William Masham, which had brought him into contact with such politically active Puritans as Oliver Cromwell and Thomas Hooker, to pursue his by-then completely Nonconformist religious ideals in New England.

Arriving in Boston in 1631, Williams refused to associate himself with the Anglican Puritans and in the following year moved to the separatist Plymouth Colony. In 1633 he was back in Salem after a disagreement with Plymouth in which he insisted that the king's patent was invalid and that only direct purchase from the Indians gave a just title to the land.

Invited by the church at Salem to become pastor in 1634, Williams was banished from Massachusetts Bay by the civil authorities for his dangerous views: besides those on land rights, he held that magistrates had no right to interfere in matters of religion. Consequently, in January 1636 Williams set out for Narragansett Bay, and in the spring, on land purchased from the Narragansett Indians, he founded the town of Providence and the colony of Rhode Island. Providence became a haven for Anabaptists, Quakers, and others whose beliefs were denied public expression. Williams was briefly an Anabaptist but in 1639 declared himself a Seeker. He remained a steadfast believer in Calvinist theology. Williams went to England in 1643 to obtain a charter for Rhode Island and again in 1651–54

to have it confirmed, during which visit he befriended the poet John Milton. He was the first president of Rhode Island under its charter and until his death always held some public office. He was of constant service to Rhode Island and neighbouring colonies as a peacemaker with the Narragansett Indians, whose language he knew and whose trust he had earned, although he helped defend Rhode Island against them during King Philip's War (1675–76).

Williams was a vigorous controversialist and a prolific writer. His greatest work was *The Bloudy Tenent of Persecution* (1644).

Williams, Rowan, in full ROWAN DOUGLAS WILLIAMS (b. June 14, 1950, Swansea, Wales), 104th archbishop of Canterbury (from 2002), a noted theologian, archbishop of the Church in Wales (2000–02), and the first archbishop of Canterbury in modern times chosen from outside the Church of England.

Williams entered Christ's College, Cambridge, where he earned bachelor's and master's degrees in theology; he was awarded a doctorate of philosophy in theology by Wadham College, Oxford, in 1975. He became bishop of Monmouth in 1992 and was enthroned as archbishop of Wales in 2000. His nomination as archbishop of Canterbury in 2002 generated significant controversy because of his liberal views on homosexuality and other matters. Williams criticized the Iraq war (the Second Persian Gulf War) in 2003.

Upon assuming office, Williams faced numerous challenges. He sought to improve relations between Christians and Muslims, and he strove to maintain good ties with the Roman Catholic church, meeting with Pope John Paul II in Rome. Within his own church, the ordination and consecration of homosexuals threatened to divide the Anglican Communion (the association of Anglican churches).

A fellow of the British Academy since 1990, he is the author of *Arius: Heresy and Tradition* (2002) and *Writing in the Dust: After September 11* (2002).

Williams, Ted, byname of THEODORE SAMUEL WILLIAMS (b. Aug. 30, 1918, San Diego, Calif., U.S.—d. July 5, 2002, Inverness, Fla.), American professional baseball player who compiled a lifetime batting average of .344 as a left-handed hitting outfielder with the Boston Red Sox from 1939 until his retirement in 1960. He twice won the Triple Crown (best batting average, most home runs, and most runs batted in during a single season). He also hit a total of 521 home runs, although he lost five years of his career to service as a flyer in World War II and the Korean War. He was elected to the Baseball Hall of Fame in 1966. He was the last of the .400 hitters in the 20th century (.406 in 1941).

Williams returned to the major leagues in 1969 to manage the Washington Senators. In his first year he was named American League Manager of the Year, but he left the franchise in 1972, after it had become the Texas Rangers. After his retirement as a manager, he occasionally worked as a batting coach and became a consultant for a line of fishing equipment. His autobiography, written with John Underwood, *My Turn at Bat,* was published in 1969 and *The Science of Batting* in 1971.

Williams, Tennessee, original name THOMAS LANIER WILLIAMS (b. March 26, 1911, Columbus, Miss., U.S.—d. Feb. 25, 1983, New York City), U.S. dramatist whose plays reveal a world of human frustration in which sex and violence underlie an atmosphere of romantic gentility.

Williams became interested in playwriting while at the University of Missouri (Columbia) and Washington University (St. Louis) and worked at it during the Depression while employed in a shoe factory. Little theatre groups produced some of his work, encouraging him



Tennessee Williams
By courtesy of New Directions; photograph, Angus McBean

to study dramatic writing at the University of Iowa, where he earned a B.A. in 1938.

His first recognition came when *American Blues* (1939), a group of one-act plays, won a Group Theatre award. Williams, however, continued to work at jobs ranging from theatre usher to Hollywood scriptwriter until success came with *The Glass Menagerie* (1944). In it, Williams portrayed a declassed Southern family living in a tenement. The play is about the failure of a domineering mother, Amanda, living upon her delusions of a romantic past, and her cynical son, Tom, to secure a suitor for Tom's crippled and painfully shy sister, Laura, who lives in a fantasy world with a collection of glass animals.

Williams' next major play, *A Streetcar Named Desire* (1947), won a Pulitzer Prize. It is a study of the mental and moral ruin of Blanche Du Bois, another former Southern belle, whose genteel pretensions are no match for the harsh realities symbolized by her brutish brother-in-law, Stanley Kowalski.

In 1953, *Camino Real,* a complex and bizarre work set in a mythical, microcosmic town whose inhabitants include Lord Byron and Don Quixote, was a commercial failure, but his *Cat on a Hot Tin Roof* (1955), which exposes the emotional lies governing relationships in the family of a wealthy Southern planter, was awarded a Pulitzer Prize and was successfully filmed, as was *The Night of the Iguana* (1961), the story of a defrocked minister turned sleazy tour guide, who finds God in a cheap Mexican hotel. *Suddenly Last Summer* (1958) deals with lobotomy, pederasty, and cannibalism, and in *Sweet Bird of Youth* (1959), the gigolo hero is castrated for having infected a Southern politician's daughter with venereal disease.

Williams was in ill-health during the 1960s, compounded by years of addiction to sleeping pills and liquor, problems that he struggled to overcome after a severe mental and physical breakdown in 1969. His later plays were unsuccessful, closing soon to poor reviews. They include *Vieux Carré* (1977), about down-and-outs in New Orleans; *A Lovely Sunday for Crève Coeur* (1978–79), about a fading belle in St. Louis during the Great Depression; and *Clothes for a Summer Hotel* (1980), centring on Zelda Fitzgerald, wife of novelist F. Scott Fitzgerald, and on the people they knew.

Williams also wrote two novels, *The Roman Spring of Mrs. Stone* (1950) and *Moise and the World of Reason* (1975), essays, poetry, film scripts, short stories, and an autobiography, *Memoirs* (1975). His works won four Drama Critics' awards and were widely translated and performed around the world.

Williams, Venus; and Williams, Serena (respectively, b. June 17, 1980, Lynwood, Calif., U.S.; b. Sept. 26, 1981, Saginaw, Mich., U.S.), American tennis players and sisters who, from 1999 to 2002, collected eight grand-slam singles titles, five doubles titles, and three Olympic gold medals.

The Williams sisters were introduced to the sport on the public courts in Los Angeles by their father, who early recognized their talent and oversaw their development. Venus turned professional in 1994, and Serena followed suit a year later. Possessing powerful serves and ground strokes and superb athleticism, the sisters were soon dominating women's professional tennis. Serena won the U.S. Open in 1999. Venus won Wimbledon and the U.S. Open in 2000 and 2001. At the 2000 Sydney Olympics Venus captured the gold medal in the singles competition and claimed a second one with Serena in the doubles event. In 2002 Serena won the French and U.S. opens and Wimbledon, defeating Venus in the finals of each tournament.

Williams, William, also called WILLIAMS PANTYCELYN (b. 1717, Cefn Coed, Llanfair-ar-y-bryn, Carmarthenshire, Wales—d. Jan. 11, 1791, Pantycelyn), leader of the Methodist revival in Wales and its chief hymn writer.

His parents were Nonconformists, and he was educated at a Nonconformist academy. While there he was converted by the preaching of the religious reformer Howell Harris (1714–73) and in 1740 was ordained deacon; he became a curate, but because of his Methodist affinities he was finally refused priestly orders in 1743. Although he still considered himself an Anglican clergyman, he spent the rest of his life in evangelistic tours as a Methodist preacher and in writing hymns, religious poems, and prose treatises. After his marriage (*c.* 1748) he lived at Pantycelyn and became known as "Williams Pantycelyn."

Williams has been called the first Welsh Romantic poet. In more than 800 hymns, published in booklets between 1744 and 1787, and in an "epic" poem, *Bywyd a Marwolaeth Theomemphus,* he interpreted the religious experience of the Methodist movement with sensitivity and intense feeling. Earlier Welsh poetic tradition was almost unknown to him, and his bare metre, sincerity of language, mystical reflection, and spiritual longing were new to Welsh poetry. Many of his prose works and pamphlets complement his hymns, but he was aware of contemporary secular studies in English, and some of his books were written to educate the Welsh in their own tongue and for his own use in teaching them to read. In *Pantheologia* (1762–*c.* 1799) he attempted a history of world religions. Many of his hymns remain in regular use, the best known in English being "Guide me, O Thou Great Jehovah," in a considerably altered version.

Williams, William Carlos (b. Sept. 17, 1883, Rutherford, N.J., U.S.—d. March 4, 1963, Rutherford), U.S. poet who succeeded in making the ordinary appear extraordinary through the clarity and discreteness of his imagery.



William Carlos Williams
By courtesy of the New Jersey State Library, Trenton

After receiving an M.D. from the University of Pennsylvania in 1906 and after internship in New York and graduate study in pediatrics in Leipzig, he returned in 1910 to a lifetime of poetry and medical practice in his hometown.

In *Al Que Quiere!* (1917; "To Him Who

Wants It!") his style was distinctly his own. Characteristic poems that proffer Williams' fresh, direct impression of the sensual world are the frequently anthologized "Lighthearted William," "By the Road to the Contagious Hospital," and "Red Wheelbarrow."

In the 1930s during the Depression, his images became less a celebration of the world and more a catalog of its wrongs. Such poems as "Proletarian Portrait" and "The Yachts" reveal his skill in conveying attitudes by presentation rather than explanation.

In *Paterson* (5 vol., 1946–58), Williams expressed the idea of the city, which in its complexity also represents man in his complexity. The poem is based on the industrial city in New Jersey on the Passaic River and evokes a complex vision of America and modern man.

A prolific writer of prose, Williams' *In the American Grain* (1925) analyzed the American character and culture through essays on historical figures. Three novels form a trilogy about a family—*White Mule* (1937), *In the Money* (1940), and *The Build-Up* (1952). Among his notable short stories are "Jean Beicke," "A Face of Stone," and "The Farmers' Daughters." His play *A Dream of Love* (published 1948) was produced in off-Broadway and academic theatres. Williams' *Autobiography* appeared in 1951, and in 1963 he was posthumously awarded the Pulitzer Prize in poetry for his *Pictures from Brueghel, and Other Poems* (1962). *William Carlos Williams*, by the poet Reed Whittemore, was published in 1975.

Williams College, private coeducational institution of higher learning founded in 1793 at Williamstown, Mass. Like many other New England colleges, Williams was established by the Congregational church, but it is now nondenominational. It offers undergraduate liberal arts and graduate programs in fine and applied arts and social sciences. There are special accelerated and honours programs, as well as opportunities for independent study and study abroad. Cross-registration arrangements are maintained with Massachusetts College of Liberal Arts and Bennington College.

Williamsburg, historic city, seat, but administratively independent, of James City county, southeastern Virginia, U.S., on a tidewater peninsula between the James and York rivers 28 mi (45 km) northwest of Newport News.

First settled in 1633 as Middle Plantation, it originally stood within a 6-mi (10-km) stockade and served as a refuge from attacks by Powhatan Indians. The College of William and Mary, second oldest (after Harvard University) in the United States, was founded there in 1693. In 1699, after the burning of nearby Jamestown, the city became the capital of Virginia and was renamed to honour William III. It subsequently became the political, social, and cultural centre of the colony. There Virginia's first theatre was organized (1716), first successful printing press set up (1730), first newspaper published (1736), and first paper mill established (1744). In the Capitol, Patrick Henry presented his historic speech against the Stamp Act (1765), and on May 15, 1776, the Virginia Convention passed resolutions urging the Continental Congress to declare for independence. Williamsburg declined in importance after the state government was moved to Richmond in 1780. Confederate forces were defeated at the Battle of Williamsburg in 1862.



The restored Capitol, Williamsburg, Va.
Arthur Griffin—EB Inc.

Colonial Williamsburg, a restoration of a large section of the early colonial area, was begun in 1926, when the Rev. William A.R. Goodwin, rector of Bruton Parish Church (1705–11; restored 1905–07), originated the idea and interested John D. Rockefeller, Jr., in sponsoring the project. The historic area is currently about a mile (2 km) long and a half mile (1 km) wide; more than 500 buildings have been restored or reconstructed. The exhibition buildings—which include the Capitol, Governor's Palace and Gardens, and Raleigh Tavern—are furnished as they were in the 18th century, and the entire area is landscaped as it was in colonial times. Hostesses, craftsmen, militiamen, and attendants costumed in the style of the period give a flavour of living history. Part of the city is included in the Colonial National Historical Park. Williamsburg's economy depends on services to Eastern State Hospital (founded 1773), the College of William and Mary, and tourism. Inc. city, 1722. Pop. (2003 est.) 11,605.

Williamson, Alexander William (b. May 1, 1824, London, Eng.—d. May 6, 1904, Hindhead, Surrey), English chemist whose research on alcohols and ethers clarified organic molecular structure.

From 1849 to 1887 Williamson served on the faculty of University College, London. In 1850 he discovered the structural relation between ethers and alcohols: in ethers the oxygen atom links two hydrocarbon groups, whereas in alcohols the oxygen is bonded to a hydrocarbon group and a hydrogen atom. In further studies, Williamson created an understanding of reversible reactions. He also was the first to explain the state of dynamic equilibrium, in which two opposing reactions have equal rates, resulting in no net change in concentration for any of the reactants.

In 1854 Williamson described the process of making ether from alcohol and revealed why an acid is needed as a catalyst. This was the first time that catalytic action was clearly explained. He was responsible for the Williamson synthesis of mixed ethers (ethers that contain two different hydrocarbon groupings).

Williamson, Henry (b. Dec. 1, 1895, Bedfordshire, Eng.—d. Aug. 13, 1977, Berkshire), English novelist who is known for his sensitive but unsentimental handling of nature themes.

After World War I service, Williamson became a journalist in London, but he disliked city life and moved to England's West Country. He tried farming and ultimately settled at Georgeham, in Devon. He first came to notice as a writer with four novels written between 1921 and 1928 and published under the title of *The Flax of Dream* (1936). *Tarka the Otter* (1927) established his reputation and was awarded the Hawthornden Prize in 1928. Its nonhuman hero was presented without the mawkish sentiment that mars many "animal" stories. Williamson later produced another ambitious series of novels under the general title of *A Chronicle of Ancient Sunlight* (1951–69).

Williamson, Sonny Boy, byname of JOHN LEE WILLIAMSON (b. March 30, 1914, Jackson, Tenn., U.S.—d. June 1, 1948, Chicago, Ill.), American blues vocalist and the first influential harmonica virtuoso, a self-taught player who developed several technical innovations on his instrument.

Williamson traveled through Tennessee and Arkansas with mandolinist Yank Rachell and guitarist John Estes, working in bars, on the streets, and at parties from the late 1920s until he settled in Chicago in 1934. He began recording in 1937, using small bands composed of a guitar, string bass, and sometimes a piano. Characteristically, he alternated vocal phrases with harmonica phrases, built melodic solo choruses, and preferred fast "jump" tempos. Every aspect of his style, including his slight speech impediment, has been imitated.

Working in Chicago blues clubs, Williamson prefigured the post-World War II electric blues; he performed with Muddy Waters, an adherent of electronic amplification, in 1943. At the height of his popularity, Williamson was robbed and murdered while walking home from a blues bar. Alex ("Rice") Miller, also a blues singer and harmonica player, took Sonny Boy Williamson's name, insisting that he had invented it, and performed, toured, and recorded under it until his death in 1965.

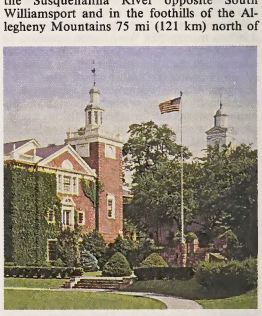
Williamson, William Crawford (b. Nov. 24, 1816, Scarborough, Yorkshire, Eng.—d. June 23, 1895, London), English naturalist, a founder of modern paleobotany.

Apprenticed to an apothecary in 1832, Williamson, during his spare time, studied natural history and wrote several outstanding papers on fossils. In 1835 he was appointed curator of the museum of the Manchester Natural History Society. He left the museum to complete his medical training at University College, London, and then returned to Manchester, where he established his practice.

In 1845 Williamson initiated the study of deep-sea deposits when he wrote a paper on the microscopic organisms found in the mud of the eastern Mediterranean region. Between 1840 and 1850 he introduced a new technique for the study of marine protozoans (Foraminifera) and demonstrated plantlike characteristics of *Volvox,* which is a colonial protozoan. Six years later he was appointed professor of natural history, anatomy, and physiology at Owens College in Manchester. In 1880 he became professor of botany there, a position he held until 1892.

As a founder of paleobotany, Williamson demonstrated that certain fossils containing secondary wood (then considered a characteristic of the phanerogams, or seed plants and flowering plants) were really cryptogams (or lower plants without seeds or flowers, such as algae, ferns, and mosses). Williamson published this controversial material in the first of 19 memoirs gathered under the title *On the Organization of the Fossil Plants of the Coal Measures* (1872–94).

Williamsport, city, seat (1796) of Lycoming county, north-central Pennsylvania, U.S., on the Susquehanna River opposite South Williamsport and in the foothills of the Allegheny Mountains 75 mi (121 km) north of



Clarke Chapel, Lycoming College, Williamsport, Pa.
P. Vannucci—Shostal/EB Inc.

Harrisburg. Founded in 1795, it was supposedly named for William Russell, who had a boat landing on the river. It became a centre for lumbering in the 1860s. The "Sawdust War" erupted (1872) as workers sought a 10-hour day. The militia put it down. As the timber supply diminished, the economy diversified, eventually including metal and leather products, furniture, and textiles. The seat of Lycoming College (1812) and Williamsport Area Community College (1920), Williamsport is the site of Little League Baseball International Headquarters, the World Series being held there annually (in August) in the World Series Little League Stadium. Inc. borough, 1806; city, 1866. Pop. (1990) city, 31,933; Williamsport MSA, 118,710.

Williamstown, town (township), Berkshire County, northwestern Massachusetts, U.S., on the Hoosic River, 18 mi (29 km) north of Pittsfield. Settled as West Hoosac in 1749, it was incorporated in 1765 and renamed for Col. Ephraim Williams, killed in the French and Indian Wars, who had bequeathed money in his will to establish a "free school" there provided the town bear his name. The school was eventually founded in 1790 and was chartered as Williams College in 1793. Prominent graduates include the poet William Cullen Bryant (who is said to have written his "Thanatopsis" while a student there) and Pres. James A. Garfield. Notable campus buildings include the Gothic Chapel, the Chapin Library (with rare-book displays) and Lawrence Hall (housing an art museum). Haystack Monument in Mission Park claims to mark the birthplace of American foreign missions (it commemorates a prayer meeting there in 1806 [for the establishment of overseas missions] by a student group who sought shelter in a haystack during a sudden rainstorm). The town's Sterling and Francis Clark Art Institute has a notable collection of French Impressionists, old silverware, and sculpture. The town's life centres around the college; its economy is supplemented by a few light industries (including wire making) and tourism, attracted by the Williamstown Summer Theater and the Berkshire Hills resort area (nearby Taconic Trail and Clarksburg state parks and Mt. Greylock State Reservation). Pop. (1990) 8,220.

Willibrord, SAINT, also called WILLIBRORD OF UTRECHT, Willibrord also spelled WILBRORD (b. 658? Northumbria, probably near York, Eng.—d. Nov. 7, 739, Echternach, Austrasia; feast day November 7), Anglo-Saxon bishop and missionary, apostle of Frieseland, and patron saint of Holland.

The son of the hermit St. Wilgis, Willibrord was sent by him to the Benedictine monastery of Ripon, Eng., under Abbot St. Wilfrid of York. After Wilfrid was deposed and exiled in 677/678, Willibrord also went into exile, spending 12 years in Ireland, where he became a disciple of St. Egbert. He was ordained priest in 688.

In 690 Egbert sent Willibrord with 11 companions to undertake the Christianization of the Frisians, whose districts had recently been conquered (689) by Pepin II the Young. Willibrord began the policy of mutual cooperation between the English missions and the Carolingian dynasty. He went to Rome in 690 for a commission from Pope St. Sergius I and was later sent again by Pepin for his consecration (Nov. 21, 695) as archbishop of the Frisians, with a see to be established at Utrecht, Neth. On that occasion, Sergius renamed him Clement. Willibrord's unusual respect for Roman authority had established a precedent that greatly increased papal influence in the affairs of the Frankish Church.

In 698 Willibrord established his second missionary base, the important monastery of Echternach. Having extended his apostolate into Friesland, he attempted to evangelize Denmark, where he instructed and baptized 30 boys; returning with them, he made dramatic stops on the Frisian islands of Heligoland and Walcheren. In 714 he baptized Pepin III the Short, heir to the Merovingian kingdom. Upon the death of Pepin II, the pagan Frisian king Radbod launched a highly destructive campaign against the Christians and banished Willibrord.

After Radbod's death in 719, Willibrord, with the aid of the Frankish king Charles Martel, regained his apostolate. From 719 to 722, he was assisted in his missionary work by the man who carried on his work after 739, Wynfrith (St. Boniface), apostle of Germany. While training a native clergy, he established in the Frankish kingdoms an English cultural influence that was to dominate Charlemagne's court through the extensive labours of later missionaries. He began in the West the appointment of *chorepiscopoi* ("country bishops"), or suffragan bishops (*i.e.,* bishops of sees under an archbishop, or metropolitan), and he introduced into the Franks' dominions the practice of dating by the Christian Era.

Willibrord was buried in the abbey church of Echternach. The "Calendar of St. Willibrord" (a calendar of saints, with some lines attributed to Willibrord) was printed in facsimile in 1918. A. Grieve's *Willibrod, Missionary in the Netherlands 691–739,* appeared in 1923, followed by G.H. Verbist's *Saint Willibrod: Apôtre des Pays-Bas et fondateur d'Echternach* ("St. Willibrord; Apostle of the Low Countries and Founder of Echternach") in 1939, and by C. Wampach's *Sankt Willibrord* in 1953.

Willimantic, city and principal community in the town (township) of Windham, Windham County, east central Connecticut, U.S., at the junction of the Willimantic and Natchaug rivers. Known as "Thread City," it is the home of the American Thread Company, established in 1854, the first company in the United States to make acceptable cotton thread. The site was settled *c.* 1686 and developed because of the availability of waterpower for gristmills and sawmills. Eastern Connecticut State College was opened in 1889 as a state normal school. Inc. borough, 1833; city, 1893. Pop. (1990) 14,746.

Willingboro, residential township, Burlington County, New Jersey, U.S., midway between Camden and Trenton on Rancocas Creek in the Delaware Valley. English Quakers settled there about 1677. The community, which originally included what is now Edgewater Park Township, Delanco Township, and Beverly, was called Willingboro (corrupted from Wellingborough, Eng.) in 1682 and was incorporated in 1688. In 1959 the name was changed to Levittown after Levitt & Sons, Inc., a building firm that had participated in community development; in 1963 the name Willingboro was restored. The Little Red Schoolhouse (1866) has a display of artifacts. Pop. (1990) 36,291.

Willis, Bailey (b. May 31, 1857, Idlewild-on-Hudson, N.Y., U.S.—d. Feb. 19, 1949, Palo Alto, Calif.), U.S. geologist known for his structural and geomorphological analysis of the Appalachian Mountains.

Willis was a member of the U.S. Geological Survey from 1884 until 1916, when he became professor of geology at Stanford University, Palo Alto, Calif., where he retired as professor emeritus in 1922. His work included studies of denudation (a form of erosion) chronology in North and South America and Africa, model experiments of folding and deformation, paleogeographic mapping of North America, and theories of the differentiation of the Earth's crust. Willis wrote *The Mechanics of Appalachian Structure; Living Africa; African Plateaus and Rift Valleys; Earthquake Conditions in Chile; Earthquakes in the Holy Land;* and *Geological Map of North America.*

Willis, Henry (b. April 27, 1821, London—d. Feb. 11, 1901, London), British organ builder, a meticulous craftsman and designer whose splendid instruments, though limited and perhaps decadent in comparison with the 18th-century German classical organ, were perfectly suited to the music played in England during his time.

Willis was the son of an organ builder and showed extraordinary inventiveness while still an apprentice. He also learned to play the instrument well and served as a church organist for most of his life; thus, he understood the instrument from a performer's viewpoint. His early instruments, among them a large one for the Crystal Palace of the Great Exhibition (1851), gained him a wide reputation, and thereafter he built or restored perhaps 1,000 church and concert hall instruments, including a number outside England.

Willis' organs may be called "orchestral" in that they made some use of pipe ranks designed to imitate orchestral instruments and were well suited to the organ arrangements of orchestral works then popular in England. But although they were expressive in the Romantic sense, his organs were also well balanced tonally, with an abundance of traditional, characteristic organ voices. Willis' reed stops were particularly renowned, and the specifications for his instruments included rather more of the critical higher pitched stops and mixtures (stops comprising two or more ranks, or sets, of pipes sounding simultaneously) than was common in his time.

Willis' sons, Henry II and Vincent, and his grandchildren carried on the family profession, making notable improvements in tone and mechanism.

Willis, Thomas (b. Jan. 27, 1621, Great Bedwyn, Wiltshire, Eng.—d. Nov. 11, 1675, London), British physicians, leader of the English iatrochemists, who attempted to explain



Thomas Willis, engraving by G. Vertue, 1742, after a portrait by D. Loggan, *c.* 1666
Archiv fur Kunst und Geschichte, Berlin

the workings of the body from current knowledge of chemical interactions; he is known for his careful studies of the nervous system and of various diseases. An Oxford professor of natural philosophy (1660–75), he opened a London practice in 1666 that became the most fashionable and profitable of the period.

In his *Cerebri Anatome, cui accessit Nervorum descriptio et usus* (1664; "Anatomy of the Brain, with a Description of the Nerves and Their Function"), the most complete and accurate account of the nervous system to that time, he rendered the first description of the hexagonal continuity of arteries (the circle of Willis) located at the base of the brain and ensuring that organ a maximum blood supply, and of the 11th cranial nerve, or spinal accessory nerve, responsible for motor stimulation of major neck muscles. Willis also was first to describe myasthenia gravis (1671), a chronic muscular fatigue marked by progressive paral-

ysis, and puerperal (childbed) fever, which he named.

Williston, city, seat of Williams County, northwestern North Dakota, U.S., on the Missouri River. Originally called Little Muddy, it was first settled in the 1870s by Robert Matthews, who cut hay for cavalry horses at Ft. Buford (now restored as a state historic site), southwest of the city. An important factor in the community's growth was the arrival of the Great Northern Railway (1887) and the location there of division headquarters. It was then renamed by James J. Hill, builder and first president of the railway, for a stockholder friend, S. Willis James of New York City. The economy, once heavily dependent on agriculture, has become diversified. The development of oil wells and refineries, following the discovery of oil (1951) in the Williston Basin, has given the economy new impetus. Livestock raising and the growing of grain, especially wheat, are still important, with water from the Garrison Dam project easing the threat of drought, such as that which ravaged the area in the 1930s. The Williston Center of the University of North Dakota was opened in 1957. Fort Union Trading Post National Historic Site is nearby to the west. Inc. village, 1894; city, 1904. Pop. (1990) 13,131.

Articles are alphabetized word by word, not letter by letter

Williston Basin, large sedimentary basin along the eastern edge of the Rocky Mountains in western North Dakota, eastern Montana, and southern Saskatchewan, Can. The basin is characterized by thick sequences of sediments that underlie an area of about 285,000 square kilometres (110,000 square miles), and it is geologically closely related to the Alberta Basin in Canada. It was formed by a gentle downwarping of the land that began in the Middle Ordovician Epoch (478 to 458 million years ago). Rising seas covered the basin at various intervals during the next 400,000,000 years, resulting in the gradual buildup of marine sediments there.

The Williston Basin is an important source of petroleum. Oil is recovered from the basin's deep limestone strata and natural gas from its uppermost layers of sand. Petroleum accumulation in the basin is largely attributable to structural traps produced by the folding and faulting of rock that occurred during the formation of the Rocky Mountains.

Willkie, Wendell L(ewis) (b. Feb. 18, 1892, Elwood, Ind., U.S.—d. Oct. 8, 1944, New York City), U.S. Republican presidential candidate in 1940, who tried unsuccessfully to



Willkie
By courtesy of the National Archives, Washington, D.C.

unseat Pres. Franklin D. Roosevelt. He subsequently became identified with his famous "One World" concept of international cooperation.

Willkie earned his law degree from Indiana University in 1916 and practiced law with his father before entering the U.S. Army during World War I. After the war he entered corporate law practice, moving to New York City in 1929 to work in the legal department of Commonwealth and Southern Corporation; four years later the dynamic lawyer was president of the huge utilities holding company. After 1933 he gained national prominence as leader of the battle of privately owned utilities against competition from the federal government's Tennessee Valley Authority.

Although Willkie had been a Democrat in the early 1930s, he turned Republican a few years later because of what he felt to be unwise government restraints on business enterprise. His effective criticism of Roosevelt's New Deal administration made him a dark horse candidate for the Republican nomination in 1940. Spontaneously, hundreds of grass-roots "Willkie for President" clubs sprang up throughout the country. Despite a late start, limited organization, and opposition from a large segment of party leadership, he was nominated on the sixth ballot. Campaigning until he was hoarse, Willkie stressed the need to create more jobs through policies fostering business expansion and investment—at the same time preserving the best of the New Deal reforms. He also supported aid to the Allies as World War II engulfed Europe. The opposition capitalized on Willkie's Wall Street background and the critical nature of the world situation, however, with the result that he carried only 10 states (82 electoral votes to Roosevelt's 449); nevertheless, his popular vote of more than 22,000,000 was the largest ever received by a Republican to that time.

Willkie went on to stress the need for a "loyal opposition" in a two-party system; he visited England (1941) and the Middle East, the Soviet Union, and China (1942). In 1942 he became chairman of the board of 20th Century-Fox Film Corporation. His book, *One World* (1943), largely an outgrowth of his travels, made a strong plea for postwar cooperation and was influential in turning many Republicans away from isolationism.

Support of Roosevelt's war policies brought considerable opposition to Willkie's renomination in 1944, and after his defeat in the Wisconsin primary, he withdrew from the race. In 1952 Joseph Barnes wrote his biography, *Willkie.*

Willmar, city, seat of Kandiyohi County, southwest central Minnesota, U.S., on Foot and Willmar lakes in the Little Crow lake region. An early settlement (1856) was deserted because of the Sioux uprising of 1862. In 1869 a railhead construction camp was established and named for Leon Willmar, an agent of the St. Paul and Pacific Railroad. It became a railroad division headquarters and a shipping point for grain and livestock. Subsequent development included a large turkey-processing plant and industries ranging from clothing to farm machinery. The city is the site of Willmar Area Vocational-Technical Institute (1962). A state mental hospital is nearby. Inc. village, 1874; city, 1901. Pop. (1990) 17,531.

Willoughby (of Parham), Francis Willoughby, 5th Baron (b. *c.* 1613, England—d. July 1666, at sea between Barbados and St. Kitts), governor of Barbados who in 1651 brought about the settlement of Suriname (then nominally Spanish territory) by immigrants from Caribbean and other South American colonies. Originally a supporter of Parliament in the English Civil War, he joined the Royalist side in 1648 and was appointed governor of Barbados by Charles II in 1650. He left Barbados in 1652, after the colony surrendered to a Cromwellian fleet. After the restoration of the monarchy, he was given joint proprietorship of Suriname with Lawrence Hyde.

willow, shrubs and trees of the genus *Salix,* family Salicaceae, mostly native to north temperate areas, valued for ornament, shade, erosion control, and timber. Salicin, source of salicylic acid used in pain relievers, is derived



Weeping willow (*Salix babylonica*) showing (top) form and (bottom) leaves
(Top) A to Z Botanical Collection—EB Inc., (bottom) Kenneth and Brenda Formanek

from certain willows. All species have alternate, usually narrow leaves and catkins, male and female on separate trees; the seeds have long, silky hairs.

Three of the largest willows are black (*S. nigra*), crack, or brittle (*S. fragilis*), and white (*S. alba*), all reaching 20 metres (65 feet) or more; the first named is North American, the other two Eurasian but naturalized widely. All are common in lowland situations.

Widespread from Mexico to Chile, the Chilean willow (*S. chilensis*) reaches 18 m; the columnar Xochimilco willow (*S. chilensis fastigiata*) is a variety especially common at Xochimilco near Mexico City.

The shrubby common, or silky, osier (*S. viminalis*) supplies twigs used for basketmaking in Europe. Woolly willow (*S. lanata*), of northern Eurasia, to over 1 m, has woolly white leaf buds.

Several species and hybrids with drooping habit are called weeping willows, especially *S. babylonica* and its varieties from East Asia.

From northern Asia, *S. matsudana* has sharply toothed leaves, whitish beneath. One variety, *S. matsudana tortuosa,* is called corkscrew willow for its twisted branches.

Pussy willows, the male form of several shrubby species, have woolly catkins that are considered a harbinger of spring. The catkins are formed before the leaves appear. The North American *S. discolor* is slightly smaller than the Eurasian species, which attain a maximum 7.5 m.

There are numerous shrubby willows common along watercourses (*e.g., S. purpurea* and *S. sericea*) and several range to the tundra, where they grow as small matted woody plants (*e.g., S. arctica* and *S. glacialis*).

willow oak, any of several species of North American ornamental and timber trees belonging to the red oak group of the genus *Quercus,* in the beech family (Fagaceae), which have willowlike leaves.

Specifically, willow oak refers to *Quercus phellos,* native to poorly drained areas of the Atlantic and Gulf coastal plains and the Mississippi Valley region. About 18 metres (60 feet) tall, it has drooping lower branches and slender side branches, with spurlike branchlets similar to those of pin oak. The trunk has an almost conical symmetrical crown; the smooth grayish-black bark becomes roughly ridged on older trees. The pale-green, tapering leaves turn yellow in autumn. Willow oak is widely planted as an ornamental and street tree in the southern United States; it grows quickly and has a shallow root system.

Water oak (*Q. nigra*), laurel oak (*Q. laurifolia*), shingle oak (*Q. imbricaria*), and live oak (*see* live oak) are other willow oaks planted as ornamentals in the southern U.S.

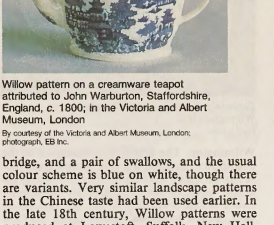
Water oak, also known as possum oak and spotted oak, is a bottomland species of the southeastern U.S. coastal plains, up to about 25 m tall. Its glossy, blue-green leaves vary in shape and size but are usually spoon-shaped or oblong, slightly lobed at the apex. They turn yellow in autumn and persist into winter. The small acorns are set in shallow, scaly or hairy cups.

Laurel oak, sometimes called Darlington, diamond-leaf, or water oak, is a stately tree, up to 18 m tall, found on sandy soils of the Atlantic and Gulf coastal plains. It produces a large annual crop of dark-brown or black, egg-shaped acorns.

Shingle oak, a similar tree with longer and wider leaves, was a source of roofing and siding shingles for the early pioneers; its timber is still used in construction.

Willow Palisade, Wade–Giles romanization LIU-T'IAO PIEN, Pinyin LIUTIAOBIAN, ditch and embankment planted with willows built across part of southeastern Manchuria during the early Ch'ing (1644–1911/12) dynasty. The Chinese (Han) in Manchuria, possibly from as early as 1,000 BC, were localized almost entirely in a triangular area in southern Manchuria centring about the alluvial basin of the lower Liao Ho (river) and the uplands of the Liaotung Peninsula. Willow walls or palisades were built along the western side of this area in southern Manchuria as early as the Ming (1368–1644) dynasty. The Willow Palisade of the Ch'ing dynasty was constructed as a 500-mi (800-km-) long northeastward extension of the Great Wall from Shan-hai-kuan to the Sungari River north of Ch'ang-ch'un, thereby separating the Chinese in southern Manchuria from the Mongol-occupied steppes to the west. The southeastern 300-mi-long portion of the palisade, built eastward from northwest of Shen-yang and then south to where the Yalu River meets Korea Bay, formed the frontier between the Chinese and the Koreans (east) and the Manchu (north). After 1688, Chinese under the Manchu-ruled Ch'ing dynasty were prohibited from crossing the palisade without authorization and from settling in the Manchu homeland.

Willow pattern, landscape design developed by Thomas Turner at Caughley, Shropshire, Eng., in 1779 in imitation of the Chinese. Its classic components are a weeping willow, pagoda-like structures, three men on a quaint



Willow pattern on a creamware teapot attributed to John Warburton, Staffordshire, England, *c.* 1800; in the Victoria and Albert Museum, London

By courtesy of the Victoria and Albert Museum, London; photograph, EB Inc.

bridge, and a pair of swallows, and the usual colour scheme is blue on white, though there are variants. Very similar landscape patterns in the Chinese taste had been used earlier. In the late 18th century, Willow patterns were produced at Lowestoft, Suffolk, New Hall, Staffordshire, and elsewhere. A legend of lovers transformed into swallows associated with the Willow pattern is English, not Chinese. "Nanking" porcelain, often confused with Blue Willow ware, was export ware decorated in blue on white, made at Ching-te-chen and shipped from the port of Nanking; polychromed export porcelain was shipped through Canton.

Wills, Helen (Newington), in full HELEN NEWINGTON WILLS MOODY ROARK (b. Oct. 6, 1905, Centerville, Calif., U.S.—d. Jan. 1, 1998, Carmel, Calif.), outstanding U.S. tennis player who was the top female competitor in the world for eight years (1927–33 and 1935).

Although she did not own her own racket until age 14, Wills won the first of her seven U.S. singles titles just three years later, in 1923, and repeated this feat in 1924, 1925, 1927–29, and 1931. She was known for her seriousness, in part responsible for her rapid climb, and was often referred to as "Little Miss Poker Face." Her powerful overheads and serves made up for her lack of speed.

From 1927 to 1932 she won every set in singles play and took the Wimbledon title eight times (1927–30, 1932–33, 1935, and 1938). In addition to her U.S. and British victories, Wills won (from 1923 through 1939) four French singles titles and 12 U.S., Wimbledon, and French doubles championships. In 10 Wightman Cup tournaments, she won 18 out of 20 singles matches. She was also the gold medalist for women's singles and doubles in the 1924 Olympics in Paris, the only Olympic tennis competition held during her career.

In 1926, before her game had reached its peak, Wills was defeated by five-time Wimbledon champion Suzanne Lenglen of France in their only meeting. Subsequently, she engaged in a bitter rivalry with the great U.S. player Helen Hull Jacobs.

Wills, Maury, byname of MAURICE MORNING WILLS (b. Oct. 2, 1932, Washington, D.C.), U.S. professional baseball player and manager, who set base-stealing records in his playing career.

Wills was a star football quarterback and baseball pitcher for Cardozo High School (Washington, D.C.), and was signed to a contract by the National League Brooklyn (later Los Angeles) Dodgers in 1950. He batted both right- and left-handed and threw right-handed. He played for their minor league teams (1951–59) as a second baseman before he was called up to the parent club in 1959, where he played shortstop until he was traded to the Pittsburgh Pirates (1967–68) and drafted in the expansion of the league by the Montreal Expos (1969). He was traded back to the Dodgers in that year and played with them until his retirement in 1972.

Wills led the league in stolen bases in six seasons (1960–65), establishing a season record of 104 in 1962 (surpassed in 1974 by Lou Brock's 118). After his retirement as a player Wills managed four seasons in the Mexican League during the 1970s, served as base-stealing instructor for five major league clubs in spring training, and did some sports announcing. He was manager of the American League Seattle Mariners (1980–81).

Willstätter, Richard (b. Aug. 13, 1872, Karlsruhe, Baden—d. Aug. 3, 1942, Locarno, Switz.), German chemist whose study of the structure of chlorophyll and other plant pigments won him the 1915 Nobel Prize for Chemistry.

Willstätter obtained his doctorate from the University of Munich (1894) for work on the structure of cocaine. While serving as assistant to Adolf von Baeyer at Munich he continued research into the structure of alkaloids and synthesized several.

In 1905 he was given a professorship at Zürich and began working on chlorophyll. He elucidated its structure and showed that the blood pigment heme bears a structural resemblance to the porphyrin compound found in chlorophyll. He was professor of chemistry in the University of Berlin and director of the Kaiser Wilhelm Institute at Berlin (1912–16), where his investigations revealed the structure of many of the pigments of flowers and fruits. When his work was interrupted by the war, at the behest of Fritz Haber he turned his attention to developing a gas mask.

In 1916 Willstätter succeeded Baeyer at Munich. During the 1920s he investigated the mechanisms of enzyme reactions and did much to establish that enzymes are chemical substances and not biological organisms. His view of enzymes as nonprotein in nature was widely held until disproved in 1930. Being a Jew, in 1924 he resigned his post at Munich in protest against anti-Semitic pressures. He continued his work privately, first in Munich and, from 1939, in Switzerland.

willy-willy, in western Australia, any large, travelling tropical cyclone (*q.v.*).

Wilmette, village, Cook County, northeastern Illinois, U.S., on Lake Michigan, northern residential suburb of Chicago. Laid out in 1869, it was named for Archange Ouilmette, the half-breed Potawatomi Indian wife of Antoine Ouilmette. The U.S. government ceded to her much of the land now within the village boundaries. It is the site of the Baha'i House of Worship (1930), a nine-sided, mosquelike temple that is the centre of the Baha'i faith in North America, and Mallinckrodt College (1918). Inc. 1872. Pop. (1990) 26,690.

Wilmington, largest city in Delaware, U.S., and seat of New Castle County at the influx of the Christina River and Brandywine Creek into the Delaware River. It is the state's industrial, financial, and commercial centre and main port.

The oldest permanent settlement in the Delaware Valley, the site was settled by Swedes in 1638. Called Fort Christina, it was captured by Peter Stuyvesant's Dutch forces in 1655. The Dutch, who named the place Altena, were ousted by the English in 1664. A small agricultural hamlet for its first 100 years, it developed into a prosperous port and market town after the Quakers moved there in the

1730s. The Quakers secured a borough charter from Thomas Penn, the proprietor, who named the town (1739) for his friend Spencer Compton, earl of Wilmington.

By the time of the American Revolution, Wilmington was the largest town in Delaware. Following the Battle of the Brandywine (Sept. 11, 1777), the British captured John McKinly, the state president, in Wilmington and occupied the town. Subsequent growth was due to accessibility to other ports (especially Philadelphia, 25 mi [40 km] northeast), abundance of water power in nearby creeks, and the fertility of nearby farmlands. Sawmills, gristmills, and paper mills were built along the Brandywine, just north of Wilmington, and by the 1790s its flour mills were the largest in the United States. In 1802 a French immigrant, Eleuthère Irénée du Pont de Nemours, established a gunpowder mill, the forerunner of the modern gigantic and diversified Du Pont industries with their experimental laboratories in Wilmington. The city's industrial development was given impetus by the completion (1837) of the Philadelphia, Wilmington, and Baltimore (now Penn Central) Railroad. Besides chemical products, manufactures now include automobiles, leather goods, textiles, iron and steel goods, vulcanized fibre, industrial and domestic hose, and processed foods.



Main exhibit building of the Hagley Museum, Wilmington, Del.
Milt and Joan Mann from CameraMann

Among the city's historic sites and museums are the Fort Christina Monument (by Swedish sculptor Carl Milles), marking the site of the original settlement; Old Swedes Church (Holy Trinity; 1698); Old Town Hall (1798), headquarters of the Historical Society of Delaware; Hagley Museum, occupying the original Du Pont powder mill complex and featuring exhibits dramatizing the industrial history along the Brandywine; Henry Francis du Pont Winterthur Museum, which is a collection of early American interior architecture, furniture, and accessories; and the Delaware Art Museum (opened 1938). Wilmington is the seat of Brandywine College (founded 1966) and Goldey Beacom College (1886). Inc. 1832. Pop. (1990) city, 71,529; Wilmington PMSA, 578,587.

Wilmington, city, seat of New Hanover County, chief seaport of North Carolina, U.S., on Cape Fear River, 30 mi (50 km) above its mouth. Formed in the 1730s from New Liverpool and New Carthage, it was incorporated (1740) as New Town (Newton) and later renamed to honour Spencer Compton, earl of



Greenfield Gardens, a noted beauty spot in Wilmington, N.C.
Frank J. Miller

Wilmington. The first armed resistance to the Stamp Act occurred there in November 1765. A British effort to conquer the colonies by division was frustrated at the Battle of Moore's Creek Bridge (February 1776); the site, 18 mi west, is now a national military park. In 1781 Wilmington was used by the British general, Lord Cornwallis, as his headquarters. During the Civil War it was a centre for blockade-running and was the last Confederate port to close, holding out until the fall of Ft. Fisher (22 mi south) on Jan. 15, 1865. After suffering severe hurricane damage in the 1950s, the city recovered economically with its shipping, truck farming, tourism, and manufacturing (especially textiles, baked goods, chemicals, containers, and refrigeration equipment). A branch of the University of North Carolina (1946), Wilmington College (1947), and Cape Fear Technical Institute (1959) are there. The uss "North Carolina" Battleship Memorial of World War II is moored on the river. Inc. city, 1866. Pop. (1990) city, 55,530; Wilmington MSA, 120,284.

Wilmington, Spencer Compton, earl of, VISCOUNT PEVENSEY, also called (1728–30) BARON WILMINGTON (b. 1673?—d. July 2, 1743), British politician, favourite of King George II and nominal prime minister of Great Britain from February 1742 to July 1743.

Third son of James Spencer, 3rd earl of Northampton, he first entered Parliament in 1698; in 1715 he became speaker of the House of Commons and in 1716 a member of the privy council. In 1730 he was created earl of Wilmington by a king who befriended him and exaggerated his abilities. He became an aging compromise candidate for the prime ministry in 1742, when the real power lay with the Duke of Newcastle and John Carteret (later Earl Granville). Wilmington was deemed mediocre and dull by the public and peers alike and was the frequent target of satirists and caricaturists. He died unmarried at the age of 70, his titles becoming extinct.

Wilmot, Frank Leslie Thompson: *see* Maurice, Furnley.

Wilmot, Henry, BARON WILMOT OF ADDERBURY, 2ND VISCOUNT WILMOT OF ATHLONE: *see* Rochester, Henry Wilmot, 1st earl of.

Wilmot, John: *see* Rochester, John Wilmot, 2nd earl of.

Wilmot Proviso, in U.S. history, important congressional proposal in the 1840s to prohibit the extension of slavery into the territories, a basic plank upon which the Republican Party was subsequently built. Soon after the Mexican War, Pres. James K. Polk asked Congress for $2,000,000 to negotiate peace and settle the boundary with Mexico. In behalf of anti-slavery forces throughout the country, a Democratic congressman from Pennsylvania named David Wilmot offered an amendment (Aug. 8, 1846) to the bill forbidding slavery in the new territory, thus precipitating bitter national debate in an atmosphere of heightening sectional conflict. Despite repeated attempts, the Wilmot Proviso was never passed by both houses of Congress. But out of the attempt by both Democrats and Whigs to subordinate or compromise the slavery issue grew the Republican Party, founded in 1854, which specifically supported the Wilmot principle.

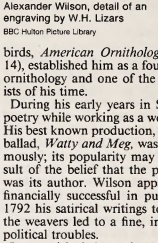
Wilms' tumour: *see* nephroblastoma.

Wilno (Lithuania): *see* Vilnius.

Wilno dispute: *see* Vilnius dispute.

Wilson, city, seat (1855) of Wilson County, east central North Carolina, U.S. A leading market for bright-leaf tobacco, it was incorporated in 1849 and was named for Gen. Louis D. Wilson (1789–1847), who died at Vera Cruz during the Mexican War. Light manufacturing augments its tobacco economy. Wilson is the seat of Atlantic Christian College (founded 1902) and Wilson County Technical Institute (1958). Pop. (1990) 36,930.

Wilson, Alexander (b. July 6, 1766, Paisley, Renfrew, Scot.—d. Aug. 23, 1813, Philadelphia), Scottish-born ornithologist and poet whose pioneering work on North American



Alexander Wilson, detail of an engraving by W.H. Lizars
BBC Hulton Picture Library

birds, *American Ornithology*, 9 vol., (1808–14), established him as a founder of American ornithology and one of the foremost naturalists of his time.

During his early years in Scotland he wrote poetry while working as a weaver and peddler. His best known production, a comic, dramatic ballad, *Watty and Meg*, was published anonymously; its popularity may have been the result of the belief that the poet Robert Burns was its author. Wilson apparently was never financially successful in publishing verse. In 1792 his satirical writings to aid the cause of the weavers led to a fine, imprisonment, and political troubles.

Impoverished, he emigrated in 1794 to the United States, where he became a teacher. Influenced by the naturalist William Bartram, he decided in 1804 to write on North American birds. After studying art and ornithology in his leisure time, he became assistant editor of Rees's *Cyclopedia* and in 1808 published the first volume of *American Ornithology*. He spent much of the remainder of his life selling subscriptions for his expensive work and collecting specimens for the remaining volumes. During his travels he met the U.S. naturalist John J. Audubon, who was then a merchant. Later, the success of Wilson's work encouraged Audubon to continue to paint birdlife and to publish the results of his studies.

Wilson, Sir Angus (Frank Johnstone) (b. Aug. 11, 1913, Bexhill, East Sussex, Eng.—d. May 31, 1991, Bury St. Edmunds, Suffolk, Eng.), British writer whose fiction—sometimes serious, sometimes richly satirical—portrays conflicts in contemporary English social and intellectual life.

Wilson was the youngest of six sons born to an upper-middle-class family who lived a shabby-genteel existence in small hotels and boarding houses, chiefly in London. This unsettled world on the fringe of society is featured in many of his short stories, and he describes it in his autobiographical *Wild Garden* (1963). He was educated at Westminster School, London, and Merton College, Oxford, and then worked as a cataloger at the British Museum Reading Room. His mother died when he was 15 years old, and he and his father developed a close companionship that left an emotional void at the latter's death in 1939. A nervous breakdown while working for the Foreign Office during World War II led him to conclude that he had kept himself in a state of childlike innocence about the world and that it was necessary to become an adult, no matter how painfully. Several of the central characters in his novels and stories are also faced with this problem. He returned to the British Museum after the war, becoming deputy to the superintendent of the Reading Room until he left in 1955 to devote himself to writing. He was professor of English literature at the University of East Anglia (1966–78), becoming emeritus thereafter.

Death Dance: 25 Stories (1969) is a collection of early stories. His first novel, *Hemlock and After* (1952), is regarded by some critics as his best. Before that he had already been noticed by the reading public with the stories collected as *The Living Set* (1949) and *Such Darling Dodos* (1950). *Anglo-Saxon Attitudes* (1956) and *The Old Men at the Zoo* (1961) offer acute pictures of a wide array of characters, chiefly learned or propertied, in British life. *The Middle Age of Mrs. Eliot* (1958) is a psychological portrait. Later novels include *Late Call* (1965), *As If By Magic* (1973), and *Setting the World on Fire* (1980). *The World of Charles Dickens* (1970) and *The Strange Ride of Rudyard Kipling* (1977) are notable biographies. Wilson was knighted in 1980.

Wilson, C(harles) T(homson) R(ees) (b. Feb. 14, 1869, Glencorse, Midlothian, Scot.—d. Nov. 15, 1959, Carlops, Peeblesshire), Scottish physicist, joint recipient, with Arthur H. Compton, of the Nobel Prize for Physics in



C.T.R. Wilson, 1927
By courtesy of the Nobel Foundation, Stockholm

1927 for his invention of a device called the Wilson cloud chamber, widely used in the study of radioactivity, X rays, cosmic rays, and other nuclear phenomena.

Wilson began studying clouds as a meteorologist in 1895. In an effort to duplicate the effects of certain clouds on mountaintops, he devised a way of expanding moist air in a closed container. The expansion cooled the air so that it became supersaturated and moisture condensed on dust particles.

Wilson noted that when he used dust-free air the air remained supersaturated and that clouds did not form until the degree of supersaturation reached a certain critical point. He believed that in the absence of dust the clouds formed by condensing on ions (charged atoms or molecules) in the air. Hearing of the discovery of X rays, he thought that ion formation as a result of such radiation might bring about more intensive cloud formation. He experimented and found that radiation left a trail of condensed water droplets in his cloud chamber. Perfected by 1912, his chamber proved indispensable in the study of nuclear physics and eventually led to the development (by Donald A. Glasser in 1952) of the bubble chamber.

From 1916 Wilson became involved in the study of lightning and in 1925 was appointed Jacksonian professor of natural history at the University of Cambridge. Applying his studies of thunderstorms, he devised a method of protecting British wartime barrage balloons from lightning, and in 1956 he published a theory of thunderstorm electricity.

Wilson, Colin (Henry) (b. June 26, 1931, Leicester, Leicestershire, Eng.), English novelist and writer on philosophy, sociology, music, literature, and the occult.

Wilson left school at age 16. He subsequently worked as a laboratory assistant, civil servant, labourer, dishwasher, and factory worker. For a short while, until discharged on medical grounds, he served in the Royal Air Force (1949–50). He lived in Paris and Strasbourg (1950–51) and was working in a coffee bar while he wrote his first book, *The Outsider* (1956). The book was a study of alienation as glimpsed through the lives and writings of some of the principal intellectual figures of the 20th century. It was at first acclaimed for its brilliance, and this initial critical response catapulted Wilson to fame at the age of 24, in the process making *The Outsider* a best-seller.

By the time Wilson's *Religion and the Rebel* was published in 1957, however, the literary establishment had changed its opinion of his talent, and the new book was dismissed as unoriginal and superficial. This negative criticism dogged Wilson until his first novel, *Ritual in the Dark* (1960), was published. When his second novel, *Adrift in Soho,* appeared in 1961, Wilson was well on his way to repairing his tarnished reputation.

Many of Wilson's books deal with the psychology of crime, the occult, human sexuality, or Wilson's own original form of Existential philosophy. An extremely prolific author, he wrote more than 50 books by the early 1980s. Among his works are *Necessary Doubt* (1964), *The Mind Parasites* (1967), *A Casebook of Murder* (1970), *Starseekers* (1980), *The Quest for Wilhelm Reich* (1981), and *Poltergeist!* (1981).

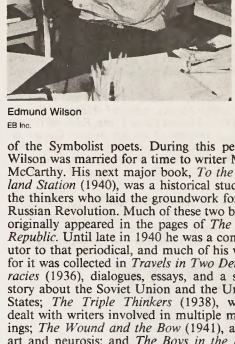
Wilson, (John) Dover (b. July 13, 1881, London, Eng.—d. Jan. 15, 1969, Balerno, Midlothian, Scot.), British Shakespearean scholar and educator.

Educated at the University of Cambridge, Wilson was professor of education at King's College, London (1924–35), and regius professor of English literature at the University of Edinburgh (1935–45). Besides serving as chief editor of the New Cambridge edition of William Shakespeare's plays (from 1921), he was a trustee of Shakespeare's birthplace and also of the National Library of Scotland. Wilson made important if controversial contributions to Shakespearean scholarship by a bold elucidation of textual obscurities and original, stimulating interpretations of the plays. His critical judgments have been variously labeled extreme, faulty, or inspired. His intensive study of Elizabethan handwriting proved helpful in reconstructing Shakespeare's text. His most famous book, *What Happens in Hamlet* (1959), was an original reading of that play, and *The Fortunes of Falstaff* (1943) presented a picture of Falstaff as a force of evil ultimately rejected by the king. His other works include *Life in Shakespeare's England: A Book of Elizabethan Prose* (1911); *The Essential Shakespeare: A Biographical Adventure* (1932); *Shakespeare's Happy Comedies* (1962); and *Shakespeare's Sonnets* (1963).

Consult the INDEX *first*

Wilson, Edmund (b. May 8, 1895, Red Bank, N.J., U.S.—d. June 12, 1972, Talcottville, N.Y.), American critic and essayist recognized as the leading critic of his time.

Educated at Princeton, Wilson moved from newspaper reporting in New York to become managing editor of *Vanity Fair* (1920–21) and associate editor of *The New Republic* (1926–31). Wilson's first critical work, *Axel's Castle* (1931), was an important international survey



Edmund Wilson
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of the Symbolist poets. During this period, Wilson was married for a time to writer Mary McCarthy. His next major book, *To the Finland Station* (1940), was a historical study of the thinkers who laid the groundwork for the Russian Revolution. Much of these two books originally appeared in the pages of *The New Republic.* Until late in 1940 he was a contributor to that periodical, and much of his work for it was collected in *Travels in Two Democracies* (1936), dialogues, essays, and a short story about the Soviet Union and the United States; *The Triple Thinkers* (1938), which dealt with writers involved in multiple meanings; *The Wound and the Bow* (1941), about art and neurosis; and *The Boys in the Back Room* (1941), a discussion of such new American novelists as John Steinbeck and James M. Cain. From 1944 to 1948 Wilson regularly reviewed books for *The New Yorker,* and major articles by him appeared in the magazine until the year of his death, including serialization of *Upstate: Records and Recollections of Northern New York* (1972), a collection from his journals.

After World War II Wilson wrote *The Scrolls from the Dead Sea* (1955), for which he learned to read Hebrew; *Red, Black, Blond and Olive: Studies in Four Civilizations: Zuni, Haiti, Soviet Russia, Israel* (1956); *Apologies to the Iroquois* (1960); *Patriotic Gore* (1962), an analysis of American Civil War literature; and *O Canada: An American's Notes on Canadian Culture* (1965). In this period five volumes of his magazine pieces were collected: *Europe Without Baedeker* (1947), *Classics and Commercials* (1950), *The Shores of Light* (1952), *The American Earthquake* (1958), and *The Bit Between My Teeth* (1965).

In other works Wilson gave evidence of his crotchety character: *A Piece of My Mind: Reflections at Sixty* (1956), *The Cold War and the Income Tax* (1963), and *The Fruits of the MLA* (1968), a lengthy attack on the Modern Language Association's editions of American authors, which he felt buried their subjects in pedantry. His plays are in part collected in *Five Plays* (1954) and in *The Duke of Palermo and Other Plays with an Open Letter to Mike Nichols* (1969). His poems appear in *Notebooks of Night* (1942) and in *Night Thoughts* (1961); an early collection, *Poets, Farewell,* appeared in 1929. *Memoirs of Hecate County* (1946) is a collection of short stories that encountered censorship problems when it first appeared. Wilson edited the posthumous papers and notebooks of his friend F. Scott Fitzgerald, *The Crack-Up* (1945), and also edited the novel *The Last Tycoon* (1941), which Fitzgerald had left uncompleted at his death. Wilson wrote one novel himself, *I Thought of Daisy* (1929). *The Twenties: From Notebooks and Diaries of the Period,* edited by Leon Edel, was published posthumously in 1975. His widow Elena edited *Letters on Literature and Politics 1912–1972* (1977), and his correspondence with Vladimir Nabokov, the novelist, appeared in 1979.

Wilson concerned himself with both literary and social themes and wrote as historian, poet, novelist, editor, and short-story writer. He covered a multitude of subjects, probing each with an expansiveness that was firmly rooted in scholarship and common sense, and he expressed his views in a prose style noted for its clarity and precision. His critical writings on the American novelists Ernest Hemingway, John Dos Passos, F. Scott Fitzgerald, and William Faulkner attracted public interest to their early work and guided opinion toward their acceptance.

BIBLIOGRAPHY. Studies of his life and works include Jeffrey Meyers, *Edmund Wilson: A Biography* (1995); Richard Hauer Costa, *Edmund Wilson* (1980), a memoir of his last decade; George H. Douglas, *Edmund Wilson's America* (1983); David Castronovo, *Edmund Wilson* (1984); and Janet Groth, *Edmund Wilson: A Critic for Our Time* (1989).

Wilson, Edmund Beecher (b. Oct. 19, 1856, Geneva, Ill., U.S.—d. March 3, 1939, New York, N.Y.), American biologist known for his researches in embryology and cytology.



Edmund Beecher Wilson
By courtesy of Columbia University

In 1891 Wilson joined the faculty of Columbia University, where he elevated the department of zoology to a peak of international prestige. His first experimental studies, in embryology, led him to investigations at the cellular level. He became established as an outstanding pioneer in work on cell lineage—*i.e.,* the tracing of the formation of different kinds of tissues from individual precursor cells. His interest then extended to internal cellular organization; publication of his *Cell in Development and Inheritance* (1896) deeply influenced the trend of biological thought. The problem of sex determination became his next concern, and his cytological studies, culminating in a series of papers on the relation of chromosomes to the determination of sex, the first published in 1905, represented the pinnacle of his scientific achievement. Having recognized the importance of Gregor Mendel's earlier findings on heredity when they were rediscovered in 1900, Wilson realized that the role of chromosomes went far beyond the determination of sex; he envisioned their function as important components in heredity as a whole. His ideas exerted a powerful force in shaping future research in genetics.

Wilson, Edward O., in full EDWARD OSBORNE WILSON (b. June 10, 1929, Birmingham, Ala., U.S.), American biologist recognized as the world's leading authority on ants. He was also the foremost proponent of sociobiology, the study of the genetic basis of the social behaviour of all animals, including humans.

Wilson devoted much of his early career at the University of Alabama (B.S., 1949; M.S., 1950) to the study of ants. In the same year that he gained his doctorate (1955) at Harvard University, he completed an exhaustive taxonomic analysis of the ant genus *Lasius.* In collaboration with W.L. Brown, he developed the concept of "character displacement," a process in which two closely related species populations undergo rapid evolutionary differentiation after first coming into contact with each other, in order to minimize the chances of both competition and hybridization between them.

After his appointment to the Harvard faculty in 1956, Wilson made a series of important discoveries, including the determination that ants communicate primarily through the transmission of a chemical substance known as a pheromone. In the course of revising the classification of ants in the South Pacific, he formulated the concept of the taxon cycle, in which speciation and species dispersal are linked to the varying habitats that organisms encounter as their populations expand. In 1971 he published *The Insect Societies,* his definitive work on ants and other social insects. The book provides a comprehensive picture, treating the ecology and population dynamics of innumerable species in addition to their societal behaviour patterns. In his second major work, *Sociobiology: The New Synthesis* (1975), Wilson presented his theories about the biological basis of social behaviour. It contained a chapter proposing that the essentially biological principles on which animal societies were based applied to human social behaviour. This inflamed certain scientists and groups that regarded such ideas as politically provocative. Actually, Wilson maintained that he saw perhaps as little as 10 percent of human behaviour as genetically induced, the rest being attributable to environment. In his 1979 Pulitzer Prize-winning book *On Human Nature* (1978), Wilson explored the implications of sociobiology in regard to human aggression, sexuality, and ethics. His book *The Ants* (1990) was a monumental summary of contemporary knowledge of those insects. In *The Diversity of Life* (1992), Wilson traced how the world's living species became diverse and examined the massive species extinctions caused by human activities in the 20th century. His autobiography, *Naturalist,* appeared in 1994.

One of Wilson's most notable theories is that even a characteristic such as altruism may be genetically based and may have evolved through the process of natural selection. Traditionally, natural selection has been thought to foster only those physical and behavioral traits that increase an individual's chances of reproducing. Thus, an altruistic behaviour, as when an organism sacrifices itself in order to save other members of its immediate family, would seem incompatible with natural selection. Wilson maintains, however, that much altruistic behaviour is consistent with natural selection in that the sacrifice is made to save closely related individuals—*i.e.,* individuals who share many of the sacrificed organism's genes. Thus, in Wilson's theory, the preservation of the gene, rather than the preservation of the individual, becomes the focus of evolutionary strategy.

At Harvard, Wilson was professor of zoology (1964–76) and F.B. Baird, Jr., professor of science thereafter. He was also curator of entomology at the Museum of Comparative Zoology from 1972 on. In 1990 he shared Sweden's Crafoord Prize with the American biologist Paul Ehrlich.

Wilson, Harold, BARON WILSON OF RIEVAULX, originally JAMES HAROLD WILSON (b. March 11, 1916, Huddersfield, Yorkshire, Eng.—d. May 24, 1995, London), Labour Party politician who was prime minister of the United Kingdom from 1964 to 1970 and from 1974 to 1976.

The son of an industrial chemist, Wilson was educated at the University of Oxford, where, as a fellow of University College (1938–39), he collaborated with Sir William (afterward 1st Baron) Beveridge on work that led to Beveridge's epochal report (1942) advocating social insurance and other welfare measures. On the outbreak of World War II, Wilson was drafted into the civil service. As director of economics and statistics (1943–44) at the Ministry of Fuel and Power, he produced a study of the mining industry. His book *New Deal for Coal* (1945) was the basis of the Labour Party's plans for nationalizing the coal mines.



Harold Wilson
Central Press—Pictorial Parade

Wilson was first elected to the House of Commons in 1945 and was appointed president of the Board of Trade in 1947, becoming, at age 31, Britain's youngest cabinet minister since William Pitt the Younger in 1792. Wilson resigned his post in April 1951 in protest against the introduction of national health service charges to finance rearmament for the Korean War. He became Labour's spokesman on finance and foreign affairs, and in 1960 he mounted a left-wing challenge to Hugh Gaitskell for the party leadership. This failed, but after Gaitskell died in 1963, Wilson was elected leader of the Labour Party. He worked to consolidate the party, and after Labour won the general election of 1964, he became prime minister.

In 1965 Wilson was unable to avert an illegal declaration of independence by the white minority government of the British colony of Rhodesia, and his subsequent efforts to topple the rebel government by the use of economic sanctions rather than by military force failed. Wilson steered Britain clear of direct military involvement in the Vietnam War, though he gave verbal support to the U.S. war effort. His government outlawed capital punishment (1965) and began the Open University for continuing education. Wilson had widened his party's voting majority in the general election of 1966, but his popularity declined in the

late 1960s, partly because of his assumption of direct responsibility for the economy shortly before the pound was devalued (Nov. 18, 1967). With unemployment rising and trade-union disputes on the increase, the Conservatives won the general election of June 1970, and Wilson resigned.

In the general election of February 1974 the Conservatives won a plurality of the popular vote but were unable to form a coalition, so Wilson formed a government that March. This administration lasted until October, when he won a narrow majority after the second general election in eight months. Wilson's adroitness in holding together a party of social democrats, trade unionists, and leftists was never more severely tested than in 1975. His party was deeply divided over the question of Britain's new membership in the European Economic Community (EEC). By the June referendum on EEC membership, Wilson was able not only to confirm British membership in the EEC by an overwhelming majority but also to end an acrimonious, long-running quarrel inside the party. In Britain, however, economic difficulties continued, and on March 16, 1976—with the pound floundering and a crucial budget soon to be presented—Wilson announced his resignation to a stunned cabinet. The motives behind this resignation, which took place three years before the next scheduled election, remain unclear. In April the queen appointed Wilson a Knight of the Garter, and in 1983 he was created a life peer.

A consummate politician, Wilson won four of five general elections, more than any other postwar British leader of any party. His own version of politics in his time may be found in his *The Labour Government, 1964–1970* (1971), *The Governance of Britain* (1976), and *Final Term: The Labour Government 1974–76* (1979).

Wilson, Henry, original name JEREMIAH JONES COLBATH (b. Feb. 16, 1812, Farmington, N.H., U.S.—d. Nov. 22, 1875, Washington, D.C.), U.S. senator and vice president of the United States (1873–75) who was a national leader in the antislavery cause.

Indentured as a farm labourer at the age of 10, the youth legally changed his name to Henry Wilson when he was freed at 21. He learned to make shoes and became a small-scale manufacturer at Natick, Mass. After visiting Washington, D.C., and listening to slavery debates and observing slave auctions, he determined to devote his life to emancipation. He attracted attention as a stump speaker and was elected as a Whig to the Massachusetts



Henry Wilson
By courtesy of the Library of Congress, Washington, D.C.

legislature in 1840, serving almost continuously for the next 12 years. Disappointed at the Whigs' ambivalent stand on the slavery issue, he helped form the Free-Soil Party in 1848. He then joined the antiforeign Know-Nothing Party (1854) but was converted to the Republican Party a few years later. Elected to the U.S. Senate (1855–73), he served as chairman of the Committee on Military Affairs during the Civil War (1861–65) and opposed President Andrew Johnson's postwar policy of accommodation toward the defeated South. Defeated for the vice presidential nomination in 1868, he was chosen four years later and served during the second term of President Ulysses S. Grant. He died in office of a stroke.

Wilson wrote on the war and Reconstruction and is best known for *History of the Rise and Fall of the Slave Power in America,* 3 vol. (1872–77).

Wilson, Sir Henry Hughes, BARONET (b. May 5, 1864, near Edgeworthstown, County Longford, Ire.—d. June 22, 1922, London, Eng.), British field marshal, chief of the British imperial general staff, and main military adviser to Prime Minister David Lloyd George



Sir Henry Hughes Wilson, detail of a painting by John Singer Sargent; in the National Portrait Gallery, London
By courtesy of the National Portrait Gallery, London

in the last year of World War I. While in the War Office as director of military operations (1910–14), he determined that Great Britain should support France in a war against Germany on the basis of French requirements, a policy not favoured by many British leaders.

A soldier from the early 1880s, Wilson rose to the command of the Staff College at Camberley, Surrey (1907–10). During this period he cultivated the friendship of his counterpart at the French war college, General (afterward Marshal) Ferdinand Foch—an association that may account for Wilson's readiness to involve Great Britain in French strategy. He played a dubious part in the Curragh incident (March 1914), surreptitiously encouraging some British army officers who refused to lead troops against Ulster opponents of Irish Home Rule.

On the outbreak of World War I, the British government chose Wilson's policy of fighting in France alongside French armies in preference to attacking the German invaders in Belgium, the strategy of the commander in chief, Field Marshal Earl Roberts. Wilson agreed with Roberts, however, on the necessity of military conscription (not instituted until 1916). The smooth mobilization of the standing army and its rapid movement to France in August 1914 may be credited largely to Wilson's prewar planning.

Wilson himself soon went to France as assistant chief of the general staff. His only field command in the war (December 1915–December 1916) was marked by the loss to the Germans of a sector of Vimy Ridge, near Arras, by his IV Corps. In September 1917 he took over the Eastern Command, a position that enabled him to live in London and ingratiate himself with Lloyd George. As chief of the imperial general staff (from Feb. 18, 1918), he aided the prime minister in securing Foch's appointment as supreme commander of the Allied armies on the Western Front.

Disagreeing with the government's postwar Irish policy, Wilson, who had been promoted to field marshal and created a baronet (1919), was refused reappointment as chief of staff by Lloyd George. Wilson thereupon left the army and entered the House of Commons as a Conservative member for an Ulster constituency (all in February 1922). A flamboyant personage and an eloquent speaker on behalf of Anglo-Irish Unionism, he evoked the hatred of his nationalist countrymen and was assassinated on his doorstep by two members of the revolutionary Irish Republican Army. Wilson left no child, and the baronetcy became extinct upon his death.

BIBLIOGRAPHY. A biography by C.E. Callwell, *Field-Marshal Sir Henry Wilson . . .* , 2 vol. (1927), contained extracts from Wilson's diaries—extreme denunciations of individuals and erroneous military ideas—that damaged his professional reputation. A more recent biography is Basil Collier, *Brasshat* (1961).

Wilson (of Libya and of Stowlangtoft), Henry Maitland Wilson, 1st Baron (b. Sept. 5, 1881, London, Eng.—d. Dec. 31, 1964, Chilton, Aylesbury, Buckinghamshire, Eng.), British field marshal, commander in chief in the Middle East (February–December 1943), and supreme Allied commander in the Mediterranean (December 1943–November 1944), popularly known as "Jumbo" because of his great height and bulk.



1st Baron Wilson
Camera Press

In 1939 Wilson was placed in command of British troops in Egypt. With General Archibald Percival (afterward 1st Earl) Wavell and General Richard Nugent O'Connor, he routed the Italian army in Cyrenaica (Barqah, Libya) in the winter of 1940–41. He led an unsuccessful expedition to Greece in March 1941 and also led the force of British Commonwealth and Free French troops that took Syria from the Vichy French that summer. After the Italian armistice of Sept. 8, 1943, Wilson seized the Italian-controlled Dodecanese (Dhodhekánisos) Islands, but without adequate reinforcements he soon lost them to the Germans. As supreme commander in the Mediterranean, succeeding General Dwight D. Eisenhower, he maintained excellent relations between British and U.S. forces. From 1945 to 1947 he headed the British joint staff mission in Washington, D.C.

Wilson, J. Tuzo, in full JOHN TUZO WILSON (b. Oct. 24, 1908, Ottawa, Ont., Can.—d. April 15, 1993, Toronto, Ont.), Canadian geologist and geophysicist who established global patterns of faulting and the structure of the continents. His studies in plate tectonics had an important bearing on the theories of continental drift, seafloor spreading, and convection currents within the Earth.

The son of a Scottish engineer who had immigrated to Canada, Wilson in 1930 became the first person at any Canadian university to graduate in geophysical studies (B.A., Trinity College, University of Toronto). He then studied at St. John's College, Cambridge (B.A., 1932), Princeton University (Ph.D., 1936), and Cambridge University (M.A., 1940; Sc.D., 1958). He worked with the Geological Sur-

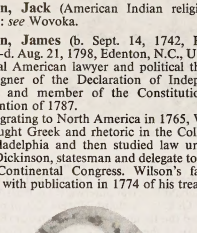
vey of Canada (1936–39) and served with the Royal Canadian Engineers during World War II, rising to the rank of colonel. After the war, in 1946, Wilson became professor of geophysics at the University of Toronto, where he remained until 1974, when he became director general of the Ontario Science Centre. From 1983 to 1986 he was chancellor of York University. He was president of both the Royal Society of Canada (1972–73) and the American Geophysical Union (1980–82). Among his major publications were *One Chinese Moon* (1959), *IGY: Year of the New Moons* (1961), *A Revolution in Earth Science* (1967), and *Continents Adrift and Continents Aground* (1977).

In the early 1960s Wilson became the world's leading spokesman for the revived theory of continental drift, at a time when prevailing opinion held that continents were fixed and immovable. His paper entitled *A New Class of Faults and Their Bearing on Continental Drift* (1965) introduced the concept of the transform fault. Whereas previous theories of continental drift had conceived of plates as either moving closer together (convergent plates) or further apart (divergent), Wilson asserted that a third kind of movement existed whereby plates slide past each other. This theory became one of the bases for plate tectonics, which revolutionized the geophysical sciences in the 1970s. A range of mountains in Antarctica is named for him.

Wilson, Jack (American Indian religious leader): *see* Wovoka.

Wilson, James (b. Sept. 14, 1742, Fife, Scot.—d. Aug. 21, 1798, Edenton, N.C., U.S.), colonial American lawyer and political theorist, signer of the Declaration of Independence, and member of the Constitutional Convention of 1787.

Immigrating to North America in 1765, Wilson taught Greek and rhetoric in the College of Philadelphia and then studied law under John Dickinson, statesman and delegate to the First Continental Congress. Wilson's fame spread with publication in 1774 of his treatise



James Wilson, portrait by Philip Fishbourne Wharton, 1783; in Independence National Historical Park, Philadelphia

By courtesy of the Independence National Historical Park Collection, Philadelphia

Considerations on the Nature and Extent of the Legislative Authority of the British Parliament. In this work he set out a scheme of empire in which the British colonies would have the equivalent of dominion status. In 1774 he became a member of the Committee of Correspondence in Cumberland County, Pa., and he served as a delegate to the Second Continental Congress. In 1779 he was appointed advocate general for France and represented that country in cases rising out of its alliance with the American colonies. He became a champion of the Bank of North America and an associate of merchant-banker Robert Morris in his struggle for currency reform after 1781. As a member of the federal Congress (1783; 1785–86), he pressed for an amendment to the Articles of Confederation to permit Congress to levy a general tax.

During the Constitutional Convention in 1787, Wilson helped to draft the U.S. Constitution; he then led the fight for ratification in Pennsylvania. In 1790 he engineered the drafting of Pennsylvania's new constitution and delivered a series of lectures that are landmarks in the evolution of American jurisprudence. He was appointed an associate justice of the U.S. Supreme Court (1789–98), where his most notable decision was that on *Chisholm* v. *Georgia* (*q.v.*). In the winter of 1796–97 financial ruin shattered his health and ended his career.

Wilson, John Anthony Burgess: *see* Burgess, Anthony.

Wilson, Kenneth Geddes (b. June 8, 1936, Waltham, Mass., U.S.), American physicist who was awarded the 1982 Nobel Prize for Physics for his development of a general procedure for constructing improved theories concerning the transformations of matter called continuous, or second-order, phase transitions. Wilson's work provided, among other things, a mathematical strategy for dealing with effects that involve neighbouring atoms or molecules as well as those that influence a specimen of material large enough to be observed experimentally.

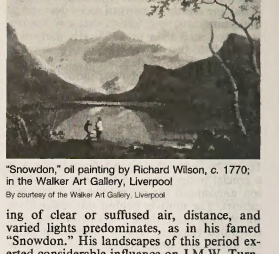
Wilson was graduated from Harvard University in 1956. In 1961 he received a Ph.D. from the California Institute of Technology, where he completed a dissertation under Murray Gell-Mann (winner of the Nobel Prize for Physics in 1969) and Francis Low. After a year at the European Council for Nuclear Research, Wilson was appointed assistant professor at Cornell University in 1963; he was professor of physics from 1971 to 1988. From 1988 he taught at Ohio State University.

Wilson, Mount, peak (5,710 feet [1,740 m]) in the San Gabriel Mountains of the Angeles National Forest, southern California, U.S. It lies just northeast of Pasadena. A highway leads to the summit, an eroded plateau, which is the site of the famous astronomical observatory, the Mount Wilson Observatory (established 1904), administered by the Carnegie Institution. The mountain was named for Benjamin Davis Wilson, who blazed a "burro" trail to the summit in 1864.

Wilson, Richard (b. Aug. 1, 1714, Penegoes, Montgomeryshire, Wales—d. May 15, 1782, Llanberis, Carnarvonshire), one of the earliest major British landscape painters, whose works combine a mood of classical serenity with picturesque effects.

In 1729 Wilson studied portraiture with Thomas Wright in London and after about 1735 worked on his own in this genre. From 1746 his work shows a growing interest in landscape that, soon after his arrival in Italy late in 1750, became almost exclusive. Staying at first in Venice, he met the landscape painter Francesco Zuccarelli. Early in 1752 he went to Rome and became part of an art circle that included the painters Joseph Vernet and Anton Raphael Mengs. He remained in Rome until 1757, working mostly for aristocratic English tourists. He produced not only large landscapes in the manner of Nicolas Poussin, Salvator Rosa, and Claude Lorrain but also numerous drawings of Roman sites and buildings, which he used in composing Italianate landscapes after his return to England. The finest of these is a set of drawings made for Lord Dartmouth and dated 1754. They show how Wilson tempered his delicate observation of light and distance with the discipline of such 17th-century classical Baroque painters as Poussin and Claude. Returning to London probably in 1757, he became influential as a teacher and, after 1760, as an exhibitor with the Society of Artists and the Royal Academy. He was a founding member of the academy in 1768 and, from 1776, its librarian, a post he took to relieve his poverty.

Though continuing to produce Italian landscapes, Wilson now turned to depicting his own country, especially Wales and the rural environs of London. The order and clarity rather than the classical apparatus of Italy survive, and Wilson's exact and tranquil record-



"Snowdon," oil painting by Richard Wilson, *c.* 1770; in the Walker Art Gallery, Liverpool

By courtesy of the Walker Art Gallery, Liverpool

ing of clear or suffused air, distance, and varied lights predominates, as in his famed "Snowdon." His landscapes of this period exerted considerable influence on J.M.W. Turner, John Constable, and John Crome.

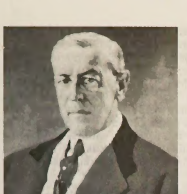
Wilson, Robert Woodrow (b. Jan. 10, 1936, Houston, Texas, U.S.), American radio astronomer who shared, with Arno Penzias, the 1978 Nobel Prize for Physics for a discovery that supported the "big bang" model (*q.v.*).

Educated at Rice University, Houston, and the California Institute of Technology, Pasadena, where he received his doctorate in 1962, Wilson then worked (1963–76) at the Bell Telephone Laboratories at Holmdel, N.J., where, in collaboration with Penzias, he began monitoring radio emissions from a ring of gas encircling the Milky Way Galaxy. The two scientists detected an unusual background radiation that seemed to permeate the cosmos uniformly and indicated a temperature of 3K. This radiation appeared to be a remnant of the big bang, the primordial explosion billions of years ago from which the universe originated.

From 1976 Wilson was head of Bell's Radio Physics Research Department. He became a member of the U.S. National Academy of Science in 1979.

Wilson, Woodrow, in full THOMAS WOODROW WILSON (b. Dec. 28, 1856, Staunton, Va., U.S.—d. Feb. 3, 1924, Washington, D.C.), 28th president of the United States (1913–21), an American scholar and statesman best remembered for his legislative accomplishments and his high-minded idealism. Wilson led his country into World War I and became the creator and leading advocate of the League of Nations (*q.v.*), for which he was awarded the 1919 Nobel Prize for Peace. During his second term the Nineteenth Amendment to the U.S. Constitution, giving women the right to vote, was passed and ratified. He suffered a paralytic stroke while seeking American public support for the Treaty of Versailles (October 1919), and his continuing incapacity caused the worst crisis of presidential disability in American history.

Early life, education, and governorship. Wilson's father, Joseph Ruggles Wilson, was a Presbyterian minister who had moved to Virginia from Ohio and was the son of Scotch-Irish immigrants; his mother, Janet Woodrow, the daughter of a Presbyterian minister, had been born in England of Scottish parentage. Wilson was the only president after Andrew Jackson to have a foreign-born parent.



Woodrow Wilson, detail of a portrait by Wilford Seymour Conrow
By courtesy of the New York Historical Society

The family left Virginia before Wilson's second birthday, as his father successively held pastorates in Georgia and North Carolina and taught at the Columbia Theological Seminary in South Carolina. His uncle, James Woodrow, was the leading light of the seminary faculty, and after college the young man dropped his first name both to emphasize the family connection and because he thought "Woodrow Wilson" sounded more dignified. His father served during the Civil War as a chaplain with the Confederate army, and his church in Georgia was turned into a military hospital. The young Wilson was deeply affected by the horrors of the war.

Apparently dyslexic from childhood, Wilson did not learn to read until after he was 10 and never became a rapid reader. Nevertheless, he developed passionate interests in politics and literature. He attended Davidson College near Charlotte, N.C., for a year before entering what is now Princeton University in 1875. At Princeton he blossomed intellectually, reading widely, engaging in debate, and editing the college newspaper. While still an undergraduate he published a scholarly essay that compared the American form of government with the British parliamentary system, a subject that he would develop further in his first book and apply in his own political career.

After graduation from Princeton in 1879, Wilson studied law at the University of Virginia, with the hope that a law career would lead to politics. Two years of humdrum legal practice in Atlanta, Ga., disillusioned him, and he abandoned law for graduate study in government and history at Johns Hopkins University, where in 1886 he received a Ph.D.; he was the only president to earn that degree.

Wilson's doctoral thesis was published as *Congressional Government: A Study in American Politics* (1885), which further developed his comparison between the American and parliamentary government and suggested reforms that would make the American system more efficient and more answerable to public opinion. Among his later books are a general analysis of government, *The State: Elements of Historical and Practical Politics* (1889); a history of the United States, *Division and Reunion, 1829–1889* (1893); the five-volume *A History of the American People* (1902); and *Constitutional Government in the United States* (1908), in which Wilson elegantly set forth the modern view of the president as "the representative of no constituency, but of the whole people. When he speaks in his true character, he speaks for no special interest."

In 1885 Wilson married Ellen Louise Axson, the daughter of a Presbyterian minister, with whom he had three daughters. His wife's death in August 1914 devastated him, but he recovered to marry Edith Bolling Galt in December 1915.

Wilson was the only professional academic to become president. He began his career teaching history and political science at Bryn Mawr College in 1885 and moved to Wesleyan University in Connecticut in 1888. Two years later he went to Princeton, and in 1902 he was the unanimous choice to become president of Princeton. Wilson upgraded the university both financially and intellectually, but opposition from faculty conservatives and wealthy alumni forced him to abandon several of his key plans.

As Princeton's president, Wilson attracted the attention of conservative kingmakers in the Democratic Party, who offered him the 1910 nomination for governor of New Jersey. Wilson won the governorship with a dynamic, progressive campaign. Once in office he put his earlier ideas about parliamentary practices to work in implementing a sweeping reform program that gave him a national reputation and made him a contender for the Democratic presidential nomination.

Prevailing at the 1912 convention after a hard struggle against better-entrenched rivals, Wilson entered into an exciting three-way race for president. Former president Theodore Roosevelt's bolt to the Progressive (Bull Moose) Party had split the dominant Republican Party, a factor that allowed Wilson to be elected with only 42 percent of the popular vote but with an electoral college landslide of 435 votes to Roosevelt's 88 and William Howard Taft's 8. In that campaign, Wilson answered Roosevelt's call for a "New Nationalism" with his own equally compelling vision of a "New Freedom." Wilson was the first Southern-born president elected since the Civil War.

First term as president. Admitting that he intended to conduct himself as a prime minister, Wilson drew up a legislative program in advance, broke with previous presidential practice by appearing before Congress in person, and worked mainly through his party. Important help in keeping congressional Democrats in line came from the party's three-time unsuccessful presidential nominee, William Jennings Bryan (*q.v.*), whom Wilson appointed secretary of state. Indispensable policy advice came from the controversial Boston attorney Louis Brandeis (*q.v.*), who had helped Wilson formulate the New Freedom agenda during the campaign. Wilson also kept Congress in session continually from April 1913 to October 1914, almost a year and a half, something that had never before happened.

Wilson's approach achieved spectacular results. He won his first victory with passage of the Underwood-Simmons Tariff, which reduced duties on imports for the first time in 40 years. Accompanying the new tariff, to offset lost revenues, was an income tax, which was permitted under the recently adopted Sixteenth Amendment to the Constitution. Wilson's second victory came when, after months of complicated debate and bargaining over banking and currency reform, Congress passed the act creating the Federal Reserve System, which remains the most powerful government agency in economic affairs. A third victory came with passage of the Clayton Antitrust Act, which strengthened existing laws against anticompetitive business actions and gave labour unions relief from court injunctions. The Federal Trade Commission, which remains a major agency overseeing business practices, was also created at this time.

Wilson followed these legislative accomplishments with a second wave of reform measures in 1916. In part to attract Roosevelt's Progressive voters of 1912, he pushed through Congress laws to create an agency to regulate overseas shipping, to make the first government loans to farmers, to prohibit child labour, to raise income and inheritance taxes, and to mandate an eight-hour workday for railroad workers. Wilson also nominated Brandeis to a justiceship on the Supreme Court and successfully fought for his confirmation in the Senate. Brandeis, who served until 1939, was the first Jewish justice and became a major force on the Supreme Court. These victories were even more impressive than the earlier ones, because losses in the 1914 elections had reduced the Democrats' majorities in Congress and Republican opposition had hardened.

Foreign affairs bedeviled Wilson from his first days in the White House. Latin America was the first trouble spot. Though they had been critical of the previous administration's interventionism in that region, Wilson and Bryan soon followed the same course, occupying Haiti and the Dominican Republic and governing them as protectorates. Mexico, which was torn by revolution and counterrevolution, proved most vexing of all. First adopting a policy of "watchful waiting" and then seeking to overthrow the military dictatorship of Victoriano Huerta only dragged the United States into interventions by the navy at Veracruz in 1914 and by the army in 1916 in a "punitive expedition" against the guerrilla leader Pancho Villa, who had crossed the border into New Mexico. Wilson eventually reconciled himself to a hands-off stance toward Mexico.

The outbreak of World War I in August 1914, which coincided with his first wife's death, tried Wilson's mind and soul. Almost no one questioned American neutrality in the beginning, but both the British blockade of maritime trade and German U-boat attacks soon made neutrality painful. On May 7, 1915, when a U-boat sank the British liner *Lusitania,* killing more than 1,100 people, including 128 Americans, the war came home with a vengeance. Wilson at first urged his countrymen to show restraint, declaring, "There is such a thing as a man being too proud to fight," but he also pressed the Germans to rein in their submarines and decided to build up the armed forces. Those moves impelled Bryan to resign in protest and to oppose Wilson politically. A combination of patience and firmness on the president's part paid off when the Germans, for military reasons of their own, pledged to curtail submarine warfare in April 1916. For the rest of that year the threat of war receded, while relations with Great Britain worsened because of their ever-tightening blockade and their brutal suppression of the Easter Rising (*q.v.*), the armed revolt in Ireland that eventually led to independence.

Second term as president. Wilson prevailed in the 1916 election, becoming the first Democrat to win a second consecutive term since Andrew Jackson. His narrow victory by 277 to 254 electoral votes over Charles Evans Hughes, the nominee of the reunited and resurgent Republicans, was a great political feat. The campaign cry "He kept us out of war" helped, but Wilson's domestic record on progressive and labour issues played the biggest part in his achieving a healthy plurality in the popular vote and a small electoral margin. That record was enhanced during his second term by the passing and ratification (1920) of the Nineteenth Amendment, in which women secured the vote, in part because of their successful participation in the war effort.

His reelection assured, Wilson mounted a peace offensive in December 1916 and January 1917 aimed at ending the war. First he made a public diplomatic appeal to the belligerent nations to state their peace terms and accept American mediation, and then on January 22 he gave a stirring speech in which he called for a "peace without victory" and pledged to establish a league of nations to prevent future wars.

The Germans rendered Wilson's peace efforts moot by unleashing their submarines on February 1. For the next two months Wilson agonized over how to respond. Public opinion remained divided and uncertain, even after publication of the Zimmermann Telegram, a secret communication from the German foreign secretary to the German minister in Mexico authorizing him to offer Texas, New Mexico, and Arizona to Mexico in return for going to war against the United States. Wilson finally decided to intervene, mainly because he could see no alternative and hoped to use American belligerency as a means to build a just, lasting peace. On April 2, 1917, he went before Congress to ask for a declaration of war so that the United States could strive to fulfill his injunction that "the world must be made safe for democracy."

Wilson proved to be a surprisingly effective war president. Recognizing what he did not know, he delegated military decisions to professional soldiers, particularly General John J. Pershing, who commanded the American Expeditionary Force in France, and economic mobilization to such men as Bernard Baruch, William Gibbs McAdoo, and Herbert Hoover. Careful planning also ensured the success of the Selective Service Act, which became law in May. This helped to raise the strength of the armed forces to five million men and women, two million of whom reached France by the war's end. The boost given to the Allies by American money, supplies, and manpower tipped the scales against the Germans, who sued for peace and laid down their arms with the Armistice of November 11, 1918.

A less happy side to Wilson's delegation of war-making tasks came at home, where some of his cabinet members, most notably U.S. Attorney General A. Mitchell Palmer, brutally suppressed dissent. The overzealous hounding of radical groups, aliens, and dissidents both during the war and in the Red Scare of 1919–20 was justified on grounds of national security but was condemned by civil libertarians and ultimately discredited. Diplomacy was the one job that Wilson kept to himself. He seized the initiative on war aims with his Fourteen Points speech of January 8, 1918, in which he promised a liberal, nonpunitive peace and a league of nations. He made the controversial decision to go in person to the Paris Peace Conference, where he spent seven months in wearying, often acrimonious negotiations with the British, French, and Italians. The final product, the Treaty of Versailles, was signed on June 28, 1919. The treaty's financial and territorial terms severely compromised Wilson's aims, but those were offset by its inclusion of the Covenant of the League of Nations, which he believed would adjust international differences and maintain peace.

Wilson returned from the peace conference exhausted and in failing health, in no shape to face the biggest fight of his career. Republican senators, led by Henry Cabot Lodge, sought either to reject the treaty or to attach reservations that would gravely limit America's commitments to the League of Nations. After two months of frustrating talks with senators, Wilson took his case to the people in September 1919 in the hope of shaping public opinion on this important issue. A master of the English language and public oratory, he threw himself into a whirlwind cross-country tour, giving 39 speeches in three weeks.

The strain, both mental and physical, was too much for him. He had a near breakdown on September 25, after which his doctor canceled the rest of the tour and rushed him back to Washington. On October 2, 1919, Wilson suffered a massive stroke that left him partially paralyzed on his left side. His intellectual capacity was not affected, but his emotional balance and judgment were badly impaired.

This was the worst crisis of presidential disability in American history, and it was handled badly. No one seriously suggested that Wilson resign. His wife, Edith, controlled access to him, made decisions by default, and engineered a cover-up of his condition, which included misleadingly optimistic reports from his doctors. Although he gradually recovered from the worst effects of the stroke, Wilson never again fully functioned as president.

The peace treaty went down to defeat in the Senate, as a consequence of Wilson's stroke-induced rigidity. He demanded that Democratic senators spurn all efforts at compromise with Lodge and other Republicans. Twice, on November 19, 1919, and March 19, 1920, the Treaty of Versailles failed to gain the two-thirds vote necessary for ratification. Later, under Warren G. Harding, Wilson's Republican successor, the United States made a separate peace with Germany, something Wilson had believed "would place ineffable stain upon the gallantry and honor of the United States." The United States never joined the League of Nations.

In the 1920 election Wilson called for "a great and solemn referendum" on the treaty and the League of Nations and entertained fantasies about running on that issue himself. Edith Wilson and his closest friends quietly scotched those notions. Instead, the Democrats nominated James M. Cox, the governor of Ohio, on the strength of his lack of association with Wilson, although an administration loyalist, Assistant Secretary of the Navy Franklin D. Roosevelt, received the vice presidential nomination. The Republicans won a landslide victory, which they interpreted as a mandate to reverse Wilson's progressive policies at home and his internationalism abroad.

Later years. An invalid, Wilson lived in Washington for almost three years after leaving office on March 3, 1921. He never wavered in his conviction that the United States should and would eventually join the League of Nations. Wilson died in his sleep at his Washington home. His remains were interred in the newly begun National Cathedral; he is the only president buried in the capital city. His historical reputation at first suffered from his failure to carry the day in his last years and the ascendancy of the Republicans, and it declined further during the 1930s with the "revisionist" revulsion against World War I. But during World War II Wilson's reputation soared, as he came to be regarded as a wrongly unheeded prophet whose policies would have prevented world calamity. The United Nations and collective security pacts are viewed as fulfillment of Wilson's internationalist vision.

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(Jo.M.C.)

Wilson's Creek, Battle of (Aug. 10, 1861), in the American Civil War, successful Southern engagement fought between 5,400 Union troops under General Nathaniel Lyon and a combined force of more than 10,000 Confederate troops and Missouri Militia commanded by General Benjamin McCulloch and General Sterling Price, 10 miles (16 km) southwest of Springfield, Mo. Union General Franz Sigel attacked the rear of the Confederate forces with 1,200 men while Lyon led a frontal attack with the main Union force. Sigel was repulsed, and after several hours of fighting Lyon was killed. With casualties heavy on both sides, the Union forces retreated toward Springfield.

Wilson's disease, also called HEPATOLENTICULAR DEGENERATION, a hereditary defect associated with the metabolism of copper and characterized by the progressive degeneration of the basal ganglia of the brain (large group of nuclei involved in the control of movement), the development of a brownish ring at the margin of the cornea, and the gradual replacement of liver cells with fibrous tissue. The disorder, which usually first appears in the second or third decade of life, is caused by a deficiency in the circulation of the copper-binding protein, ceruloplasmin, resulting in an excess of free copper in the body. The copper is deposited in the affected structures, giving rise to the characteristic symptoms, which include tremor, incoordination, and personality changes. In treatment a high-protein, low-copper diet is usually combined with administration of a chelating substance such as penicillamine, which removes the copper from the tissues for excretion in the urine. Early diagnosis and treatment can potentially reverse the effects of the disorder and prevent permanent brain and liver damage.

To make the best use of the Britannica, consult the INDEX *first*

Wilson's Promontory, southernmost point of the Australian mainland, in Victoria, 110 miles (177 km) southeast of Melbourne. A granite peninsula, 22 miles long with a maximum width of 14 miles, it projects into Bass Strait and is almost an island, being linked to the mainland by beach ridges. From a spectacular scenic 80-mile coastline, it rises to a mountainous interior; its highest point is Mount Latrobe, at 2,475 feet (754 m). There is a lighthouse at its southern tip. The vegetative cover, which tends toward the xerophytic (adapted to a dry climate) on the west, is periodically swept by fires. Visited in 1798 by the English explorer George Bass, the promontory was first called Furneaux Land, after a member of Captain James Cook's second (1772) expedition. It was renamed for Thomas Wilson, an English merchant. In 1905 the entire promontory was made a national park. It is notable for its beaches, fern gullies, more than 700 species of plants, and a variety of animals, including emus, koalas, and wombats.

wilt, common symptom of plant disease resulting from a water loss in leaves and stems. Affected parts lose their turgidity and droop. Specific wilt diseases—caused by a variety of fungi, bacteria, and viruses—are easily confused with root and crown rots, stem cankers, insect injuries, drought or excess water, and other noninfectious problems.

Verticillium wilt is a very destructive fungal disease in cool climates. It affects several hundred species of trees, shrubs, vines, flowers, house plants, vegetables, fruits, field crops, and weeds. The causal agent is the soil-inhabiting fungus *Verticillium albo-atrum* (*V. dahliae*). In hot weather, the leaves on one or more branches turn dull green to yellow, wilt, and wither, often from the base upward. Annuals and young trees are often stunted and usually die; perennials may die branch by branch over a period of from several weeks to years or apparently recover. The sapwood (just beneath

the bark) of wilted branches, when cut lengthwise, usually shows dark streaks. Infections occur through roots and wounds. Control can be obtained by growing disease-free and resistant or immune plants, rotating with highly resistant or immune plants for five years or longer, destroying infected plants and susceptible weeds, fertilizing and watering to encourage vigour, removing wilted branches on trees and shrubs (sterilizing tools between cuts), and avoiding the wounding of roots or stems when planting or cultivating. Soil known to harbour *Verticillium* can be fumigated or heat-treated to kill the disease organisms.

Oak wilt, caused by the fungus *Ceratocystis fagacearum*, is a serious disease in the eastern half of the United States. All oaks (*Quercus*) are susceptible, as are Chinese, European, and American chestnuts, tan oak (*Lithocarpus densiflorus*), and bush chinquapin. Trees in the red- and black-oak group usually die within several weeks during late spring and summer. Their leaves turn pale or dull green, look water-soaked, curl upward, and often become yellowed or bronzed from the margins inward; the upper branches are usually affected first. White and bur oaks commonly die back slowly over several years. Their leaves usually wilt, turn light brown, curl, and cling to their stems. The disease is spread from tree to tree by natural underground root grafts, sap- and fungus-feeding insects, and possibly by squirrels. Control measures include prompt removal of diseased trees, injecting Vapam (sodium methyldithiocarbamate) into the soil midway between healthy and recently infected trees, avoidance of injuring or pruning of trees from budbreak to midsummer, and painting wounds promptly with tree-wound dressing.

Bacterial wilt, caused by numerous species of the genera *Corynebacterium, Erwinia, Pseudomonas,* and *Xanthomonas,* induces stunting, wilting, and withering, starting usually with younger leaves. Stems, which often shrivel and wither, show discolored water-conducting tissue. A bacterial ooze is often evident when infected stems are cut and squeezed. Rapidly expanding, dark green, water-soaked areas or streaks may develop first in leaves.

Bacterial wilt may be managed by growing resistant varieties; planting disease-free materials in well-drained, fertile soil that is clean or sterilized; observing stringent sanitation including weed- and insect-control measures; and rotating susceptible crops.

Spotted wilt, caused by a virus, is transmitted by the larvae of several species of insect called thrips. Plants commonly are stunted and bunchy. Brown, purplish, pale green, red, yellow, or white rings (often zoned) and spots form in leaves, flowers, and fruit; long streaks may develop in petioles and stems. Leaves are distorted, sometimes mottled, and may turn yellow or bronze. Tops may wilt and wither; fruit is often rough and distorted. Control includes growing resistant varieties and disease-free stock, spraying or dusting during thrips infestations, promptly destroying infected plants and crop debris after harvest, and observing stringent weed control. *See also* Fusarium wilt; Panama disease; Dutch elm disease.

Wilton, town ("parish"), Salisbury district, county of Wiltshire, England. The parish is internationally known for its carpets. The Royal Carpet Factory was built there in 1655, and the production of Wilton and Axminster carpets became the town's main industry. Felts and agricultural machinery are other products. Since ancient times Wilton also has been a centre for the sheep trade. Pop. (1991) 3,717.

Wiltshire, administrative, geographic, and historic county of southern England, on a low plateau draining into the basins of the Bristol Channel, the English Channel, and the River Thames. Trowbridge is the administrative centre. The administrative county of Wiltshire comprises four districts—Salisbury (in the south), West Wiltshire, Kennet (in the east), and North Wiltshire. The geographic county encompasses the administrative county and the unitary authority of Swindon. The historic county of Wiltshire is nearly coterminous with the geographic county but also includes a small area north of Sherston in the district of Cotswold in the administrative county of Gloucestershire.

Chalk uplands constitute much of Wiltshire. Salisbury Plain occupies central Wiltshire, and north of the River Kennet are the Marlborough Downs. Along the county's western border rise parts of the Cotswolds, a range of limestone hills. Between these two upland areas lie the clay vales of Wardour and Pewsey. South of Trowbridge the vales are fairly heavily wooded, in marked contrast to the open, rolling countryside of the uplands. Parts of the Marlborough Downs, the Cotswolds, and the vale of Pewsey have been designated Areas of Outstanding Natural Beauty.

In prehistoric times the chalk uplands were the most heavily populated parts of England, and Wiltshire has many prehistoric monuments. Stonehenge, 8 miles (13 km) north of Salisbury, dates from the Neolithic Period. Nearby lie other important Neolithic monuments, including those at Avebury and Windmill Hill. The latter is believed to have been a centre of ritual and of seasonal tribal fasting in the 4th millennium BC. Long Neolithic burial mounds, or barrows, abound, as do burial mounds from the Bronze Age. Durrington Walls, a large ditch-enclosed ceremonial earthwork, dates from the late 3rd millennium BC. During the Iron Age, hill forts were constructed, such as those at Yarnbury Castle, near Berwick St. James, and at Old Sarum, outside Salisbury.

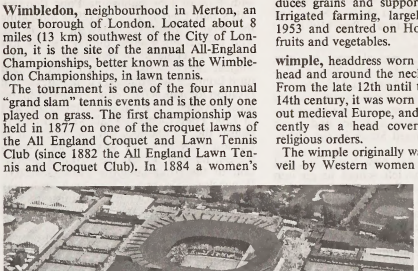
There is little evidence of Roman occupation, and in the Middle Ages sheep farming by Cistercian monks was probably the most important activity. Salisbury has long been the ecclesiastical centre of the county and is renowned for its 13th-century cathedral.

Outside Salisbury and industrial Swindon, agriculture is the most important activity. A large part of Salisbury Plain is occupied by the Ministry of Defense. Sand and gravel, chalk, limestone, and clay are worked in various parts of the county. Area administrative county, 1,255 square miles (3,250 square km); geographic county, 1,344 square miles (3,481 square km). Pop. (1998 est.) administrative county, 425,800; geographic county, 605,500.

Wimbledon, neighbourhood in Merton, an outer borough of London. Located about 8 miles (13 km) southwest of the City of London, it is the site of the annual All-England Championships, better known as the Wimbledon Championships, in lawn tennis.

The tournament is one of the four annual "grand slam" tennis events and is the only one played on grass. The first championship was held in 1877 on one of the croquet lawns of the All England Croquet and Lawn Tennis Club (since 1882 the All England Lawn Tennis and Croquet Club). In 1884 a women's championship was introduced, and the national men's doubles was transferred from Oxford. Mixed doubles and women's doubles were inaugurated in 1913. In 1920 Suzanne Lenglen of France became the first person to win three Wimbledon championships (in singles and doubles events) in a single year; in 1937 Don Budge of the United States became the first man to win three Wimbledon championships in a single year. (In 1938 he repeated that feat, and he also won the other three championships of the grand slam.) In 1980 Björn Borg of Sweden won the men's singles for a fifth consecutive year, a feat not achieved since the abolition of the challenge-round system in 1922 requiring the defending champion to play all rounds. Martina Navratilova of the United States won six consecutive women's championships (1982–87), eclipsing the record of Suzanne Lenglen (1919–23).

The Wimbledon Championships, originally played by amateurs, were opened to professional players in 1968; Rod Laver of Australia and Billie Jean King of the United States won the singles events that year. The current championships, in addition to men's and women's singles and doubles and mixed doubles, include events for junior boys and girls and for senior players. For winners, *see* Sporting Record: *Tennis.*



Tennis courts at Wimbledon, Eng., from above
Aerofilms Ltd.

Wimborne Minster, town ("parish"), East Dorset district, administrative and historic county of Dorset, England, on the River Allen. Cuthburga and Cwenburh, sisters of King Ine of Wessex, founded a convent there in 718; the present minster, reputedly occupying the same site, is dedicated to St. Cuthburga and dates from 1120. The chantry and seminary, founded in 1496, were reestablished as a grammar school by royal charter of Elizabeth I (reigned 1558–1603). St. Margaret's Leper Hospital (13th century) has been converted to almshouses. Pop. (1991) 15,274.

Wimmera, region, west-central Victoria, Australia. First surveyed (1836) by Thomas Mitchell, the area was settled in the 1860s. Its generally level terrain, in the basin of the north-flowing, dissipative Wimmera River, is bounded by the Murray River on the north and the Eastern Highlands to the south and covers an area of about 9,200 square miles (23,800 square km). Receiving 15 to 25 inches (380 to 635 mm) of rainfall annually, it produces grains and supports livestock raising. Irrigated farming, largely developed since 1953 and centred on Horsham (*q.v.*), yields fruits and vegetables.

wimple, headdress worn by women over the head and around the neck, cheeks, and chin. From the late 12th until the beginning of the 14th century, it was worn extensively throughout medieval Europe, and it survived until recently as a head covering for women in religious orders.

The wimple originally was adopted as a chin veil by Western women after the crusaders

brought back from the Near East such fashions as the veil of the Muslim woman. The wimple, usually made of fine white linen or



Woman wearing a wimple in "Portrait of a Young Lady," oil portrait by Rogier van der Weyden, 1435; in the Staatliche Museen, Berlin

By courtesy of the Staatliche Museen Preussischer Kulturbesitz Gemaldegalerie Berlin

silk, framed the face and covered the neck and sometimes part of the bosom.

Winam Gulf, formerly KAVIRONDO GULF, gulf of the northeastern corner of Lake Victoria, southwestern Kenya, East Africa. It is a shallow inlet, 35 mi (56 km) long and 15 mi wide, and is connected to the main lake by a channel 3 mi wide. The port of Kisumu stands on its northeastern shore.

Winchcombe, parish, Tewkesbury district (borough), county of Gloucestershire, England, on the River Isbourne, near the Cotswolds. The site was first settled when Cenwulf, king of Mercia (reigned 796–821), founded a Benedictine abbey there in the 8th century; it was twice rebuilt before the dissolution of the monasteries (1536–38). The parish Church of St. Peter, standing on the site of a former church, is Perpendicular in style. The Cistercian abbey (1246) at Hailes, now a National Trust property, is 2 mi (3.2 km) northeast. Belas Knap, an important restored Stone Age burial mound, lies southeast. Pop. (1981 prelim.) 5,531.

Winchell, Walter, original name WALTER WINCHEL (b. April 7, 1897, New York City—d. Feb. 20, 1972, Los Angeles), U.S. journalist and broadcaster whose newspaper columns and radio broadcasts containing news and gossip gave him a massive audience and much influence in the United States in the 1930s, '40s, and '50s.

Winchell was raised in New York City, and when he was 13 he left school to go into vaudeville with Eddie Cantor and George Jessel. Then he teamed with a singer named Rita Greene (whom he later married and still later divorced) as Winchel and Greene. During this period an extra L was added to his name by accident on a theatre marquee. After two years of service in the U.S. Navy during World War I, he returned to the Winchell and Greene act. Quick-witted and inquisitive, Winchell rapidly learned personal and family background and gossip about others with him on the vaudeville circuit, and he took to posting such intelligence, neatly typed and punctuated and with often far-fetched puns, on theatre bulletin boards. One of these documents reached the publisher of *Vaudeville News,* and he became its Western correspondent. This evolved into a full-time job in 1927, and Winchell's career as a gossip columnist was launched. In 1924 he was given a show-business column, "On-Broadway," in the *New York Evening Graphic,* which he conducted for five years. He moved to the *New York Daily Mirror,* where his widely syndicated column appeared until 1963. He introduced a weekly radio program in 1932, continuing it until the early 1950s. Winchell's news reports, always very opinionated, brought him both admirers and detractors. But the reports interested millions of people, as did the Broadway idiom in which he wrote and spoke. He was viewed by authorities as one of the nation's most prolific phrase-makers.

In 1940 Winchell broke the news of Pres. Franklin D. Roosevelt's decision to seek a third term. By the 1950s he had turned arch-conservative, supporting Sen. Joseph McCarthy and noting with approval the increased blacklisting of actors, writers, and technicians in radio and television on suspicion of being Communists or Communist sympathizers. He was the friend or acquaintance of hundreds of celebrities. He served as the unseen narrator of the television drama series "The Untouchables" from 1959 to 1963.

Winchelsea, site in Rother district, county of East Sussex, England, with historical importance as a former English Channel port and as an example of medieval town planning. Old Winchelsea, reputed to have consisted of 700 houses, 50 inns, and numerous churches, was destroyed by the sea in 1287. New Winchelsea was then built by Edward I (reigned 1272–1307) on higher ground and was laid out in a grid pattern, with the Church of St. Thomas Becket at the centre. Three town gates still stand. From the 12th century Winchelsea was one of the Cinque Ports (*q.v.*). Marshes adjoin the spur on which the new town was built. Until the 15th century these were a sea inlet that provided a good harbour, but during the 16th century the inlet became silted up, destroying the port. Only a small village remains.

Winchelsey, Robert (d. 1313, Otford, Kent, Eng.), archbishop of Canterbury who was a champion of clerical privilege and a leading opponent of kings Edward I and Edward II of England.

Winchelsey became chancellor of Oxford University by 1288, and in 1293 he was elected archbishop of Canterbury. He clashed with Edward I by publishing Pope Boniface VIII's bull *Clericis Laicos* (1296) forbidding the clergy to pay taxes to lay rulers. Edward, who desperately needed money for his foreign wars, retaliated by outlawing the entire English clergy. Winchelsey remained defiant until Boniface agreed (1297) to permit clerical taxation for national defense. Further disputes arose between the King and Winchelsey, and in 1306 Pope Clement V allowed Edward to banish the Archbishop. On the accession of Edward II, Winchelsey was recalled. Nevertheless, he soon joined the baronial opposition to the royal favourite Piers Gaveston. Winchelsey was one of the lords ordainers who seized control of the administration in 1310, and two years later he excommunicated Gaveston.

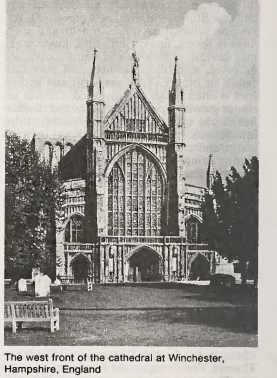
At the time of his death, Winchelsey was popularly equated with Thomas Becket, the archbishop of Canterbury martyred by King Henry II.

Winchester, district (city), in the central part of the county of Hampshire, England, best known for its cathedral. It lies in the valley of the River Itchen. Although few traces of the ancient Venta Belgarum remain, its central position in the Roman road system points to its early importance. The West Saxon episcopal see was removed there from Dorchester in the 7th century, and under the Saxon bishops and Alfred the Great (ruled 871–899) Winchester became a centre of learning. It was the seat of the Danish king Canute's government (ruled 1016–35), and several early kings, including Alfred and Canute II, were buried there. Its prosperity continued after the Norman Conquest (1066), when it benefitted from its proximity to the English Channel port of Southampton (12 mi [19 km] south), which provided a close association with the royal possessions in Normandy. One of the earliest seats of the English wool and cloth trade—its merchant guild dates to Saxon times—it gained further importance with William II's 11th-century grant to Bishop Walkelin of the Fair of St. Giles, which was maintained until the 19th century. In the 13th century, Winchester contained a large Jewish community, commemorated in the street name Jewry. During the civil wars of Stephen's reign (1135–54) the city was burned, and thereafter London, with greater geographical advantages, superseded it as England's leading city.

Winchester has grown only modestly in modern times. It remains an important agricultural market centre, and its administrative functions as the long-established county town have grown. There is little manufacturing. The residential attractiveness of Winchester has brought commuters and retired persons in increasing numbers.

The glory of the historic city is its great cathedral, the longest (556 ft [169 m]) in England. The original Saxon Cathedral Church of St. Swithun was replaced by the Norman structure of Bishop Walkelin (1070–98). The nave is Perpendicular work of the great 14th-century bishops William of Edington and William of Wykeham. The cathedral was built on piles in the alluvium of the Itchen Valley floor and has required extensive 20th-century restoration, including underpinning of its insecure foundations. Of the Norman castle, only the great hall remains. King's Gate and West Gate are surviving gateways of the medieval city wall, and there is a graceful city cross. The Hospital of St. Cross (1136) is a unique example of a medieval almshouse still maintained. Among many educational institutions the most famous is the boys' school, Winchester College, founded by William of Wykeham in 1382.

The district, with 255 sq mi (659 sq km), extends well beyond the historic cathedral town to include a broad rural area. There are army and navy establishments within the district.



The west front of the cathedral at Winchester, Hampshire, England

Howard Moore/Woodmansterne

Trout fishing is popular in the Itchen Valley. Pop. (1981 prelim.) city, 30,642; (1983 est.) district, 92,300.

Winchester, city, seat, but administratively independent, of Frederick County, northern Virginia, U.S., at the northern end of the Shenandoah Valley, 70 mi (113 km) northwest of Washington, D.C. It was founded as Fredericktown by Col. James Wood in 1744, near the site of a Shawnee Indian village, on lands belonging to Thomas, Lord Fairfax; since 1751 it has been the site of the county courthouse. Renamed in 1752 for Winchester, Eng., it served as George Washington's headquarters when he surveyed lands west of the Blue Ridge Mountains and again when he commanded Virginia troops during the French and Indian War. Washington's surveying office, which he used while constructing Ft. Loudoun (1756; a remnant remains), is now a museum. During the Civil War, Winchester changed hands repeatedly; it was the site of three important battles and served as the headquarters for generals "Stonewall" Jackson (Confederate) and Philip Sheridan (Federal).

The city, in the heart of an apple-growing region, is a processing centre. The Shenandoah Apple Blossom Festival is an annual event in April–May. Manufactures include rubber goods, plastics, steel conveyers, tin cans, and textiles. Winchester is the home of Shenandoah College and Conservatory of Music (1875) and is the birthplace of Adm. Richard E. Byrd, the polar explorer, and of the writer Willa Cather. Inc. town, 1779; city, 1874. Pop. (1990) 21,947.

Winchester, Hugh Le Despenser, earl of: *see* Despenser, Hugh Le and Hugh Le.

Winchester, Oliver Fisher (b. Nov. 30, 1810, Boston—d. Dec. 11, 1880, New Haven, Conn., U.S.), U.S. manufacturer of guns and ammunition who developed the Winchester rifle and made the Winchester Repeating Arms Company a success by the shrewd purchase and improvement of the inventions of other men.

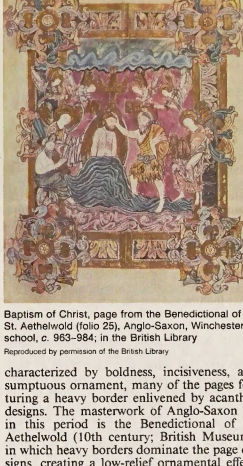
As a young man, Winchester moved to Baltimore and operated a men's furnishing store there until 1848, when he set up a factory in New Haven to manufacture dress shirts. His financial success enabled him, in 1857, to purchase the Volcanic Repeating Arms Company of New Haven, successively reorganized as the New Haven Arms Company, and, in 1867, the Winchester Repeating Arms Company.

B.T. Henry, whom he retained as plant manager and chief gun designer, had designed the lever-action Henry repeating rifle and patented it in 1860. Widely used in the Civil War, it was the forerunner of a long line of Winchester guns, including the famous Model 73, a favourite weapon of the settlers in the American West.

Winchester augmented his line by purchasing the patents of the American Repeating Rifle Company, the Spencer Repeating Rifle Company, and the bolt-action repeating rifle of Benjamin B. Hotchkiss. Winchester was also noted for his philanthropy, particularly to Yale University.

Winchester College, one of the oldest of the great public schools of England, in Winchester, Hampshire. Its formal name, St. Mary College of Winchester near Winchester, dates from 1382, when it was founded by Bishop William of Wykeham (*q.v.*) to prepare boys for his New College, Oxford, known as St. Mary College of Winchester in Oxford. The organization of the school, established as a self-governing and sovereign body, was the pattern for Henry VI's foundation at Eton College and, more generally, the pattern for other English public schools.

Winchester school, painting style of English illuminated manuscripts produced primarily at Winchester but also at Canterbury and in various southern monasteries in the 10th and early 11th centuries. The Winchester style is



Baptism of Christ, page from the Benedictional of St. Aethelwold (folio 25), Anglo-Saxon, Winchester school, *c.* 963–984; in the British Library
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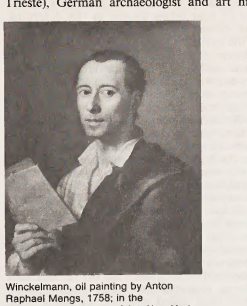
characterized by boldness, incisiveness, and sumptuous ornament, many of the pages featuring a heavy border enlivened by acanthus designs. The masterwork of Anglo-Saxon art in this period is the Benedictional of St. Aethelwold (10th century; British Museum), in which heavy borders dominate the page designs, creating a low-relief ornamental effect. The colours are rich: purple, green, gold, and blue. The limitation of the style was that it treated both ornament and figures in the same sumptuous, monumental manner. Ultimately, however, the style was modified by the influence of a contemporary trend in drawing (based on the Utrecht Psalter, *c.* 830) that featured sketchy, agitated figures. The result was a combination of the active figure style and the grand and graceful Winchester decoration, a synthesis seen in the Sacramentary of Robert of Jumièges (*c.* 1008; Rouen, Fr.).

Winckelmann, Johann (Joachim) (b. Dec. 9, 1717, Stendal, Prussia—d. June 8, 1768, Trieste), German archaeologist and art historian whose writings directed popular taste toward classical art, particularly that of ancient Greece, and influenced not only Western painting and sculpture but also literature and even philosophy.



Winckelmann, oil painting by Anton Raphael Mengs, 1758; in the Metropolitan Museum of Art, New York City
By courtesy of the Metropolitan Museum of Art, New York City, Harris Brisbane Dick Fund, 1948

Winckelmann was the son of a cobbler. His formative years were deeply influenced by the study of Greek, particularly of Homer, whom he first read in Alexander Pope's English translation. Later he studied theology at the University of Halle (1738) and medicine at the University of Jena (1741–42). But it was not until 1748, as librarian to Count von Bünau at Nöthnitz near Dresden, that he came into contact with the world of Greek art. There he wrote the formative essay, *Gedanken über die Nachahmung der griechischen Werke in der Malerei und Bildhauerkunst* (1755; *Reflections on the Painting and Sculpture of the Greeks,* 1765), in which he maintained, "The only way for us to become great, or even inimitable if possible, is to imitate the Greeks." His essay became a manifesto of the Greek ideal in education and art and was soon translated into several languages. Under the influence of the Saxon court, he embraced the Catholic faith; and, entering the service of the future cardinal Achinto, he exchanged his homeland for the city of Rome, second only to Paris as a cultural centre. There he rose to the position of librarian of the Vatican, president of Antiquities, and, later, secretary to Cardinal Albani, who had one of the great private collections of classical art. Winckelmann's position and influential patronage gave him access to the art treasures of Rome and the freedom to develop his talents as art critic and consultant to visitors from among the European nobility. His works were widely read and earned him the respect of the intellectual world of the day, including, somewhat later, the poet Goethe, who said,

> Winckelmann is like Columbus, not yet having discovered the new world but inspired by a premonition of what is to come. One learns nothing new when reading his work, but one becomes a new man!

His general *Geschichte der Kunst des Alterturns* (1764; "History of the Art of Antiquity") is virtually the first work to define in ancient art an organic development of growth, maturity, and decline; to include such cultural and technical factors as climate, freedom, and craftsmanship in explaining the art of a people; or to attempt a definition of ideal beauty. This work inaugurated the division of ancient art into periods—a pre-Phidian (or archaic), the high or sublime style of the great Greek sculptors Phidias and Polyclitus of the 5th century BC, the elegant or beautiful style of the sculptor Praxiteles and the painter Apelles (both flourishing in Greece in the 4th century BC), and the imitative period, corresponding to the Greek-tinctured Hellenistic and the Roman—that have passed into the common parlance of Greek art history. But his fame rests chiefly upon his descriptions of individual works of art, combining meticulous, firsthand observation with a warm and spontaneous style. His remarks on the Laocoön, the Apollo Belvedere, the Niobids, and the Belvedere Torso have become landmarks alike in the history of German literature and art criticism. The study of art history as a distinct discipline and of archaeology as a humane science may be said to date from Winckelmann.

His observations, however true to the spirit of Greek art, are derived almost entirely from later Hellenistic works or Roman copies of Greek masterpieces. He died short of his ambition to visit Greece, in spite of repeated invitations from his friends to undertake the somewhat hazardous venture. The world of Greek art, like the land of Greece itself, remained for him always an ideal, more of the mind than of the eye—a conception that has persisted in varying degrees to the present day.

The circumstances leading to Winckelmann's death are obscure and have given rise to much conjecture about his complex, apparently homosexual, personality. In 1768 he revisited Dresden and Vienna for the first time since his long sojourn in Italy. On his way back to Rome he was murdered at Trieste by a chance acquaintance whom he had befriended. He was buried there in the churchyard of the Cathedral of San Giusto.

The genius and writings of Winckelmann, more than of any other single critic, reawakened the popular taste for classical art and were instrumental in generating the Neoclassical movement in the arts. Winckelmann's two most influential works were the *Reflections* and the "History."

The *Reflections,* essentially a philosophical definition of the Greek aesthetic, contains his often-quoted dictum on the "noble simplicity and quiet grandeur" of Greek sculpture. It also contains a description of the Greek statue of Laocoön that profoundly influenced the German playwright and critic Gotthold Ephraim Lessing, as well as much subsequent discussion on the relation between art, literature, and the emotions. The "History," though now long antiquated, is significant for having given the study of the history of art its foundations and a scientific methodology.

Winckelmann's visits to Pompeii and Herculaneum during the early years of their discovery led to his communications in the form of "open letters," which exposed the blunders of amateur treasure seekers and helped put these excavations into competent hands. For this and his catalog of ancient gems, he has been called the "father of modern archaeology."

(M.I.W.)

BIBLIOGRAPHY. Wolfgang Leppmann, *Winckelmann* (1970), includes a list of his works and further bibliography.

Winckler, Hugo (b. July 4, 1863, Gräfenhainchen, Saxony [Germany]—d. April 19, 1913, Berlin, Ger.), German archaeologist and historian whose excavations at Boğazköy, in Turkey, disclosed the capital of the Hittite empire, Hattusa, and yielded thousands of cuneiform tablets from which much of Hittite history was reconstructed.

Winckler's primary interest was in the language and writing of the ancient Middle East. Prior to his appointment as professor of Oriental languages at the University of Berlin (1904), he had written extensively on Assyrian cuneiform and on Old Testament subjects. He also wrote a history of Babylonia and Assyria (1891) and made translations of the Code of Hammurabi and of the Amarna letters.

Under the auspices of the German Orient Society, Winckler in 1906 began excavating at Boğazköy, where he met with extraordinary success. In ruined storage chambers, very likely royal archives, that appeared to have been destroyed by a great fire, he found thousands of hardened clay tablets. Most were in an unknown language, which was later shown to be Hittite. A few, in Akkadian, included a cuneiform version of a peace treaty concluded between the Egyptian pharaoh Ramses II and the Hittite king Hattusilis, which Winckler translated.

Winckler continued excavating in cooperation with the Turkish archaeologist Theodore Makridi Bey until 1912, revealing the remains of a city whose temples, palaces, fortifications, and gateways left little doubt that this was the site of a mighty capital. From his findings, Winckler was able to draw a preliminary outline of the history of the Hittite empire in the 14th and 13th centuries BC. His accounts of his work may be found in *Vorläufige Nachrichten über die Ausgrabungen in Bog-haz Köi im Sommer 1907* (1907; abstracted as "Excavations at Boghaz-Keui in the Summer of 1907," in the Smithsonian Institution annual report for 1908 [1909]) and in *Nach Boghaskö! Ein nachgelassenes Fragment* (1913; "To Boğazköy! A Fragment Left Behind").

wind, in climatology, the movement of air relative to the surface of the Earth. Winds play a significant role in determining and controlling climate and weather.

A brief treatment of winds follows. For full treatment, *see* MACROPAEDIA: Climate and Weather.

Wind occurs because of horizontal and vertical differences (gradients) in atmospheric pressure. Accordingly, the distribution of winds is closely related to that of pressure. Near the Earth's surface, winds generally flow around regions of relatively low and high pressure—cyclones and anticyclones, respectively. They rotate counterclockwise around lows in the Northern Hemisphere and clockwise around those in the Southern Hemisphere. Similarly, wind systems rotate around the centres of highs in the opposite direction.

In the middle and upper troposphere, the pressure systems are organized in a sequence of high-pressure ridges and low-pressure troughs, rather than in the closed, roughly circular systems nearer the surface of the Earth. They have a wavelike motion and interact to form a rather complex series of ridges and troughs. The largest of the wave patterns are the so-called standing waves that have three or four ridges and a corresponding number of troughs in a broad band in middle latitudes of the Northern Hemisphere. The westerlies of the Southern Hemisphere are much less strongly affected by standing disturbances. Associated with these long standing waves are the short waves (several hundred kilometres in wavelength) called traveling waves. Such traveling waves form the upper parts of near-surface cyclones and anticyclones to which they are linked, thus guiding their movement and development.

At high latitudes the winds are generally easterly near the ground. In low, tropical, and equatorial latitudes, the northeasterly trade winds north of the intertropical convergence zone (ICZ), or thermal equator, and the southeasterly trade winds south of the ICZ move toward the ICZ, which migrates north and south with the seasonal position of the Sun. Vertically, winds then rise and create towering cumulonimbus clouds and heavy rain on either side of the ICZ, which marks a narrow belt of near calms known as the doldrums. The winds then move poleward near the top of the troposphere before sinking again in the subtropical belts in each hemisphere. From here, winds again move toward the Equator as trade winds. These gigantic cells with overturning air in each of the hemispheres in low latitudes are known as the Hadley cells. In the mid-latitudes, oppositely rotating wind systems called Ferrel cells carry surface air poleward and upper tropospheric air toward the Hadley cells. The three-dimensional pattern of winds over the Earth, known as general circulation, is responsible for the fundamental latitudinal structure of pressure and air movement and, hence, of climates.

On a smaller scale are the local winds, systems that are associated with specific geographic locations and reflect the influence of topographic features. The most common of these local wind systems are the sea and land breezes, mountain and valley breezes, foehn winds (also called chinook, or Santa Ana, winds), and katabatic winds. Local winds exert a pronounced influence on local climate and are themselves affected by local weather conditions.

Wind speeds and gustiness are generally strongest by day when the heating of the ground by the Sun causes overturning of the air, the descending currents conserving the angular momentum of high-altitude winds. By night, the gustiness dies down and winds are generally lighter.

wind-bell, also called WIND CHIME, a bell or a cluster of resonating pieces that are moved and sounded by the wind. The wind-bell has three basic forms: (1) a cluster of small pieces of metal, glass, pottery, bamboo, seashell, or wood that tinkle when blown by the wind; (2) a cluster of chimes that are rung by a central clapper, to which is attached a flat plate to catch the wind; and (3) a bell whose clapper is attached to a flat plate to catch the wind.

Although the wind-bell has existed from prehistoric times in many cultures, it received its most elegant and prolific development in east and south Asia, from Bali to Tibet and Japan, where it was often elaborately decorated, cast, or carved and was hung from the eaves of sacred structures. Buddhists especially made use of wind-bells, attaching them profusely by the hundreds or even thousands to the eaves of temples, shrines, and pagodas, causing during breezy moments an almost overwhelming volume of tintinnabulation. In Asia—and also in the ancient Mediterranean—wind-bells served to attract beneficent spirits. In China and Japan (where they are known as *feng-ling* and *fūrin,* respectively—literally "wind-bell"), they became a decorative art on private homes as well as on sacred structures, and in the 19th and 20th centuries their popular use spread more widely among Western countries.

Consult the INDEX *first*

wind-blown moss, also called FORK MOSS, any plant of the genus *Dicranum* (order Bryales), numbering several hundred species distributed primarily throughout the Northern Hemisphere. They form dense cushions on soil, logs, or rocks. More than 20 species are native to North America. The most common is *D. scoparium,* sometimes called broom moss because of its broomlike or brushlike tufts. Its erect, often forked caulids (stems) may be 5 to 12 cm (2 to 5 inches) high; the yellow or yellow-green, glossy phyllids (leaves) and long-beaked capsules (spore cases) usually point in one direction. Broom moss is sometimes used by florists for window displays.

Wind Cave National Park, national park in southwestern South Dakota, U.S., established in 1903 to preserve a series of limestone caverns and a tract of unspoiled prairie grassland in the Black Hills. The park's surface area is 28,292 acres (11,449 hectares), and the caves contain 51 miles (82 km) of explored passages. The caverns have two unusual features: a reversible wind that flows alternately in and out of the cave according to outside air pressure, which suggested the name; and beautiful rock formations called boxwork, formed by calcite deposition in unique patterns. The cave's entrance is an artificial one; the only natural entrance is a small hole in the rocks.

A game sanctuary like all national reserves, the park has antelope, deer, and even buffalo herds and many species of birds. Vegetation, besides the grassland, includes deciduous and coniferous trees, cactus and other arid-type plants, and wildflowers.

wind chill, also spelled WINDCHILL, also called WIND CHILL FACTOR, a measure of the rate of heat loss from skin that is exposed to the air. It is based on the fact that, as wind speeds increase, the heat loss also increases, making the air "feel" colder. Wind chill is usually reported as a "wind chill temperature" or "wind chill equivalent," that is, the temperature under calm air at which heat loss would be equal to the loss actually being experienced because of higher wind speeds. For example, as is shown in the Celsius wind chill chart, a temperature of −25° C in calm air

would have a wind chill temperature equal to the actual air temperature. Under these conditions, exposed skin would freeze in 30 minutes. At a wind speed of 40 km per hour, however, the wind chill temperature would be −41° C, and skin would freeze in less than 10 minutes.

Celsius

wind speed (kph) \ temperature (°C)	calm	0	−5	−10	−15	−20	−25	−30	−35	−40
calm										
10	3	−3	−9	−15	−21	−27	−33	−39	−45	−51
20	1	−5	−12	−18	−24	−31	−37	−43	−49	−56
30	0	−7	−13	−20	−26	−33	−39	−46	−52	−59
40	−1	−7	−14	−21	−27	−34	−41	−48	−54	−61
50	−2	−8	−15	−22	−29	−35	−42	−49	−56	−63
60	−2	−9	−16	−23	−30	−37	−43	−50	−57	−64
70	−2	−9	−16	−23	−30	−37	−44	−51	−59	−66
80	−3	−10	−17	−24	−31	−38	−45	−52	−60	−67
90	−3	−10	−17	−25	−32	−39	−46	−53	−61	−68
100	−3	−11	−18	−25	−32	−40	−47	−54	−61	−69

wind chill (°C) = 13.12 + 0.6215T − 11.37($V^{0.16}$) + 0.3965T($V^{0.16}$)

T = air temperature (°C) V = wind speed (kph)

Fahrenheit

wind speed (mph) \ temperature (°F)	calm	40	35	30	25	20	15	10	5	0	−5	−10	−15	−20	−25	−30	−35	−40
calm																		
5		36	31	25	19	13	7	1	−5	−11	−16	−22	−28	−34	−40	−46	−52	−57
10		34	27	21	15	9	3	−4	−10	−16	−22	−28	−35	−41	−47	−53	−59	−66
15		32	25	19	13	6	0	−7	−13	−19	−26	−32	−39	−45	−51	−58	−64	−71
20		30	24	17	11	4	−2	−9	−15	−22	−29	−35	−42	−48	−55	−61	−68	−74
25		29	23	16	9	3	−4	−11	−17	−24	−31	−37	−44	−51	−58	−64	−71	−78
30		28	22	15	8	1	−5	−12	−19	−26	−33	−39	−46	−53	−60	−67	−73	−80
35		28	21	14	7	0	−7	−14	−21	−27	−34	−41	−48	−55	−62	−69	−76	−82
40		27	20	13	6	−1	−8	−15	−22	−29	−36	−43	−50	−57	−64	−71	−78	−84
45		26	19	12	5	−2	−9	−16	−23	−30	−37	−44	−51	−58	−65	−72	−79	−86
50		26	19	12	4	−3	−10	−17	−24	−31	−38	−45	−52	−60	−67	−74	−81	−88
55		25	18	11	4	−3	−11	−18	−25	−32	−39	−46	−54	−61	−68	−75	−82	−89
60		25	17	10	3	−4	−11	−19	−26	−33	−40	−48	−55	−62	−69	−76	−84	−91

wind chill (°F) = 35.74 + 0.6215T − 35.75($V^{0.16}$) + 0.4275T($V^{0.16}$)

T = air temperature (°F) V = wind speed (mph

frostbite times: 30 minutes; 10 minutes; 5 minutes

Matching a specific air temperature (columns) with a wind speed (rows) will show the wind chill equivalent and the approximate time to frostbite

wind instrument, musical instrument that uses air as a primary vibrating medium for the production of sound. In the West, wind instruments help make up the second section of the orchestra and have been traditionally divided into woodwinds (clarinet, oboe, flute, and saxophone) and brass (trumpet, trombone, French horn, and tuba). This system, however, is not consistent (saxophones are made of brass, and flutes can be made of silver or gold) and does not take into account the method of sound production.

A brief treatment of wind instruments follows. For full treatment, *see* MACROPAEDIA: Musical Instruments.

According to the classification of Hornbostel and Sachs (1914), now widely accepted by organologists, winds, or aerophones, may be divided into free aerophones (bull-roarer, ribbon reed, orchestral whip, mouth organ, accordion, and a reed stop on an organ), which do not contain the vibrating air, and wind instruments proper, which contain the air. Wind instruments proper are subdivided into edge instruments (flute and open flue organ stop), trumpets (lip-vibrated instruments), and reed-pipes (single- or double-reeds).

The category of free aerophones includes some of the oldest musical instruments. The bull-roarer may date back about 25,000 years and in most cultures is associated with the supernatural. It consists of a thin piece of wood, bone, or ivory attached to a long cord. The instrument is swung around the player's head, causing the disk to rotate on its axis and produce tone. The mouth organ is classified as a free aerophone with sets of free reeds. This family includes modern harmonicas and melodicas as well as the ancient Oriental types, the Chinese *sheng,* the Japanese *shō,* and the southeast Asian *khäen.* These Asian instruments consist of a gourd or wooden windchest from which a clustered set of long bamboo tubes extend, each enclosing a reed.

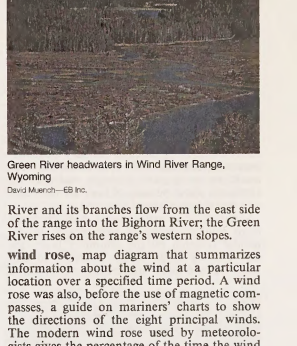
The most common edge instrument is the flute. The Western orchestral version is side-blown (transversely), but many folk and non-Western types are end-blown (extending outward from the face)—for example, the Middle Eastern *nāy* and the Swazi *umtshingo.* Sets of end-blown flutes are known as panpipes. These may be arranged in the form of a bundle or a raft (with one or two rows of pipes) or fashioned from a single block of pottery. Panpipes are common in Latin America, Asia, and the Pacific Islands. Fipple flutes (also called whistle flutes, or duct flutes) have an internal plug that focuses a thin stream of air against a hard edge. Some, like the European recorder, have a beak-shaped mouthpiece. Double and triple fipple flutes are common in Latin America and eastern Europe. One pipe is usually unfingered and serves as a drone, while the melody is played on the remaining pipe (or pipes). Ocarinas and vessel flutes are globular rather than tubular and may have fingerholes and a mouthpiece.

Trumpets are one of the most diverse types of wind instrument; they range from the sophisticated orchestral valve trumpet, French horn, tuba, and slide trombone to simple conch-shell trumpets of Asia and the Pacific and natural ivory and horn trumpets of Africa. For all of these instruments the sound is produced by an airstream passing through the player's vibrating lips, and for this reason some organologists refer to this family as lip reeds. Long trumpets such as the Swiss alphorn, the Tibetan Buddhist *dung-chen,* and the South American bark trumpet are traditionally used for signaling across long distances.

Reed pipes that have a single beating reed, usually made of dried and scraped bamboo cane, are collectively known as clarinets. They include the orchestral clarinet, saxophone, and basset horn. Clarinets are found in Europe, northern and western Africa, and South America. Double-reed instruments are generically referred to as shawms or oboes. Shawms are found throughout the world, for example, the Middle Eastern *zūrnā,* the Indian *shahnāī,* the Chinese *so-na,* and the Thai *pī-nai,* the last unusual because it has a quadruple reed made of dried palm leaf. Western types include the Renaissance cornemuse, crumhorn, and racket and the modern oboe, English horn, and bassoon.

Wind River, river in west-central Wyoming, U.S. It rises in several branches at the northern edge of the Wind River Range in the Shoshone National Forest and flows generally southeast past Dubois through the Wind River Indian Reservation to Riverton, where, after a course of 110 miles (177 km), it joins the Popo Agie River. The combined streams continue through Boysen Reservoir and Wind River Canyon to Thermopolis (hot springs) to form the Bighorn River. Wind River Dam, impounding Boysen Reservoir 35 miles (56 km) northwest of Riverton, is part of the Riverton power and irrigation project. The river was named for the prevailing strong northwesterly wind currents that sweep its valley between the Shoshone and Wind River mountain ranges.

Wind River Range, mountain range in the central Rocky Mountains, west-central Wyoming, U.S. The range extends for 100 miles (160 km) northwest–southeast to the Sweetwater River and is part of the Continental Divide. The range contains many peaks above 12,000 feet (3,658 m), including Mount Warren (13,720 feet [4,182 m]), Fremont Peak (13,730 feet [4,185 m]), and the highest point in Wyoming, Gannett Peak (13,804 feet [4,207 m]). In the north is Togwotee Pass (9,662 feet [2,945 m]), and at the southern end of the range is the historic South Pass (7,743 feet [2,360 m]), through which ran the old Oregon Trail. Parts of Bridger and Shoshone national forests and Wind River Indian Reservation are included in the range. The Wind River and its branches flow from the east side of the range into the Bighorn River; the Green River rises on the range's western slopes.



Green River headwaters in Wind River Range, Wyoming
David Muench—EB Inc.

wind rose, map diagram that summarizes information about the wind at a particular location over a specified time period. A wind rose was also, before the use of magnetic compasses, a guide on mariners' charts to show the directions of the eight principal winds. The modern wind rose used by meteorologists gives the percentage of the time the wind blows from each direction during the observation period; it sometimes shows the strengths of these winds and the percentage of the time calm air or light winds are observed. This wind rose usually has eight radiating lines, whose lengths are proportional to wind frequency, and shows wind strength by the thickness of the lines or by feathers attached to them. The frequency of calm or nearly calm air is given as a number in the centre.

The earliest-known wind roses appeared on navigation charts used in the 13th century by Italian and Spanish sailors. The eight points were marked with the initials of the principal

winds; sometimes the east point had a cross, and the north point had a fleur-de-lis. When the magnetic compass began to be used in navigation, the wind rose was combined with it and used as a compass card.

wind scorpion: *see* sunspider.

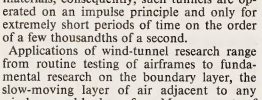
wind shear, rate of change of wind velocity with distance perpendicular to the wind direction. A very narrow zone of abrupt velocity change is known as a shear line. Wind shear is observed not only near the ground but also in jet streams, where it may be associated with clear-air turbulence. Vertical wind shear is closely associated with the vertical flux of momentum, heat, and water vapour.

wind tunnel, device for producing a controlled stream of air in order to study the effects of movement through air or resistance to moving air on models of aircraft and other machines and objects. Provided that the airstream is properly controlled, it is immaterial whether the stationary model under testing is designed to move through the air, as an aircraft, or to withstand wind pressures while standing in place, as a building.

In open-ended wind tunnels of the early 20th century, air traveled slowly through a large-bore section of the tunnel, was accelerated in the nozzlelike test section, and slowed again in the large-bore diffuser section before being released into the atmosphere. Because little control could be exercised over the pressure, temperature, and humidity of the air in such an open-circuit tunnel, it was supplanted by a closed-circuit design in which air blown through the test section was contained in the circular or rectangular tunnel, passed through fans, and cycled back to the test section with the aid of turning vanes. Air velocity is controlled by changing the speed of the rotating fans or by adjusting the angle of the fan blades. In high-velocity tunnels, water-cooling systems are installed in the low-speed sections to cool the recycled air.

Wind tunnels are classified as low-speed or high-speed; they are further classified as subsonic (80 percent of the speed of sound), transonic (about the speed of sound), supersonic (up to 6 times the speed of sound), hypersonic (6 to 12 times the speed of sound), and hypervelocity (over 12 times the speed of sound). To duplicate temperatures of flight at speeds of 10,000 miles (16,000 km) per hour and more, the test air must be heated well above the melting point of ordinary structural materials; consequently, such tunnels are operated on an impulse principle and only for extremely short periods of time on the order of a few thousandths of a second.

Applications of wind-tunnel research range from routine testing of airframes to fundamental research on the boundary layer, the slow-moving layer of air adjacent to any wind-exposed body surface. Measurements of



General arrangement of a closed-circuit wind tunnel

air pressure and other characteristics at many points on the model yield information about how the total wind load is distributed on the structure.

Windau (Latvia): *see* Ventspils.

Windaus, Adolf (b. Dec. 25, 1876, Berlin, Ger.—d. June 9, 1959, Göttingen, W.Ger.), German organic chemist, winner of the Nobel Prize for Chemistry in 1928 for research on substances, notably vitamin D, that play important biological roles.

Windaus switched from medical to chemical studies. After receiving his Ph.D. from the University of Freiburg (1899), he held positions there and at Innsbruck, Austria, before his appointment as head of the chemical institute at the University of Göttingen (1915–44). His work establishing the structure of cholesterol, begun in 1901, spanned some 30 years. This work was part of his study of the complex alcohols known as sterols. In attempting to discover whether cholesterol was transformed into vitamin D by ultraviolet radiation, he discovered the chemical precursor of the vitamin, 7-dehydrocholesterol. His research also helped establish the chemistry of the sex hormones and advanced the development of drugs used to treat heart ailments.

Windermere, lake, largest in England, in the southeastern part of the Lake District, in the county of Cumbria. The lake is 10.5 miles (17 km) long and 1 mile (1.6 km) wide; its area is 6 square miles (16 square km). It lies in two basins, separated by a group of islands opposite the town of Bowness on the eastern shore, and is drained by the River Leven. Part of the Lake District National Park, Windermere is a popular tourist centre with facilities for yachting and steamers operating in the summer. The town of Windermere is adjacent to Bowness.


Windermere, Cumbria
Julie Fryer/Bruce Coleman Ltd.

windflower: *see* anemone.

Windhoek, town, capital of Namibia, located roughly in the centre of the country. It lies at an elevation of 5,428 feet (1,654 m) and is about 400 miles (650 km) north of the Orange River and 760 miles (1,225 km) north of Cape Town, S.Af. The town is surrounded by dry, arid country, but a circular chain of hills protects it from excessive dry winds. Before European settlement began, the town was known as Aigams, meaning "hot water," in reference to the hot springs in the region. The area was initially settled by Khoikhoin and Herero peoples. In 1890 the site of the present town was claimed for the German government. In 1915 South African forces occupied Windhoek and initiated their claim for the country, then known as South West Africa. When Namibia became independent in 1990, Windhoek transformed from a territorial capital into a national capital.

Windhoek is the main commercial centre of Namibia, being linked by road and railway to the port of Walvis Bay and to South Africa. It is located in the midst of Karakul grazing lands (for Persian lamb), and a number of furriers who process and transport the pelts are located in the town. The processing of cattle and sheep is also an important industry. There are administration buildings, a state museum, and secondary schools, including the large African Augustinian High School. An international airport serves Johannesburg and Cape Town. Pop. (1997 est.) 169,000.

windmill, device for tapping the energy of the wind by means of sails mounted on a rotating shaft. The sails are mounted at an angle or are given a slight twist so that the force of wind against them is divided into two components, one of which, in the plane of the sails, imparts rotation.

Like waterwheels, windmills were among the original prime movers that replaced human beings as a source of power. The use of windmills was increasingly widespread in Europe from the 12th century until the early 19th century. Their slow decline, because of the development of steam power, lasted for a further 100 years. Their rapid demise began following World War I with the development of the internal-combustion engine and the spread of electric power; from that time on, however, electrical generation by wind power has served as the subject of more and more experiments.

The earliest-known references to windmills are to a Persian millwright in AD 644 and to windmills in Seistan, Persia, in AD 915. These windmills are of the horizontal-mill type, with sails radiating from a vertical axis standing in a fixed building, which has openings for the inlet and outlet of the wind diametrically opposite to each other. Each mill drives a single pair of stones directly, without the use of gears, and the design is derived from the earliest water mills. Persian millwrights, taken prisoner by the forces of Genghis Khan, were sent to China to instruct in the building of windmills; their use for irrigation there has lasted ever since.

The vertical windmill, with sails on a horizontal axis, derives directly from the Roman water mill with its right-angle drive to the stones through a single pair of gears. The earliest form of vertical mill is known as the post mill. It has a boxlike body containing the gearing, millstones, and machinery and carrying the sails. It is mounted on a well-supported wooden post socketed into a horizontal beam on the level of the second floor of the mill body. On this it can be turned so that the sails can be faced into the wind.

The next development was to place the stones and gearing in a fixed tower. This has a movable top, or cap, which carries the sails and can be turned around on a track, or curb, on top of the tower. The earliest-known illustration of a tower mill is dated about 1420. Both post and tower mills were to be found throughout Europe and were also built by settlers in America.

To work efficiently, the sails of a windmill must face squarely into the wind, and in the early mills the turning of the post-mill body,

or the tower-mill cap, was done by hand by means of a long tailpole stretching down to the ground. In 1745 Edmund Lee in England invented the automatic fantail. This consists of a set of five to eight smaller vanes mounted on the tailpole or the ladder of a post mill at right angles to the sails and connected by gearing to wheels running on a track around the mill. When the wind veers it strikes the sides of the vanes, turns them and hence the track wheels also, which turn the mill body until the sails are again square into the wind. The fantail may also be fitted to the caps of tower mills, driving down to a geared rack on the curb.

The sails of a mill are mounted on an axle, or windshaft, inclined upward at an angle of from 5° to 15° to the horizontal. The first mill sails were wooden frames on which sailcloth was spread; each sail was set individually with the mill at rest. The early sails were flat planes inclined at a constant angle to the direction of rotation; later they were built with a twist like that of an airplane propeller.

In 1772 Andrew Meikle, a Scot, invented his spring sail, substituting hinged shutters, like those of a Venetian blind, for sailcloths and controlling them by a connecting bar and a spring on each sail. Each spring had to be adjusted individually with the mill at rest according to the power required; the sails were then, within limits, self-regulating.

In 1789 Stephen Hooper in England utilized roller blinds instead of shutters and devised a remote control to enable all the blinds to be adjusted simultaneously while the mill was at work. In 1807 Sir William Cubitt invented his "patent sail" combining Meikle's hinged shutters with Hooper's remote control by chain from the ground via a rod passing through a hole drilled through the windshaft; the operation was comparable to operating an umbrella; by varying the weights hung on the chain the sails were made self-regulating.

The annular-sailed wind pump was brought out in the United States by Daniel Hallady in 1854, and its production in steel by Stuart Perry in 1883 led to worldwide adoption, for, although inefficient, it was cheap and reliable. The design consists of a number of small vanes set radially in a wheel. Governing is automatic: of yaw by tail vane, and of torque by setting the wheel off-centre with respect to the vertical yaw axis. Thus, as the wind increases the mill turns on its vertical axis, reducing the effective area and therefore the speed.

The most important use of the windmill was for grinding grain. In certain areas its uses in land drainage and water pumping were equally important. The windmill has been used as a source of electrical power since P. La Cour's mill, built in Denmark in 1890 with patent sails and twin fantails on a steel tower. Interest in the use of windmills for the generation of electric power, on both single-user and commercial scales, revived in the 1970s.

window, opening in the wall of a building for the admission of light and air; windows are often arranged also for the purposes of architectural decoration. Since early times, the openings have been filled with stone, wooden, or iron grilles or lights (panels of glass or other translucent material such as mica or, in the Far East, paper. Modern windows are almost always filled with glass, though a few use transparent plastic. A window in a vertically sliding frame is called a sash window: a single-hung sash has only one half that moves; in a double-hung sash, both parts slide. A casement window (*q.v.*) opens sideward on a hinge.

Windows are a very ancient invention, probably coincident with the development of fixed and enclosed houses. Representations of windows occur in early wall paintings in Egypt and in reliefs from Assyria. The Egyptian examples show openings in house walls covered with mattings, like the doors themselves. Assyrian windows were almost always wider than they were high and were subdivided by little colonnettes.

The devotion of the ancient Greeks to the house built around a court led to an almost total disappearance of windows in their architecture, since each room was lighted by a door to the central, colonnaded court. In Roman imperial times, however, the glazed window first definitely appeared, and fragments of glass in a bronze frame have been found in Pompeii, among other sites. It is obvious, moreover, that the great windows in the baths of Rome must have been enclosed in some way, in order to retain the heat. The general hypothesis is that these great clerestory openings were filled, originally, with frames of bronze which subdivided the whole into small areas, each of which held a pane of glass. In general, however, glazed windows were very exceptional in Roman times; marble, mica, and shell were most often used to fill window openings.

In Early Christian and Byzantine churches, windows became more numerous and were often glazed. Thus, it is known that the windows of Hagia Sophia at Constantinople (begun 532) were filled with pierced marble frames enclosing panes of glass. Islāmic mosque builders copied this Byzantine technique of small pieces of glass inserted in a masonry frame and, by substituting cement for marble in the frame, obtained great freedom and richness in pattern design, so that with the use of different colours of glass in the small openings, brilliant effects were produced. Islāmic builders of Egypt and Syria also developed an extremely rich type of domestic window that was usually unglazed. This consisted of a projecting, bracketed, framework of wood with its sides entirely filled by intricate grillwork formed by carved, turned, wooden spindles. It was not until the 12th and 13th centuries in western and northern Europe, however, that this stained-glass technique reached its most distinguished development. Instead of marble or cement, European glaziers used strips of lead, called cames, to separate the different pieces of coloured glass. Because of the softness of the lead, the cames could be shaped into any pattern. Thus, it was possible to adorn the windows of Gothic cathedrals with detailed pictorial designs. Moreover, with the introduction of stone mullions (slender vertical supports that form a division between glazed areas) and a system of tracery in about 1250, church windows became increasingly larger.

The arch-shaped window, which during the Byzantine period had superseded the segmental and square-headed window common in Roman work, became the governing form for important masonry buildings in medieval European and Islāmic architecture. Domestic windows were most often rectangular and were closed with shutters, lattices, or grilles. During the late Middle Ages in Europe, however, the growing cheapness of glass and the development of the fixed glazed sash resulted in a gradual increase in the number of glazed windows in domestic and civil buildings. Because the sashes were small, the desire for light and air was satisfied by the use of mullions and transoms (horizontal supports) to subdivide large window openings. Initially, sashes were set only in the upper portion of the window, with the lower portion still closed with shutters. By the 15th century, however, solid shutters were being replaced by hinged glazed sashes, or casements, which led to the standard use of rectangular openings in all buildings because of the ease with which the casements could be framed in them.

During the High Renaissance in Italy and France, window openings conformed to classical proportions and were divided by a single mullion and a single transom forming a cross. They were frequently decorated with an architrave, and a cornice and pediment. Pilasters and columns were often added at the sides. During the Baroque period these decorative window enclosures were often elaborately scrolled and ornamented with fantastic cartouches, consoles, masks, and human figures.

In the later Renaissance the French produced and developed the type of large casement window that has remained the accepted form on the continent of Europe ever since—popularly known as the French window. In this type of casement window the opening is long—frequently extending down to the floor—and comparatively narrow and is glazed with two large, hinged, wooden sashes, arranged to swing in, each subdivided into three or more lights of comparatively large size. An iron railing or stone balustrade is built on the outside for safety. In the 17th century the vertical sliding sash window and the double-hung window were developed in England, becoming standard in that country and in the United States during the 18th and 19th centuries.

In modern architecture the impact of industry on many processes of contemporary building has led to the use of metal frames for windows in most residential construction, and it has made possible the use of ever greater areas of glass. Windows are often wall to wall and floor to ceiling, and frequently when the building is air-conditioned they no longer have opening sash members. Shop windows and other similar large glass areas are, in fact, both wall and window, and to withstand wind pressures they must be of a prescribed thickness per square foot of exposed area. Skyscrapers have been covered completely in glass; though at first these window sidings were simply "curtain walls" or unopenable windows, subsequent energy-saving requirements made necessary the use of openable and often tinted sections of these glass walls. Modern windows are often made with double or triple thicknesses of glass separated by air space for insulation; these are called double- or triple-glazed windows.

Window Rock, capital of the extensive Navajo Indian Reservation, Apache county, northeastern Arizona, U.S. It lies 23 miles (37 km) northwest of Gallup, N.M. Established in 1936 as the Central Agency Headquarters to consolidate the many Indian agencies scattered throughout the reservation (which overlaps into New Mexico and Utah), the town was named for the huge wind-eroded opening in the sandstone cliffs that overlook the administrative buildings from the north. The focal point is the octagonal Navajo Council House where the tribal council meets. Pop. (1990) 3,306.

window-winged moth, any of the several hundred species of tropical insects constituting the family Thyrididae (order Lepidoptera). They are generally dark-coloured and small to medium-sized, with a wingspan of from 10 to 30 mm (0.4 to 1.2 inches). The middle area of each wing usually has a characteristic translucent yellow or whitish area of exposed membrane, hence the name window. Larvae are leaf rollers; *i.e.,* they live within a tunnel formed by spinning together the edges of a leaf. For pupation they make a cocoon on the ground. Some authorities consider the Thyrididae to be closely related to ancestral butterflies.

windrower, self-propelled or tractor-drawn farm machine for cutting grain and laying the stalks in windrows for later threshing and cleaning. The modern descendant of the header, the windrower is used to harvest grain in parts of the United States, Canada, and the "new lands" in Siberia in which certain

conditions, such as high moisture content and uneven ripening, make direct combine harvesting impractical. Because grain cut by windrowers dries to a moisture content suitable for threshing, harvesting may be done a week or 10 days earlier than by combine, reducing grain losses considerably.

A windrower usually consists of a cutter bar driven by an engine or powered by a shaft from the tractor, a reel to sweep the grain onto



A windrower in operation
By courtesy of International Harvester Co.

a platform, and a canvas conveyor to carry it to one side and deposit it in a windrow for drying.

Winds, Tower of the, also called HOROLOGIUM, Greek HOROLOGION ("Timepiece"), building in Athens erected about 100–50 BC by Andronicus of Cyrrhus for measuring time. Still standing, it is an octagonal marble structure, 42 feet (12.8 m) high and 26 feet (7.9 m) in diameter. The building's eight sides, which face points of the compass, are decorated with a frieze of figures in relief representing the winds; below it, on the sides facing the sun, are the lines of a sundial. The Horologium was surmounted by a weathervane in the form of a bronze Triton and contained a water clock (clepsydra) to record the time when the sun was not shining.

Windscale, nuclear reactor facility and plutonium production plant in the county of Cumberland (now part of Cumbria), in northwestern England, that in 1957 was the site of the United Kingdom's most serious nuclear power accident. The Windscale plant consisted of two gas-cooled nuclear reactors. The accident occurred on Oct. 8, 1957, when a routine heating of the No. 1 reactor's graphite control blocks got out of control, causing adjacent uranium cartridges to rupture. The uranium thus released began to oxidize, releasing radioactivity and causing a fire that burned for 16 hours before it was put out. The fire left about 10 tons of radioactive fuel melted in the reactor core. The fire also caused the release of sizable amounts of radioactive iodine into the atmosphere. As a consequence, the government banned the sale of milk produced in a 200-square-mile (500-square-kilometre) area around the reactor site for several weeks. At the time the British government released only sketchy details of the accident and in general tried to minimize its seriousness. The contaminated Windscale reactor was subsequently sealed until a cleanup of it was begun in the late 1980s.

Windsor, town, part of the Richmond-Windsor urban area, New South Wales, Australia, on the Hawkesbury River. In 1794, Major Francis Grose, then acting governor, placed 22 settlers in the riverside district known as Green Hills. In 1810 Governor Lachlan Macquarie founded a township (named for Windsor, Eng.) above flood level on higher ground. The modern town has several buildings dating from the period of initial settlement in the early 19th century. Hawkesbury Agricultural College at Richmond was founded in 1888; the School of Arts, in 1861; and the National School, in 1870. Windsor's manufactures include clothing and plastics. Many workers commute to Sydney, 30 miles (50 km) southeast. Windsor was proclaimed a municipality in 1871. Pop. (2001 prelim.) including Richmond, 21,050.

Windsor, town, seat of Hants county, Nova Scotia, Canada. It lies at the confluence of the Avon and St. Croix rivers, 41 miles (66 km) northwest of Halifax. The site was settled as Piziquid by the French in 1703. Fort Edward was built in 1750 by Major Charles Lawrence to protect British property, and in 1755 the French Acadians were deported from the area. Loyalist families from New England moved in shortly afterward, and in 1764 the community was renamed after Windsor, Eng. It became a port for shipping gypsum from nearby quarries to the United States. The Bay of Fundy tides of its harbour, an inlet of Minas Basin, range from 60 feet (18 m) at high water (ample for oceangoing vessels) to almost no water at low tide. The town's chief manufactures are lumber products, textiles, fertilizers, insecticides, ground limestone, rock wool, and plaster. Inc. 1878. Pop. (2001) 3,778.

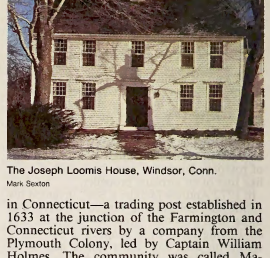
Windsor, city, seat of Essex county, southern Ontario, Canada. Windsor is situated on the left (south) bank of the Detroit River, opposite Detroit, Mich. Settled by French farmers shortly after 1701, when a fort was established at Detroit, the city was known as "the Ferry" and later as Richmond before it was renamed in 1836 for Windsor (New Windsor), Eng. Because of Windsor's strategic location on a navigable waterway opposite the heart of Detroit, the city soon developed into both an important railway terminal and a Great Lakes port, attracting many industries, including several large U.S. branch industrial plants. It annexed the adjoining cities of East Windsor, Walkerville, and Sandwich in 1935 and Riverside in 1966.

The city is a commercial and manufacturing centre serving a rich farming area that produces fruits, vegetables, corn (maize), soybeans, grain, tobacco, and potatoes. Manufactures include motor vehicles and parts, foods and beverages, medicinal and pharmaceutical preparations, salt, industrial machinery, and other iron and steel products. Windsor is also Canada's leading port of entry from the United States; two tunnels, car ferries, and a suspension bridge connect it with Detroit. The city is the site of the University of Windsor, founded in 1963 when Assumption College (1857) federated into a university, and of St. Clair College of Applied Arts and Technology. Fort Malden National Historic Park is 16 miles (26 km) south. Inc. village, 1854; town, 1858; city, 1892. Pop. (2001) city, 208,402; metropolitan area, 307,877.

Windsor, also called NEW WINDSOR, locality, Windsor and Maidenhead district, county of Berkshire, England. Windsor is situated on the south bank of the River Thames and lies to the west of London. The modern town is dominated by the royal castle (*see* Windsor Castle) standing on the outcrop of chalk on which William I the Conqueror (reigned 1066–87) built the original fortress. The castle is in regular occupation as a royal residence and is a conspicuous landmark for travelers approaching nearby Heathrow Airport. A succession of town charters dates from 1277 to 1685.

Windsor is today a residential and local service centre, with many commuters to London and to nearby Slough. It has a variety of light metal industries and printing. Almost surrounding the town is the great royal park where, from Saxon times, the kings hunted. Nearby are Eton College and Ascot racecourse. Pop. (1991) Windsor-Eton, 30,136.

Windsor, town (township), northern suburb of Hartford, northern Connecticut, U.S. It was the site of the first English settlement



The Joseph Loomis House, Windsor, Conn.
Mark Sexton

in Connecticut—a trading post established in 1633 at the junction of the Farmington and Connecticut rivers by a company from the Plymouth Colony, led by Captain William Holmes. The community was called Matianuck until 1635, when it was permanently settled by Puritans from Dorchester, Mass. In 1637 it was renamed Windsor for the royal English borough. Windsor (which was never officially incorporated) originally comprised a much larger area, which included the present townsites of Windsor Locks, East Windsor, South Windsor, Simsbury, Bloomfield, and Ellington. Several colonial buildings remain in the town, including the Joseph Loomis House, near which a boulder marks the spot where the first colonists settled. After 1950 the town's traditional farm economy was augmented by light industrial development. Pop. (2000) 28,237.

Windsor, HOUSE OF, formerly (1901–17) SAXE-COBURG-GOTHA, OF SAXE-COBURG AND GOTHA, the royal house of the United Kingdom, which succeeded the house of Hanover on the death of its last monarch, Queen Victoria, on Jan. 22, 1901. The dynasty has included Edward VII (reigned 1901–10), George V (1910–36), Edward VIII (1936), George VI (1936–52), and Elizabeth II (1952–). The heir apparent is Charles, Prince of Wales.

The dynastic name of Saxe-Coburg-Gotha (German: Sachsen-Coburg-Gotha, or Sachsen-Coburg und Gotha) was that of Victoria's German-born husband, Albert, prince consort of Great Britain and Ireland. Their eldest son was Edward VII. During the anti-German atmosphere of World War I, George V declared by royal proclamation (July 17, 1917) that all descendants of Queen Victoria in the male line who were also British subjects would adopt the surname of "Windsor."

Queen Elizabeth II's children would normally have borne their father's surname, Mountbatten (which itself had been anglicized from "Battenberg"). In 1952, soon after her accession, however, she declared in council that her children and descendants would bear the surname Windsor. This decision was modified (Feb. 8, 1960) to the effect that issue other than those styled prince or princess and royal highness should bear the name Mountbatten-Windsor.

Windsor, Alice de: *see* Perrers, Alice.

Windsor, Prince Edward, Duke of: *see* Edward VIII *under* Edward (England and the United Kingdom).

Windsor, Wallis Warfield, Duchess of, *née* BESSIE WALLIS WARFIELD, also called (1916–27) WALLIS WARFIELD SPENCER, or (1928–37) WALLIS WARFIELD SIMPSON (b. June 19, 1896, Blue Ridge Summit, Pa., U.S.—d.

April 24, 1986, Paris, France), American socialite who became the wife of Prince Edward, Duke of Windsor (Edward VIII), after the latter had abdicated the British throne in order to marry her.

Born into an old established American family, Warfield moved in Baltimore social circles and married an American naval aviator, Earl Winfield Spencer, Jr., in 1916; they were divorced in 1927. In 1928 she married the Briton Ernest Aldrich Simpson, with whom she moved to London. Wallis Simpson met Edward, then the Prince of Wales, while moving in fashionable British society. The two became friends and gradually fell in love. Wallis sued for divorce from her second husband in July 1936, with the apparent intention of marrying Edward (who had become King Edward VIII), but as a woman twice divorced she was socially and politically unacceptable as a prospective British queen. Edward renounced the British throne on Dec. 10, 1936 (confirmed by the Declaration of Abdication Act the following day), in order to marry Simpson. In referring to the reason for his abdication, he said in a famous radio broadcast: "I have found it impossible to carry the heavy burden of responsibility and to discharge my duties as king, as I wish to do, without the help and support of the woman I love."

He became the Duke of Windsor, and they were married on June 3, 1937, after she had received her divorce; Wallis thus became the Duchess of Windsor. The couple remained happily married and lived largely in France after World War II. She had a sense of fashion and style; credited to her is the phrase "One can never be too rich or too thin."

Windsor and Maidenhead, district and royal borough, county of Berkshire, southern England, located about 40 miles (64 km) west of central London. The district is bordered on the northwest and bisected in the northeast by the River Thames.

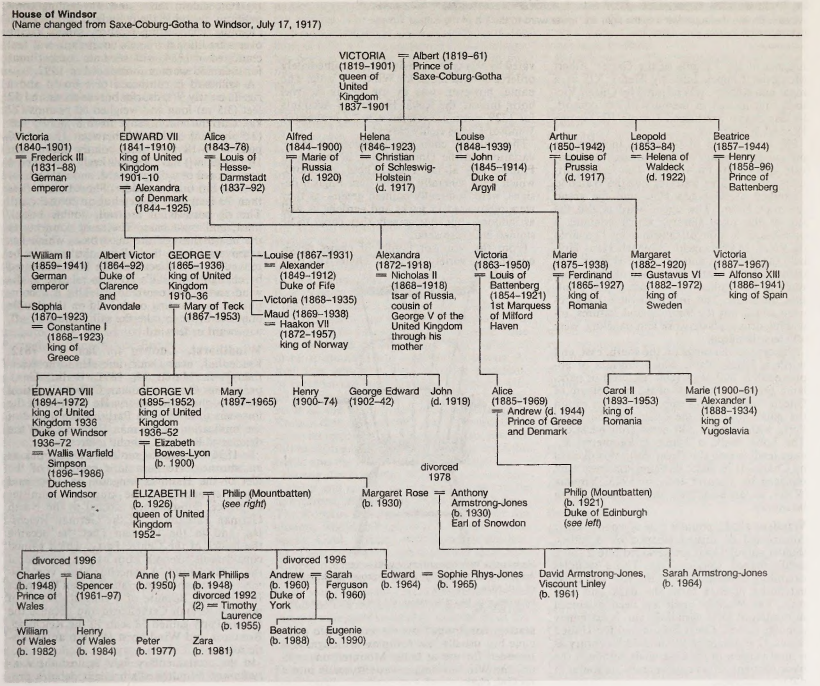
The district contains the ancient towns of Windsor and Maidenhead, as well as Windsor Castle, long-time residence of British royalty. Its numerous historical structures, as well as scenic stretches of the Thames near Maidenhead, attract many tourists.

A border of chalk hills fronts the river near the town ("parish") of Cookham in the northwest. The district is not particularly productive agriculturally, but the sandy and clay soils of the valley support a growth of heath, parkland (*e.g.,* Windsor Great Park), and Windsor Forest. Eton town and college lie across the Thames from Windsor, and the entirety is a historical conservation area. Maidenhead is the district seat. Area 76 square miles (198 square km). Pop. (1991 prelim.) 128,700.

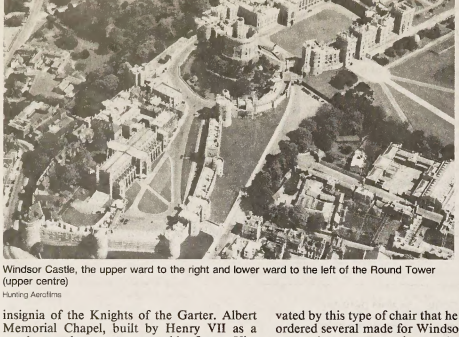
Windsor Castle, English royal residence that stands on a ridge at the northeastern edge of the district of Windsor and Maidenhead in the county of Berkshire, England. The castle occupies 13 acres (5 hectares) of ground above the north bank of the River Thames. Windsor Castle comprises two quadrilateral-shaped building complexes, or courts, that are separated by the massive Round Tower. The latter is a massive circular tower that is built on an artificial mound and is visible for many miles over the surrounding flatland. The court west of the Round Tower is called the lower ward; the court to the east is called the upper ward.

There was a royal residence at Windsor in Saxon times (*c.* 9th century). William I the Conqueror developed the present site, constructing a mound with a stockade about 1070. Henry II replaced this with the stone Round Tower and added outer walls to the north, east, and south. In the 13th century Henry III completed the south wall and the western end of the lower ward and built a royal chapel on the site of the present-day Albert Memorial Chapel. Edward III made this chapel the centre of the newly formed Order of the Garter in 1348 and converted the fortress buildings in the upper ward to residential apartments for the monarchs. These apartments were rebuilt by Charles II and later reconstructed by George IV for use by visitors of state in addition to the monarchs.

The lower ward includes St. George's Chapel and the Albert Memorial Chapel. St. George's Chapel, designed to be the chapel of the Order of the Garter, was begun by Edward IV and is one of the best examples of Perpendicular



Gothic-style architecture. It was completed in 1528 and restored between 1921 and 1930. It ranks next to Westminster Abbey as a royal mausoleum and contains the bodies of Henry VI, Edward IV, Henry VIII and Jane Seymour, Charles I, Edward VII, and George V. The chapel also contains the impressive



Windsor Castle, the upper ward to the right and lower ward to the left of the Round Tower (upper centre)
Hunting Aerofilms

insignia of the Knights of the Garter. Albert Memorial Chapel, built by Henry VII as a royal mausoleum, was restored by Queen Victoria and named in memory of her consort. In this chapel are buried George III, George IV, and William IV.

The upper ward of the castle includes the private apartments of the monarch and private apartments for visitors. The state apartments in the upper ward include the Waterloo Chamber, St. George's Hall, and the grand reception room. The upper ward is also the site of the royal library, which contains a priceless collection of drawings by Leonardo da Vinci, Michelangelo, Raphael, Hans Holbein the Younger, and other Old Masters. Fire destroyed the northeast corner of the upper ward in November 1992. Most of the paintings, furniture, and other movable treasures were saved, but the building and fixtures, including ornate plasterwork and paneling, were severely damaged.

Adjacent to the castle on the south, east, and north is Home Park, which consists of approximately 500 acres (200 hectares) of parkland. Frogmore, the site of the mausoleum of Queen Victoria and Prince Albert, lies within the park. South of the castle lies the Great Park, with about 1,800 acres (700 hectares). The Long Walk, a 3-mile (5-kilometre) avenue leading into the Great Park, was planted by Charles II in 1685; its aging elm trees were replaced by younger trees in 1945. Virginia Water, an artificial lake, lies at the southern boundary.

Windsor chair, popular type of wooden chair constructed of turned (shaped on a lathe), slender spindles that are socketed into a solid, saddle-shaped wooden seat. Those spindles extending downward form the legs and those extending upward form the back and arm rests. The Windsor chair has been produced in numerous local variations and is extremely popular in both Great Britain and the United States. It appeared in the mid-18th century as a rural version of the desk chair, although the basic elements of its construction are found in older prototypes.

Some of the variants of the chair include the brace back, Philadelphia, smoker's bow, wheel back, and white Wyscombe, but all fit into one of three basic categories: the low back, the high back with a straight top piece known as a "comb," and the high back curved into a semicircular shape known as a "hoop."

The name is said to derive from one of George III's excursions into the homes of his humbler subjects, when he became so captivated by this type of chair that he immediately ordered several made for Windsor Castle. The name, however, was in use before he was born; indeed, the Royal Household Accounts for 1729 contain a reference to "2 Mahogany Windsor Chairs richly carved."

The Windsor chair was produced in many variations in the United States, beginning in Philadelphia about 1725. These variations, which were generally lighter than English designs, were frequently painted green—as they were often used in parks and gardens as well as indoors—but increasingly they came to be stained and varnished.

From the Windsor family of chairs developed a wide variety of "rural" chairs with rush



Hoop-back Windsor armchair with a "comb," American, 18th century; in the Metropolitan Museum of Art, New York City
By courtesy of the Metropolitan Museum of Art, New York City, gift of Mrs. J. Insley Blair, 1947

seating, constructed on the same basic principle but usually less complex in design, and intended for use at table. Mounted on rockers, the Windsor design was also made into a rocking chair.

windsurfing, also called BOARDSAILING, sport that combines aspects of sailing and surfing on a one-person craft called a sailboard.



Windsurfing
© Gary Braithacher/Tony Stone Images

The earliest prototypes of a sailboard date back to the late 1950s. Californians Jim Drake (a sailor) and Hoyle Schweitzer (a surfer) received the first patent for a sailboard in 1968. They called their design a Windsurfer, and Schweitzer began mass-producing sailboards in the early 1970s. The sport quickly spread throughout North America, and by the late 1970s it had become widely popular in Europe. The first world championship of windsurfing was held in 1973. There are currently several competitive windsurfing circuits that hold regattas, slalom races, and wavesailing competitions (a subjectively judged style event). Olympic windsurfing features sailors racing over a traditional triangle course and was first contested in 1984, with separate competitions for men and women introduced in 1992.

A sailboard is composed of a board and a rig. The early Windsurfer boards measured 12 feet (3.5 m) long and weighed 60 pounds (27 kg). Current boards range from 8 to 12.5 feet (2.5 to 4 m) and weigh between 15 and 40 pounds (7–18 kg). Long boards (more than 10 feet [3 m]) have a small keel, also called a centreboard or a daggerboard, and a skeg (rear bottom fin) but no rudder. Short boards (less than 10 feet) have a skeg but no centreboard. The rig consists of the sail, double boom, mast, and mast base. The mast connects to the board through the mast base, which has a universal joint that allows the mast to be moved in any direction. The boat is steered by changing the sail's position relative to the wind and to the centreboard. This is accomplished by adjusting one's hold on the double boom in order to rake the sail forward or aft, windward or leeward.

Windthorst, Ludwig (b. Jan. 17, 1812, Kaldenhof, near Osnabrück, Hanover [Germany]—d. March 14, 1891, Berlin, Ger.), prominent German Roman Catholic political leader of the 19th century. He was one of the founders of the Centre Party, which aimed at the unification of German Catholics and the defense of Roman Catholic interests.

In 1836 Windthorst settled at Osnabrück as an attorney. He became a member of the diet of the Hanover kingdom in 1849 and was later appointed the kingdom's minister of justice. Subsequently elected to the North German Parliament, to the German Reichstag, and to the Prussian Diet, he became the leader of the Centre Party, which gained considerable strength from its struggle against the *Kulturkampf*—Chancellor Otto von Bismarck's attempt to separate German Catholics from Rome. Because of a general distrust of political Roman Catholicism and because the Centre Party gained 58 seats in the Reichstag, Bismarck and Windthorst fell into antagonistic roles.

In the parliamentary fight against the *Kulturkampf,* Windthorst's brilliant debates pro-

vided cartoonists with an intriguing contrast between his dwarfish figure (earning him the nickname *die kleine Exzellenz*) and the giant "Iron Chancellor." Bismarck attacked the Centre Party, saying of Windthorst, "I have my wife to love and Windthorst to hate." Windthorst cooperated with Bismarck, however, on some political matters. Bismarck finally agreed to rescind most of the *Kulturkampf* laws, partly because the Centre Party's votes were usually crucial for his majority. His attempt, however, to undermine Windthorst's position and the Centre Party through direct negotiations with Pope Leo XIII was unsuccessful. By 1890 most of the anti-Catholic laws had been repealed. Windthorst's meeting with the German emperor William II in March of that year played a part in Bismarck's dismissal, though Windthorst denied any such intention. While he was undoubtedly one of the greatest German parliamentary leaders, most of his life was spent in the opposition.

Windward Group (French Polynesia): *see* Vent, Iles du.

Windward Islands, French ÎLES DU VENT, Spanish ISLAS DE BARLOVENTO, a line of West Indian islands constituting the southern arc of the Lesser Antilles, at the eastern end of the Caribbean Sea, between latitudes 12° and 16° N and longitudes 60° and 62° W. They include, from north to south, the English-speaking island of Dominica; the French *département* of Martinique; the English-speaking islands of Saint Lucia, Saint Vincent, and Grenada; and, between Saint Vincent and Grenada, the chain of small islands known as the Grenadines. Though near the general area, Trinidad and Tobago (at the south end of the group) and Barbados (just east) are usually not considered part of the Windward Islands. Dominica is sometimes classified as part of the Leeward Islands (*q.v.*), rather than the Windwards.

The geology of the Windwards is volcanic, with craters, hot springs, and sulfuric vents found in the mountainous central ribs of the islands. On May 8, 1902, the eruption of Mount Pelée on Martinique was one of the most destructive in modern history, killing about 30,000 people. The climate of the Windwards is everywhere marine, and the extreme heat is greatly tempered by the steady tradewinds and by the daily sea breezes. A dry season alternates with a wet season, with the eastern sides of the islands receiving more rainfall because of the prevailing northeasterly tradewinds. Hurricanes are a threat from June to October.

The population is predominantly black or mulatto, with an admixture of East Indians, Portuguese, French, and British.

Windward Islands, Portuguese ILHAS DE BARLAVENTO, island group in the Atlantic Ocean off the West African coast, comprising one of two island groups of Cape Verde (*q.v.*) and consisting of the following islands: Boa Vista, Sal, Santa Luzia, Santo Antão, São Nicolau, and São Vicente. The landscape is generally barren and the climate always hot. The Windward Islands suffer from constant drought due to poor rainfall.

Windward Passage, strait in the West Indies, connecting the Atlantic Ocean with the Caribbean Sea. It is 50 miles (80 km) wide and separates Cuba (west) from Hispaniola (southeast). It has a threshold depth of 5,500 feet (1,700 m) and is on the direct shipping route between the east coast of the United States and the Panama Canal. The Jamaica Channel, between Jamaica (west) and Hispaniola (east), forms a southwest extension of the Windward Passage.

wine, alcoholic beverage made from the fermented juice of grapes. The term may be applied to products made from fruits, vegetables, herbs, and even flowers, but used alone it applies only to the grape product.

A brief treatment of wine follows. For full treatment, *see* MACROPAEDIA: Beverage Production.

The major constituents of wine are water, sugar, and alcohol. More than 400 known compounds contribute to the flavour, aroma, and colour of wine. Wines may be classified according to colour as red, rosé (pink), or white. Wines described as white actually range from straw colour through brown. Wine taste is described as sweet or dry. Sweet wines are high in sugar content; dry wines, the opposite of sweet, are not sour but lack sweetness because they contain little or no sugar. High acidity may also contribute to dryness.

Wines are also classified as table, sparkling, or fortified. Table wines, the natural or still wines, may be red, rosé, or white, with alcoholic content from about 7 to 15 percent. Sparkling wines, effervescent or bubbling, are most frequently white, but may be red or rosé, and have alcoholic content similar to that of table wines. Fortified, or dessert, wines contain added brandy and may be red or white, with alcoholic content from about 16 to 23 percent. Fortified wines with additional flavouring are called aromatic wines.

The leading wine-producing countries include France, Italy, Spain, Argentina, Portugal, Germany, South Africa, and the United States. Wines may be named for place of origin or grape variety used, or may bear generic names. Most European wines take place-names, usually the most specific to which they are entitled. The words *Appellation d'Origine Contrôlée* (controlled place of origin) on the label of a French wine guarantee that the wine has been produced at the stated location and has met with rigid French laws controlling production.

In the United States varietal names are increasingly used; the law requires that the variety named must comprise at least 75 percent of the grapes used to produce the wine. Certain European place-names are used as generic terms for American wines resembling the original, but, although the same grape variety may be used, soil, climate, and processing variations result in a different wine.

Wine labels may show the vintage, meaning the year in which the grapes used were harvested. The vintage is an important indicator of the wine's value because seasonal variations in weather affect harvest quality from year to year. Wines blended from several vintages bear undated labels.

History. Wine had a history by the time the Old Testament was written; in Genesis 9:20 it is ascribed to Noah. In ancient Greece wine was dark and usually drunk with water; to drink it unmixed was regarded as riotous. At that time wine was kept in casks, goatskins, or earthenware amphorae and stoppered with oil or a greasy rag; effectively, air was working on it all the time. There was little change in Roman days, though with greater wealth there came an approach to connoisseurship. But the full maturing of wine was impossible until the bottle and the cork were generally used.

During the European Middle Ages, the production and quality of wine, so far as can be ascertained, fell steadily from classical days. The Romans had planted vines wherever the climate would tolerate it—in North Africa, Spain, Gaul, Britain, and Illyria in particular. Their cultivation continued for local consumption, and because of the need of wine for the communion service, the care of the vineyards was particularly an ecclesiastical preoccupation. The reappearance of good wines and famous vineyards invariably resulted from the efforts of monks or of monarchs distinguished by their devotion to the church.

The planting of vines in some of the most famous Rhenish and Burgundian vineyards is traditionally ascribed to Charlemagne, but it was not until the 12th century that the great wine-growing areas were planted and found a larger market. Owing to the limits of medieval transport, vineyards had to be by riversides; and the most famous wines came from lands along the Rhine, the Garonne, and the Loire rivers.

The use of wine bottles and corks as it is known in modern times seems to have become common toward the end of the 17th century, the development of both resulting largely from the work of Dom Pierre Pérignon of Hautvillers, the father of the champagne trade. Another important change was the discovery, by accident in the year 1775 in the Rheingau, that grapes left to rot on the vines produced a sweetness and bouquet unobtainable otherwise. In the mid-1750s the Madeira shippers first began scientifically fortifying their wines by adding a proportion of brandy to them, a process essential for the manufacture and maturing of almost all dessert wines.

European vineyards were visited by a disaster that threatened at one time to wipe them out completely when, in 1863, there was accidentally imported an American louse of the genus *Phylloxera,* which fed upon the roots of vines. Large wine-growing areas were devastated as the pest spread; 2,500,000 acres (1,000,000 hectares) were thought to have been ruined in France; and in Madeira and the Canary Islands wine production ceased completely. The ravages were checked eventually by the importation of louse-resisting stocks from California, on which the older vines were grafted.

Manufacture. The manufacture of wine varies in detail according to the type of wine to be produced, but it usually follows a standard pattern. The grapes are crushed and the grape must is allowed to ferment in vats, usually after the addition of sulfur dioxide to suppress wild yeasts and organisms other than the true wine yeast *Saccharomyees ellipsoideus.* A selected strain of wine yeast may be added at this point. Heat is produced by the fermentation, and the temperature may have to be controlled within optimum limits. Air is excluded from the vats as much as possible to discourage the action of *Acetobacter,* the vinegar-forming bacterium, and other harmful organisms. When fermentation is well advanced, the "free-run" wine is drawn off. Fermentation continues and is completed after several weeks. The wine is racked (drawn) off to separate it from the lees, or sediment of yeast, acid potassium, tartrate, and other matter; in the case of quality wines, racking may be repeated at intervals for several years during the aging period in wood. Before bottling, the wine is cleared by the addition of fining agents such as bentonite to precipitate particles of suspended matter. During aging, and subsequent maturation in bottles, many reactions including oxidation occur, which enhance the taste, aroma, and preservative properties of the wine.

During storage, wine requires protection from temperature extremes, from light, and from vibration; bottles containing table wine are laid on their sides during storage to keep their corks moist.

wing, in zoology, one of the paired structures by means of which certain animals propel themselves in the air. Vertebrate wings are modifications of the forelimbs. In birds the fingers are reduced and the forearm is lengthened. The primary flight feathers on the distal portion of the wing create most of the propelling force in flight, while on the less mobile upper wing the secondaries provide the greater portion of the lift. Adaptations include the high-speed wings of swallows and the slotted, soaring wings of vultures. The wings of pen-

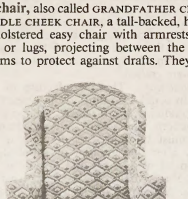
guins, which lack primary flight feathers, are used only for swimming. Bats, the only mammals capable of true flight, have wings formed of a flight membrane stretched over slender, elongated arm and hand bones. The so-called flying squirrel does not actually fly but is capable of gliding, using paired membranes attached to the forelegs and hind legs. Likewise the colugo, or flying lemur, has membranous structures that function in gliding.

Insect wings are formed of folds of integument. Most insects have two pair of wings, although flies use only the first pair and beetles only the second. The two wings on a side are usually moved together, but in the dragonfly they work independently.

wing, in aeronautics, an airfoil that helps lift a heavier-than-air craft. When positioned above the fuselage (high wings), wings provide an unrestricted view below and good lateral stability. Parasol wings, placed on struts high above the fuselage of seaplanes, help keep the engine from water spray.

Midwings, positioned in the middle of the fuselage, leave the airplane belly free of spars, with room for bombs or cargo. Placed below the fuselage, low wings reduce the height of the undercarriage and simplify engine maintenance.

wing chair, also called GRANDFATHER CHAIR, or SADDLE CHEEK CHAIR, a tall-backed, heavily upholstered easy chair with armrests and wings, or lugs, projecting between the back and arms to protect against drafts. They first



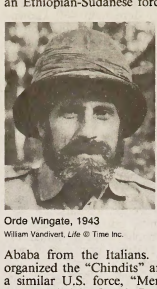
Queen Anne style wing chair with bargello or flame-stitch, American, needlepoint upholstery c. 1725; in the Metropolitan Museum of Art, New York City

By courtesy of the Metropolitan Museum of Art, New York City, gift of Mrs. J. Insley Blair, 1950

appeared in the late 17th century—when the wings were sometimes known as "cheeks"—and they have maintained their popularity ever since. Often they form part of a set, or suite.

Wingate, Orde Charles (b. Feb. 26, 1903, Naini Tāl, India—d. March 24, 1944, Burma [now Myanmar]), British soldier, an outstanding "irregular" commander and unconventional personage in the tradition of General Charles George Gordon and Colonel T.E. Lawrence ("Lawrence of Arabia"). His "Chindits," or "Wingate's Raiders," a brigade of British, Gurkha, and Burmese guerrillas, harassed much stronger Japanese forces in the jungles of northern Burma (now Myanmar) during World War II.

Educated at Charterhouse and the Royal Military Academy, Woolwich, Wingate was commissioned in the Royal Artillery in 1923, serving in the Sudan and making some exploration of the Libyan desert (1928–33). In 1936–39, while serving as an intelligence officer in Palestine, Wingate organized night patrols to repel Arab raids on Jewish communities along the Mosul-Haifa oil pipeline, successfully testing his "penetration" method of light infantry operations against the enemy's rear. From January to May 1941 he led an Ethiopian-Sudanese force that took Addis



Orde Wingate, 1943

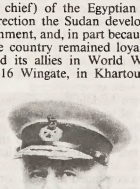
William Vandivert, *Life* © Time Inc.

Ababa from the Italians. Sent to India, he organized the "Chindits" and helped to train a similar U.S. force, "Merrill's Marauders," commanded by Frank Dow Merrill. During February–May 1943, the "Chindits" entered Japanese-held Burma from the west, crossed the Chindwin River, and, receiving supplies from the air, conducted effective guerrilla operations against the Japanese until they reached the Irrawaddy River. On crossing that river in an attempt to cut Japanese communications with the Salween River front to the east, they found the terrain unfavourable and were forced to return circuitously to India.

Given command (as acting major general) of airborne troops invading central Burma in March 1944, Wingate severed the important Mandalay-Myitkyinā railway, but soon afterward he was killed in an airplane crash.

Wingate, Sir Reginald, 1ST BARONET, in full SIR FRANCIS REGINALD WINGATE (b. June 25, 1861, Port Glasgow, Renfrew, Scot.—d. Jan. 28, 1953, Dunbar, East Lothian), British general and imperial administrator, principal founder and governor-general (1899–1916) of the Anglo-Egyptian Sudan (from 1956 the independent Republic of The Sudan).

Commissioned in the British artillery in 1880, Wingate was assigned to the Egyptian army in 1883. Six years later he became director of Egyptian military intelligence. He fought in several battles against adherents of al-Mahdī (Muḥammad Aḥmad, a nationalist rebel against the British-supported Egyptian overlordship of the Sudan), and on Nov. 24, 1899, he defeated and killed the Khalifa 'Abd Allāh ibn Muḥammad, successor to al-Mahdī. The next month he was appointed governor-general of the Sudan and sirdar (commander in chief) of the Egyptian army. Under his direction the Sudan developed a sound government, and, in part because of his influence, the country remained loyal to Great Britain and its allies in World War I. From June 1916 Wingate, in Khartoum, assisted Saudi



Reginald Wingate, 1919

BBC Hulton Picture Library

rebels in Arabia against the rule of Turkey, with which Great Britain was at war. In January 1917 he was named British high commissioner for Egypt. Although his sympathy with the Egyptian Nationalist Party led to his dismissal in October 1919, subsequent British policy in Egypt generally followed his recommendations.

Winisk River, river, north-central Ontario, Canada, emptying into Hudson Bay. Arising from Wunnummin Lake, it flows eastward to Winisk Lake and then north and east for 295 miles (475 km) to its mouth on the bay, draining an area of 24,000 square miles (62,000 square km). Its major tributaries include the Pipestone, Asheweig, and Shamattawa rivers. The Winisk (Indian for "woodcock") lies in a region that is uninhabited except for a few small trading posts. A 250-mile (400-kilometre) stretch of the river lies in Winisk River Provincial Park (670 square miles [1,735 square km]), and its lower course passes through Polar Bear Provincial Park (9,300 square miles [24,087 square km]).

Winkler, Clemens Alexander (b. Dec. 26, 1838, Freiberg, Ger.—d. Oct. 8, 1904, Dresden), German chemist who discovered the element germanium.

After 12 years managing a cobalt glassworks, Winkler joined the faculty of the Freiberg School of Mining in 1873. In 1886, while analyzing the mineral argyrodite, he discovered germanium. It proved to be the element predicted in 1871 by Dmitry I. Mendeleyev, who had called it ekasilicon.

Consult the INDEX *first*

Winkler Prins Encyclopedie, the standard Dutch encyclopaedia, published by Elsevier in Amsterdam. The first edition (1870–82) was based on the German *Brockhaus Enzyklopädie* (*q.v.*). The 6th edition (1947–54) appeared in 18 volumes. A new, 25-volume, thoroughly revised edition was published in 1979–84 and entitled *Grote Winkler Prins Encyclopedie.*

The later editions of the encyclopaedia are known for their well-balanced articles, some of which are signed. Illustrations and maps are frequently in colour and in foldout form. Bibliographies contain works in various languages. The final volume includes an index.

Winneba, coastal town, southern Ghana. It lies along the Gulf of Guinea near the mouth of the Ayensu River. It was originally a roadstead port, dependent upon the forest products of the area around Swedru (15 miles [24 km] north-northwest). All port activities ceased in 1962, however, with the opening of Tema Harbour, and Winneba has since relied upon its fishing industry, agriculture (coconut palm), and some tourism, since it has a bathing beach. Pop. (1984) 27,105.

Winnebago, a Siouan-speaking tribe of North American Indians who lived in what is now eastern Wisconsin when first encountered by the French explorer Jean Nicolet in 1634. Settled in permanent villages of dome-shaped wigwams, the Winnebago cultivated corn (maize), squash, beans, and tobacco. They also participated in communal bison hunts in the prairies to the southwest. They were divided into exogamous clans that were grouped into two major divisions, or phratries. The Upper (Air) division contained four clans, the Lower (Earth) division eight. Some clans had special functions, such as the adjudication of disputes, and each clan had customs relating to life crisis events. The major summer ceremonial was the Summer Medicine Dance, which included a secret ceremony for members of the Medicine Dance Society (a secret religious society open to both men and women), as well as public rituals. The Winter Feast was a clan ceremonial intended to increase war



Yellow Thunder, a Winnebago chief
By courtesy of the State Historical Society of Wisconsin, Madison

and hunting powers; the spring buffalo dance was a magical ceremonial for calling the bison.

In response to the fur trade, the Winnebago began a westerly expansion during the mid-17th century. By the early 19th century they claimed most of southwestern Wisconsin and the northwestern corner of Illinois. This land was ceded to the U.S. government in a series of treaties. The Winnebago were involved in the Black Hawk War of 1832, after which the majority of the tribe was removed by the government to Iowa, then to Missouri and to South Dakota. In 1865 about 1,200 of the Winnebago settled in Nebraska near their old friends and allies the Omaha; the population of the Winnebago Reservation in Thurston county, Neb., at the end of the 20th century was some 1,200, with others living throughout the state. The larger body of Winnebago finally were moved back to Wisconsin, where, from 1875, they were allowed to remain. The present Ho-Chunk Nation in Wisconsin consists of portions of 12 counties throughout the state and had a population of some 3,000–5,000 at the end of the 20th century. The total number of Winnebago has been estimated to be some 7,000.

Winnetka, village, Cook county, northeastern Illinois, U.S. It lies along Lake Michigan and is an affluent northern residential suburb of Chicago. German settler Michael Schmidt arrived in the area in 1826; ten years later settlers came from Vermont. The village was laid out in 1854 with the arrival of the railroad. German immigrants contributed to its growth. The name is said to be derived from a Native American word meaning "beautiful land." Winnetka's public school system gained national recognition for its innovative experiments in teaching (often called the Winnetka Plan). The Hadley School for the Blind, an institution established in 1920 that teaches by mail, is there. Inc. 1869. Pop. (2000) 12,419.

Winnipeg, city, capital (1870) of Manitoba, Can. It lies at the confluence of the Red and Assiniboine rivers, 40 miles (65 km) southwest of Lake Winnipeg and 60 miles (95 km) north of the Minnesota (U.S.) border. French voyageur La Vérendrye established Fort-Rouge on the site in 1783, and later other forts were built there: Fort Gibraltar (built by the North West Company in 1810) and Fort Garry (Hudson's Bay Company, 1821). These, together with the Red River Settlement of Scottish colonists (founded in 1811–12), formed the nucleus of the new city, the name of which was taken from that of Lake Winnipeg and derived from the Cree Indian words *win nipee* ("muddy water").

The arrival in 1885 of the Canadian Pacific, the first Canadian transcontinental railroad, led to Winnipeg's becoming the major grain market and warehousing and distributing point for the Prairie Provinces. The city also serves the mining districts of the north and is now one of Canada's largest industrial, communications, commercial, and financial centres. It is the headquarters of the Canadian grain industry. The economy is highly diversified; major factors include food processing, finance, telecommunications, printing, and the manufacture of apparel, transportation equipment, and aerospace products and technology. Winnipeg's industrial growth has been stimulated by the availability of cheap hydroelectric power (from plants on the Winnipeg River) and excellent transportation facilities. A major junction on two transcontinental rail lines and the Trans-Canada Highway, Winnipeg also has a busy international airport. Following disastrous floods in 1950, the 30-mile (48-km) Red River Floodway was built (completed 1968), allowing that river's floodwaters to bypass the city.

A cosmopolitan city of many ethnic groups (including sizable populations of French-speaking and native peoples), Winnipeg dominates Manitoba's cultural life. It is the home of a symphony orchestra, the Manitoba Opera, the Royal Winnipeg Ballet, and the Manitoba Theatre Centre. It is the seat of the University



The Forks National Historic Site, Winnipeg, Man., on the Assiniboine River
Brian Sytnyk/Masterfile

of Manitoba (1877), the University of Winnipeg (1871), and Red River College (1938). The provincial Legislative Building (1920) is a neoclassical structure with the well-known Golden Boy (a bronze statue of a youth carrying a torch in his right hand and a sheaf of wheat over his left arm) on top of its dome. The city's Centennial Centre includes the Museum of Man and Nature and a planetarium. Winnipeg plays host to an annual (August) international festival of folk arts. The Forks National Historic Site commemorates the history of the Canadian West. The Winnipeg Art Gallery has an extensive collection of Inuit art. Winnipeg has its own Canadian Football League team, the Blue Bombers.

In 1972 the municipalities that comprised the Metropolitan Corporation of Greater Winnipeg (including Saint Boniface [*q.v.*], Saint James, East and West Kildonan, Transcona and Saint Vital) were absorbed into the city. Inc. 1873. Pop. (2001) city, 619,544; metropolitan area, 671,274.

Winnipeg, Lake, lake in south-central Manitoba, Canada, at the southwestern edge of the Canadian Shield, the rocky, glaciated region of eastern Canada. Fed by many rivers, including the Saskatchewan, Red, and Winnipeg, which drain a large part of the Great Plains, the lake is drained to the northeast by the Nelson River into Hudson Bay. Lake Winnipeg, at an elevation of 713 feet (217 m), is 264 miles (425 km) long and up to 68 miles (109 km) wide and has an area of 9,416 square miles (24,387 square km). Visited in the 1730s by the son of La Vérendrye (the French voyageur) and named from the Cree Indian words for "muddy water," the lake is a remnant of glacial Lake Agassiz. With an average depth of about 50 feet (713 feet at its deepest point), it is important for shipping and commercial fishing (based at Gimli), while its southern shore



Grand Rapids power development at the influx of the Saskatchewan River at the northwestern end of Lake Winnipeg, Manitoba
George Hunter

is a major resort area serving Winnipeg, 40 miles (64 km) south. Major islands include Hecla, Deer, and Black, which form part of Hecla Provincial Park.

Winnipeg Free Press, daily newspaper published in Winnipeg, Manitoba, Can., known for outspoken independence and championship of public service and minority causes.

Established in 1872 by William F. Luxton and John A. Kenny as the *Manitoba Free Press*, the paper grew in circulation and influence during Canada's westward expansion in the 1880s. From 1901 its editor was John Wesley Dafoe, who guided the paper for more than 40 years and established its political independence and commitment to public service. The coverage of local, national, and international news in the *Free Press* is widely respected, and its editorials have won international recognition.

Winnipeg River, river in southeastern Manitoba and western Ontario, Canada. The river issues from Lake of the Woods along the Canada–U.S. border and flows generally northwestward through several lakes for about 200 miles (320 km), draining an area of 48,880 square miles (126,600 square km) before it enters the southeastern end of Lake Winnipeg near Pine Falls. One of its tributaries, the Firesteel River, rises near Lake Superior; together, the rivers served as a 475-mile (765-kilometre) route for explorers and fur traders after they had been navigated in 1733 by the French voyageurs La Vérendrye and La Jemeraye. Numerous falls and rapids on the Winnipeg's lower course hinder navigation but provide hydroelectric power for most of Manitoba. Power plants are located at Seven Sisters Falls, Great Falls, Pointe du Bois, Slave Falls, Pine Falls, and McArthur Falls.

Winnipegosis, Lake, lake in western Manitoba, Canada, between Lake Winnipeg and the Saskatchewan border, a remnant of glacial Lake Agassiz. Supplied by numerous small streams on the west, the 2,075-square-mile (5,374-square-kilometre) lake is drained southeastward into Lake Manitoba and thence into Lake Winnipeg. Lake Winnipegosis is more than 150 miles (240 km) long, is up to 32 miles (51 km) wide, and has a maximum depth of 833 feet (254 m). Winnipegosis (a Cree Indian term meaning "little muddy water") is an island-strewn lake that is navigable only by small vessels. It was explored in 1739 by the French voyageur La Vérendrye and later served as part of a fur-trading route. The lake is now important for commercial fishing, centred at Winnipegosis, which is situated on the lake's southern shore at the mouth of the Mossy River. Win-

nipegosis is the largest riparian settlement and is the terminus of a branch of the Canadian National Railway from Dauphin (35 miles [56 km] south).

Winnipesaukee, Lake, lake in Belknap and Carroll counties, east-central New Hampshire, U.S. It lies at the foothills of the White Mountains east of Laconia. The state's largest lake, it is 20 miles (32 km) long by 12 miles (19 km) wide and is dotted with 274 islands, the largest of which is Long Island. The lake is a popular summer recreation area, with a steamboat service, an annual regatta, wooded shorelines, and many coves and bays. The lake's outlet, the Winnipesaukee River, flows about 20 miles southwest to Franklin, where it enters the Merrimack River. The meaning of the lake's Indian name is much disputed, but a commonly accepted translation is "good outlet."

Winogradsky, Sergey Nikolayevich, Winogradsky also spelled VINOGRADSKY (b. Sept. 1, 1856, Kiev, Russian Empire [now in Ukraine]—d. Feb. 25, 1953, Brie-Comte-Robert, France), Russian microbiologist whose discoveries concerning the physiology of the processes of nitrification and nitrogen fixation by soil bacteria helped to establish bacteriology as a major biological science.

After studying natural sciences at the University of St. Petersburg in 1881, Winogradsky went (1885) to Strassburg, Ger. In 1887 he established the specific physiology of sulfur bacteria, demonstrating that the colourless form of these bacteria can obtain energy by oxidizing hydrogen sulfide to sulfur and then to sulfuric acid in the absence of light.

In 1888 Winogradsky went to the University of Zürich, where he discovered (1889–90) the microbial agents responsible for nitrification (the oxidation of ammonium salts to nitrites and nitrites to nitrates). He established two new genera—*Nitrosomonas* (nitrite formers) and *Nitrosococcus* ([*Nitrobacter*] nitrate formers)—for the two new types of microorganisms concerned in the process. He returned to St. Petersburg and worked for the Imperial Institute of Experimental Medicine until his first retirement in 1905. Forced out of Russia by the October Revolution of 1917, he resumed his career in 1922 at the Pasteur Institute in Paris, where he remained until he again retired in 1940.

While at the Imperial Institute, Winogradsky proposed new methods of studying soil microorganisms, particularly those that fix nitrogen symbiotically in legumes as well as those dispersed in soil. In 1893–95 he also discovered *Clostridium pasteurianum,* an anaerobic bacterium (*i.e.,* able to grow in the absence of oxygen) that is able to utilize free nitrogen from the atmosphere in metabolic processes.

Winona, city, seat of Winona County, southeastern Minnesota, U.S. It lies on high bluffs above the Mississippi River, in a mixed-farming area. Founded in 1851 by New Englanders, it was called Montezuma when laid out in 1852 but was renamed to honour a legendary Indian princess. Its early growth as a river port and wheat-shipping and logging-sawmilling centre was boosted by the arrival of the railroads in the 1860s. After 1900 timber and wheat operations declined, and diversified industries, notably the manufacture of chains and pharmaceuticals, arose. Limestone quarries are also worked in the locality. Winona State University (1858) and St. Mary's College (1912) are in the area, and the stern-wheeled steamboat *Julius C. Wilkie* is preserved as a museum of river lore. Sugar Loaf Hill, a limestone formation 500 feet (150 m) above the Mississippi, was a river pilot's landmark. Inc. 1857. Pop. (1992 est.) 26,007.



The *Julius C. Wilkie,* Steamboat Museum, Winona, Minn.

Mitt and Joan Mann from CameraMann

Winooski, city, Chittenden county, northwestern Vermont, U.S. The city lies on a steep side hill rising from the Winooski River, just northeast of Burlington. It was founded in 1787 by Ira Allen and Remember Baker, Vermont pioneers who were attracted by the waterpower potential of the river's lower falls. Known as the "Mill City," its development as an industrial community began with the establishment of a woolen mill in 1835. Textile manufacturing became a major industry but is no longer a factor in the city's economy, which now depends chiefly on woodworking and tool and die industries. St. Michael's College (1904) is in nearby Colchester. Inc. 1922. Pop. (1990) 6,649.

Winooski River, river in north-central Vermont, U.S. It rises near Cabot in Washington county and flows southwest, then northwest across the state through the Green Mountains, past Montpelier and Waterbury, to drain into Lake Champlain near Winooski after a course of about 90 miles (45 km). The river's name comes from an Indian word for "onion." Flood-control and hydroelectric-power projects on the river and its tributaries include the East Barre Dam on the Jail Branch (1935).

Winslow, city, Navajo county, east-central Arizona, U.S. It lies in the valley of the Little Colorado River. Founded in 1882 as a divisional terminal of the Santa Fe Railway, it was named for Edward F. Winslow, a railroad official. Winslow's economy is based upon railroad services, lumbering, livestock raising (mainly by the Indians), and tourism. Meteor Crater is a few miles west. To the north is the extensive Navajo Indian Reservation, which includes Monument Valley and Canyon de Chelly National Monument and which encloses the Hopi Indian Reservation. Inc. town, 1900; city, 1957. Pop. (1990) 8,190.

Winslow, Edward (b. Oct. 18, 1595, Droitwich, Worcestershire, Eng.—d. May 8, 1655, at sea, near Jamaica, British West Indies), English founder of the Plymouth colony in Massachusetts.

In 1617 Winslow moved to Holland, where he united with John Robinson's church at Leiden, and in 1620 he was one of the *Mayflower* pilgrims who emigrated to New England. His first wife, Elizabeth (Barker) Winslow, died soon after their arrival at Plymouth. In May 1621 he married Mrs. Susanna White, the mother of Peregrine White (1620–1704), who was the first child born among the New England colonists. Winslow's marriage to Susanna White was the first in New England.

Winslow was delegated by his associates to deal with the Indians in the vicinity (the Wampanoag) and succeeded in winning the friendship of their chief, Massasoit. He served as a member of the governor's council from 1624 to 1647, except in 1633–34, 1636–37, and 1644–45, when he was governor of the colony. In 1643 he was one of the commissioners of the United Colonies of New England and on several occasions was sent to England to represent the interests of the Massachusetts Bay and Plymouth colonies.



Edward Winslow, detail of an oil painting by Robert Walker, 1651; in the Pilgrim Hall Museum, Plymouth, Mass.

By courtesy of Pilgrim Hall Museum, Plymouth, Mass.

In October 1646 he left on his last mission as the agent of Massachusetts Bay and spent nine years in England, where he held minor offices under Oliver Cromwell. In 1655 Winslow was chief of the three commissioners that Cromwell sent on his expedition against the West Indies, but he died onboard ship near Jamaica.

His writings, though fragmentary, are of great value to historians of the Plymouth colony. His *Glorious Progress of the Gospel Amongst the Indians in New England* (1649) led to the founding of the Society for the Propagation of the Gospel in New England.

Winslow, Josiah (b. *c.* 1629, Plymouth colony [now Plymouth, Mass., U.S.]—d. Dec. 18, 1680, Marshfield, Plymouth colony), British-American military leader and governor of the Plymouth colony who established the colony's first public school.

Josiah Winslow was the son of Governor Edward Winslow, an original founder of the Plymouth colony in 1620. After attending Harvard College, Josiah accompanied his father on a journey to England in 1651. When he returned to Plymouth the next year, he was appointed militia commander of Marshfield, and in 1657 he was appointed assistant governor of the Plymouth colony. In 1658 he became one of the colony's commissioners in the New England Confederation's directorate, and later he was chosen commander-in-chief of Plymouth's military forces, succeeding Myles Standish. As commander, he laboured to prevent Indian uprisings. In 1672 he became a signatory to the new governing articles of the New England Confederation.

Winslow was elected governor of Plymouth in 1673, and in one of his early administrative actions, he established the first public school in the colony. When King Philip's War erupted in 1675, he became commander-in-chief of the forces of the New England Confederation. Although he defeated the rebellious Indians in a battle and burned many of their villages, his losses were high and illness obliged him to relinquish his command to Captain Benjamin Church in February 1676. Winslow continued as governor of Plymouth, nevertheless, and in 1677 he successfully satisfied the inquiries into the colony's activities by Edward Randolph, investigative agent for the Lords of Trade. He was in the process of negotiating a new charter from crown officials in England at the time of his death.

Winsor, Justin (b. Jan. 2, 1831, Boston, Mass., U.S.—d. Oct. 22, 1897, Cambridge, Mass.), librarian who, as superintendent of the Boston Public Library (1868–77) and librarian of Harvard University (from 1877), came to be regarded as the leading figure of the library profession in the United States.

Winsor, a freelance writer in Boston, was appointed a trustee of that city's public library (1866) and then became its chief administrator, at first on a temporary basis. During his tenure of office he established numerous



Winsor, engraving by J.A.J. Wilcox
By courtesy of the Library of Congress, Washington, D.C.

branch libraries in Boston. In 1876 he was a founder of the American Library Association and became its first president, serving until 1885 and again in 1897. Winsor also was a historian; he edited the *Narrative and Critical History of America,* 8 vol. (1884–89), and wrote several books.

Winstanley, Gerrard (baptized Oct. 10, 1609, Wigan, Lancashire, Eng.—d. after 1660), leader and theoretician of the group of English agrarian communists known as the Diggers, who, in 1649–50, cultivated common land on St. George's Hill, Walton-on-Thames, Surrey, and at nearby Cobham until they were dispersed by force and legal harassment. They believed that land should be made available to the very poor.

Of Lancashire origin, Winstanley was a cloth merchant in London until his business failed. In April 1649, in the revolutionary atmosphere of the Commonwealth period, he and William Everard took the lead in establishing the Digger colony, a timely project because of the unprecedented height of food prices in England. Although the colony ceased to exist in March 1650, Winstanley remained prominent as a pamphleteer, foreshadowing later communist and materialist ideas in his vigorous and racy prose.

The Law of Freedom in a Platform (1652), his sketch of a communist society, was dedicated to Oliver Cromwell. Winstanley believed that the English Civil War had been fought against king, landlords, lawyers, and all who bought and sold, these being enemies of the landless and labouring poor, and against priests, whose preaching of heaven and hell diverted men from asserting their rights on Earth and who were an instrument of class rule. He was an advocate of universal religious toleration, and he would have replaced sermons by lectures on the natural sciences and on the English constitution. He may be the Gerard Winstanley, a Quaker, who died in 1676. Winstanley's works were edited by G.H. Sabine (1941); a biography by T. Wilson Hayes, *Winstanley the Digger,* was published in 1979.

Winsted, city and principal community in the town (township) of Winchester, Litchfield County, northwestern Connecticut, U.S., at the confluence of the Still and Mad rivers. The area was first settled in 1750. Winsted, named from a combination of *Win*chester and Barkham*sted* (which borders it on the east), was incorporated as a borough in 1856 and as a city in 1917. Its site had an abundant supply of waterpower from Highland Lake and Mad River, and in the 19th century a variety of metal, wooden, and leather goods were made. The economy is now based on diversified engineering products. Northwestern Connecticut Community College was founded at Winsted in 1965. Pop. (1990) 8,254.

Winstedt, Sir Richard Olof (b. Aug. 2, 1878, Oxford—d. June 2, 1966, London), director of education in British Malaya who shaped Malay education and produced an extensive body of writings on Malaya.

Winstedt first went to Malaya in 1902. As an administrative officer posted to rural districts in Perak and Negeri Sembilan, he immersed himself (with several notable Malay amanuenses) in the study of the language, beliefs, customs, and history of the Malays. His first paper on Malay folklore was published in 1907, and the first edition of his *Malay Grammar* in 1913. As a result of his special interests, Winstedt was made assistant director of education for the Straits Settlements and Federated Malay States, with special responsibility for vernacular (Malay) education. He was director of education from 1924 to 1931.

Though he was responsible for introducing into Malay schools a greater proportion of indigenous materials, vernacular education remained at the most elementary level. Winstedt was accused by some of using education to create a quiescent colonial population rather than to advance the true interests of the Malays in what was fast becoming a multiracial and highly westernized society.

Despite a busy official life, Winstedt was the author of a large series of monographs and articles on the history and culture of Malaya. During the 1930s he wrote histories of several Malay states and in 1935 a general history of the peninsula. He also published a *History of Classical Malay Literature* (1940), a work on Malay magic, and several dictionaries. After his retirement in 1935, he returned to England, was knighted (1935), and from 1937 to 1946 was reader in Malay at the School of Oriental and African Studies, University of London. He was elected a Fellow of the British Academy in 1945.

Winston-Salem, city, port of entry, seat of Forsyth County, on the Piedmont Plateau of North Carolina, U.S. With High Point and Greensboro it forms a tri-city industrial area. Winston-Salem was created in 1913 from two towns originally a mile apart. Winston, founded in 1849 as the county seat, was named



Wait Chapel on the campus of Wake Forest University, Winston-Salem, N.C.
Mitt and Joan Mann from CameraMann

in 1851 for Maj. Joseph Winston, a Revolutionary War soldier. Salem (meaning "peace") was laid out in 1766 by Moravian colonists in the centre of their Wachovia land tract; it was incorporated in 1856, when the land was sold to outsiders. R.J. Reynolds founded his tobacco company there in 1875, and tobacco dominates its diversified industries, which include the manufacture of textiles, beer, rubber, leather, and petroleum.

The city is the home of Wake Forest University (1834), Salem College (1772), Winston-Salem State University (1892), Forsyth Technical Institute (1958), North Carolina School of the Arts (1965), and Piedmont Bible College (1945). Old Salem, a replica of the original settlement, is the site of the annual Moravian Easter Sunrise Service. Inc. city, 1913. Pop. (1990) city, 143,485; Greensboro–Winston-Salem–High Point MSA, 942,091.

winter, coldest season of the year, between autumn and spring; the name comes from an old Germanic word that means "time of water" and refers to the rain and snow of winter in middle and high latitudes. In the Northern Hemisphere, it is commonly regarded as extending from the winter solstice (year's shortest day), December 22 or 23, to the vernal equinox (day and night equal in length), March 20 or 21, and in the Southern Hemisphere, from June 21 or 22 to September 22 or 23. The low temperatures associated with winter occur only in middle and high latitudes; in equatorial regions, temperatures are almost uniformly high throughout the year. For physical causes of the seasons, *see* season.

The concept of winter in European languages is associated with the season of dormancy, particularly in relation to crops; some plants die, leaving their seeds, and others merely cease growth until spring. Many animals, of course, also become dormant, especially those that hibernate; many insects die. In many cultures, winter, like the other seasons, has been marked by rites and festivals revolving around the season's importance in food production.

winter aconite, also called NEW-YEAR'S GIFT, any of about seven species of perennial herba-



Winter aconite (*Eranthis*)
G.E. Hyde from the Natural History Photographic Agency—EB Inc.

ceous plants constituting the genus *Eranthis* of the buttercup family (Ranunculaceae) native to the temperate regions of Europe and widely planted for their early spring flowers.

The solitary blossoms, consisting of five to eight yellow sepals (petals are reduced or absent), arise on short stalks from tuberous roots. *E. hyemalis,* a frequently cultivated species, grows to about 20 centimetres (8 inches) or less and has flowers 2½ cm across.

winter cress, any of about 12 species of the genus *Barbarea,* weedy herbs of the mustard family (Brassicaceae), native to the north temperate region. Common winter cress, or rocket (*B. vulgaris*), in early summer bears flower stems 80 centimetres (32 inches) tall with unstalked, small, lobed leaves and branched clusters of small, bright-yellow flowers. The fruits are many-seeded, long, narrow capsules. Early winter cress, or scurvy grass (*B. verna*), has basal leaves with four to eight pairs of lobes—about twice as many as common winter cress. Both species sometimes are cultivated as salad plants.

Winter Haven, city, Polk County, central Florida, U.S., situated amid a large cluster of small lakes, 14 mi (23 km) east of Lakeland. The first white settlement (1883) on the site was called Harris' Corner (for the F.A.K. Harris Store) but was renamed Winter Haven in 1884. Citrus groves and tomatoes were cultivated, and the settlement developed as a shipping point with railroad connections at Bartow Junction (Lake Alfred). It was incorporated in

1911 and in 1924 amalgamated with nearby Florence Villa to form the City of Winter Haven. The citrus industry, phosphate mining, and tourism are the city's economic mainstays, and the region has a large retiree population. Cypress Gardens, just southeast of the city, is Florida's first theme park (1936), and is noted for its botanical gardens and water ski show. Polk Community College opened in 1964. Pop. (2000) city, 26,487; Lakeland–Winter Haven MSA, 483,924.

winter hazel, any of about 10 species of the genus *Corylopsis,* deciduous shrubs or small trees of the witch hazel family (Hamamelidaceae). They are native to eastern Asia and the Himalayas but are planted elsewhere as ornamentals. Their bell-shaped creamy to yellow fragrant flowers appear in hanging clusters in early spring before the leaves. Especially early are the creamy flowers of the buttercup winter hazel (*C. pauciflora*), which appear in clusters of two or three on the densely branched shrubs up to 2 m (6 feet) tall. Spike winter hazel (*C. spicata*), about the same height, blooms about the same time but bears lemon-yellow flowers. The fragrant winter hazel (*C. glabrescens*), up to 6 m tall, is somewhat hardier than the aforementioned species.

Winter Park, city, Orange county, central Florida, U.S., just north of Orlando. Founded as Lakeview in 1858, the name was changed to Osceola in 1870. In 1881 Loring A. Chase and Oliver E. Chapman purchased land on the site and laid out a town they called Winter Park. The loose-skinned mandarin-type Temple orange was first cultivated there. The founding (1885) of Rollins College gave impetus to the community's growth. A chain of lakes with boating and fishing facilities is within the city, which is now primarily a residential resort. The city's Charles Hosmer Morse Museum of American Art contains works by Louis Comfort Tiffany. Inc. town, 1887; city, 1925; rechartered 1949. Pop. (2000) 24,090.

Winteraceae, family of aromatic trees and shrubs of the order Magnoliales that contains seven or eight genera and 88 to 120 species, depending on the authority consulted. All but four species are native to Southeast Asia and Australasia. Members of the family have wood without water-conducting cells; acrid sap; gland-dotted, leathery, smooth-margined leaves; and small, usually bisexual flowers in clusters, with two to six sepals, petals in two or more series, several stamens, and one to several carpels (structure units of the female flower parts).

Many species have medicinal qualities; the best known is the South American Winter's bark (*Drimys winteri*), a 15-metre (50-foot) tree. It has peppery, hot-tasting leaves and bark. The bark was formerly used to prevent scurvy. Winter's bark has feathery, elliptic-shaped leaves; red-tinged shoots; and jasmine-scented, cream-coloured, 8- to 12-petaled, 2.5-centimetre (1-inch) flowers in clusters. A closely related Central American species with similar medicinal attributes, *D. granadensis,* is the only North American member of the family. *Pseudowintera colorata,* of New Zealand, has peppery, elliptic, red-blotched leaves on a 10-metre (32-foot) tree. Other genera of the family are *Bubbia, Belliolum, Exospermum, Tetrathalamus,* and *Zygogynum.*

Winterbotham, Frederick William (b. April 16, 1897, Stroud, Gloucestershire, Eng.—d. Jan. 28, 1990, Blandford, Dorset), British secret-service official who played a key role in the Ultra code-breaking project during World War II.

Winterbotham joined the Royal Gloucestershire Hussars in 1915 but later transferred to the Royal Flying Corps, where he became a fighter pilot. He was shot down, and as a prisoner of war he learned to speak German. Upon leaving the military he attended the University of Oxford and received a degree in law in 1920. In 1929 he joined the British secret service (sometimes called MI-6) as chief of its air intelligence department. In this capacity he often visited Germany in the 1930s, using a Foreign Office job as cover. By 1939 he had also helped develop a new method of aerial photo-reconnaissance that was very useful to the British in World War II.

In 1938 Winterbotham and his colleagues in MI-6 were made aware of a new mechanical encrypting device developed by the Germans, called Enigma. Polish code-breaking experts were able to penetrate this top-secret code system during the 1930s, so that British experts, employing information from the Poles and French, were able to intercept, decode, and read many of the most important messages of the German armed forces as early as 1940. Winterbotham was put in charge of distributing this highly sensitive intelligence data, which was code-named Ultra, to the British leader Winston Churchill and to British field commands around the world. The information that Winterbotham's teams of operatives conveyed helped Allied planners and commanders to proceed against Axis forces with maximum strategic effect.

Winterbotham was made a Commander of the British Empire in 1943 and received the Legion of Merit in 1945. He revealed the story of the Ultra project to the general public in his book *The Ultra Secret* (1974).

wintergreen, any of several evergreen plants within the heath order (Ericales).

The genus *Pyrola* includes some 12 species, commonly called shinleaf, native to the North Temperate Zone. They are creeping perennials with leaves that usually grow in a rosette at the base of the stem. Several to numerous flowers are borne in a terminal spike. The calyx (sepals, collectively) is 5-lobed; there are 5 petals and 10 stamens. *P. minor* has pinkish globular flowers growing in a dense cluster. The pinkish globular flowers of *P. media* grow in a rather elongated cylindrical cluster. The flowers of *P. rotundifolia* are white, with widely spread petals.

Gaultheria procumbens, also called teaberry and checkerberry, has many short, erect branches with short-stalked, thick, shining tooth-edged leaves in the upper part. Flowers hang singly from the leaf axils and have a pale pink, waxy-looking, urn-shaped corolla. The bright red berrylike fruits, called deerberries, consist of the much-enlarged fleshy calyx, which surrounds the small, many-seeded capsule. The plant is a native of shady woods on sandy soil, particularly in the mountainous areas of the northern United States and southern Canada; it is hardy in England. The leaves, sharply astringent and having a peculiar aromatic smell and taste, yield the pungent oil of wintergreen, a volatile oil used as a flavouring for candies and chewing gum and in the treatment of muscular aches and pains. The active ingredient, methyl salicylate, is also synthesized



Wintergreen (*Gaultheria procumbens*)
Roger and Joy Spurr—Bruce Coleman Inc./EB Inc.

and sold as oil of wintergreen. Mountain tea, an infusion of wintergreen leaves, has been used in some parts of North America as a beverage.

Winterhalter, Franz Xaver (b. April 20, 1805, Menzenschwand, Ger.—d. July 8, 1873, Frankfurt am Main), German painter and lithographer, known for portraits of royalty.

Trained in Freiburg im Breisgau and Munich, Winterhalter entered court circles when in 1828 he became drawing master to Sophie, later grand duchess of Baden, at Karlsruhe. After 1834 he went to Paris and quickly became fashionable, at first under the protection of King Louis-Philippe and later at the court of Napoleon III. He was first summoned to the English court by Queen Victoria in 1841. During his career he painted most of Europe's royalty and leading aristocracy. His style was somewhat pedantic at first, producing a smooth, enamel-like surface; he later developed a freedom of brushwork that engendered the romantic charm (well exemplified in the celebrated portrait of the empress Elizabeth of Austria) that accounts for his popularity. Winterhalter's works, which became widely known through copies and reproductions, are now mainly valued for the picture they give of aristocratic mid-19th-century Europe.

Winters, (Arthur) Yvor (b. Oct. 17, 1900, Chicago, Ill., U.S.—d. Jan. 25, 1968, Palo Alto, Calif.), American poet, critic, and teacher who held that literature should be evaluated for its moral and intellectual content as well as its aesthetic elements.

Educated at the University of Chicago, University of Colorado (Boulder), and Stanford University (California), Winters taught at the University of Idaho (Pocatello) and at Stanford (1927–66). His attacks on such contemporary literary idols as T.S. Eliot and Henry James aroused much controversy. His collected poems appeared in 1952 (rev. ed., 1960). His major critical works, *Primitivism and Decadence, Maule's Curse,* and *The Anatomy of Nonsense,* were collected as *In Defense of Reason* (1947; rev. ed., 1960). *Forms of Discovery: Critical and Historical Essays on the Forms of the Short Poem* appeared in 1967.

Winterthur, city, Zürich *canton,* northern Switzerland. It lies in a wooded basin east of the Töss River, northeast of Zürich city. The Roman settlement of Vitodurum was on the site of the city's northeastern suburb of Ober-Winterthur. Winterthur was founded in about 1175 by the counts of Kyburg, who granted it a charter with extensive privileges. It was inherited in 1264 by the Habsburgs, who sold it to the city of Zürich in 1467. Notable landmarks include the Town Church of St. Laurenz (1264–1515), the town hall (1781–83), and the Assembly Hall (1865–69). Notable among the advanced schools is the Technikum, Switzerland's largest school of technology. The city's Collection Oskar Reinhart am Römerholz picture gallery and its symphony orchestra are well known. A rail and industrial centre, Winterthur is home to high-technology businesses and also manufactures cotton textiles. Pop. (1998 est.) 87,697.

Winterthur Museum, in full HENRY FRANCIS DU PONT WINTERTHUR MUSEUM, museum in Winterthur, Del., U.S., near Wilmington, that specializes in American decorative arts and furnishings. Occupying a mansion built in 1839, the museum limits its collections to American domestic architecture, furniture, metalware, textiles, paintings, prints and other objects made in the period from 1640 to 1860. The museum displays much of its collection in period rooms, each complete to the last detail. The mansion was purchased in 1926 by Henry Francis du Pont, who built up the collection and opened the renovated and expanded building as a museum in 1951.

Winthrop, John (b. Jan. 22 [Jan. 12, Old Style], 1588, Edwardstone, Suffolk, Eng.—d. April 5 [March 26], 1649, Boston, Massachusetts Bay Colony [U.S.]), first governor of the Massachusetts Bay Colony, the chief figure among the Puritan founders of New England.

Background and early life. Winthrop's father was a newly risen country gentleman



John Winthrop, detail of an oil painting, school of Sir Anthony Van Dyck, c. 1625–49; in the collection of the American Antiquarian Society, Worcester, Mass.

By courtesy of the American Antiquarian Society, Worcester, Mass.

whose 500-acre (200-hectare) estate, Groton Manor, had been bought from Henry VIII at the time of the Reformation. Winthrop thus belonged to a class—the gentry—that became the dominant force in English society between 1540 and 1640, and he ably assumed the habit of command appropriate to a member of the ruling class in a highly stratified society.

At age 15 he entered Trinity College, Cambridge; at age 17 he married the first of his four wives—Mary Forth, daughter of an Essex squire—and the next year the first of his 16 children was born. Like many members of his class, Winthrop studied law, served as justice of the peace, and obtained a government office; from 1627 to 1629 he was an attorney at the Court of Wards and Liveries. For more than 20 years Winthrop was primarily a country squire at Groton, with no discernible interest in overseas colonization.

He was an ardently religious person. From his early teens Winthrop threw himself into scriptural study and prayers, and gradually he trained himself into a full-fledged Puritan, convinced that God had elected him to sainthood. His religious experience reinforced his elitist outlook, but it also made him a social activist. Like other prominent Puritans, Winthrop dedicated himself to remaking, as far as possible, the wicked world as he saw it, arguing that "the life which is most exercised with tryalls and temptations is the sweetest, and will prove the safeste."

During the late 1620s, Winthrop felt increasingly trapped by the economic slump that reduced his landed income and by Charles I's belligerent anti-Puritan policy, which cost him his court post in 1629. When, in 1629, the Massachusetts Bay Company obtained a royal charter to plant a colony in New England, Winthrop joined the company, pledging to sell his English estate and take his family to Massachusetts if the company government and charter were also transferred to America. The other members agreed to these terms and elected him governor (October 20).

Journey to America. As Winthrop sailed west on the *Arbella* the spring of 1630, he composed a lay sermon, "A Modell of Christian Charity," in which he pictured the Massachusetts colonists in covenant with God and with each other, divinely ordained to build "a Citty upon a Hill" in New England. Some critics have seen Winthrop as a visionary utopian, while others have seen him as a social reactionary; but most obviously he was urging his fellow colonists to adopt the group discipline and individual responsibility that gave Massachusetts such immediate and lasting success as a social experiment.

For the remaining 19 years of his life, Winthrop lived in the New England wilderness, a father figure among the colonists. In the annual Massachusetts elections he was chosen governor 12 times between 1631 and 1648, and during the intervening years he sat on the court of assistants or colony council. His American career passed through three distinct phases. On first arrival, in the early 1630s, he did his most creative work, guiding the colonists as they laid out a network of tightly organized towns, each with its church of self-professed saints. Winthrop himself settled at Boston, which quickly became the capital and chief port of Massachusetts. His new farm on the Mystic River was much inferior to his former estate at Groton, but Winthrop never regretted the move because he was free at last to build a godly commonwealth.

Opposition against him built up after a few years, however, as dissidents kept challenging Winthrop's system in the mid- and late 1630s. He was nettled when the freemen (voters) insisted in 1634 on electing a representative assembly to share in decision making. He found Roger Williams' criticism of church–state relations intolerable, though he secretly helped Williams to flee to Rhode Island in 1636. And he took it as a personal affront when numerous colonists chose to migrate from Massachusetts to Connecticut.

Conflict with Anne Hutchinson. The greatest outrage by far, however, came when Anne Hutchinson, a mere woman, gained control of his Boston church in 1636 and endeavoured to convert the whole colony to a religious position that Winthrop considered blasphemous. It was he who led the counterattack against her. His victory was complete. Hutchinson was tried before the general court—chiefly for "traducing the ministers"—and was sentenced to banishment. Later she was tried before the Boston church and formally excommunicated. She established a settlement on Aquidneck Island (now Rhode Island) in 1638 and four years later, after the death of her husband, settled on Long Island Sound. Winthrop sanctimoniously noted her tragic misfortunes—her deformed stillborn baby and her murder by Indians—as proof of God's judgment against heretics.

By 1640 Winthrop had become the custodian of Massachusetts orthodoxy, suspicious of new ideas and influences and convinced that God favoured his community above all others. With the outbreak of the English Civil War in 1642, many New Englanders returned home to fight against Charles I. Winthrop, however, stayed on in America, and he criticized the course of the Puritan Revolution. His own political philosophy was best summed up in a speech of 1645, in which he defined the magistrates' authority very broadly and the people's liberty very narrowly. But Winthrop was never a petty tyrant; the colonists respected and loved him to the end. His tender side is best revealed by the loving letters he exchanged with his third wife, Margaret, who was his helpmate from 1618 to 1647. The most notable of his sons, John Winthrop the Younger (1606–76), was a talented scientist and governor of Connecticut. Later descendants have figured prominently in American politics, science, and business.

After struggling six weeks with "a feverish distemper," he died, age 61, in the spring of 1649. By force of character Winthrop had persuaded the colonists to adopt many—though by no means all—of his pet social and political ideas. The detailed journal that he kept during his years in America is a prime source for the early history of Massachusetts, and his copious file of correspondence and memoranda gives an exceptionally full impression of his activities and personality. (R.S.Du.)

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Winthrop, John, THE YOUNGER (b. Feb. 22 [Feb. 12, Old Style], 1606, Groton, Suffolk, Eng.—d. April 15 [April 5], 1676, Boston, Massachusetts Bay Colony [U.S.]), lawyer and a colonial governor in British North America.

The son of John Winthrop, the first governor of the Massachusetts Bay Colony, he emigrated to Boston in 1631 and was a member of the governor's council in 1635, 1640, 1641, and 1644–49. He was a founder of Agawam (now Ipswich), Mass., in 1633. He went back to England in 1634 and returned the following year as governor (for one year)



John Winthrop the Younger, detail of a 19th-century painting by G.F. Wright after a contemporary portrait by an unknown artist

By courtesy of the Connecticut State Library, Hartford

of Connecticut. He was again in England in 1641–43 and on his return to Massachusetts established ironworks at Lynn and Braintree.

Winthrop became magistrate of Connecticut in 1651. From 1657 to 1658 he was lieutenant governor and from the following year until his death was annually elected governor of the colony. In 1662 he obtained in England the charter uniting the colonies of Connecticut and New Haven. In 1675 Winthrop was further honoured by being chosen a commissioner of the United Colonies of New England. In England he was elected to membership in the newly organized Royal Society.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Winton, town, central Queensland, Australia, on Western Mills Creek, an intermittent tributary of the Diamantina River. Settled in 1873 and originally called Pelican Waterholes, it became a village in 1875 and a town in 1879. It was later renamed after Winton, Eng., the birthplace of its postmaster. It is at the junction of the Landsborough Highway and the Kennedy Developmental Road, with rail links northwest and east to the coastal towns of Rockhampton and Townsville and air service to Brisbane (700 miles [1,200 km] southeast). Winton is the trucking centre for the pastoral Channel Country, handling cattle and high-quality merino sheep. There are meat-handling works in the town. The words to the popular song "Waltzing Matilda" were supposedly composed by A.B. ("Banjo") Pater-

son at nearby Dagworth Station in about 1898. The airline Qantas was formed as a company in Winton in 1920. Pop. (1989 est.) 1,729.

Winton, Alexander (b. June 20, 1860, Grangemouth, Stirling, Scot.—d. June 21, 1932, Cleveland, Ohio, U.S.), Scottish-born American pioneer automobile manufacturer who put thousands of "Winton Sixes" on the road.

After serving an apprenticeship in Clyde shipyards Winton moved to the United States in 1880, worked in iron mills and as a steamship engineer, and became a bicycle manufacturer in Cleveland in 1890. He built a gasoline-powered car in 1896 and in 1897 formed the Winton Motor Carriage Company. In 1897, as a demonstration of endurance, he drove one of his models from Cleveland to New York City, a trip lasting from July 28 to August 7. In March 1898 he made the first sale of a regularly produced American automobile, and for some years he remained one of the leading U.S. automobile manufacturers.

Winton built four- and six-cylinder engines and was the first in the United States to build a straight eight-cylinder engine. His racing car "Bullet No. 1" set a speed record of one mile in 52.2 seconds at Daytona Beach, Fla., in 1902. In 1912 he founded the Winton Gas Engine Company, now part of General Motors, to do experimental work on diesel engines.

Wintun, any of a number of groups of Penutian-speaking California Indians originally inhabiting the west side of the Sacramento Valley, some 250 miles (400 km) from north to south, together with certain stretches of the flanking foothills. Four primary linguistic groupings, each, in fact, speaking a number of dialects, made up the Wintun population: the northern Wintun (Wintu), the central Wintun (Nomlaki), and the two subdivisions of the southern Wintun, the Hill and River Patwin. The Patwin are sometimes classified as a group separate from the Wintun.

The elongated shape of Wintun territory made for considerable cultural diversity; contacts with close neighbours to the east and west were more frequent for most communities than were those with other Wintun at the extremities of the group's territory. In the north, for instance, basketry was twined in the fashion of that of the Oregon Indians; in the centre it was well-twined and intricately ornamented like that of the Pomo; and in the south it had mixed characteristics. Fishing was pursued everywhere; the gathering of acorns and other wild plant foods was universal, as was the hunting of waterfowl and other game. The house of the River Patwin was domed and earth-covered; that of the hill people was either a conical bark house or a simpler thatched structure; the nature of the northern dwellings is unknown.

Not much is known of Wintun social or political organization; there were apparently autonomous villages or bands, however; and the Patwin are known to have had a community chief with near-absolute power.

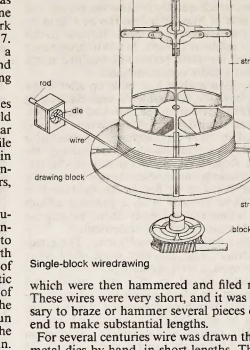
The southern Wintun greatly influenced the development of the Kuksu cult, a religion of secret societies and esoteric rites that spread to various Californian Indians. The cult's main purposes were to bring strength to young male initiates, to bring fertility to natural crops, and to ward off natural disasters. Wintun mythology was based on the existence of a single creator and powerful beings existing in direct natural personifications.

Before the influx of white settlers there were at least 12,000 Wintun; in the late 20th century there were scarcely more than 1,000 identifiable Wintun left (though many northern Californian Indians have intermarried). *Compare* Pomo.

Wiraqoca (Inca god): *see* Viracocha.

wire, thread or slender rod, usually very flexible and circular in cross section, made from various metals and alloys, including iron, steel, brass, bronze, copper, aluminum, zinc, gold, silver, and platinum. The processes used are all fundamentally the same.

The first known writing relating to wire and its manufacture appears in the Bible (Exodus 39:3): "And gold leaf was hammered out and cut into threads . . . ." Round wire was probably made by cutting plates into narrow strips,



Single-block wiredrawing

which were then hammered and filed round. These wires were very short, and it was necessary to braze or hammer several pieces end to end to make substantial lengths.

For several centuries wire was drawn through metal dies by hand, in short lengths. The section to be drawn was hammered to a point so that it could be pushed through the hole in the die. The wiredrawer grasped it with his hands or with tongs and pulled it through the die, the amount of reduction being limited by the strength of the wiredrawer. Various means were used to augment his strength, such as seating him in a hanging chair so that by bracing his legs against the die-holding structure he could pull with his arms and push with his legs. Larger wire had to be made by hammering or rolling or both.

In the 19th century requirements for large tonnages and great lengths of steel and copper wire became acute, especially after the invention of wire rope, the development of the telegraph in the 1840s, and the invention of the telephone and barbed wire later in the century. These demands were met by the Bessemer and the open-hearth steelmaking processes and new machinery and methods of rolling rods.

Wire nowadays is drawn from a hot-rolled section of steel called a rod. (Rods of some of the softer metals may be formed by extrusion or casting instead of rolling.) The rods are cleaned of scale (oxides that form on the surface) by immersion in dilute sulfuric acid. Other acids or a molten salt bath, such as of sodium hydride, may be used, as may mechanical scalers, depending on the material. Metallic grit blasting is sometimes used to clean spring wire. After acid cleaning, the metal is washed and immersed in a coating solution, such as a lime emulsion, borax, or phosphate, to neutralize any remaining acid and act as a lubricant in subsequent wire-drawing operations.

The wire-drawing process consists of pointing the rod, threading the pointed end through the die, and attaching the end to a drawing block as shown in the figure. The block, revolved by an electric motor, pulls the lubricated rod through the die, reducing it in diameter and increasing its length. For smaller sizes of wire, the reduction cannot be performed in a single draft, and a multiple-block machine is used, consisting of a number of single-block machines built together in one unit.

wirehaired pointing griffon, breed of sporting dog developed as an all-purpose hunting dog by E.K. Korthals, of The Netherlands, around the end of the 19th century. It was bred to point and to retrieve both on land and in water, and it is generally a slow, deliberate hunter. Ideally a vigorous, strong-limbed dog with a rugged constitution, the wirehaired pointing griffon stands about 20 to 24 inches (50 to 60 cm) and weighs 45 to 60 pounds (20.5 to 27 kg). It is bushy-browed and has a harsh, unkempt-looking coat in various combinations of gray, white, and chestnut brown.

wireworm, any of certain millipede (*q.v.*) species.

Wirral, metropolitan district (borough), metropolitan area of Merseyside, England, occupying the major portion of the Wirral Peninsula, which is bounded by the River Mersey, the Irish Sea, and the River Dee. Ferries, road tunnels, and a rail tunnel connect Wirral with the rest of Merseyside. Urban, industrial, and commercial development is concentrated on the northeastern side of the peninsula, along the Mersey, while much of the rest of the borough contains villages and rich agricultural land. The western part includes housing for commuters to Liverpool. The coastal strip from New Brighton to West Kirby is a recreational area, and the golf course of the Royal Liverpool Golf Club is at Hoylake. The area of the borough is 61 square miles (158 square km).

Wirral was almost all an agricultural area until the early 19th century, but with the growth of Liverpool, parts of the peninsula became desirable residential areas for Liverpool businessmen. In 1824 William Laird founded the shipyards at Birkenhead and laid out the town on a grid pattern with Hamilton Square as the focus. Later in the century the Birkenhead docks developed a trade independent of Liverpool. Today industries include flour milling, the manufacture of margarine and pharmaceuticals, and marine engineering. The long-established Unilever soap works at Port Sunlight adjoin a model garden village created for employees by the first Lord Leverhulme. Pop. (2001) 312,289.

Wirt, William (Albert) (b. Jan. 21, 1874, Markle, Ind., U.S.—d. March 11, 1938, Gary, Ind.), innovative American educator, best known for his "platoon" system of alternating two groups of students between classroom and recreational or vocational activities.

Wirt graduated from DePauw University (Greencastle, Ind.) in 1898, attended graduate school there and at the University of Chicago, and then went to Europe to study educational methods.

He began his professional career while in college in Indiana; he was superintendent of schools in Redkey (1895–97), taught mathematics at Greencastle (1897–99), then served as superintendent at Bluffton (1899–1907). He introduced his system at Bluffton, but it was as superintendent of the Gary public schools (1907–38) that Wirt attracted national attention with what became known as the Gary Plan: Wirt's idea of splitting the student body into platoons. In that time Gary won national renown as a centre for progressive education.

Wirt intended his plan to make more efficient use of school facilities. It led to greater emphasis on recreational and vocational activities in school, lengthened school hours from six to eight, and encouraged teachers in subject-area specialization. In 1914 New York

City hired Wirt to implement his system there, but controversy among New York educators over the Gary Plan led to its repudiation in 1918. The number of schools following Wirt's program dwindled from more than 1,000 (in more than 200 cities) in 1930 to a handful within two decades.

Wirt was a conservative Republican who viewed President Franklin D. Roosevelt and the New Deal with hostility and charged that public schools were spreading communist propaganda in the 1930s. This led to a congressional investigation, which found no evidence to support his allegations.

Wirth, (Karl) Joseph (b. Sept. 6, 1879, Freiburg im Breisgau, Ger.—d. Jan. 3, 1956, Freiburg), liberal German statesman and chancellor during the Weimar Republic (1919–33), who advocated a policy of fulfillment of Germany's obligations under the Versailles Treaty



Joseph Wirth, charcoal drawing by Sors, 1922
Archiv für Kunst und Geschichte, Berlin

settlement and consistently opposed German militarism after both world wars.

Wirth, a member of the left wing of the Roman Catholic Centre Party, was elected to the Reichstag (federal lower house) in 1914 and served in the Weimar national assembly after the revolution of 1918. In 1920 he became minister of finance. After the Cabinet of Konstantin Fehrenbach resigned in protest over the heavy reparations obligations imposed by the Versailles Treaty, Wirth took office as chancellor in May 1921, pursuing a policy of treaty fulfillment. Although he resigned over the loss of much of Upper Silesia to Poland in October 1921, he formed a new Cabinet four days later. With his foreign minister, Walther Rathenau, he negotiated the Treaty of Rapallo with the Soviet Union (April 16, 1922), which broke Germany's postwar isolation, but he then resigned over the reparations question in November 1922. He held a number of responsible posts toward the end of the Weimar period as minister for the provinces occupied by the Allies (1929–30) and minister of the interior in the Cabinet of Heinrich Brüning (1930–31). Retiring in October 1931, he was forced into exile after Adolf Hitler took power (January 1933). Wirth resided first in Paris and later in Switzerland. Returning home in 1948, he opposed West Germany's rearmament and its membership in NATO, and he unsuccessfully called for a reunited, neutral Germany. These efforts gained him the Soviet Union's Stalin Peace Prize for 1955.

Wirth, Louis (b. Aug. 28, 1897, Gemünden, Ger.—d. May 3, 1952, Buffalo, N.Y., U.S.), American sociologist who pioneered in the study of urban problems.

A noted teacher at the University of Chicago from 1926, Wirth blended empirical research and theory in his work and contributed to the emergence of sociology as a profession. Wirth was president (1947) of the American Sociological Society and first president (1949–52) of the International Sociological Association.

He was the chief author of *Our Cities: Their Role in the National Economy* (1937). Written in the name of the U.S. National Resources Committee, this volume was an important early attempt to outline a national urban policy based on the findings of the social sciences. He also wrote *The Ghetto* (1928); "Urbanism as a Way of Life" (1938), an article published in the *American Journal of Sociology* that became a classic; and many other papers, collected in *Community Life and Social Policy* (1956) and *Louis Wirth on Cities and Social Life* (1964).

Wisbech, town ("parish"), Fenland district, county of Cambridgeshire, England. It lies along the River Nen 11 miles (18 km) above the latter's outlet in The Wash. Wisbech is the trading, administrative, and service centre of the productive agricultural region of the Fenland. The town has canning and brewing activities, as well as light engineering industries. The growing of bulbs and flowers is a special feature of the district, and Wisbech has a school of horticulture. Among the Georgian houses that line the riverside is Peckover House, now owned by the National Trust. Pop. (1991) 24,981.

Wisconsin, constituent state of the United States of America, one of the northern states of the Midwest, bounded on the north by Lake Superior and the Upper Peninsula of Michigan, on the east by Lake Michigan, on the south by Illinois, and on the west by Minnesota and Iowa. The capital is Madison.

A brief treatment of Wisconsin follows. For full treatment, *see* MACROPAEDIA: United States of America: *Wisconsin*.

The French explorer Jean Nicolet visited Wisconsin in 1634, and the first permanent European settlement in the region was established in 1717. The area remained under French control until 1763, when it was acquired by Britain. After the American Revolution the region was ceded to the United States, becoming part of the Northwest Territory in 1787 and of the Indiana Territory in 1800. An influx of northern European immigrants began in the 1830s and continued for several decades. In 1836 the Wisconsin Territory was organized, and in 1848 it became the 30th state. The Progressive Movement began in Wisconsin about 1900, resulting in the passage of legislation that made the state a leader in social reform. During the 20th century Wisconsin evolved from an almost entirely rural to a predominantly urban society.

Wisconsin comprises five physical regions: the Northern Highland, the Lake Superior Lowland, the Central Plain, the Western Upland, and the Southeastern Ridges and Lowlands. Northern Wisconsin has one of the greatest concentrations of lakes in the world. It is one of the few states in which essentially all drainage is outflowing. Many unique landforms are found in the state such as the rocky Door Peninsula between Lake Michigan and Green Bay, the broad river gorges between the Mississippi and the Wisconsin rivers, the narrow river gorge known as the Wisconsin Dells, the unglaciated "Driftless Area" in the southwest, and the irregular glacial "kettle moraine" region in the south-central area.

Wisconsin has long, cold winters and warm but relatively short summers. Average January temperatures are between 10° and 22° F (−12° and −6° C), while average July temperatures are between 66° and 72° F (19° and 22° C). The average annual rainfall is about 30 inches (760 mm), and snowfall varies from 30 to 60 inches a year.

Forests, covering about 45 percent of the state, are most heavily concentrated in the Northern Highland and Central Plain. Trees are second-growth hardwoods and evergreens. Much of the pine acreage is plantation growth. Common animals include white-tailed deer, fox, rabbit, skunk, squirrel, chipmunk, and gopher; there are many black bear. Waterfowl are abundant, and migratory geese visit the state twice a year. There are more than 170 species of fish, including all the major freshwater game fish and salmon.

Germans are the most numerous ethnic group in Wisconsin's population, followed by Poles, Scandinavians, and British. The black population increased by about 80 percent in the 1970s and 1980s to nearly 5 percent of the whole in 1990. The vast majority of blacks reside in southeastern lakeshore cities, particularly Milwaukee. American Indians remaining in the state are concentrated largely in Menominee county (the whole of which is a Menominee Indian reservation) and Milwaukee.

The southeastern industrial belt along Lake Michigan is the primary factor in making Wisconsin the 12th largest manufacturing state in the nation. The southern two-thirds of the state supports an agricultural life that makes it the major milk, butter, and cheese producer in the United States. The sparsely settled northern forest and lake country hosts much of the tourist and recreational activity in the upper Midwest.

The greater population density of the southeast is reflected in the focus of major transportation routes around Milwaukee. Intercity and intracity bus service is widespread. Wisconsin ports handle more than one-fourth of the domestic freight tonnage of the Great Lakes. Madison and Milwaukee are served by large commercial airlines and, along with smaller cities, by regional or commuter lines.

Besides being the state's major system of public higher education, with numerous regional campuses plus the original one at Madison, the University of Wisconsin contributes substantially to the arts and culture of the state. The Milwaukee Art Museum has an outstanding collection of 20th-century art. Many local folk festivals are held annually, such as the William Tell Pageant in New Glarus and the Song of Norway in Blue Mounds. Newspapers and commercial television and radio reach all parts of the state; educational television stations are located in Madison and Milwaukee. Area 56,153 square miles (145,436 square km). Pop. (2000) 5,363,675.

Where the same name may denote a person, place, or thing, the articles will be found in that order

Wisconsin, University of, system of higher education of the state of Wisconsin, comprising 13 four-year institutions and 13 two-year educational centres. The original campus of the University of Wisconsin was founded at Madison as a land-grant college in 1849 and attained a firm foundation after the Morrill Act of 1862. It became fully coeducational in 1874 and gained a reputation as an exemplar of democratic education that was open to all "who possess sufficient intellectual endowment."

In 1971 the University of Wisconsin at Madison was merged with the Wisconsin State Universities system. The University of Wisconsin thus became one of the largest state university systems in the nation, with an enrollment of about 160,000 students. All of the system's 13 four-year institutions grant bachelor's and master's degrees, while the main campus at Madison and the one at Milwaukee grant doctoral degrees as well. The Madison campus is one of the world's great university research centres. It has a college of letters and science; undergraduate schools of agriculture and life sciences, health professions, business, education, environmental studies, and consumer sciences; and graduate or first-professional schools of law, pharmacy, medicine, veterinary medicine, and nursing.

Wisconsin Dells, scenic region and city along the Wisconsin River, in Columbia and Sauk counties, south-central Wisconsin, U.S. The city of Wisconsin Dells is located 45 miles (72 km) northwest of Madison.

The dells were formed by a strong current that cut a channel as much as 150 feet (45 m) deep through the sandstone and, in the process, carved unusual rock formations along a 15-mile (24-kilometre) stretch of the Wisconsin River. Early rivermen gave the dramatic shapes descriptive names such as Black Hawk's Head and Chimney Rock. The most famous rock formation is Standing Rock, with a natural amphitheatre where the Indian Ceremonial (dance) takes place during the summer. A dam divides the Wisconsin River into the Upper and Lower Dells, which may be viewed from the river and are accessible by footpaths from boat landing sites.

The city, called Kilbourn until 1931, has developed as a tourist centre for the area and has a number of other attractions, including Storybook Gardens, Fort Dells (a frontier-town amusement park), and Wisconsin Deer Park. Pop. (1990) city, 2,393.

Wisconsin Evangelical Lutheran Synod, conservative Lutheran church in the United States, formed in 1892 as a federation of three conservative synods of German background and then known as the General Evangelical Lutheran Synod of Wisconsin, Minnesota, Michigan and Other States. The Wisconsin Synod had been organized in 1850, and the Minnesota and Michigan synods in 1860. In 1904 the Nebraska Synod joined the federation, which then became known as the Joint Synod of Wisconsin, Minnesota, Michigan, and Nebraska. In 1917 the synods were incorporated into one body, and in 1919 the body's new constitution received final acceptance. The name of the new church was Evangelical Lutheran Joint Synod of Wisconsin and Other States; the present name was adopted in 1959.

The Wisconsin Synod maintains a strict, conservative interpretation of Christian doctrine and the Lutheran confessions and will not cooperate with other Lutheran groups without absolute agreement in all matters of doctrine and practice. It cooperated with the Missouri Synod in the Synodical Conference (organized in 1872), an advisory body, until the early 1960s, when it accused the Missouri Synod of cooperating with other Lutheran groups before establishing agreements on doctrine.

Church members of the Wisconsin Synod are forbidden to cooperate in any community organizations with members of other church groups if prayers are offered, since the synod maintains that praying with others involves accepting their beliefs. Membership in lodges and the Boy Scouts is forbidden, and pastors may not be military chaplains.

In the synod's government, the local congregation has considerable autonomy. The church is divided into geographic districts, which send delegates to the synodical meeting in odd-numbered years. An extensive parochial-school system is maintained. Offices of the synod are in Milwaukee.

Wisconsin Glacial Stage, most recent major division of Pleistocene time and deposits in North America (1,600,000 to 10,000 years ago). It was named for rock deposits studied in the state of Wisconsin. At least the last half, and possibly all, of the Wisconsin Stage corresponds to the Würm Glacial Stage of classical European usage. The Wisconsin Stage follows the Sangamon Interglacial Stage and represents the last time that major continental ice sheets advanced across the North American continent. Its end is approximately coincides with the close of the Pleistocene Epoch in North America, a somewhat vague termination because the glacial ice did not recede everywhere at the same time. Similarly, there is no conclusive evidence that the ice will not return.

The Wisconsin Glacial Stage is the best known of the glaciations that affected North America, and it has been possible to divide the Wisconsin into early, middle, and late episodes. The beginning of the Early Wisconsin has been dated (during the late 1970s) using cores from the seafloor to about 115,000 years ago. In the Great Lakes region, where deposits of Wisconsin age are well represented, five substages, representing successive advances and retreats of glaciers, are recognized.

The Wisconsin Glacial Stage had a profound effect upon the landscape of North America. The Great Lakes are remnants of glacial lakes that bordered the vast continental ice sheets. Much material was eroded from various areas, only to be deposited elsewhere. The rich soils of the Great Plains, for example, are largely derived from the silt deposited by streams of glacial meltwater. Sequences of pollen grains preserved in Wisconsin sediments indicate the presence of tundra on the fringes of the ice masses; the tundra was occupied by the woolly mammoth, caribou, and muskox. Bison, horses, giant ground sloths, and a host of other vertebrates occupied the Great Plains to the southwest, while an equally rich and diverse fauna that included peccaries, sabre-toothed cats, mastodons, and camels occupied the region to the southeast. During the Late Wisconsin the first clear traces of human presence in North America became evident, though there are some indications that humans may have arrived even earlier.

A feature of the end of the Wisconsin Glacial Stage, and so of the Pleistocene Epoch as well, was the extinction of numerous species of large mammals in North America, including the horse, mammoth, mastodon, camel, giant armadillo, and sabre-toothed cats. It has been suggested that overhunting by the first humans in the New World was the major factor in this wave of animal extinction. The true answer is probably more complex, involving diverse climatic and environmental factors, in addition to possible human intervention.

Wisconsin River, river rising in the lake region of Vilas county, northern Wisconsin, U.S., near the Wisconsin-Michigan border. It flows south through central Wisconsin past Wausau, Stevens Point, Wisconsin Rapids, and Wisconsin Dells (site of a scenic gorge). The river then turns southeast past Portage and then southwest and west to join the Mississippi River near Prairie du Chien after a course of 430 miles (690 km).

The Wisconsin is navigable for light craft as far as Portage, 200 miles (320 km) from its mouth, but navigation farther upstream is made difficult by shifting sandbars. At Portage the Fox River (connected to the Wisconsin by a canal) is only 1.5 miles (2.5 km) to the east across low, marshy ground. Lake Wisconsin is formed by a hydroelectric dam on the river near Prairie du Sac.

Wise, Isaac Mayer (b. March 29, 1819, Steingrub, Bohemia, Austrian Empire [now in Czechoslovakia]—d. March 26, 1900, Cincinnati, Ohio, U.S.), rabbi whose goal of uniting American Jewry made him the greatest organizer of Reform Jewish institutions in the United States.

After serving as a rabbi for two years in Radnice, Bohemia, Wise immigrated in 1846 to Albany, N.Y., where he was a rabbi for eight years. His congregation there was the first in the United States to employ family pews; these became a standard institution in Reform Judaism. In 1854 Wise accepted the pulpit of Bene Yeshurun in Cincinnati, a post he retained for the rest of his life.

Although Wise failed in his efforts to unite American Jews of all persuasions, he did bring about great unanimity among Reform Jews. In addition, he succeeded in adapting Reform Judaism to American life. An astute politician, he propagandized tirelessly for centralized Reform institutions in his English-language weekly, the *American Israelite;* in his German-language paper, *Die Deborah;* and in many rabbinical conferences.

The fruits of his efforts were the Union of American Hebrew Congregations (*see* American Hebrew Congregations, Union of), a confederation of synagogues in the Midwest and South that grew into an association of American and Canadian Reform congregations; its educational arm, Hebrew Union College (*q.v.*; now Hebrew Union College–Jewish Institute of Religion), the first permanent American rabbinical college, of which Wise was president until his death; and the Central Conference of American Rabbis, which became the legislative body of Reform Judaism. Wise served as president of the Central Conference until his death.

Because of the diversity of Reform prayer books, Wise tried to compile a standard work and in 1857 published the *Minhag America* ("American Usage"). It was superseded in 1894 by the Union Prayer Book, which came into being, in large part, because Wise had emphasized so often and so forcefully the need for a standard text. A believer in the universal mission of Judaism, he was a firm opponent of the establishment of a Jewish state in Palestine.

Wise, John (baptized Aug. 15, 1652, Roxbury, Mass. [U.S.]—d. April 8, 1725, Ipswich, Mass.), colonial American Congregational minister, theologian, and pamphleteer in support of liberal church and civil government.

After graduating from Harvard College in 1673, Wise preached at Branford, Conn., and Hatfield, Mass. In 1680 he accepted a call to the newly organized church at Chebacco in Ipswich, Mass. During the administration of Governor Sir Edmund Andros, he was arrested, tried, and briefly deprived of his ministry for leading his town's resistance to taxes imposed by the governor. After Andros's overthrow in 1689, Wise was chosen as a representative from Ipswich to the Boston Convention that reorganized the Massachusetts government.

The publication in 1705 of Increase Mather's *Questions and Proposals,* a pamphlet that advocated the establishment of Presbyterian-oriented associations of congregational clergymen that would exercise the authority then invested in the individual churches, brought out Wise's more democratic concepts of church polity. He expressed those beliefs in a pamphlet published in 1710, *The Churches Quarrel Espoused,* which helped defeat Mather's proposals. Seven years later he published *A Vindication of the Government of New England Churches,* a work that delineated his liberal concepts concerning both civil and ecclesiastical governments. Strongly influenced by Whig political theory, it had a significant influence on patriot leaders of the American Revolution.

Wise, Robert (b. Sept. 10, 1914, Winchester, Ind., U.S.), American motion-picture director and producer whose films combine dramatic tension with the insightful depiction of character.

Wise studied journalism at Franklin College and began working at RKO Studios in Hollywood in 1933. He was promoted to editor in 1939 and edited Orson Welles' *Citizen Kane* (1941) and *The Magnificent Ambersons* (1942). He began directing in 1944 with *The Curse of the Cat People,* which was followed by other thrillers, notably *The Body Snatcher* (1945), and by *The Set-Up* (1949), a realistic depiction of the milieu of professional boxing.

Wise established his reputation with the dramas *Three Secrets* (1950) and *Executive Suite* (1954), the science-fiction classic *The Day the Earth Stood Still* (1951), the war stories *The Desert Rats* (1953) and *Run Silent, Run Deep* (1958), the boxing picture *Somebody Up There Likes Me* (1956), and the crime dramas *I Want to Live* (1958) and *Odds Against Tomorrow* (1959); the latter was the first film Wise produced as well as directed.

Wise's greatest popular success came with two big-budget musicals, *West Side Story* (1961; codirected with Jerome Robbins) and *The Sound of Music* (1965), and with *The Sand Pebbles* (1966), a colourful action epic. Among his subsequent works were two science-fiction films, *The Andromeda Strain* (1971) and *Star Trek: The Motion Picture* (1979).

Wise, Stephen Samuel (b. March 17, 1874, Budapest, Hung., Austria-Hungary—d. April 19, 1949, New York, N.Y., U.S.), Reform rabbi, a leader of the Zionist movement in the United States, and a liberal activist who influenced the development of Reform Judaism in that country.

Wise earned his Ph.D. at Columbia University in 1901 and received his rabbinical training from private teachers. After serving as rabbi to congregations in New York City (1893–1900) and Portland, Ore. (1900–06), he was invited to become rabbi of Temple Emanu-El (New York City), then the most influential Reform congregation in the country. He declined the appointment, however, after receiving inadequate assurance of free speech in the pulpit, and he founded the influential Free Synagogue (1907) instead, which he led until his death. Wise became a noted civic reformer in New York City politics in subsequent decades and was famous for his brilliant and timely sermons, which he preached to large audiences at Carnegie Hall for many years.

Wise was one of the first Jewish leaders in the United States to become active in the Zionist movement. He attended the Second Zionist Congress in Basel, Switz., in 1898, and that same year he helped found the Zionist Organization of America (ZOA), of which he served as president in 1936–38. He also helped found and led the permanent American Jewish Congress and the World Jewish Congress (1936). As a prominent member of the Democratic Party and an acquaintance of President Woodrow Wilson, Wise influenced the U.S. government toward approval of the Balfour Declaration. He was a leader in the struggle to marshal American public opinion against Adolf Hitler in the 1930s.

In 1922 Wise founded the Jewish Institute of Religion in New York City, a seminary that was especially designed to train liberal rabbis for the New York area; this school merged with Hebrew Union College in 1950.

Wise Men: *see* Magi.

Wiseman, Frederick (b. Jan. 1, 1930, Boston, Mass., U.S.), American filmmaker noted for his documentaries that examine the functioning of American institutions.

Wiseman was educated at Williams College in Williamstown, Mass. (B.A., 1951), and at Yale Law School (L.L.B., 1954.). He practiced and taught law thereafter but remained indifferent to the subject, so in 1964 he produced director Shirley Clarke's film adaptation of Warren Miller's novel *The Cool World*. Deciding to direct, produce, and edit his own films from then on, Wiseman soon afterward completed his first major film, *Titicut Follies* (1967), an unflinching look at the conditions inside a state hospital for the criminally insane. This and most subsequent films were shot in black-and-white, carried neither commentary nor music, and were the result of dozens of hours of direct shooting that Wiseman then reduced to an hour or two of finished product, imposing structure and viewpoint in the course of a highly selective editing process.

Wiseman proceeded to make documentaries on various American institutions, including a public high school (*High School*, 1968), a metropolitan police force (*Law and Order*, 1969), an inner-city hospital (*Hospital*, 1970), military training (*Basic Training*, 1971), a juvenile court (*Juvenile Court*, 1973), animal experimentation (*Primate*, 1974), a city welfare office (*Welfare*, 1975), an exclusive department store (*The Store*, 1983), an intensive-care hospital ward (*Near Death*, 1989), and a public park (*Central Park*, 1990). In his films Wiseman eschewed polemics in favour of a complex and sympathetic presentation of such institutions' effects on individual people.

Wiseman, Nicholas, in full NICHOLAS PATRICK STEPHEN WISEMAN (b. Aug. 2, 1802, Seville, Spain—d. Feb. 15, 1865, London, Eng.), first cardinal resident in England since the Reformation and first archbishop of Westminster. He was one of the chief architects of the 19th-century revival of Roman Catholicism in England.

Wiseman's Irish parents emigrated to Spain, but after his father died, he and his mother went home to County Waterford. He received his doctorate in 1824 and was appointed professor of Oriental languages in the University of Rome and rector of the English College there in 1828.

When the Oxford Movement was aiming to restore 17th-century church ideals through a return of the Anglo-Catholic church in England, Wiseman successfully preached (1835–36) in London on Roman Catholicism and founded the Roman Catholic quarterly *Dublin Review*. Thereafter he devoted his life to the Roman Catholic revival in England. Made bishop in 1840, he was appointed vicar apostolic of the Midland district and president of Oscott College, near Birmingham. His sympathy with the Oxford Movement's doctrine created a rapport with such exponents of it as John Henry Newman and Edward Pusey.

Because the Roman Catholic revival was gaining impetus through numerous conversions and through a vast immigration of Roman Catholic labourers from Ireland, Wiseman was transferred in 1848 to London as vicar apostolic. Pope Pius IX, deciding in 1850 to restore a hierarchy of dioceses in England, summoned Wiseman to Rome and made him cardinal and first archbishop of Westminster. Pius' creation of English dioceses and Wiseman's declaration of it were denounced as "papal aggression" by the English, who burned the pope and Wiseman in effigy on Nov. 5, 1850 (Guy Fawkes Day). In reply, Wiseman wrote *Appeal to the Reason and Good Feeling of the English People*. In 1852 he presided at the first Synod of Westminster.

Wiseman was widely respected for his intellect, humanitarianism, and constructive achievements. His celebrated *Horae Syriacae* (1827; "Syriac Seasons") contained important original research on the Syriac version of the Old Testament, and his historical novel *Fabiola* (1854) was translated into many languages.

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wisent, oxlike mammal, also known as the European bison. *See* bison.

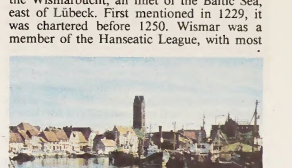
Wishart, George (b. *c.* 1513, Pitarrow, Scot.—d. March 1, 1546, Edinburgh), an early martyr of the Reformation in Scotland.

While a teacher of Greek at Montrose, Wishart was accused of heresy and went to Cambridge (1538), where he became acquainted with the Reformer Hugh Latimer, himself later martyred. In 1539 Wishart was sent to preach in Bristol, where he was again accused of heresy, and this time he left for the European continent. After serving briefly as tutor at Cambridge (1542–43), he returned to Scotland, where he strongly influenced John Knox and preached Reformation doctrine. Taken into custody by the Earl of Bothwell on condition that he should not be handed over to Cardinal David Beaton and imprisoned in Edinburgh, he was in fact handed over to Beaton, who had him tried and then burned at the stake at St. Andrews. His translation of the First Helvetic Confession (1536) was published in 1548.

Wislicenus, Johannes (Adolph) (b. June 24, 1835, Kleineichstädt, Thuringia [Germany]—d. Dec. 5, 1902, Leipzig, Ger.), German chemist whose pioneering work led to the recognition of the importance of the spatial arrangement of atoms within a molecule.

Wislicenus's education included study at Harvard and Zürich, where he taught, prior to professorships elsewhere. He anticipated the structural theory of Jacobus van't Hoff and Joseph-Achille Le Bel by several years in his work on lactic acid, which led to his discovery (1873) that two compounds might have the same chemical formula but exhibit different characteristics. Wislicenus attributed this phenomenon (isomerism) to the different molecular structure or arrangement of atoms of the two compounds.

Wismar, city, Mecklenburg-West Pomerania *Land* (state), northern Germany. It lies along the Wismarbucht, an inlet of the Baltic Sea, east of Lübeck. First mentioned in 1229, it was chartered before 1250. Wismar was a member of the Hanseatic League, with most



Fishing boats in the harbour at Wismar, Ger.
W. Krammisch—Bruce Coleman Inc.

of its trade in herring and beer. In 1648 it passed to Sweden, which did not renounce its claims to the city until 1903, although Wismar was administered by Mecklenburg-Schwerin state after 1803. Many historic buildings were destroyed in World War II, but the medieval town centre remains.

Wismar's channel and port facilities were greatly extended after World War II, and important new shipbuilding yards were established. Wismar is a road and rail junction; its industries include fishing, sugar refining, and metalworking. Pop. (1990 est.) 57,173.

Wiśniowiecki, Michael: *see* Michael Wiśniowiecki.

Wissel Lakes, Indonesian DANAU-DANAU WISSEL, chain of three highland lakes located in the Sudirman Range of Irian Jaya *provinsi* (province), Indonesia, western New Guinea. They comprise Paniai, the largest and northernmost; Tage, to its south; and Tigi, the southernmost. Situated at an elevation of about 5,750 feet (1,750 m), they were created by tectonic damming of the Arabu River. The lake shores support one of the densest concentrations of agricultural population in the New Guinea highlands, mostly the pygmoid Kapauku, a Papuan-speaking people. Although the area has been populated since prehistoric times, high densities probably date only from the introduction of the

sweet potato in the 16th century. The first European to see the lakes was a Dutch officer, Lieutenant Wissel, in 1937.

Wissler, Clark (b. Sept. 18, 1870, Wayne county, Ind., U.S.—d. Aug. 25, 1947, New York, N.Y.), American anthropologist who developed the concept of culture area.

Though educated as a psychologist (Ph.D., Columbia University, 1901), Wissler was



Wissler
By courtesy of the American Museum of Natural History, New York

drawn to anthropology through the influence of Franz Boas. Wissler was curator of the American Museum of Natural History in New York City for nearly 40 years and also taught at Yale University (1924–40).

North American Indians of the Plains (1912) reflects the main focus of his fieldwork. He became a leading authority on the Dakota and Blackfoot tribes, writing more than 200 scientific and popular articles. His descriptions particularly noted material culture, myths and tales, art designs, social organization and ethical values, and especially the spectacular Sun Dance religious ceremony.

At the American Museum, Wissler arranged collections and exhibits according to area and tribe. In *The American Indian* (1917), a classic in North American ethnology, he explored the regional clustering of cultural traits and the relation between culture and physical environment, outlining the main culture areas. The distribution and adaptation of cultural traits and their relative ages were treated in *Man and Culture* (1923) and *The Relation of Nature to Man in Aboriginal America* (1926). Later works include *Indian Cavalcade* (1938) and *Indians of the United States* (1940).

Wissmann, Hermann von (b. Sept. 4, 1853, Frankfurt an der Oder, Brandenburg [Germany]—d. June 15, 1905, near Liezen, Austria), German explorer who twice crossed the continent of Africa and added to the knowledge of the upper Congo River basin. His explorations led to the establishment of German colonies in East Africa.

Wissmann left Luanda, Angola, in 1880 and traversed Africa to Sadani, Tanganyika, where he arrived in 1882. In the course of his trip he discovered the Sankuru River (in Zaire) and investigated routes between the Kasai and Congo rivers. In 1884 and 1886 Wissmann undertook missions for King Leopold II of the Belgians to explore the navigability of the Kasai River, and he again explored eastward across the continent to Lake Tanganyika (now in Tanzania) and to Zanzibar.

In 1888 Wissmann was appointed imperial commissioner for East Africa to suppress a rebellion led by Arab slave traders and to establish German control in what is now Tanzania. He resigned in 1891 but in 1895 returned to East Africa as imperial governor.

Wister, Owen (b. July 14, 1860, Philadelphia, Pa., U.S.—d. July 21, 1938, North Kingstown, R.I.), novelist whose *The Virginian* (1902) helped establish the cowboy as an American folk hero and stock fictional character.

Wister graduated from Harvard in 1882 and studied musical composition in Paris for two years. Ill health forced his return to the United States, and he spent the summer of 1885 in Wyoming. In the fall Wister entered Harvard Law School, graduating in 1888, and after being admitted to the bar in 1889, he practiced for two years in Philadelphia. He continued to spend his summers in the West, and in 1891, after the enthusiastic acceptance by *Harper's* of two of his Western sketches, he devoted himself to a literary career.

The Virginian was the story of a cowboy ranch foreman and was a great popular success. It introduced such themes as the conflict



Wister
By courtesy of the Library of Congress, Washington, D.C.

of its genteel heroine, a schoolteacher from the East, with her cowboy lover, who depends for his life on a harsh code of ethics. Its climactic gun duel is considered the first such "showdown" in fiction. Wister's other major work was *Roosevelt: The Story of a Friendship, 1880–1919* (1930), detailing his long acquaintance with Theodore Roosevelt, a Harvard classmate. Wister also wrote a number of books for children. His collected writings were published in 11 volumes in 1928. His journals and letters from 1885 to 1895 were published in *Owen Wister Out West* (1958), edited by his daughter, Fanny Kemble Wister.

Wisteria, also spelled WISTARIA, genus of twining, usually woody vines, of the pea family (Fabaceae), mostly native to Asia and North America but widely cultivated in other regions for their attractive growth habit and beautiful profuse flowers. The alternate leaves are pinnately compound (feather formed). The flowers, which grow in large, drooping clusters, are blue, purple, rose, or white.



Wisteria
W.H. Hodge

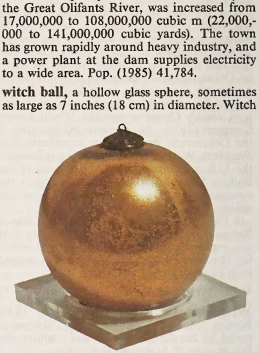
Cultivated species include *W. floribunda* (Japanese wisteria), native to Japan and the hardiest member of the genus; *W. frutescens* (American wisteria), native to the southeastern United States; *W. macrostachya* (Kentucky wisteria), native to the central and southern United States; and *W. sinensis* (Chinese wisteria), native to China.

witan, also called WITENAGEMOT, the council of the Anglo-Saxon kings in and of England; its essential duty was to advise the king on all matters on which he chose to ask its opinion. It attested his grants of land to churches or laymen, consented to his issue of new laws or new statements of ancient custom, and helped him deal with rebels and persons suspected of disaffection. Its composition and time of meeting were determined by the king's pleasure.

Usually attended by the greater nobles and bishops, the witan was in no sense a popular assembly. In its composition and duties it closely resembled its successor, the *commune concilium* of the Anglo-Norman kings, the fundamental difference being that, in the latter body, baronial councillors were bound to the king by feudal ties.

Witbank, town, Eastern Transvaal province, South Africa, east of Pretoria. Established in 1890, it is at the centre of a coal-mining area in which more than 20 collieries operate. During the South African War, the young soldier-journalist Winston Churchill hid in a colliery near Witbank after his escape from Pretoria. Witbank attained town status in 1910. In 1972 the capacity of the Witbank Dam, on the Great Olifants River, was increased from 17,000,000 to 108,000,000 cubic m (22,000,000 to 141,000,000 cubic yards). The town has grown rapidly around heavy industry, and a power plant at the dam supplies electricity to a wide area. Pop. (1985) 41,784.

witch ball, a hollow glass sphere, sometimes as large as 7 inches (18 cm) in diameter. Witch



Witch ball, with a silvered interior, English, 19th century; in the Victoria and Albert Museum, London
By courtesy of the Victoria and Albert Museum, London; photograph, A.C. Cooper Ltd.

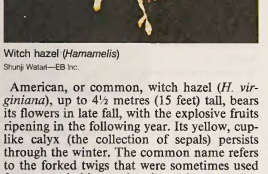
balls are made in several colours, among which green and blue predominate. Its name is possibly a corruption of the 18th-century term watch ball.

References to witch balls are found from the 18th century onward, but their origin is probably older. In England many examples, striped and spattered with enamel colours, have been attributed to the Nailsea works near Bristol; but they were also made elsewhere in England and, from the 19th century, in the United States. Having some kinship with the glass balls used by fishermen to float their

nets, witch balls have been associated with sea superstitions; it has also been suggested that they were originally hung in windows to ward off misfortune. It seems likely, however, that those that are silvered inside, made from the mid-19th century onward, were hung up for their reflective qualities; they could reflect a whole room in the manner of a convex mirror. They are sought after as curios, and modern examples are still made.

witch doctor, a healer or benevolent worker of magic in a nonliterate society. The term originated in England in the 18th century and is generally considered to be pejorative and anthropologically inaccurate. *See also* medicine man; shaman.

witch hazel, any of six species of the genus *Hamamelis* (family Hamamelidaceae), all of which are shrubs and small trees that are native to eastern North America and eastern Asia. Some are grown for their yellow flowers, with four narrow, twisted ribbonlike petals, borne on warm winter days or in early spring. Witch hazels produce small clusters of four-petalled flowers borne close to the branches and have deciduous, prominently veined, oval, toothed leaves.



Witch hazel (*Hamamelis*)
Shunji Watari—EB Inc.

American, or common, witch hazel (*H. virginiana*), up to 4½ metres (15 feet) tall, bears its flowers in late fall, with the explosive fruits ripening in the following year. Its yellow, cuplike calyx (the collection of sepals) persists through the winter. The common name refers to the forked twigs that were sometimes used for water-witching or dowsing to locate underground water. The fragrant liniment witch hazel is made from the dried leaves and sometimes from the twigs and bark. Vernal witch hazel (*H. vernalis*), about two metres tall, blooms in late winter or early spring.

Witch of Buchenwald: *see* Koch, Ilsa.

witchcraft, the exercise or invocation of alleged supernatural powers to control people or events, practices typically involving sorcery or magic. The stereotype of witches, especially in the West, is that of crones who meet secretly at night, indulge in cannibalism and orgiastic rites with the devil, and perform black magic. Witchcraft thus defined exists more in the imagination of contemporaries than in any objective reality. Belief in witchcraft was particularly intense in the early modern period in Europe and continues in modern Western and world cultures.

A brief treatment of witchcraft follows. For full treatment, *see* MACROPAEDIA: Occultism.

In ancient Greece witchcraft is mentioned as early as Homer. The best known sorceress in classical times was the legendary Medea. The Roman poet Horace left an elaborate description in *Satires* of the proceedings of two witches in the Esquiline cemetery.

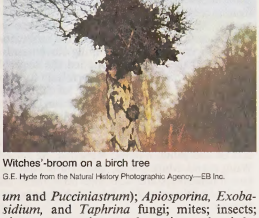
The Bible contains a number of references to witchcraft, a notable example being the so-called Witch of Endor consulted by King Saul (I Sam. 28). The early Church Fathers generally held that any so-called witchcraft was a delusion and a deception and that the name of Jesus used by a believing Christian could turn aside attempted witchcraft. This attitude was accompanied by strong disapproval of the practice, as shown in church canons. Clergy were urged to preach that claims of witchcraft were false, for God alone is powerful, and that there is a sharp distinction between factual evidence and fantasy or dreams.

Beginning in the 11th century, the Western stereotype of the witch focused on the diabolical nature of witchcraft and associated it with society's other enemies, including heretics. The connection with Satan was emphasized with the rise of the dualist heresy, which ascribed real power to the devil as an equal opponent of God. Once witchcraft was believed to involve demonic possession, heresy, and the rejection of God, it came within the scope of the Inquisition.

From the 14th to the early 18th century, vehement opposition to the witch cult was demonstrated throughout Europe in public "trials" and executions, conducted on the basis of the biblical injunction "You shall not permit a sorceress to live" (Ex. 22:18). Victims of the witchcraft trials have been variously estimated to number from the hundreds of thousands to the millions.

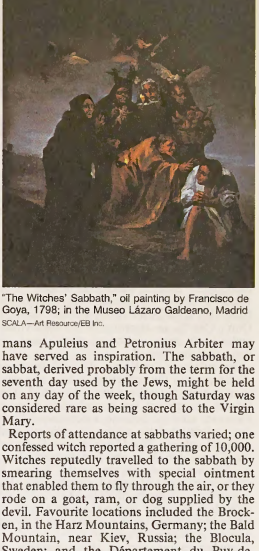
Belief in witchcraft was taken to colonial America by English settlers. In 1692, after a prolonged witch trial at Salem, Mass., as a result of accusations by a group of teen-age girls, more than 30 persons were convicted of witchcraft, some after torture. Belief in witchcraft continues in the modern Western and non-Western world. Among some peoples individuals will openly avow that they are witches and make public threats; more frequently, personal knowledge of the techniques is denied, and witchcraft is the subject only of hushed gossip. In the 1950s Wicca, a new form of witchcraft, emerged in England and spread quickly to the United States. Most Wiccans believe in the Goddess, respect nature, are pantheistic or polytheistic, and celebrate rituals on holy days (including Halloween) that involve ceremonial magic.

witches'-broom, symptom of plant disease that occurs as an abnormal brushlike cluster of dwarfed, weak shoots arising at or near the same point; twigs and branches of woody plants may die back. There are numerous causes, including rust (*Gymnosporangium* and *Puccinia strum*); *Apiosporina, Exobasidium,* and *Taphrina* fungi; mites; insects; viruses; mycoplasmas; bacteria; and mistletoes. Susceptible plants include alder, alfalfa, *Amelanchier,* birch, California buckeye, *Chamaecyparis,* cherry, cherry laurel, elm, fir, hackberry, *Holodiscus* (ocean spray), honey locust, juniper and red-cedar, manzanita, mountain heath, mulberry, oak, potato, rhododendron, rose, sophora, spruce, and strawberry.



Witches'-broom on a birch tree
G.E. Hyde from the Natural History Photographic Agency—EB Inc.

witches' sabbath, nocturnal gathering of witches, a colourful and intriguing part of the lore surrounding them in Christian European tradition. The concept dates from at least the mid-14th century when it first appeared in Inquisition records, although revels and feasts mentioned by such classical authors as the Romans Apuleius and Petronius Arbiter may have served as inspiration. The sabbath, or sabbat, derived probably from the term for the seventh day used by the Jews, might be held on any day of the week, though Saturday was considered rare as being sacred to the Virgin Mary.



"The Witches' Sabbath," oil painting by Francisco de Goya, 1798; in the Museo Lázaro Galdeano, Madrid
SCALA—Art Resource/EB Inc.

Reports of attendance at sabbaths varied; one confessed witch reported a gathering of 10,000. Witches reputedly travelled to the sabbath by smearing themselves with special ointment that enabled them to fly through the air, or they rode on a goat, ram, or dog supplied by the devil. Favourite locations included the Brocken, in the Harz Mountains, Germany; the Bald Mountain, near Kiev, Russia; the Blocula, Sweden; and the Département du Puy-de-Dôme, Auvergne, France. Typical dates included the two traditional Druid festivals, the eve of May Day (April 30) and All Hallows Eve (October 31), and the seasonal festivals of winter (February 2), spring (June 23), summer (August 1), and fall (December 21).

Occurrences at the sabbath were represented by inquisitors as including obeisance to the devil by kissing him under his tail, dancing, feasting, and indiscriminate intercourse.

witchweed, any plant of the genus *Striga* in the figwort family (Scrophulariaceae), including about 50 species of the Old World tropics and one species introduced into the southeastern United States. About 10 species are destructive as parasites on such crops as maize (corn), sorghum, rice, sugarcane, and tobacco.

Witchweeds are branched herbs, 15 to about 75 centimetres (0.5 to 2.5 feet) tall, with opposite or alternate, usually narrow and rough or sometimes scalelike leaves. The two-lipped solitary flowers are red, yellow, purplish, bluish, or white. Witchweed seeds, minute and

produced in great numbers, germinate when in contact with a host root. Roots of the parasite establish and maintain connection with the host. The first four to six weeks of the life cycle are spent underground, where the young plant is entirely dependent upon its host. After emergence the plant can photosynthesize its own food but takes water and minerals from the host. The parasite dies when its seeds mature or when the host is harvested. Host plants appear stunted and chlorotic (yellow), often showing signs of wilting; they may produce no yield, or their yield may be sharply reduced. Severe infestation may kill the host. Members of the genus *Alectra* (also in the figwort family), some of which parasitize legumes and tobacco in Africa and sugarcane in tropical America, are also sometimes called witchweeds.

witenagemot (Anglo-Saxon council): *see* witan.

Wither, George, Wither also spelled WITHERS (b. June 11, 1588, Bentworth, Hampshire, Eng.—d. May 2, 1667, London), English poet and Puritan pamphleteer, best remembered for a few songs and hymns.

Wither entered Magdalen College, Oxford, in 1604 but left in 1606 without a degree. In 1610 he settled in London and in 1615 began to study law. His *Abuses Stript and Whipt* (1613)—with its satiric treatment of lust, avarice, and pride—apparently gave offense, and he was imprisoned for some months. In prison he wrote *The Shepherd's Hunting* (1615), whose five eclogues are among his finest verse, looking back to Spenser in form and forward to Wordsworth in feeling. *Fidelia* (1617), an elegiac epistle lamenting a lover's inconstancy, contains in later editions the famous lyric "Shall I, wasting in despair." For *Wither's Motto. Nec Habeo, nec Careo, nec Curo* (1621; "I Don't Have, I Don't Want, I Don't Care"), an assertion of his own virtue and a lively denunciation of others' vices, he was again imprisoned.

The eulogy *Faire-Virtue, The Mistresse of Phil'Arete* and the collection of love and pastoral poems, *Juvenilia,* appeared in 1622. The former became his last contribution to pure literature after he became a convinced Puritan and devoted his writing to religious and political causes. *The Hymnes and Songs of the Church* (1623) is the first hymnbook in English not based entirely on the Psalms; it contains passages of rugged, simple prose. He was in London during the plague of 1625 and published *Britain's Remembrancer* (1628), a voluminous poem on the subject, interspersed with invective and prophecy.

Between taking part in the expedition of Charles I against the Scottish Covenanters and serving on the Parliamentary side in the Civil War, Wither wrote many religious poems and hymns, which were published in 1641 in *Haleluiah or, Britans Second Remembrancer.* He was imprisoned from 1660 to 1663 for an unpublished poem criticizing the new House of Commons.

Wither's verse has been thought monotonous, but its variety is surprising. In his songs and hymns he blended rustic language and regular rhythm to produce an impressive effect. Although his reputation faded and his name became a synonym for a hack Puritan pamphleteer, he was later restored to favour.

witherite, a carbonate mineral, barium carbonate ($BaCO_3$), that is, with the exception of barite, the most common barium mineral, despite its rarity. It is ordinarily found in fairly pure form in association with barite and galena in low-temperature hydrothermal veins, as in the north of England and in Scotland. Because of its solubility in common acids, witherite is preferred to barite in the preparation of other barium compounds. It is also used in case-hardening steel and in refining sugar. For detailed physical properties, *see* carbonate mineral (table).

Witherspoon, John (b. Feb. 15, 1723 [Feb. 5, 1722, old style], Gifford, East Lothian, Scot.—d. Nov. 15, 1794, Tusculum, N.J., U.S.), Scottish-American Presbyterian minister and president of the College of New Jersey (now Princeton University); he was the only clergyman to sign the Declaration of Independence.

After completing his theological studies at the University of Edinburgh (1743), he was called to the parish of Beith in 1745 and in 1757 became pastor at Paisley. A conservative churchman, he frequently involved himself in ecclesiastical controversies, in which he proved himself a keen dialectician and an effective speaker. In 1768 he left Paisley to assume the presidency of the College of New Jersey. He was warmly received by the American Presbyterian Church and contributed significantly to its revitalization and growth. He was a vigorous college president, expanding the curriculum, providing scientific equipment, and working to increase the endowment and enrollment.

From his arrival, Witherspoon was an enthusiast about America, and in the dispute with the mother country he ranged himself uncompromisingly on the side of the colonists. He presided over the Somerset County Committee of Correspondence (1775–76), was a member of two provincial congresses, and was a delegate to the Continental Congress (1776–79, 1780–82), where in 1776 he was a persuasive advocate of adopting a resolution of independence.

Witherspoon wrote extensively on religious and political topics. His works include *Ecclesiastical Characteristics* (1753), *Considerations on the Nature and Extent of the Legislative Authority of the British Parliament* (1774), as well as numerous essays, sermons, and pamphlets.

Witigis (fl. 536), Ostrogoth soldier who became king of Italy and led his people in an unsuccessful last-ditch struggle against the Eastern Roman Empire.

Witigis was elected king in the autumn of 536 to replace Theodahad, who had been deposed and killed as the Byzantine general Belisarius advanced on Rome. Leaving a small garrison to defend Rome, Witigis massed his forces in Ravenna, where he married Matasuntha, granddaughter of King Theodoric, to strengthen the legality of his own position. In Witigis' absence, Pope Silverius turned Rome over to Belisarius.

In March 537 Witigis returned to besiege Rome, cutting the aqueducts to reduce Belisarius' garrison, a maneuver that backfired by turning Witigis' own camp into a malaria-breeding marsh. When the Eastern Roman emperor Justinian I sent reinforcements, Witigis was forced to agree to a three-month truce, which Belisarius broke, invading Picenum and threatening Ravenna. In March 538 the Goths abandoned the siege of Rome. They held out in northern Italy for two more years, but, by the spring of 540, they held only the stronghold of Ravenna.

To salvage the situation, Witigis agreed to abdicate, and the Gothic chiefs offered the throne to Belisarius. The General, on pretext of accepting, entered Ravenna; he seized Witigis and Matasuntha, the Gothic nobles, and Theodoric's treasure and bore them off to Constantinople. The fate of Witigis is unknown.

Witkiewicz, Stanisław Ignacy, byname WITKACY (b. Feb. 24, 1885, Warsaw—d. Sept. 18, 1939, Jeziory, Wołyna, Pol.), Polish painter, novelist, and playwright.

After studying at the Academy of Fine Arts in Kraków, he traveled in Germany, France, and Italy. In 1914 he left for Australia as the artist and photographer of an anthropological expedition led by Bronisław Malinowski. Three years later, as a reserve officer in the Russian Army, Witkiewicz witnessed the Russian Revolution, but in 1918 he settled at Zakopane at the foot of the Tatra Mountains. He committed suicide at the beginning of World War II.

Witkiewicz's plays anticipated the Theatre of the Absurd of Ionesco and Beckett in their deliberately contorted characters and plots and their use of grotesque parody. Rapid tempos, warped time juxtapositions, and catastrophic incidents are combined with an original and symbolic use of language in such plays as *Kurka wodna* (1921; "The Water Hen") and *Wariat i zakonnica* (1925; "The Madman and the Nun").

His works began to be revived in Poland and the West in the 1950s and are now a permanent feature of Polish theatrical repertoires.

Witkowski, Felix Ernst: *see* Harden, Maximilian Felix Ernst.

Witold WIELKI (Lithuanian leader): *see* Vytautas the Great.

Witos, Wincenty (b. Jan. 22, 1874, Wierzchosławice, Galicia, Pol., Austria-Hungary—d. Oct. 30, 1945, Kraków), Polish statesman and leader of the Peasant Party, who was



Witos
By courtesy of the Polish Library, London

three times prime minister of Poland (1920–21, 1923, 1926).

Witos sat during 1908–14 in the Galician Sejm (Diet) of Austria-Poland and in 1911–18 in the Austrian Reichsrat (lower house of parliament). After World War I he was elected to the Sejm of the newly established republic of Poland and soon became the leader of the Peasant Party, then the strongest political group in the Sejm. From July 1920 to September 1921 he served as prime minister of an all-party coalition. In May–December 1923 he headed his second government but was unable to halt inflation and national unrest. Although initially identified with the parties of the left, Witos gradually emerged as a force for conservatism and in May 1926 formed his third administration on an exclusively right-of-centre base. Within a few days, however, his Cabinet was overthrown by a coup led by the national hero Józef Piłsudski.

Thereafter, Witos remained in opposition to Piłsudski's thinly veiled dictatorship. He was imprisoned for political reasons in 1930 and again in 1932 was put under sentence, which was quashed as illegal (1933). Fearing a new arrest, however, he fled to Czechoslovakia. He subsequently returned to Poland but was imprisoned by the Germans in 1939. Arrested by the Russians in 1945, he was freed shortly before his death.

Witoto, also spelled HUITOTO, South American Indians of southeastern Colombia and northern Peru, belonging to an isolated language group. There were more than 31 Witotoan tribes in an aboriginal population of several thousand. Exploitation, disease, and assimilation had reduced the Witoto to fewer than 1,000 individuals at the latest estimate. The greatest decline occurred during their ex-

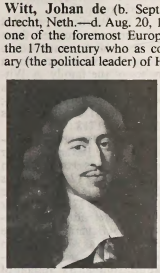
ploitation as rubber gatherers at the turn of the 20th century. The most important surviving groups were the Witoto proper, the Bora (Miranna), the Ocaina, and the Orejone, now living along the Putumayo, Apaporis, and Caquetá rivers.

Witoto culture is typical of the tropical forest: they are good farmers and food gatherers as well as proficient hunters and fishermen. The typical settlement consists of a single large round or rectangular hut sheltering many families. They use large, hollow signal drums. Traditionally, women go naked, while men wear only a breechclout; both sexes paint colourful designs on their bodies (sometimes from shoulders to ankles).

Warfare was common among the Witoto, who kept young prisoners but ate older captives. Cannibalism was limited to male participation and was part of a magico-religious celebration. Shamans conjured spirits and healed diseases. Child betrothal and bride service were present. The Witoto household, consisting of the head, his sons, their wives, and unmarried children, was the basic political unit.

Witsieshoek (South Africa, town): *see* Phuthaditjhaba.

Witt, Johan de (b. Sept. 24, 1625, Dordrecht, Neth.—d. Aug. 20, 1672, The Hague), one of the foremost European statesmen of the 17th century who as councillor pensionary (the political leader) of Holland (1653–72)



De Witt, detail of a painting by Jacobus de Baen; in the Rijksmuseum, Amsterdam

By courtesy of the Rijksmuseum, Amsterdam

guided the United Provinces in the First and Second Anglo-Dutch wars (1652–54, 1665–67) and consolidated the nation's naval and commercial power.

De Witt was a member of one of the old burgher-regent families of his native town of Dordrecht (Dort). His father, Jacob, was six times burgomaster and for many years sat for the town in the States of Holland. He was a strenuous adherent of the republican or oligarchical states-right party in opposition to the princes of the House of Orange, who represented the federal principle and had the support of the masses of the people. De Witt was educated at Leiden and early displayed remarkable talents, especially in mathematics and jurisprudence. His *Elementa curvarum linearum* (written before 1650, but published 1659–61) was one of the first textbooks in analytic geometry. (He later also applied his mathematical knowledge to the financial and budgetary problems of the republic.) In 1645 he and his elder brother Cornelius visited France, Italy, Switzerland, and England, and on his return he lived at The Hague as an advocate.

In 1650 he was appointed pensionary of Dordrecht, which made him the leader of the town's deputation in the States of Holland. In this year the States of Holland found themselves engaged in a struggle for provincial supremacy, on the question of the disbanding of troops. The youthful prince of Orange, William II, with the support of the States General and the army, seized five of the leaders of the states-right party and imprisoned them in Loevestein Castle; among these was Jacob de Witt. The sudden death of William, at the moment when he had crushed opposition, led to a reaction. He left only a posthumous child, afterwards William III of Orange; the principles advocated by Jacob de Witt triumphed, and the authority of the States became predominant in the republic.

It was his father's position that gave Johan his opportunity, but his own eloquence, wisdom, and business ability caused him to be appointed councillor pensionary (*raadpensionaris*) of Holland on July 23, 1653, at 28. He was reelected in 1658, 1663, and 1668 and held office until just before his death in 1672. He found in 1653 his country brought to the brink of ruin through the war with England, and he resolved to bring about peace. He rejected Cromwell's suggestion of the union of England and Holland, but in 1654 the Treaty of Westminster was concluded, by which the Dutch made large concessions and agreed to the striking of the flag to English ships in the narrow seas. The treaty included a secret article, which the States General refused to entertain, but which de Witt induced the States of Holland to accept, by which the provinces of Holland pledged themselves not to elect a stadholder or a captain general. This Act of Seclusion was aimed at the young Prince of Orange, whose close relationship to the Stuarts made him an object of suspicion to Cromwell.

The policy of de Witt after the peace of 1654 was eminently successful. He restored the finances of the country and extended its commercial supremacy in the East Indies. In 1658–59 he sustained Denmark against Sweden, and in 1662 concluded an advantageous peace with Portugal. The accession of Charles II to the English throne led to the rescinding of the Act of Seclusion; nevertheless de Witt steadily refused to allow the Prince of Orange to be appointed stadholder or captain general. This led to ill will between the English and Dutch governments, and to a renewal of old grievances about maritime and commercial rights, and war broke out in 1665. The councillor pensionary himself went to sea with the fleet, and it was owing to his exertions as an organizer and a diplomat quite as much as to the brilliant seamanship of Admiral de Ruyter that the Treaty of Breda (July 31, 1667), maintaining the status quo, was so honourable to the United Provinces. In 1667 he promulgated his celebrated edict for the republican administration of Holland. A still greater triumph of diplomatic skill was the conclusion of the Triple Alliance (Jan. 17, 1668) between the Dutch Republic, England, and Sweden, which checked the attempt of Louis XIV of France to take possession of the Spanish Netherlands in the name of his wife, the infanta Maria Theresa.

In 1672 Louis XIV suddenly declared war and invaded the United Provinces at the head of a splendid army. The voice of the people called William III to the head of affairs, and there were violent demonstrations against Johan de Witt. His brother Cornelius was arrested (July 24) on a charge of conspiring against the Prince. On August 4 Johan de Witt resigned the post of councillor pensionary. Cornelius was put to the torture and on August 19 sentenced to deprivation of his offices and banishment. His brother came to visit him in the Gevangenpoort at The Hague. A vast crowd, hearing this, collected outside and finally burst in, seized the two brothers, and tore them to pieces. Thus perished one of the greatest statesmen of his age and of Dutch history.

Witte, Emanuel de (b. 1617, Alkmaar, Neth.—d. 1692, Amsterdam), Dutch painter whose scenes of church interiors represent the last phase of architectural painting in the Netherlands.



"Adriana van Heusden and Her Daughter at the Fishmarket in Amsterdam (?)," oil on canvas by Emanuel de Witte; in the National Gallery, London

By courtesy of the trustees of the National Gallery, London; photograph, J.R. Freeman & Co. Ltd.

His artistic career began in Delft, where he concentrated on historical subjects and portraits. About mid-century he seems to have developed an interest in architectural painting, probably influenced by the example of his contemporaries Gerard Houckgeest and Hendrick Cornelisz van Vliet. By 1652 de Witte was living in Amsterdam, where he spent the remainder of his life.

De Witte depicted the interiors of such Amsterdam buildings as the Nieuwe Kerk (New Church; painting, 1677; Museum of Fine Arts, Boston), the Oude Kerk (Old Church; paintings in the Museum Boymans-van Beuningen, Rotterdam; Museum of Fine Arts, Springfield, Mass.; Akademie des Bildenden Künste, Vienna), and the Portuguese Synagogue (painting, 1680; Rijksmuseum, Amsterdam). His interiors were constructed on a grand scale, using elaborate perspective and relatively large figures. His palette tended toward monochrome tonalities of whitish yellow in areas of sunlight and gray to deep black in the shadows, occasionally accented by a soft green or red. De Witte was also a notable painter of scenes from everyday life such as "The Fish Market" (1672) and "Bourgeois Interior with a Woman at the Virginals" (both in the Museum Boymans-van Beuningen, Rotterdam).

Witte, Sergey Yulyevich, Graf (Count) (b. June 29 [June 17, old style], 1849, Tiflis, Georgia, Russian Empire—d. March 13 [Feb. 28, O.S.], 1915, Petrograd), Russian minister



Sergey Yulyevich Witte, 1905

H. Roger-Viollet

of finance (1892–1903) and first constitutional prime minister of the Russian Empire (1905–06), who sought to wed firm authoritarian rule to modernization along Western lines.

Life. Witte's father, of Dutch ancestry, directed the agricultural department in the office of the governor general of the Caucasus. His mother came from a high-ranking family of the Russian nobility engaged in state service. Witte's childhood in the Caucasus was a happy one. Following his successful career as a student of mathematics at the Novorossiysky University (now Odessa State University) at Odessa, Witte thought of entering on an academic career. But he followed the advice of a family friend, the minister of communications, and entered the railway administration. It was the beginning of a career that brought Witte to the heart of imperial politics and finance. After a period in the chancellery of the governor general of Odessa and Bessarabia (1871–74), Witte studied railway administration in the Odessa Railway at the Odessa office of the Ministry of Communications. He led a disciplined, orderly life, imposed partly by family poverty and partly by an urge to succeed. By the time of the Russo-Turkish War (1877–78) he had already risen to a position in which he controlled all the traffic passing to the front along the lines of the Odessa Railway. At one critical point he devised a novel system of double-shift working to overcome delays on the line.

Witte showed his freedom from bureaucratic prejudice by appointing men of all nationalities—Jews, Poles, Ukrainians—as his subordinates and by cultivating favourable press relations. His economic acumen was shown in his collection and use of railway statistics and in the implementation of an effective freight tariff whereby he lowered freight rates and increased revenue.

In 1889 Witte was invited to establish a railway department in the Ministry of Finance. He advanced rapidly and became in quick succession minister of communications (February 1892) and minister of finance (August 1892). Far-reaching plans for the economic development of the Russian Empire formed the kernel of Witte's policy. He aimed at "removing the unfavourable conditions which hamper the economic development of the country and at kindling a healthy spirit of enterprise" (Witte's first budget to the Emperor, 1893). Using the full power of the state, Witte unfolded a vast range of activity: a remodelled State Bank made ready capital available to industry; Russian steamship companies and nautical and engineering schools were established; savings banks were encouraged; company law was reformed; and the ruble was made convertible. Witte was also instrumental in raising large loans from investors in France, Britain, Belgium, and Germany to finance Russian industrialization.

He deployed his greatest energy in stimulating railway building, particularly the Trans-Siberian line (actually begun in 1891). He saw it not only as a means to bring urban progress to the countryside but also as an economic stimulus in itself, as a link between European and Asiatic Russia, and as a way of making Russia the chief intermediary between western Europe and the Far East. For almost a decade the "Witte system" enjoyed considerable success, but at the turn of the century international uncertainty (the Boer War, the Spanish–American War, and the Boxer Rebellion in China) reduced the flow of foreign loans to Russia, and strikes and peasant unrest in Russia revealed that the mass of the population would no longer tolerate the reduced living standards that Witte's policy entailed. Moreover, influential agricultural interests, always hostile to Witte's all-out support for industrialization, made their opposition manifest at court. His relationship with Emperor Nicholas II, who feared this dynamic man, was also unhappy. In August 1903 Witte was removed from the Ministry of Finance and appointed to the largely decorative position of chairman of the Committee of Ministers.

He had to look on in impotence as the government blundered into war with Japan. But he was to render highly important services to the empire in 1905 and 1906. In July 1905 he was appointed chief Russian plenipotentiary to conduct peace negotiations with Japan. He obtained unexpectedly favourable terms for Russia, but his achievement did not make him any more popular.

At a political level, Witte, though he detested constitutionalism in any form, used his influence to persuade the Tsar to issue the "October Manifesto" of 1905, which promised to grant a measure of representative government. No less important was Witte's role as prime minister in the new system of government, in organizing the repression of all the forces of disruption in the autumn and winter of 1905–06—*e.g.*, the St. Petersburg Soviet, or workers' council, the troop mutinies in the Far East, strikes in South Russia, and peasant uprisings in the Baltic provinces.

Witte was also instrumental in concluding arrangements in 1906 with a group of European bankers for a series of loans that restored Russian finances, which were in a state of virtual collapse through the effects of defeat in the Far East and the widespread revolts of 1905.

This was Witte's last opportunity to serve the state. He was forced to resign the premiership in April 1906, having lost what little confidence the Tsar had in him. Witte never returned to office, and his efforts to influence policy were ineffectual. Thus, in the summer and winter of 1914–15 he vainly opposed Russian entry into World War I and was sympathetic to peace feelers put out by the German government through Witte's own German banker. He died embittered and dispirited, foreseeing disaster for the tsarist empire.

Assessment. Witte's reputation was at first eclipsed through the collapse of tsarism, but he is now appreciated as a successor to Peter I the Great in the drive to modernize a backward empire and as a forerunner of the Communists in the policy of implementing an industrial revolution from above. The "Witte period" of 1892–1903 may well be compared to the period of the First Five-Year Plan. But Witte worked in an unsympathetic political context that was perhaps incompatible with industrialization and by which he was ultimately defeated. (L.Ko.)

BIBLIOGRAPHY. Theodore von Laue, *Sergei Witte and the Industrialization of Russia* (1963), is the only study of Witte's career that is commensurate with the importance of the subject, ending with Witte's final fall from power in 1906 (includes a useful bibliography). The *Memoirs of Count Witte*, trans. and ed. by Abraham Yarmolinsky (1921), remains indispensable, though the emphasis is on Witte's career in 1905–06. The *Memoirs* in their Russian original were republished in one volume, ed. by A.L. Sidorov (1960).

Witteberg series, uppermost member of the Cape System of sedimentary rocks in South Africa. It consists of about 805 metres (2,640 feet) of shales and sandstones and is transitional between the Late Devonian epoch and the Early Carboniferous epoch (the Carboniferous began about 360,000,000 years ago). Fossil plants are prominent in Witteberg rocks: numerous genera have been described, including *Sigillaria, Lepidodendron, Cyclostigma,* and the psilophyte *Dutoitia.*

Wittelsbach, HOUSE OF, German noble family that provided rulers of Bavaria and of the Rhenish Palatinate until the 20th century. The name was taken from the castle of Wittelsbach, which formerly stood near Aichach on the Paar in Bavaria. In 1124, Otto V, count of Scheyern (d. 1155), removed the residence of his family to Wittelsbach and called himself by this name. His son, Otto VI, after serving the German king Frederick I, was invested duke of Bavaria, as Otto I. From that date, 1180, until 1918, Bavaria was ruled by the Wittelsbachs.

The first step toward extending their authority outside Bavaria was made in 1214, when Otto II, through marriage, obtained the Palatinate of the Rhine. A descendant, Louis, became duke of Bavaria in 1294 and Holy Roman emperor, as Louis IV, in 1328. In 1329, by the Treaty of Pavia, Louis IV made the first important division of the Wittelsbach lands by granting the Palatinate of the Rhine and the upper Palatinate of Bavaria to his brother's sons, Rudolf II (d. 1353) and Rupert I. Rupert, who from 1353 to 1390 was sole ruler, was granted the title of elector of the Palatinate of the Rhine in 1356.

Meanwhile, the descendants of the emperor Louis IV retained the rest of Bavaria but made several divisions of their territory, the most important of which was in 1392, when the branches of Ingolstadt, Munich, and Landshut were founded. Three generations later, however, after much contention, all Bavaria was reunited by Albert IV (d. 1508), who introduced the rule of primogeniture.

The Wittelsbachs of the Palatinate provided a German king, Rupert, who reigned from 1400 to 1410, but their lands continued to be subdivided among themselves, creating a profusion of branches of the family. A Wittelsbach of one of the Palatinate branches became king of Sweden as Charles X in 1654; Charles XI and Charles XII continued this Wittelsbach kingdom until 1718.

The Bavarian dukes had also become electors, beginning in 1623. The Bavarian elector Charles Albert (d. 1745) was Holy Roman emperor, as Charles VII, from 1742. With his son Maximilian III Joseph the Bavarian line of Wittelsbachs died out in 1777. The elector Palatine, Charles Theodore, also a Wittelsbach, then succeeded to Bavaria, by virtue of a dynastic treaty of 1724. On his death (1799) the Palatinate and Bavaria were reunited under Duke Maximilian IV Joseph of Zweibrücken, who in 1806 became king of Bavaria as Maximilian I.

Maximilian I's descendants were kings of Bavaria until Louis III abdicated in 1918. Louis III's son, Prince Rupert (d. 1955), a potential pretender to the British crown through his female descent from the Stuarts, led Bavarian monarchist opinion against Hitler.

Prince Adalbert of Bavaria (a grandson of King Maximilian I), his son Louis Ferdinand, and his grandson Ferdinand all married Spanish infantas (1856, 1883, and 1906). Their branch had a contingent interest in the succession to the Spanish crown.

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Witten, city, North Rhine-Westphalia *Land* (state), northwestern Germany, on the Ruhr River, bordering Dortmund (north) and Bochum (northwest). Chartered in 1825, it was severely damaged in World War II but has been rebuilt along modern lines with numerous commercial enterprises.

Witten's heavily wooded surroundings to the south are a favourite Ruhr recreation area. The city has a museum of graphic arts and an archive. Industries include steel manufacturing, the extraction of coal-tar products, glassworks, and machine building. Pop. (1989 est.) 103,637.

Wittenberg, city, Saxony-Anhalt *Land* (state), north-central Germany, on the Elbe River, southwest of Berlin. First mentioned

in 1180 and chartered in 1293, it was the residence of the Ascanian dukes and elec-



The medieval town hall (right) facing the marketplace in Wittenberg, Ger.

W. Krammisch—Bruce Coleman Inc./EB Inc.

tors of Saxony from 1212 until it passed, with electoral Saxony, to the House of Wettin in 1423. Wittenberg University, made famous by its teachers, the religious reformers Martin Luther and Philipp Melanchthon, was founded by the elector Frederick the Wise in 1502 and was absorbed by the University of Halle in 1817. In 1547, when John Frederick the Magnanimous signed the Capitulation of Wittenberg, the electorate passed from the Ernestine to the Albertine line of the Wettins, and the town ceased to be the official residence. The city was occupied in 1806 by the French, who strengthened its fortifications in 1813; the fortress was stormed by the Prussians in 1814, and the city was assigned to them in 1815.

The Reformation started in Wittenberg on Oct. 31, 1517, when Luther nailed his famous Ninety-five Theses to the wooden doors of the castle Church of All Saints. The doors were destroyed in a fire of 1760, and the church, containing the graves of Luther and the Reformers, was seriously damaged then and in 1813–14. It has been restored, and the bronze doors of 1858 bear the Latin text of Luther's Theses. Other notable buildings include the castle (1490–99), the town hall (1524–40), the residences of the Reformers, and the town church (1300), which houses an altarpiece by Lucas Cranach the Elder (1472–1553), court painter to the Saxon electors and a town councillor and burgomaster of Wittenberg.

Wittenberg's river harbour and its position as a railway junction aided its industrialization. The chemical industry, especially the nationally owned nitrogen works at Piesteritz, is important; a large fertilizer plant was built in the late 1970s. Pop. (1989 est.) 53,358.

Wittgenstein, Ludwig (Josef Johann) (b. April 26, 1889, Vienna—d. April 29, 1951, Cambridge, Cambridgeshire, Eng.), Austrian-born English philosopher, who was one of the most influential figures in British philosophy during the second quarter of the 20th century and who produced two original and influential systems of philosophical thought—his logical theories and later his philosophy of language.

Early life through World War I. Wittgenstein, the son of a leading Austrian steelmaker, was the youngest of eight children, all of whom were generously endowed with artistic and intellectual talent. Both parents were musically gifted, and their home was a centre of musical life. Educated at home until the age of 14, Wittgenstein then studied for three years in an Austrian school, where the emphasis was on mathematical and natural sciences, after which he studied mechanical engineering for two years in Berlin. In 1908 he engaged in aeronautical research in England, experimenting with kites at an upper atmosphere station. His interest soon turned toward developing an engine that would propel an airplane. Working in an engineering laboratory of the University of Manchester, where he was registered as a research student, he conceived the idea of placing a reaction jet at the tip of each blade of a propeller. He designed an experimental engine, supervised its construction, and tested it successfully. Problems relating to the design of a propeller aroused his interest in mathematics, and this soon produced a desire to understand the foundations of mathematics. Bertrand Russell's book *The Principles of Mathematics* (1903) had a decisive influence on him. Abandoning his engineering studies at Manchester in 1911, he went to Cambridge to study with Russell. He progressed rapidly in mathematical logic; according to Russell, he "soon knew all that I had to teach." Russell remarked that getting to know Wittgenstein was "one of the most exciting intellectual adventures" of his life. Wittgenstein, he said, had "fire and penetration and intellectual purity to a quite extraordinary degree."

Wittgenstein remained at Cambridge through most of 1913, working with unrelenting intensity at problems in and about logic and engaging in prolonged discussions with Russell. He then went to Skjolden, Nor., where he lived in seclusion, working hard at logic. Upon the outbreak of World War I, Wittgenstein enlisted in the Austrian army, serving first on a river vessel and later in an artillery workshop. In 1916 he served in a howitzer regiment on the Russian front as an artillery observer, winning several decorations for bravery. He was then sent to be trained as an artillery officer, was commissioned, and continued to serve on the eastern front until 1918, when he was transferred to a mountain artillery regiment on the Italian front.

Period of the "Tractatus." Throughout the war, Wittgenstein worked on problems of logic and philosophy, writing his thoughts in notebooks that he carried in his rucksack. When he became a prisoner of the Italians at the end of the war, he had a completed manuscript, which he sent to Russell in England. After his release, Wittgenstein tried in vain to find a publisher for his book. Its eventual publication, due to Russell's influence, occurred in 1921 under the title *Logisch-philosophische Abhandlung* (*Tractatus Logico-Philosophicus,* 1922). The *Tractatus* is universally accepted as novel, profound, and influential. The book is a series of remarks, carefully ordered and numbered in a decimal notation. Although only 75 pages, it sweeps over a vast range of topics: the nature of language; the limits of what can be said; logic, ethics, and philosophy; causality and induction; the self and the will; death and the mystical; good and evil. The central question of the *Tractatus* is: How is language possible? How can a man, by uttering a sequence of words, say something? And how can another person understand him? Wittgenstein was struck by the fact that a man can understand sentences that he has never previously encountered. The solution that burst upon him was that a sentence that says something (a proposition) must be "a *picture* of reality." "A proposition *shows* its sense," he wrote; it shows a situation in the world. His picture theory seemed to explain the "connection between the signs on paper and a situation outside in the world." Not realizing that propositions are pictures comes from failing to consider them in their "completely analyzed" form, in which they are arrangements of simple signs that are correlated with simple elements of reality so that "the picture touches reality."

One of the most striking features of the *Tractatus* is its conception of the limits of language. Not only must a propositional picture contain exactly as many elements as does the situation that it represents but, furthermore, all pictures and all possible situations in the world must share the same logical form, which is at once "the form of representation" and "the form of reality." But this form that is common to language and reality cannot itself be represented. "Propositions can represent the whole of reality," he wrote, "but they cannot represent what they must have in common with reality in order to be able to represent it—logical form." "What can be said can only be said by means of a proposition, and so nothing that is necessary for the understanding of *all* propositions can be said."

There are other things that cannot be represented ("said"): the necessary existence of simple elements of reality; the existence of a thinking, willing self; and the existence of absolute value. These things are also unthinkable, since the limits of language are the limits of thought. Thus Wittgenstein's remark, "Unsayable things do indeed exist," is itself something that cannot be said or thought; it may give insight, but it is actually nonsensical and eventually must be "thrown away." The final sentence of the book ("Whereof one cannot speak thereof one must be silent") is no truism. It is a highly metaphysical remark that attempts to convey the unsayable, unthinkable doctrine that there *is* a realm about which one can say nothing.

Upon returning to civilian life in 1919, Wittgenstein gave away the large fortune inherited from his father. He once said that he had done this to avoid having friends for the sake of his money, but it is also true that he disliked ease and luxury. His mode of life came to be characterized by extreme simplicity and frugality.

Feeling that the *Tractatus* had exhausted his contributions to philosophy, Wittgenstein sought some other vocation. He became an elementary school teacher and beginning in 1920 taught in various tiny villages in Lower Austria. During this period he was severely unhappy and frequently thought of suicide. He was helped, however, by his relationship with his young pupils. Painful frictions eventually developed between Wittgenstein and some of the other teachers and villagers, and in 1925 he abandoned his career as a school teacher. For a few months he served as a gardener's assistant in a monastery near Vienna. When he was invited to undertake the building of a mansion in Vienna for one of his sisters, he accepted the task. This project, which occupied his time for two years, was carried through with typical concentration and originality.

Wittgenstein's musical gifts were considerable. He played the clarinet when a young man, and throughout his life he had the rare ability to whistle difficult classical music, sometimes whistling long passages from memory. Wittgenstein's musical sophistication as well as the peculiar authority of his intelligence and personality are reflected in an incident that occurred when a well-known string quartet was rehearsing in a home where Wittgenstein was one of a small group of listeners. Extremely reserved at first, he offered a few modest remarks about the interpretation of the music; but eventually, according to the account of a witness, "he was carried away by passion and intervened in the rehearsal." The musicians reacted with polite disdain, but at a later rehearsal, the account continues, "Wittgenstein, now completely accepted by the four musicians, did most of the talking, and his objections and advice were heard as deferentially as if Gustav Mahler himself had interrupted their rehearsal."

For a decade after World War I, Wittgen-

stein did not engage in philosophical studies. He did, however, occasionally meet with other philosophers: the brilliant young philosopher Frank Ramsey and a few members of the so-called Vienna Circle, which gave birth to Logical Positivism.

Period of the "Philosophical Investigations." Suddenly Wittgenstein felt that once again he could do creative work in philosophy. He returned to Cambridge early in 1929, where he was made a fellow of Trinity College. Through his lectures and the wide circulation of notes taken by his students, he gradually came to exert a powerful influence on philosophical thought throughout the English-speaking world. Those who attended his discussions were impressed by the force of his intellect, his passionate seriousness, and the novelty of his ideas and methods. Through these lectures, which were extemporaneous, often taking the form of responses to his own questions, he was creating a new philosophical outlook.

From his return to Cambridge in 1929 until his death 23 years later, Wittgenstein wrote prodigiously. A large number of his notebooks, manuscripts, and typescripts have been preserved. The crown of this work was the *Philosophische Untersuchungen* (1953; *Philosophical Investigations*), which, in accordance with his wishes, was published only after his death. Subsequently, a number of related writings have been edited and published.

The thinking that began afresh in 1929 gradually arrived at a very different outlook from that of the *Tractatus.* Wittgenstein came to reject such former conceptions as that a proposition has one and only one complete analysis; that every proposition has a definite sense; that reality and language are each composed of simple elements; that there is an essence of language, of propositions, of thought; that there is an a priori order of the world. With the rejection of the assumption that all representations must share a common logical form, the conception of the unsayable disappeared.

In the *Tractatus* Wittgenstein had believed that the endless variety of kinds of uses of language is misleading—hidden beneath this diversity there must be a unifying essence to which a philosopher tries to penetrate. In the *Investigations* he held that this belief is an illusion. There is no unity hidden in the diversity. The perplexities that the philosopher feels about the nature of memory, of thinking, of understanding a word, or of following a rule and his insistence on asking "What is knowledge?" "What is an intention?" "What is an assertion?" are eased, or quieted, by descriptions, or reminders, of what lies open to view, namely the ranges of differing cases in which one applies these words as he uses language, or works with it, in the daily traffic of speech and communication. These descriptions break the hold of the preconceptions that falsify philosophical thinking; they destroy the obsessive belief that there must be an essence of knowledge, of intention, of assertion.

Wittgenstein employed the example of games and tried to get his reader to rid himself of the assumption that there is a common nature of games. Some but not all games are amusing or involve competition or winning and losing; there is only a network of "overlapping and criss-crossing" similarities between games, not some common feature running through all games. Wittgenstein used the term "family resemblance"; he held that just as the word "game" is applied to a range of cases that have only a family resemblance, so it is with the words that loom so large in philosophy: "knowledge," "proposition," "memory," "intention," "thought," "rule," and "belief." Something is called a belief, for example, perhaps because it has similarities with some of the things that were previously called beliefs.

The application of a term is extended from previous cases to new cases "as in spinning a thread we twist fibre on fibre. And the strength of the thread does not reside in the fact that some one fibre runs through its whole length, but in the overlapping of many fibres."

An outstanding feature of Wittgenstein's second philosophical position is his concern to show how concepts are linked to actions and reactions, to the expression of the concepts in human life. "What we are suppLying," he wrote, "are really remarks on the natural history of human beings." The perplexity that a man feels about the meaning of a form of words may be relieved if he asks himself, "On what occasion, for what purpose, do we say this? What kind of actions accompany these words? (Think of a greeting.) In what scenes will they be used; and what for?" Wittgenstein's aim was to display the function and significance of concepts as due not to an intangible realm of mind but to the human forms of life in which they are embedded.

Whereas the *Tractatus* is regarded with universal admiration, the reception of the *Investigations* has been mixed. Some students of philosophy are perplexed by the enigmatic style and the seeming lack of organization. Some think it is inferior to the *Tractatus* in both precision and seriousness, but for others it has radically transformed and enriched philosophy.

In 1939 Wittgenstein was appointed to the chair in philosophy at Cambridge University previously held by that master of philosophical analysis G.E. Moore. During World War II he left Cambridge to serve as a porter in Guy's Hospital in London and later worked as a laboratory assistant in the Royal Victoria Infirmary. As in his previous war service, he continued to labor at writing philosophical problems. In the autumn of 1944 he returned to Cambridge to resume his lectures and discussions. He grew more and more restive, however, as a professor of philosophy, and at the end of 1947 he resigned his chair. He wanted to devote his time and strength to completing the *Investigations,* and also he felt a need for "thinking *alone,* without having to talk to anybody." He stayed in a cottage on the west coast of Ireland until his health would no longer permit it. Thereafter he lived most of the time with various friends in the United States and England. He was frequently ill, and in the autumn of 1949 he was found to have cancer—a discovery that did not disturb him since he had "*no* wish to live on." He continued to do intensive work, however, until his death two years later.

Assessment. It is not easy to characterize Wittgenstein's attitude toward his own philosophical creation. He regarded the *Philosophical Investigations* as imperfect; he tried with fierce energy and concentration to perfect it, yet despaired of success. He was inclined to be pessimistic about the fate of his work. "It is not impossible," he wrote, "that it should fall to the lot of this work, in its poverty and in the darkness of this time, to bring light into one human eye or other—but of course, it is not likely." He regarded his own thinking as being alien to the scientific and mathematical spirit of the age in which he lived. He felt as if he were writing for people who belonged to a different culture.

It cannot be doubted that Wittgenstein has made philosophy more self-conscious and has introduced a new conception of its nature. In his view a philosophical problem is not something for which a solution must be sought: no theorem is to be proved nor any hypothesis tested. Instead, the problem is a confusion, an entanglement of one's own thoughts. "Why is philosophy so complicated?" he wrote. "It ought to be *entirely* simple.—Philosophy unties the knots in our thinking that we have, in a senseless way, put there. To do this it must make movements that are just as complicated as these knots. Although the result of philosophy is simple, its method cannot be if it is to succeed. The complexity of philosophy is not a complexity of its subject matter, but of our knotted understanding." The result of philosophical thinking of the right kind is not a truth discovered but a confusion dissolved. In all of his conceptual studies, Wittgenstein was searching for *das erlösende Wort,* the word that unties one's knotted understanding.

(N.A.M./Ed.)

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Consult the INDEX *first*

Wittig, Georg (b. June 16, 1897, Berlin—d. Aug. 26, 1987, Heidelberg, W.Ger.), German chemist whose studies of organic phosphorus compounds won him a share (with Herbert C. Brown) of the Nobel Prize for Chemistry in 1979.

Wittig graduated from the University of Marburg in 1923, received his doctorate there in 1926, and remained as a lecturer in chemistry until 1932. He taught at the Technical University in Braunschweig and at the universities of Braunschweig, Freiburg, and Tübingen before joining the faculty of the University of Heidelberg in 1956, where he became emeritus in 1965 but continued to pursue research.

In investigating reactions involving carbanions, negatively charged organic species, Wittig discovered a class of compounds called ylides mediating a particular type of reaction that became known as Wittig reactions and

that proved of great value in the synthesis of numerous organic compounds.

Wittingau (Czech Republic): *see* Třeboň.

Wittlin, Józef (b. Aug. 17, 1896, Dmytrów, Austria-Hungary [now Dmytriv, Ukraine]—d. Feb. 29, 1976, New York, N.Y., U.S.), Polish novelist, essayist, and poet, a master of the Polish language.

Having graduated from the classical *gimnazjum* in Lemberg (Polish Lwów; modern Lviv), Wittlin studied philosophy at the University of Vienna. Mobilized in 1914 in the Austro-Hungarian army as a soldier, he took part in a few battles on the Russian front but two years later was freed from military service because of his poor health. He started writing, and in his early poetry collection *Hymny* (1920; "Hymns") he voiced a humanistic protest against the debasement of individuals as the victims of powerful states and social systems. In 1924 he published a new Polish translation of Homer's *Odyssey*.

The work that ensured Wittlin a place in Polish literature is *Sól ziemi* (1936; *Salt of the Earth*). The book is a tale of a "patient infantryman," an illiterate Polish peasant who is unwillingly drafted into the Austrian army to fight a war he does not understand. The novel treats not war itself but the bewilderment of a man involved in fighting against will and national interest. Wittlin left Poland a few weeks before World War II began; he stopped in Paris and then in London. From 1941 he lived in New York City, where he wrote a warm book of yearning for his native city, *Mój Lwów* (1946; "My Lwów"). He became a U.S. citizen in 1949.

Wittstock, Battle of (Oct. 4, 1636), military engagement of the Thirty Years' War, the greatest victory of the Swedish general Johan Banér, pupil of Gustavus II Adolphus. The battle took place at a time when the Swedish army in Germany desperately needed a victory to improve the prospects of the Protestant cause after the overwhelming defeat at Nördlingen in 1634.

In the fall of 1636, Banér, with about 18,000 men, sought a battle. An imperial-Saxon army of about 25,000 men took up a position on wooded hills south of Wittstock, 58 miles (93 km) northwest of Berlin. Banér boldly sent about half of his force on a 7-mile (11-kilometre) march, in a wide encircling maneuver to the enemy's rear, while he led the other half to seize and hold a hill in front of the enemy's position. Although outnumbered by 50 squadrons to 17, the Swedish cavalry held off the imperial forces' attacks from 3:00 PM to sunset. Banér's front was on the point of being overrun at 6:00 PM, when his flanking forces arrived to attack the imperial-Saxon army from their rear and flank. Attacked from three sides, they soon collapsed and fled in panic. Contrary to the practice of the time, the pursuit was vigorously pushed the next day. When it ceased, the remains of the imperial army were unfit for action.

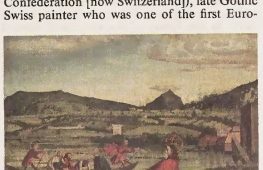
Witu Islands, also spelled VITU, volcanic island group of the Bismarck Archipelago, eastern Papua New Guinea. The islands lie 40 miles (65 km) north of New Britain Island in the Bismarck Sea, southwestern Pacific. The group, with a total land area of 45 square miles (117 square km), includes the main islands Garove (Deslacs; 26 square miles), Unea (Merite; 11 square miles), and Mundua (2 square miles), as well as five smaller islands. Unea is the highest of the islands, rising to 1,935 feet (590 m). Generally forested, the islands produce some copra and cocoa. Pop. (1990 prelim.) 11,064.

Witwatersrand, also called THE RAND, ridge of gold-bearing rock mostly in Gauteng province, South Africa. Its name means "ridge of white waters." The highland, which forms the watershed between the Vaal and Limpopo rivers, is about 62 miles (100 km) long and 23 miles (37 km) wide; its average elevation is about 5,600 feet (1,700 m). Its rich gold deposits, occurring in conglomerate beds known as reefs, were discovered in 1886. A heavy in-migration of miners followed, and the city of Johannesburg grew near the centre of the Witwatersrand. The tailing dumps of the gold mines stretch the entire length of the ridge, and chains of lakes created by water pumped from the mines occupy adjoining valleys. The politically defined Witwatersrand region consists of 14 magisterial districts extending from Randfontein and Krugersdorp districts in the west to Springs and Delmas districts in the east. Pop. (1985) 3,572,171.

Witwatersrand System, major division of Precambrian rocks in South Africa (the Precambrian began about 3.8 billion years ago and ended 540 million years ago). The Witwatersrand rocks overlie rocks of the Dominion Reef System, underlie those of the Ventersdorp System, and occur in an east-west band from Randfontein to Springs and from the Vaal River in the region of Klerksdorp in the north to Ventersdorp in the south. The rocks actually occupy a much larger area; much of the Witwatersrand System is covered by later deposits, and the subsurface areal extent of Witwatersrand rocks has been delimited by exploratory geophysical and drilling studies because the Witwatersrand is of great economic importance owing to its valuable deposits of gold and uranium.

In all, the Witwatersrand System consists of about 8,100 m (26,600 feet) of rocks that have been segregated into an upper and lower division, each of which is further divided into series. Three series are recognized in the lower division: the lowermost Hospital Hill Series, the Government Reef Series, and the Jeppestown Series, respectively. The upper division is divided into the lower Main-Bird Series, followed by the Kimberley-Elsburg Series. The Government Reef Series consists of alternating shales and quartzites in addition to pebbly layers that contain gold deposits; it also contains indications of a period of extensive glaciation. The most economically important series is the Main-Bird Series, largely quartzitic conglomerates that are extremely rich in uranium and gold. Large quantities of gold are also found in the Kimberley-Elsburg Series of shales, quartzites, and dolomites.

Witz, Konrad (b. *c.* 1400, Rottweil [now in Germany]—d. *c.* 1445, Basel or Geneva, Swiss Confederation [now Switzerland]), late Gothic Swiss painter who was one of the first European artists to incorporate realistic landscapes into religious paintings.



"The Miraculous Draft of Fishes," tempera on panel by Konrad Witz, 1444; in the Museum of Art and History, Geneva

©Musee d'Art et d'Histoire, Geneva, photograph, Yves Siza

Little is known about Witz's life or training, but in 1434 he entered the painters' guild in Basel, where he worked most of his life. The Heilsspiegel altarpiece (*c.* 1435; now dispersed), generally agreed to be his earliest surviving work, displays numerous monumental, sculpturelike figures in small, bare rooms. In this altarpiece, such figures as the personification of "The Synagogue" are placed diagonally to the picture-plane in a simple, graceful pose, revealing Witz's youthful ability to manipulate space, despite the panel's inaccurate perspective.

Three panels from about 1440–43 are probably from a dispersed altarpiece. The "SS. Catherine and Mary Magdalene," the "Meeting of Joachim and Anna," and the "Annunciation" display a highly original handling of linear perspective, a sculptural sense of form, and a great sensitivity to the play of light upon the various textures of cloth, stone, and wood. The significance of these scenes is conveyed not through the use of the mystic symbolism prevalent in the art of northern Europe but through the faithful rendering of natural phenomena, making the scenes immediate and convincing. That aspect of Witz's art is best exemplified by his masterpiece, "The Miraculous Draft of Fishes" (1444). In this work, Witz's realism is so precise that he carefully distinguishes between the light reflected off the water's surface and the light reflected off the stones beneath the shallow water. He convincingly renders the reflections of the disciples, the boat, and the buildings on the shore, as well as accurately recording in the background the landscape around Geneva.

Wivallius, Lars (b. 1605, Wivalla, Sweden—d. April 6, 1669, Stockholm), Swedish poet and adventurer, whose lyrics show a feeling for the beauties of nature new to Swedish poetry in his time.

Wivallius studied at Uppsala and in 1625 left Sweden to travel in Germany, France, Italy, and England. Frequently posing as a nobleman, he swindled his way across Europe and was imprisoned for a time in Nürnberg. Back in Sweden (1629), he succeeded in marrying the daughter of a nobleman by false pretenses but was found out and again imprisoned. In 1634 he was deported to Kajaneborg, northern Finland, where he spent seven years of severe hardship. Subsequently he became an advocate in Stockholm.

Though unscrupulous and antisocial, Wivallius was full of gaiety in his youth. Of his many ballads, written mainly in prison, the best are those inspired by longing for freedom (for example, "Ack libertas," an ode to liberty) and love of nature.

Wiyot, southernmost of the Indians of the North Pacific Coast of North America. They lived along the lower Mad River, Humboldt Bay, and lower Eel River of California and spoke Wiyot, a Macro-Algonquian language. They were culturally and linguistically related to the Yurok (*q.v.*).

Wiyot settlements were located on streams or bays, rather than on the ocean itself. The Wiyot rarely used the ocean for subsistence or for travel, preferring still water. Villages consisted of from 4 to 12 houses, probably averaging 30 people; there were also scattered settlements of one or two houses. In addition there were men's sweathouses, used for sleeping, working, and leisure as well as for regular sweat baths and purifications.

The Wiyot were mainly fishers, catching salmon and other fish on the rivers and ocean shore. They also collected mollusks, especially clams, and trapped land mammals. Houses and canoes were made of coast redwood.

Wealth was reckoned in dentalium shells, long obsidian knives, woodpecker scalps, white deerskins, and other objects. There were no formal chiefs or individuals vested with significant political authority, but wealthy men

were influential as advisers. Disputes, even murder, were settled by the payment of dentalium shells as blood money.

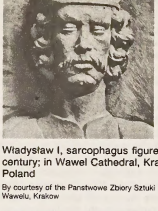
Wiyot shamans were mainly women; they acquired their powers on mountaintops at night. Some shamans only diagnosed disease; others cured by sucking out disease objects and blood. Although the Wiyot belonged to the Northwest Coast cultural area, their religion contained elements from the culture of central California, including a creator-god and many animal characters.

wizard, one who practices magic (*see* magician) or sorcery (*q.v.*).

Władysław (Polish personal name): *see under* Vladislas, except as below.

Władysław, English VLADISLAS, or VLADISLAUS, Hungarian ULÁSZLÓ, Czech VLADISLAV, name of Polish rulers grouped below chronologically and indicated by the symbol •.

• **Władysław I,** byname WŁADYSŁAW THE SHORT, Polish WŁADYSŁAW ŁOKIETEK (b. 1260/61, Poland—d. March 2, 1333, Poland), king of Poland (1320–33), a ruler who succeeded in bringing together a series of Polish principalities into a kingdom and laying the foundations for a strong Polish nation.



Władysław I, sarcophagus figure, 14th century; in Wawel Cathedral, Kraków, Poland

By courtesy of the Panstwowe Zbiory Sztuki na Wawelu, Krakow

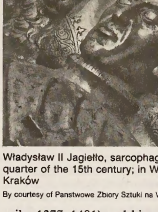
Władysław was the son of Casimir I of Kujawy, the ruler of one of the numerous small principalities formed after the Old Polish realm had been divided up two centuries earlier. Władysław succeeded his father in 1275 and was elected by the nobles of Great Poland as their prince in 1296; however, they later transferred their allegiance to King Wenceslas II of Bohemia, who was then crowned king of Poland at Gniezno in 1300.

Władysław, seeking to press his claim to the throne, went to Rome and secured the support of Pope Boniface VIII. Then, in 1305, with Hungarian help, he began a war with Wenceslas II. He occupied Little Poland in 1305 and Great Poland in 1314 and also gained control of the northern areas along the Baltic Sea, including Pomerania and Gdańsk (Danzig). The Knights of the Teutonic Order, however, captured Pomerania in 1308, and, despite a good deal of maneuvering by Władysław, it remained in German hands. Having partially reunited the Polish lands, Władysław was crowned king of Poland on Jan. 20, 1320, at Kraków.

Władysław became involved in further conflicts with the Knights of the Teutonic Order. In September 1331 war again broke out between Poland and the Teutonic Order, and at the Battle of Płowce on Sept. 27, 1331, Władysław inflicted a serious defeat on the Knights.

On the diplomatic front Władysław sought to strengthen his friendship with Hungary, and for a time he was able to halt Lithuanian raids into Poland by marrying his son to a daughter of a Lithuanian nobleman. When Władysław died, he had established a solid base for the future growth of the Polish nation.

• **Władysław II Jagiełło,** Lithuanian JOGAILA, or IOGAILA, English JAGIELLO, or JAGELLO (b. *c.* 1351—d. May 31/June 1, 1434, Grodek, near Lwów, Galicia, Pol. [now Lviv, Ukraine]), grand duke of Lithuania (as Jogaila, 1377–1401) and king of Poland (1386–1434), who joined two states that became the leading power of eastern Europe. He was the founder of Poland's Jagiellon dynasty (*q.v.*).



Władysław II Jagiełło, sarcophagus figure, second quarter of the 15th century; in Wawel Cathedral, Kraków

By courtesy of Panstwowe Zbiory Sztuki na Wawelu, Krakow

Early life. Jogaila (Jagiełło in Polish) was one of the 12 sons of Algirdas (Olgierd), grand duke of Lithuania, who named him his heir apparent. When his father died in 1377, Jogaila's title of grand duke was disputed by his relatives, and only after several years and some ruthless actions—such as the imprisonment and murder of his uncle Kęstutis (Kejstut)—did his rule become as secure as his father's had been. Part of this reign had to be devoted to winning over Kęstutis' son Vytautas (Witold in Polish), who, with the backing of the Teutonic Order, was a rival candidate for the throne of Lithuania. In the decades that followed, Jogaila and his cousin were alternately allies and foes.

In 1384 Polish nobles, who wanted a strong ruler who could help them in their attempts at recovering territory from Hungary, offered Jogaila marriage to the young Polish queen, Jadwiga (Hedwig, born in 1373 or 1374), to share her throne on the condition that he Christianize Lithuania and unite it completely with Poland. Jogaila considered the plan strategically advantageous. The agreements were set forth in the Treaty of Krewo (1385). Elected king of Poland on Feb. 2, 1386, Jogaila was baptized as a Roman Catholic, taking the name Władysław II, on February 15, married Jadwiga on February 18, and was crowned king on March 4 in Cracow. He began at once to convert Lithuania to Roman Catholicism.

As long as Queen Jadwiga lived, Władysław, though not content to play the role of prince consort, nevertheless was regarded as a foreigner and had to come to terms with a queen who had the prerogative of acting in her own right. Not until Jadwiga died childless in 1399 did he really become the leading personality in Poland, and even then many months were to pass before a second event turned his leadership to good advantage. The Teutonic Order had been successfully exploiting further dissension between him and Vytautas, but this subsided when, by the Treaty of Vilnius in 1401, Władysław recognized Vytautas as supreme duke of Lithuania on the condition that Poland and Lithuania be indissolubly united by a common foreign policy.

Rule of Poland and Lithuania. In foreign policy Władysław had four major problems to be solved: restoring Lithuania's and Poland's position vis-à-vis the Teutonic Order; halting aggression by the Tatars; regaining Ruthenia, occupied by Hungary; and expanding Poland's influence in the southeast against its Hungarian rival. In all areas Władysław was successful—thanks, in regard to the first two problems, to the military help of the energetic Vytautas. In a series of wars (1409–11, 1414, 1422, 1431–32)—the first of which included the Battle of Tannenberg (Polish Grunwald; July 15, 1410)—the Teutonic Order was defeated and lost its leading position in northeastern Europe. The territorial losses of the order were small (Samogitia to Lithuania and a little territory on the Vistula River to Poland), but its military and financial power was weakened once and for all.

As for the Tatars, they defeated Vytautas in 1399 at the Battle on the River Vorskla, at the cost of a decisive check on their own territorial expansion. For Władysław this was a double victory: the Tatars were weakened, and Vytautas' endeavours to become a fully independent ruler of a more powerful Lithuania were brought to an end by the defeat.

Ruthenia was recovered from Hungary as early as 1387, and Poland grew strong enough to make the prince of Moldavia its vassal. In 1412 Władysław even came to terms with Hungary, formerly an ally of the Teutonic Order, in exchange for a loan. Continually, he played his hand cautiously: although he supported the Hussites in their struggle against King Sigismund of Bohemia and Hungary, for example, he refrained from intervention. Władysław ended his reign with good relations between Poland and Hungary.

In domestic policies Władysław was less successful. He energetically Christianized those parts of Lithuania still pagan, but he was unable to incorporate Lithuania into Poland as he had promised and was forced to let Vytautas act virtually as a sovereign. After Vytautas' death in 1430, Władysław was still unable to restore his authority in Lithuania, and, after a period of civil war, Vytautas' brother became governor in Lithuania. In Poland the nobility strengthened its position, especially during the latter part of Władysław's reign, and Władysław was unable to win the burghers to his side and use them politically as a counterweight to the nobles. In questions of national religion the king showed resoluteness, particularly in his attempt to suppress the Polish followers of Jan Hus.

Władysław died in 1434. Subsequent to his marriage to Jadwiga he had married three times. His fourth wife became the mother of the future kings Władysław III and Casimir IV. (G.K.S.R.)

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• **Władysław III Warneńczyk** (b. Oct. 31, 1424, Kraków, Pol.—d. Nov. 10, 1444, Varna, Bulg.), Polish king (1434–44) who was also king of Hungary (as Ulászló I; 1440–44) and who attempted unsuccessfully to push the Ottoman Turks out of the Balkans. His reign was overshadowed by the presence of his adviser, Zbigniew Oleśnicki.

At the age of 10 he succeeded to the throne of Poland on the death of his father, Władysław II. During his 10 years as king, however, most

of the major decisions were either made or manipulated by Oleśnicki, who was a powerful Polish noble, bishop of Kraków, the first Polish cardinal, and his father's close adviser.

Working successfully to bring the crown of Hungary to the young king, Oleśnicki set up Władysław's election through the anti-Habsburg faction within the Hungarian nobility, and in July 1440 Władysław was crowned Ulászló I of Hungary at Buda. Three years of warfare followed, however, as supporters of the Habsburg king Albert's widow sought to gain control of the kingdom. Finally Pope Eugenius IV made peace between the rivals so that Władysław could lead a crusade against the Turks.

In 1443 Władysław and János Hunyadi, his chief Hungarian supporter, led an army of 40,000 into the Balkans. They forced Sultan Murad II to conclude the Peace of Szeged on July 1, 1444. Under its terms Turkey was to evacuate Serbia and Albania along with any other territory taken from Hungary as well as to pay an indemnity of 100,000 florins in gold. Two days after the peace was signed Władysław broke it in the name of religion and continued his invasion of the Balkans, but the whole campaign ended in disaster when the Poles and Hungarians were defeated by the Turks in the Battle of Varna. Władysław died in the fighting.

• **Władysław IV Vasa** (b. June 9, 1595, Kraków, Pol.—d. May 20, 1648, Merecz), king of Poland (1632–48), a popular monarch who did much to heal the wounds and solve the problems created by his father, Sigismund III



Władysław IV Vasa, detail of a painting by Tommaso Dolabella after a portrait from the Rubens atelier; in the State Collections of Art in the Wawel, Kraków, Pol.

Pedzlem rozmistym

Vasa, an obstinate man and religious bigot who created internal friction in Poland and pursued a series of profitless wars abroad. Władysław sought to make Poland secure during a period of change in northern Europe and Russia.

When Władysław was 15, his father manipulated the youth's election as tsar of Russia while Polish forces held Moscow during the Time of Troubles following the death of Boris Godunov. His election, which never resulted in his assumption of the Muscovite throne, was part of an unsuccessful plan by Sigismund to conquer all of Russia and convert the population to Catholicism. As a young man Władysław showed ability as a military leader in operations against Muscovy (1617–18) and the Ottoman Empire (1621).

He succeeded to the Polish throne on his father's death in 1632. In an attempt to take advantage of confusion expected after the death of the Polish king, a Muscovite army of 40,000 crossed Poland's eastern frontier and laid siege to Smolensk (ceded to Poland by Russia in 1618). Władysław broke the siege in March 1633 and then launched an offensive, capturing the Russian commander in February 1634. By the Peace of Polyanov that followed, Tsar Michael Romanov confirmed all earlier cessions of territory to Poland and agreed to pay 200,000 rubles in exchange for Władysław's renunciation of all claims to the tsardom.

Władysław then moved his army south and forced the Turks to come to terms with him. By agreement Poland and the Ottomans retained their respective control over the Cossacks and the Tatars, and the two countries shared joint suzerainty over Moldavia and Walachia.

Władysław won an advantageous peace from Sweden in the Armistice of Stuhmsdorf in September 1635, following a war undertaken to exploit Sweden's difficulties during the Thirty Years' War. He failed, however, to find any method for regaining the Swedish crown, which had been held and then lost by his father. He suffered continuing difficulties caused by the efforts of the Polish Sejm (Diet) to check the King's power and limit his dynastic ambitions. In 1637 Władysław married Cecilia Renata of Austria, sister of the Holy Roman emperor Ferdinand III. When she bore him a son, Sigismund Casimir, in 1640, Władysław once more tried to assert his personal power. His attempts to mediate between the warring German and Scandinavian powers came to nothing, and he finally planned to use the Cossacks to provoke the Turks into attacking Poland so that his military leadership would be indispensable. The plan, however, failed before it got under way. Brokenhearted at the death of his son in 1647, Władysław died at the moment when the Cossacks, angered because his promises had failed to materialize, were beginning their greatest revolt against Polish rule.

Włocławek, former (1975–98) *województwo* (province), central Poland, now part of Kujawsko-Pomorskie (*q.v.*) province.

Consult the INDEX *first*

Włocławek, city, Kujawsko-Pomorskie *województwo* (province), north-central Poland, on the Vistula River.

Włocławek was the seat of the Kujavian bishops during the 11th century, becoming one of the earliest developed towns in Wielkopolska (Great Poland); it was incorporated in 1256. The astronomer Copernicus studied there between 1489 and 1491. The town became a major industrial centre during the 19th century after the establishment of Poland's first paper mill and cellulose plant. The cellulose industry boomed in the decades following World War II but fell into decline by the end of the 20th century. Włocławek is also a centre of agriculture. In 1968 a spillway dam with a hydroelectric power station was constructed on the Vistula River. Pop. (2002) 121,229.

WMC: *see* World Methodist Council.

WMO: *see* World Meteorological Organization.

woad, also called DYERSWOAD (*Isatis tinctoria*), biennial or perennial herb, of the mustard family (Brassicaceae), formerly grown as a source of the blue dye indigo and now sometimes cultivated for its clusters of small, four-petalled yellow flowers. It is a summer-flowering native of Eurasia, now naturalized in southeastern North America. Woad reaches 90 centimetres (3 feet) and produces clusters of dangling, winged, oval, single-seeded fruits. The hairy stem leaves have arrow-shaped bases; the long basal leaves are downy and lance shaped. The ground and dried leaves, when wetted and fermented, produce indigo.



Woad (*Isatis tinctoria*)

Shunji Watari—EB Inc.

Wobbly: *see* Industrial Workers of the World.

Woburn, city, Middlesex county, northeastern Massachusetts, U.S., just north of Boston. The community, named for Woburn, Eng., was set off from Charlestown and incorporated as a town in 1642. Aided by construction of the Middlesex Canal (1803), it changed its economic base from agriculture to industry during the first half of the 19th century. Shoe manufacturing and leather tanning were the predominant industries. Services and trade are now the main income sources. Modern manufactures include electronic components, chemicals, and food products. Woburn was the birthplace (1753) of Sir Benjamin Thompson (later Count von Rumford), a noted physicist and a founder of Britain's Royal Institution. His home, Rumford House, is maintained as a museum. The city's old burial ground contains the graves of the ancestors of four U.S. presidents (Grover Cleveland, Benjamin Harrison, Franklin Pierce, and James Garfield). Pop. (2003 est.) 37,809.

Woburn Abbey, Bedfordshire, England, seat of the dukes of Bedford, with a house that was rebuilt from a medieval Cistercian abbey by Henry Flitcroft (in 1747–61) and Henry Holland (in 1787–88). The 3,000-acre (1,000-hectare) park is the home of a magnificent collection of rare animals and birds.



Père David's deer grazing at Woburn Abbey, Bedfordshire, England

© Roland Seitre/Peter Arnold, Inc.

The 13th Duke of Bedford, succeeding to the title and to severe death duties (inheritance taxes) in 1953, determined to realize to the full the potential earning power of a "stately home" and opened it as a paying tourist attraction. He was a resourceful publicist, and by the end of the 1950s Woburn Abbey was a name well known to the British public; by the 1960s it was almost as well known abroad.

Wodan (Norse god): *see* Odin.

Wodehouse, Sir P.G., in full PELHAM GRENVILLE WODEHOUSE (b. Oct. 15, 1881, Guildford, Surrey, Eng.—d. Feb. 14, 1975, Southampton, N.Y., U.S.), English-born comic novelist, short-story writer, lyricist, and



Wodehouse
The Daily Telegraph

playwright, best known as the creator of Jeeves, the supreme "gentleman's gentleman." He wrote more than 90 books and more than 20 film scripts and collaborated on more than 30 plays and musical comedies.

Wodehouse was educated at Dulwich College, London, and, after a period in a bank, took a job as a humorous columnist on the London *Globe* (1902) and wrote freelance for many other publications. After 1909 he lived and worked for long periods in the United States and in France. He was captured in France by the Germans in 1940 and spent much of the war interned in Berlin. In 1941 he made five radio broadcasts from there to the United States in which he humorously described his experiences as a prisoner and subtly ridiculed his captors. His use of enemy broadcasting facilities evoked deep and lasting resentment in Britain, however, which was then practically under siege by Germany. After the war Wodehouse settled in the United States, becoming a citizen in 1955. He was knighted in 1975.

Wodehouse began by writing public-school stories and then light romances. It was not until 1913 (in *Something New;* published in England as *Something Fresh,* 1915) that he turned to the farce, which became his special strength. He had a scholar's command of the English sentence. He delighted in vivid, far-fetched imagery and in slang. His plots are highly complicated and carefully planned. Whatever the dates of publication of his books, Wodehouse's English social atmosphere is of the late Edwardian era. The young bachelor Bertie Wooster and his effortlessly superior manservant, Jeeves, were still together, their ages unadvanced, in *Much Obliged, Jeeves* (1971), though they first appeared in a story in *The Man with Two Left Feet* (1917).

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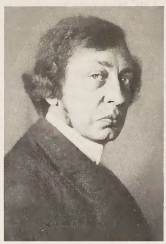
Woden (Norse god): *see* Odin.

Wodonga (Australia): *see* Albury-Wodonga.

Wodzisław Śląski, city, Katowice *województwo* (province), south-central Poland. Located in the Rybnik Coal Fields, it is 6 miles (10 km) north of the border with the Czech Republic and 30 miles (48 km) southwest of Katowice, the provincial capital. First chronicled in the 12th century as a crafts and commercial centre, Wodzisław Śląski received its city rights in 1257. Franciscan monks, under the patronage of Polish rulers, founded a monastery and church there in the 15th century. After passing to Prussia in 1875, it was returned to Poland in 1921. In World War II, most of the city's industrial plants were destroyed. Extensive postwar reconstruction made it again a major industrial and transportation centre in south-central Poland. Its economy is based on coal mining, coke production, and food processing. Several pipelines move natural gas from local fields to Katowice and other Polish cities. Pop. (1991 est.) 112,000.

Woestijne, Karel van de (b. March 10, 1878, Ghent, Belg.—d. Aug. 23, 1929, Zwijnaarde), Flemish poet whose work constitutes a symbolic autobiography of a typical turn-of-the-century personality—the sophisticated, world-weary sensualist striving after spiritual detachment.

Woestijne studied German philology and became a journalist and government official in Brussels (1907–20) and a professor of literature at Ghent from 1920 until his death. His early, subjective poetry includes *Het vaderhuis* (1903; "The Father House"), about his childhood; *De boomgaard der vogelen en der vruchten* (1905; "The Orchard of Birds and Fruit"), on his youth and courtship;



Woestijne
Edgar Barbaix, Ghent, Belg.

and *De gulden schaduw* (1910; "The Golden Shadow"), on his marriage and fatherhood.

The tormented awareness of the conflict between sense and spirit, inherent in all his works, reaches a bitter climax in *De modderen man* (1920; "The Man of Mud"). His poetry—powerfully conveying the spirit's longing for liberation from the compulsive desires of the flesh—is one of the highest achievements of European Symbolism.

Woffington, Peg, byname of MARGARET WOFFINGTON, also called THE WOFFINGTON (b. *c.* 1714, Dublin, Ire.—d. March 28, 1760, London, Eng.), Irish actress, one of the outstanding theatrical personalities of her time.

Woffington became a street singer to support



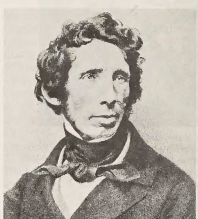
Peg Woffington as Mistress Ford in *The Merry Wives of Windsor,* engraving by J. Faber after a painting by E. Haytley
By courtesy of the Mander and Mitchenson Theatre Collection, London

her mother and sister and made her stage debut at 10 as Polly Peachum in a juvenile production of John Gay's *The Beggar's Opera,* in which, as Macheath, she first played in London, in 1732. Her real career began in 1737 with her success as Ophelia in William Shakespeare's *Hamlet;* by 1740 she was Dublin's leading actress, and her Sylvia in George Farquhar's *Recruiting Officer* and her Sir Harry Wildair in the same author's *The Constant Couple*—her most famous "breeches part"—made her Dublin's darling. London audiences were equally enthusiastic when, in November 1740, she appeared in the same parts at Covent Garden.

Woffington could now command theatres, parts, and lovers; and at Drury Lane (1740–46) she gained new fame in parts ranging from Sir John Vanbrugh's Lady Brute and Clarissa to Shakespeare's Rosalind and Mistress Ford. In 1742 she acted in Dublin with David Garrick (*q.v.*), until 1745 the most important man in her life. But Garrick wanted her to play, as leading lady and wife, under his direction, and Peg could never long adapt herself to his or any other man's ideal. At Covent Garden (1747–50) she showed his successful teaching in tragic parts, and in Dublin (1750–54) she enjoyed social as well as professional triumph. The only woman member of the Beefsteak Club, she was praised for an "understanding rare in females."

At Covent Garden (1754–57) she revived old parts, created new ones, and made new friends, among them the statesman Edmund Burke, thought to have been one of her many lovers. In this, as in much else, tradition exaggerates: she can be certainly described as mistress to only four men. In 1756 illness began to be visible, and on May 3, 1757, during a performance of Shakespeare's *As You Like It,* she collapsed in Rosalind's epilogue at "I would kiss as many . . . ," after which she retired from the stage.

Wöhler, Friedrich (b. July 31, 1800, Eschersheim, near Frankfurt am Main [Germany]—d. Sept. 23, 1882, Göttingen, Ger.), German chemist, first to synthesize (1828) an organic



Wöhler, detail of a lithograph by R. Hoffmann, 1856
The Bettmann Archive

compound (urea) from an inorganic substance. About the same time, he developed a process for preparing metallic aluminum.

Wöhler was educated at the Frankfurt *Gymnasium.* In 1820 he entered the University of Marburg, intending to become a physician. In the following year he moved to Heidelberg, where he came under the influence of one of the most prominent chemists of Germany, Leopold Gmelin. Gmelin recognized Wöhler's ability and advised him to make chemistry his career. Accordingly, though the young man received a medical degree in 1823, he decided to give up practical medicine and take up the study of chemistry with the leading chemist of Europe, Jöns Jacob Berzelius,

in Stockholm. He worked with the latter for nearly a year, from 1823 to 1824. He not only absorbed the techniques and the interest in the chemistry of new elements, for which Berzelius was famous, but also developed a lifelong friendship with his master. His correspondence with Berzelius throws much light on the personalities of both men. Wöhler later translated the major reviews and textbooks of Berzelius into German.

Upon his return to Germany Wöhler began in 1825 to teach chemistry at the municipal technical school in Berlin. He remained at this institution until 1831 and there made two of his major discoveries. In 1828 he synthesized urea, which had been considered a purely animal product, from ammonium cyanate, an inorganic compound. This achievement has been hailed by older historians of science as an important step in the overthrow of the doctrine of vitalism, the theory that a special life force directs the processes in living bodies. More recently it has been recognized that Wöhler was more interested in the chemical reactions of urea than in the philosophical significance of its synthesis.

About the same time that he synthesized urea, Wöhler developed a method for the preparation of metallic aluminum on a small scale. The method was later expanded to an industrial process.

In 1831 Wöhler was called to the technical school in Kassel. He had married his cousin, Franziska Wöhler, in 1829, and the couple had a son. In 1832 his wife died in giving birth to a daughter. Wöhler had previously become acquainted with his contemporary Justus von Liebig, who taught at Giessen, and Liebig suggested that Wöhler might better endure the loss of his wife if he joined his friend in research. The two chemists took up the study of the chemistry of oil of bitter almonds (benzaldehyde). From this investigation came the theory of radicals, the first attempt to understand the structure of organic compounds. An even more important result of the study was the cementing of the friendship of these two leading investigators. Their relationship was of great benefit to each man. Their letters, which have been published, tell much of the characters of both. Liebig was a remarkable experimentalist, but he tended to be opinionated and rather quarrelsome. Wöhler was much more restrained.

In 1834 Wöhler married Julie Pfeiffer, a friend of his first wife. There were two daughters by this marriage. In 1836 he was appointed professor of chemistry at the University of Göttingen, and there he remained for the rest of his life. He continued his studies in both inorganic and organic chemistry. He isolated several elements and new minerals and investigated compounds of physiological importance, such as uric acid and cocaine. He continued to carry out some of his studies jointly with Liebig.

Wöhler's fame did not grow as rapidly as that of Liebig, whose laboratory at Giessen was a centre for chemical research. After 1850 more and more students were attracted to Göttingen, not only because of the research reputation of the laboratory but also because of the personality of Wöhler. He was above all an outstanding teacher, and teaching was his favourite occupation. He was less interested in the laboratory side of instruction, allowing his assistants to direct much of the thesis work. Students were given great freedom to choose their own problems and to publish their results under their own names. Wöhler devoted himself to lectures, in which he excelled. He also drew his students to him by his personal kindliness and his interest in their lives and problems. His correspondence with many of them has been preserved, and it shows that he continued to be interested in their careers long after they had left him.

Wöhler's publishing activities were also important. Besides his translations of the major works of Berzelius, which resulted in their wide currency, he wrote a number of important textbooks in organic, inorganic, and analytic chemistry. He served as one of the editors of *Justus Liebigs Annalen der Chemie*, the major chemical journal of its day. He was an honorary member of nearly every scientific society and received many medals and awards.

(H.M.L.)

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Wohlgemuth, Michael: *see* Wolgemut, Michael.

Wojciechowski, Stanisław (b. March 15, 1869, Kalisz, Pol., Russian Empire—d. April 9, 1953, Golabki, Pol.), one of the leaders in the struggle for Polish independence from Russia in the years before World War I. He later served as the second president of the Polish Republic (1922–26).

While a student at the University of Warsaw, Wojciechowski worked for the Polish Socialist movement, which was a major force in the independence effort. He was arrested in 1891,



Wojciechowski
By courtesy of S. Kirkor, London

and upon his release a year later he went to Paris and then to London. In England he helped publish the Polish Socialist periodical *Przedświt* ("The Dawn") and became friends with Józef Piłsudski. He also studied the cooperative movement, and on returning to Poland in 1906 he spent his time working to develop Polish cooperatives.

During World War I, because he saw Germany as Poland's main enemy, Wojciechowski in 1915 went to Moscow, and there in 1917 he was elected president of the Council of Polish Parties' Union. He returned to Warsaw at the end of the war and from January 1919 to July 1920 served as minister of the interior in three separate cabinets of the new Polish Republic. He was elected to the Sejm (Diet) as a member of the Polish Peasant Party in November 1922. When Gabriel Narutowicz, president of the republic, was assassinated in December 1922, Wojciechowski was chosen to succeed him.

In the new government Wojciechowski and Piłsudski, then military chief of staff, differed as to the direction the nation should take. Wojciechowski supported continued parliamentary government, while Piłsudski favoured a more authoritarian approach. In May 1926, Piłsudski staged a successful coup d'état. Wojciechowski then retired to private life.

wok, thin-walled cooking pan, shaped like a shallow bowl with handles, widely used in Chinese-style cooking. The wok has a round bottom that concentrates heat, cooking food quickly with relatively little oil. Food when cooked may be moved up the sloping side of the wok to stay warm without cooking further, while other food is cooked at the bottom. The wok was developed as an implement to conserve scarce fuel. It is generally made of iron, carbon steel, copper, or aluminum. Although woks come in sizes ranging from 25 to 80 cm (10 to 32 inches) in diameter, household woks average from 30 to 36 cm.

Woks have been used for some 3,000 years in China for a variety of cooking methods, including stir-frying, boiling, and stewing. The addition of a rack and cover converts the wok into a steamer. Originally designed for use on wood- or charcoal-burning Chinese stoves, woks have been adapted for Western use by the addition of a metal ring, which is set on top of a gas or electric stove to hold the wok and prevent it from tipping. Electrically heated woks, with a removable heating element and thermostat, may be used for cooking meals at the dining table.

Woking, borough (district), administrative and historic county of Surrey, England. Woking lies about 25 miles (40 km) southwest of London. It developed as a residential town in an attractive setting of heathlands and pinewoods after the establishment of a railway connection with London (1838). It is notable for its mosque (1889), which is the headquarters of the Muslim community in Great Britain, and for its crematorium (1885), which was the first set up in England. It has light industry and shopping centres. Area 25 square miles (64 square km). Pop. (1998 est.) 91,800.

Wokingham, town and unitary authority, geographic and historic county of Berkshire, England. It lies 33 miles (53 km) west of London. The town of Wokingham, which lay in Windsor Royal Forest, was granted a market in 1219, and Elizabeth I granted its charter in 1583. Brickworks were once active southwest of the town, but engineering and software development are now the main economic activities, and many residents commute to work in Reading and Bracknell. The unitary authority comprises both developed and natural areas. Area unitary authority, 69 square miles (179 square km). Pop. (1991) town, 38,063; (1998 est.) unitary authority, 145,300.

Wolcot, John: *see* Pindar, Peter.

Wolcott, Oliver (b. Nov. 20, 1726, Windsor, Conn. [U.S.]—d. Dec. 1, 1797, Litchfield, Conn., U.S.), American public official who signed the Declaration of Independence (1776) and helped negotiate a settlement with the Iroquois (1784).

Descended from an old Connecticut family long active in public affairs, he was the son of Roger Wolcott, who was the colonial governor in 1750–54. Settling in Litchfield county, where he practiced law and was made sheriff (1751), he became a member of the Connecticut council (1771–86) and a delegate to the Continental Congress in Philadelphia. At the beginning of the Revolution, Wolcott signed the Declaration of Independence, then returned home to raise a state militia, which he commanded in defense of New York City



Oliver Wolcott, oil painting by Gilbert Stuart; in the Yale University Art Gallery
By courtesy of the Yale University Art Gallery, gift of George Gibbs, M.A. (Hon.) 1806

(August 1776). The following year he organized more Connecticut volunteers and took part in the successful campaign against General John Burgoyne. In 1779 he commanded Continental troops during the British invasion of his home state.

Wolcott had been appointed a commissioner for northern Indian affairs in 1775. After the war he helped negotiate the Second Treaty of Fort Stanwix, which redrew the western boundaries of the Six (Iroquois) Nations. He went on to serve as Connecticut's lieutenant governor (1787–96) and governor (1796–97), as well as a member of the Connecticut convention that ratified the new federal Constitution.

His son, Oliver Wolcott (1760–1833), continued the family tradition of public service as U.S. secretary of the Treasury (1795–1800) and governor of Connecticut (1817–27).

Wolcott, Roger (b. Jan. 4, 1679, Windsor, Conn. [U.S.]—d. May 17, 1767, East Windsor, Conn.), British American colonial justice, military officer, and governor of Connecticut.

After service as a clothier's apprentice, Wolcott became a successful tradesman. In 1707 he became a selectman for the town of Windsor. He was admitted to the bar in 1709 and was that year elected to the lower house of Connecticut's legislature. Wolcott became a justice of the peace (1710), a judge of Hartford's county court (1721), a judge of the Hartford superior court (1732), and chief justice of that court in 1741. He also served as clerk of the legislative assembly (1710–11), was elected to the Upper House of Assistants in 1714, and became deputy governor in 1741.

Wolcott was elected governor of Connecticut in 1750 and served for four years until his defeat by Thomas Fitch. He was an important member of colony committees concerned with boundary disputes, Indian affairs, papercurrency issues, and law code revisions.

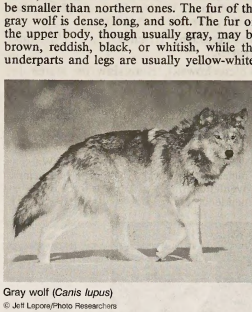
His military service started with his appointment as captain in 1722, and by 1739 he had risen to the rank of colonel, commanding Connecticut's First Regiment. He was commissioned a major general in 1745 and was second in command of the successful Anglo-American expedition that captured the French fortress of Louisbourg.

Wolcott was also a prosperous farmer and a poet. His *Poetical Meditations, Being the Improvement of Some Vacant Hours,* printed in 1725, was the first book of verse published in Connecticut.

wolf, either of two species of wild doglike carnivores of the family Canidae. The gray, or timber, wolf (*Canis lupus*) is the best-known species. It is the largest wild member of the dog family and still inhabits large areas in the Northern Hemisphere. The red wolf (*Canis rufus*) is somewhat smaller and occupies a much more restricted range.

The gray wolf has a larger natural distribution than any other mammal except human beings. It formerly inhabited all of North America from Alaska and Arctic Canada south to central Mexico and was found throughout Europe and Asia southward to the Mediterranean Sea, the Arabian Peninsula, and parts of India and China. It lived in every type of habitat in the Northern Hemisphere except tropical forests and arid deserts. The gray wolf has been eliminated from much of its original range, however, and its numbers are dwindling in many areas. In North America it is now found primarily in Canada and Alaska, with much smaller numbers in Minnesota and Mexico. In 1995 wolves were reintroduced in wilderness areas of the northern Rocky Mountains. Large numbers of gray wolves still live in Russia and neighbouring countries and in the Balkans, with much smaller populations isolated in parts of central and southern Europe and Scandinavia.

The gray wolf is a powerful animal with a broad head, robust limbs, large feet, and deep but narrow chest. Excluding certain domestic breeds of dogs, it is the largest living canid. A northern male may be about 2 m (6.5 feet) long, including the bushy, 50-centimetre (20-inch) tail, and weigh 20 to 80 kg (44 to 175 pounds). Females are slightly smaller than males, and southern races of wolves tend to be smaller than northern ones. The fur of the gray wolf is dense, long, and soft. The fur on the upper body, though usually gray, may be brown, reddish, black, or whitish, while the underparts and legs are usually yellow-white.



Gray wolf (*Canis lupus*)
© Jett Lepore/Photo Researchers

An intelligent, social animal that was admired by the American Indians, the gray wolf usually lives in packs of several to two dozen individuals. A pack is basically a family group consisting of an adult pair and their offspring of various ages. There is a clearly defined dominance hierarchy in the pack, with only the lead male and female (the alpha pair) possessing the right to mate. They are usually the parents of the other pack members. A pack's home range, or territory, typically amounts to one hundred or several hundred square kilometres and is actively defended against neighbouring packs. The group howling that wolves engage in serves to solidify a pack's social structure and signal its presence to neighbouring packs.

Wolves move and hunt mostly at night. A wolf pack feeds primarily on large herbivores such as deer, moose, and caribou, which it catches by a stalk and a chase. The pack gorges when food is available, usually reducing the carcass to hair and a few bones. In its hunting the gray wolf performs an important natural function in controlling the numbers of large herbivores and in weeding out those less fit for survival. Unfortunately, it may attack domestic livestock and has thus undergone persecution by humans. There have been few, if any, substantiated wolf attacks on humans in North America, but such attacks, though unusual, have definitely occurred in Eurasia and have sometimes resulted in death.

Gray wolves breed between January and April, and a litter of 6 to 7 pups (on average) is born in the spring after a gestation period of about 63 days. The young are reared in a den consisting of a natural hole or a burrow, usually in a hillside. All the members of a pack care solicitously for the young, who are fed with meat regurgitated by their parents after a hunt. Juveniles remain with the pack until they reach sexual maturity at less than two years, after which they leave to search for a mate and establish new territories.

The red wolf (*C. rufus*) is a tawny, reddish, or black canid of the south-central United States. It grows to a length of about 105–125 cm, excluding the tail, which is 33–43 cm long, and weighs about 14–37 kg. It is an endangered species; the total population in the late 20th century appeared to be fewer than 100.

The largest known wolf, the dire wolf (*C. dirus*), was common in western North America during the Pleistocene but is now extinct; it was half again as large as the modern gray wolf.

The coyote (*q.v.*), a North American canid, is sometimes called prairie, brush, or little, wolf.

For other animals known as wolves but not of the genus *Canis, see* maned wolf; aardwolf; Tasmanian wolf.

The Antarctic wolf, now extinct, was a South American fox (*q.v.*) of the Falkland Islands.

Wolf, Christian, Freiherr von: *see* Wolff, Christian, Freiherr von.

Wolf, Friedrich August (b. Feb. 15, 1759, Haynrode, near Nordhausen, Brandenburg [now in Germany]—d. Aug. 8, 1824, Marseille, France), German classical scholar who is considered the founder of modern philology but is best known for his *Prolegomena ad Homerum* (1795), which created the "Homer question" in its modern form.

Extremely precocious, Wolf learned Greek, Latin, and French as a child. He was largely self-taught when in 1777 he became the first to be admitted to the University of Göttingen as a student of philology, then a minor branch of theology. From 1783 to 1806 he was professor at the University of Halle, where he raised philology to an independent branch of knowledge, and his intense lectures inspired a generation of students. Though the authorship of the Homeric poems had been questioned by some since antiquity, it was Wolf's *Prolegomena* that jolted scholars out of their acceptance of the ancient blind bard as the sole author of the *Iliad* and *Odyssey.* Wolf's theory that the poems were composed orally by more than one author and that their artistic unity was imposed on them at a later date opened the way to the modern understanding of epic tradition and the origins of poetry.

Wolf, Hugo, in full HUGO PHILIPP JAKOB WOLF (b. March 13, 1860, Windischgraz, Austria [now Slovenj Gradec, Slovenia]—d. Feb. 22, 1903, Vienna), composer who brought the 19th-century German lied, or art song, to its highest point of development.

Wolf studied at the Vienna Conservatory (1875–77) but had a moody and irascible temperament and was expelled from the conservatory following his outspoken criticism of his masters. In 1875 he met the composer Richard Wagner, from whom he received encouragement. He met Johannes Brahms in 1879, and from him also he received encouragement and the urging to broaden his musical focus and his career. He was also a friend of Gustav Mahler as a young man. In the late 1870s Wolf apparently contracted the syphilis that was to cripple and kill him. In the repeated relapses of the disease, Wolf would enter deep depressions and was unable to compose, but during remissions he was radiant and highly inspired. In 1883 Wolf became music critic of the *Wiener Salonblatt;* his weekly reviews provide considerable insight into the Viennese musical world of his day.

His early songs include settings of poems by J.W. von Goethe, Nikolaus Lenau, Heinrich Heine, and Joseph von Eichendorff. In 1883 he began his symphonic poem *Penthesilea,* based on the tragedy by Heinrich von Kleist. From 1888 onward he composed a vast number of songs on poems of Goethe, Eduard Friedrich Mörike, and others. The *Spanisches Liederbuch* ("Spanish Songbook"), on poems of P.J.L. von Heyse and Emanuel von Geibel, appeared in 1891, followed by the *Italienisches Liederbuch* (part 1, 1892; part 2, 1896). Other song cycles were on poems of Henrik Ibsen and Michelangelo. His first opera, *Corregidor* (1895; composed on a story by Pedro Antonio de Alarcón), was a failure when it was produced at Mannheim in 1896; a revised version was produced at Strasbourg in 1898.

His second opera, *Manuel Venegas,* also after Alarcón, remained unfinished.

Wolf 's reputation as a song composer resulted in the formation in his lifetime of Wolf societies in Berlin and Vienna. Yet the meagre income he derived from his work compelled him to rely on the generosity of his friends. In 1897, ostensibly following upon a rebuke from Mahler but actually on account of growing signs of insanity and general paresis, he was confined to a mental home. He was temporarily discharged in 1898, but soon afterward he unsuccessfully attempted to commit suicide, and in October 1898 he requested to be placed in an asylum in Vienna.

Wolf wrote about 300 songs, many published posthumously. Of his first 100—from his early years—he only counted a handful worthwhile. But his output in the mature years was supremely original, in the finest tradition of the German lied. Wolf excelled at creating vocal melodic lines that express every

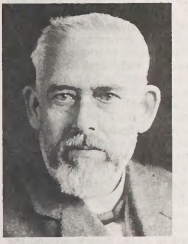


Hugo Wolf, 1895
By courtesy of the Österreichische Nationalbibliothek, Vienna

emotional nuance of a given poetic text. The atmosphere of his songs ranges from tender love lyrics to satirical humour to deeply felt spiritual suffering. The vocal melodic line is subtly combined with strikingly original harmonies in the piano accompaniment, resulting in Wolf's remarkable fusion of music and speech. His instrumental works were more interesting for their underlying ideas than for their execution; they included the *Italian Serenade* for orchestra (1892; a transcription of the serenade for string quartet of 1887).

Wolf, Max, in full MAXIMILLIAN FRANZ JOSEPH CORNELIUS WOLF (b. June 21, 1863, Heidelberg, Baden [Germany]—d. Oct. 3, 1932, Heidelberg), German astronomer who applied photography to the search for asteroids and discovered 228 of them.

Wolf showed an early interest in astronomy; he was only 21 years old when he discovered a comet, now named for him. In 1890 he was appointed *Privatdozent* (unsalaried lecturer) at the University of Heidelberg. One year later he adapted a camera to a motor-driven telescope to seek out asteroids. (All previous discoveries



Max Wolf
Archiv für Kunst und Geschichte, Berlin

had been made one by one by direct observation.) Using a time exposure of the heavens, Wolf demonstrated that the faster-moving asteroids would show up in the photograph as a short line rather than a point of light, which denoted a star.

In 1893 Wolf became director of the new Königstuhl Observatory and was appointed to an extraordinary professorship in astrophysics at Heidelberg; nine years later he was elected to the chair of astronomy at Heidelberg. Through his photographic studies he established the presence of dark clouds of interstellar matter in the Milky Way Galaxy, and he was the first to use the stereocomparator (a type of stereoscopic viewer), which greatly helps in the discovery and identification of variable or moving objects in celestial photographs. In 1906 he discovered Achilles, the first of the Trojan Planets, two groups of asteroids that move around the Sun in Jupiter's orbit: one group 60° ahead of Jupiter, the other 60° behind.

Wolf, Rudolf, in full JOHANN RUDOLF WOLF (b. July 7, 1816, Fällenden, near Zürich, Switz.—d. Dec. 6, 1893, Zürich), Swiss astronomer and astronomical historian.

Wolf studied at the universities of Zürich, Vienna, and Berlin and in 1839 went to the University of Bern as a teacher of mathematics and physics; he became professor of astronomy there in 1844. In 1855 he accepted a professorship of astronomy at both the University of Zürich and the Federal Institute of Technology in Zürich. At his instigation an observatory was opened at Zürich in 1864.

Wolf confirmed S.H. Schwabe's discovery of a cycle in sunspot activity and by use of earlier records defined the cycle's length more accurately, at an average of 11.1 years. Wolf also correlated this solar cycle with the observations of the Earth's magnetism made by Johann von Lamont. In 1849 he devised a system, still in use, of gauging solar activity by counting sunspots and sunspot groups, which are known as Wolf 's sunspot numbers.

Wolf Creek Crater, huge meteorite crater 65 miles (105 km) south of Halls Creek, Western Australia. The crater is on the edge of a little-explored desert and was first sighted from an airplane in 1937. It is 2,799 feet (853 m) in diameter and 151 feet (46 m) deep, with a rim standing 60–100 feet (18–30 m) above ground level. Only decayed meteoritic fragments have been found. It is considered an explosion crater because of its size. The crater site was made a national park (1968) with an area of 6 square miles (15 square km).

Wolf-Ferrari, Ermanno (b. Jan. 12, 1876, Venice, Italy—d. Jan. 21, 1948, Venice), Italian operatic composer who followed both the comic and the realistic traditions.

The son of a German father and an Italian mother, Wolf-Ferrari studied music in Munich and then returned to Venice, where he became director of the Liceo Benedetto Marcello in 1902. He wrote Italian operas, of which five are based on the comedies of Carlo Goldoni. His humour, however, was Germanic rather than Italian, and most of his works were produced in Germany. His most successful comic operas, *I quattro rusteghi* (1906; *The School for Fathers*) and *Il segreto di Susanna* (1909; *The Secret of Susanne*), presented 18th-century styles orchestrated in the manner of the 20th century. Comic points in these operas are delicately underlined. In *Sly* (1927; based on the opening scenes of *The Taming of the Shrew*) and in his only tragic opera, *I gioielli della Madonna* (1911; *The Jewels of the Madonna*), he was influenced by the realistic, or *verismo,* style of Pietro Mascagni. He also composed chamber, instrumental, and orchestral works and a violin concerto.

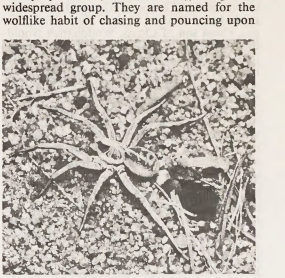
wolf herring (*Chirocentrus dorab*), species of fish belonging to the family Chirocentridae (order Clupeiformes). It is exclusively marine in habitat, occurring in the Indian Ocean and in the western Pacific to Japan and eastern Australia. In contrast to other herrings, which feed on plankton, wolf herrings are carnivorous, attacking and eating other fish. Their jaws are equipped with fanglike teeth for catching and holding prey. Otherwise, they superficially resemble members of the herring family, Clupeidae, having elongate, silvery bodies with forked tails. Because of their large size (average length about 1.5 m [5 feet]) and predatory habits, wolf herrings are a threat to many other species of fish.

Wolf-Rayet star, any of a class of extremely hot, white stars having peculiar spectra thought to indicate either great turbulence within the star or a steady, voluminous ejection of material. A typical Wolf-Rayet star is several times the diameter of the Sun and thousands of times more luminous. Only a few hundred are known, located mostly in the spiral arms of the Milky Way Galaxy. The type was first distinguished in 1867 by the French astronomers Charles-Joseph-Étienne Wolf and Georges-Antoine-Pons Rayet.

wolf snake, any of a number of nonvenomous members of the family Colubridae, named for enlarged teeth at the front of both jaws. Southeast Asian wolf snakes are placed in the genera *Cercaspis* and *Lycodon,* African species in *Lycophidion.*

The Cape wolf snake (*Lycophidion capense*), abundant from Egypt to South Africa, is a small, drab species with a metallic sheen and lives chiefly on lizards. The Indian wolf snake (*L. aulicus*) is a small, brown, nocturnal serpent of southeastern Asia that eats mice, geckos, and lizards.

wolf spider, also called GROUND SPIDER, or HUNTING SPIDER, any member of the spider family Lycosidae (order Araneida), a large and widespread group. They are named for the wolflike habit of chasing and pouncing upon



Wolf spider (*Lycosa*)
Anthony Bannister from the Natural History Photographic Agency

prey. About 125 species occur in North America, about 50 in Europe. Numerous species occur north of the Arctic Circle. Most are small to medium-sized. The largest has a body about 2.5 cm (1 inch) long and legs about the same length.

Most wolf spiders are dark brown. The hairy body is long and broad, with stout, long legs. Wolf spiders are noted for their running speed. They are easily identified by the number and arrangement of the eyes: four small eyes in the lowest row, two very large eyes in a middle row, and two small or medium-sized eyes in a top row. The jaws are prominent and strong.

Wolf spiders commonly occur in grass or under stones, logs, or leaf litter. They are especially active at night or if the sky is over-

cast. The eggs are contained in a gray silk sac attached to the female's spinnerets, or silk-producing organs, so that she appears to be dragging a large ball. After hatching, the young spiders ride on the mother's back for several days.

Most species build silk-lined, tubular nests in the ground. Some conceal the entrance with rubbish; others build a turretlike structure above it. A few species spin webs.

Wolf spiders of the genus *Pirata,* often found near ponds or streams, have a V-shaped pale mark on the back. The abdomen often has chevronlike marks and paired yellow spots. Thin-legged wolf spiders (*Pardosa*), which have a lens-shaped, greenish or gray egg sac, have relatively long legs with long spines on the "foot." Burrowing wolf spiders (*Geolycosa*), which spend most of their lives in burrows, have heavy front legs that are used for digging. The wolf spiders with the largest bodies are mostly of the genus *Lycosa,* a large group that includes *L. tarentula* of southern Europe (*see* tarantula).

Wolfdietrich, Germanic hero who appears in the Middle High German poems of *Ortnit* and *Wolfdietrich* in *Das Heldenbuch* (*see* Heldenbuch, Das) as the son of Hugdietrich, emperor of Constantinople. Repudiated by his father, who mistakenly believes him illegitimate, he is brought up by the emperor's faithful retainer Berchtung von Meran. Berchtung and his 16 sons support Wolfdietrich, who, after his father's death, is driven from his inheritance by his own brothers. After a long exile in Lombardy at the court of King Ortnit, the hero returns to liberate Berchtung's imprisoned sons and regain his kingdom. Among the exploits of Wolfdietrich is his killing of the dragon that had slain Ortnit.

The story of Wolfdietrich attached itself to the family of Clovis, king of the Franks. Some critics believe Hugdietrich to be the epic counterpart of Theodoric (Dietrich); the name might be a Latinized form of Hugo Theodericus, eldest son of Clovis. Wolfdietrich would thus represent Theodoric's son Theodebert (d. 548), whose succession was disputed by his uncles. But father and son are merged by a process of epic fusion, so that Wolfdietrich appears to be the counterpart sometimes of Theodoric and sometimes of Theodebert.

The story of how Hugdietrich won his bride Hildburg, daughter of the king of Salonika, forms in one manuscript version a separate introduction to the Wolfdietrich romance.

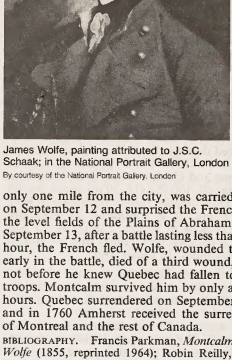
Wolfe, Charles (b. Dec. 14, 1791, Dublin, Ire.—d. Feb. 21, 1823, Queenstown, County Cork), Irish poet and clergyman, whose "Burial of Sir John Moore" (1817), commemorating the commander of the British forces at the Battle of Corunna (La Coruña, Spain) during the Peninsular War, is one of the best-known funeral elegies in English. Wolfe attended Trinity College, Dublin, was ordained in 1817, and held curacies in County Tyrone.

Wolfe, James (b. Jan. 2, 1727, Westerham, Kent, Eng.—d. Sept. 13, 1759, Quebec [now in Canada]), commander of the British army at the capture of Quebec from the French in 1759, a victory that led to British supremacy in Canada.

The elder son of Lieutenant General Edward Wolfe, he was commissioned in the Royal Marines in 1741 but transferred almost immediately to the 12th Foot. Wolfe was on active service continuously until the end of the War of the Austrian Succession, fighting against the French at Dettingen (1743) and later at Falkirk and Culloden (1746) during the Jacobite rebellion. He was promoted to lieutenant colonel in 1750 and served as brigadier general under Major General Sir Jeffrey Amherst in an expedition against the French at Cape Breton Island (1758). The capture of Louisbourg, a fortress on the island, was largely attributed to Wolfe's daring and determination.

Wolfe returned to England to restore his failing health, but there he received from William Pitt the acting rank of major general and command of the expedition to capture the city of Quebec. By late June 1759, Wolfe's entire convoy had passed up the St. Lawrence River and had reached the island of Orleans, which lay opposite Quebec along the river. The army of the French defender of Quebec, the marquis de Montcalm, was strongly entrenched on the high cliffs along the city's river frontage. Unable to lure Montcalm out from the safety of his defenses, Wolfe on July 31 ordered an assault on the Beauport shore east of the city, which proved to be a costly failure.

Mortally ill with tuberculosis, Wolfe endured great pain and anxiety while the siege dragged on throughout August. At the end of that month, he and his brigadiers agreed on a plan to land troops across the river a short distance upstream and to the west of Quebec. The resulting attack, which involved scaling the cliffs



James Wolfe, painting attributed to J.S.C. Schaak; in the National Portrait Gallery, London
By courtesy of the National Portrait Gallery, London

only one mile from the city, was carried out on September 12 and surprised the French on the level fields of the Plains of Abraham. On September 13, after a battle lasting less than an hour, the French fled. Wolfe, wounded twice early in the battle, died of a third wound, but not before he knew Quebec had fallen to his troops. Montcalm survived him by only a few hours. Quebec surrendered on September 18, and in 1760 Amherst received the surrender of Montreal and the rest of Canada.

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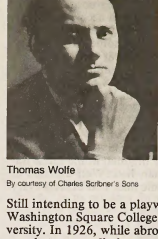
Wolfe, Thomas, in full THOMAS CLAYTON WOLFE (b. Oct. 3, 1900, Asheville, N.C., U.S.—d. Sept. 15, 1938, Baltimore, Md.), American writer best known for his first book, *Look Homeward, Angel* (1929), and his other autobiographical novels.

His father, William Oliver Wolfe, the Oliver Gant of his novels, was a stonecutter, while his mother, Julia Elizabeth Westall Wolfe, the Eliza of the early novels, owned a successful boardinghouse in Asheville, N.C., where Wolfe grew up. He was educated privately and in 1916 entered the University of North Carolina, where he wrote and acted in several one-act plays. In 1920 he enrolled in George Pierce Baker's 47 Workshop at Harvard University, intending to become a playwright. Several of his plays were produced at Harvard, including *Welcome to Our City* (1923), in which the town of Altamont (Asheville) first appeared.

In 1923 Wolfe left Harvard for New York City, where he resided for the rest of his life.



Thomas Wolfe
By courtesy of Charles Scribner's Sons

Still intending to be a playwright, he taught at Washington Square College of New York University. In 1926, while abroad, he began work on what eventually became *Look Homeward, Angel,* in which he recounted the growth of an autobiographical protagonist, Eugene Gant, in the mountain town of Altamont. The book was a success, though its publication caused a great furor in Asheville.

During the late 1920s Wolfe entered into a relationship with the theatrical designer Aline Bernstein, who appeared as Esther Jack in his last two novels and who wrote of their friendship in the novel *The Journey Down* (1938). After the publication of *Look Homeward, Angel,* Wolfe quit teaching to write full-time. His second novel, *Of Time and the River* (1935), takes up the story of Eugene Gant from his leaving home to attend Harvard until his meeting with Esther Jack. Wolfe's memoir of his life in the 1930s, *The Story of a Novel* (1936), describes his close working relationship with the editor Maxwell Perkins (*q.v.*), who helped him reduce the enormous manuscripts of his first two works down to manageable novelistic proportions.

Wolfe did not publish another novel during his lifetime, though at his death he left a prodigious quantity of manuscript, from which the editor Edward Aswell extracted two more novels, *The Web and the Rock* (1939) and *You Can't Go Home Again* (1940). These books depict the struggles of a young writer to become established in New York City and his first experiences with literary fame. A collection of Wolfe's shorter pieces and chapters of an uncompleted novel, *The Hills Beyond* (1941), and his *Letters to His Mother* (1943) were also published, as well as his *Selected Letters* (1956).

Wolfe was gifted with the faculty of almost total recall, and his fiction is characterized by an intense consciousness of scene and place, together with what is often an extraordinary lyric power. In *Look Homeward, Angel* and *Of Time and the River,* Wolfe was able to imbue his life story and the figures of his parents with a lofty romantic quality that has epic and mythopoeic overtones. Powerful emotional evocation and literal reporting are combined in his fiction, and he often alternates between dramatically effective episodes of recollection and highly charged passages of rhetoric. Though *The Web and the Rock* and *You Can't Go Home Again* contain episodes of great vividness, they are too often uncontrolled in their form and fail to sustain the epic tone of *Look Homeward, Angel,* which has become an American classic.

Wolfenbüttel, city, Lower Saxony *Land* (state), northwestern Germany. The city lies along the Oker River, just south of Brunswick. First mentioned in 1118, it grew around the castle that became a favourite Welf residence about 1283. Chartered in 1540, it was cap-

tured by the Protestant Schmalkaldic League in 1542 and was transferred to Brunswick in 1753–54. The old town has many Renaissance and Baroque half-timbered houses, including the house of Gotthold Lessing, the 18th-century critic and dramatist. Larger buildings include the castle residence of the duke of Brunswick-Wolfenbüttel and St. Mary's Church (1604–23). Wolfenbüttel's Herzog-August Library contains a notable collection of medieval manuscripts.

Wolfenbüttel's industries include canning and the manufacture of agricultural machinery and chemical and musical equipment. Pop. (1995 est.) 53,622.

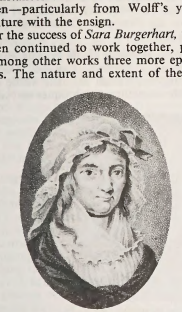
Wolfenden Report, a study containing recommendations for laws governing sexual behaviour, published in 1957 by the Committee on Homosexual Offences and Prostitution in Great Britain. It was named for Sir John Wolfenden, the chairman of the committee. Using the findings of psychoanalysis and social science, the report urged that public statutes avoid the attempt to legislate morality and that they concern themselves only with sexual acts that offend public decency or disrupt order. The committee therefore recommended that private homosexual liaisons between consenting adults be removed from the domain of criminal law. Legislation implementing these recommendations was enacted in the Sexual Offences Act (1967).

Wolff, Betje, in full ELIZABETH WOLFF-BEKKER (b. July 24, 1738, Vlissingen, Neth.—d. Nov. 5, 1804, The Hague), Dutch writer and collaborator with Aagje Deken (*q.v.*) on the first Dutch novel, *De historie van mejuffrouw Sara Burgerhart,* 2 vol. (1782; "The History of Miss Sara Burgerhart").

Wolff, the daughter of a prosperous family, ran away with a naval officer at the age of 17, only to return home in a few days, deeply hurt by the experience. In 1759 she married Adriaan Wolff, a minister more than 30 years her senior.

The first writing she did was classical poetry in imitation of Alexander Pope; she also wrote lyrical poetry and satire. She directed most of her satire at her conservative, provincial neighbours. From 1767 to 1769 Wolff contributed to the periodical *Gryzaard.* By the time she met Aagje Deken in 1776, she was a well-known and widely discussed writer. After the death of her husband, Wolff set up house with Deken. Five years later *Sara Burgerhart,* an epistolary novel inspired by Samuel Richardson's *Pamela,* was published. It was a realistic, subtly developed character study and included circumstances drawn from the lives of both women—particularly from Wolff's youthful adventure with the ensign.

After the success of *Sara Burgerhart,* the two women continued to work together, producing among other works three more epistolary novels. The nature and extent of their literary collaboration remains a matter of some dispute. Some critics, reflecting on Deken's mediocre output prior to *Sara Burgerhart,* maintain that Wolff was the principal author of the joint works. Wolff in fact had a far greater catalog and reputation.

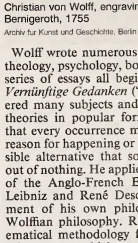


Betje Wolff, detail of an engraving by L. Portman after a drawing by A. Teerlink after a painting by P. Groenia

By courtesy of the Iconographisch Bureau, The Hague

Wolff, Christian, Freiherr (Baron) **von,** Wolff also spelled WOLF (b. Jan. 24, 1679, Breslau, Silesia [now Wrocław, Pol.]—d. April 9, 1754, Halle, Prussia [now in Germany]), philosopher, mathematician, and scientist who worked in many subjects but who is best known as the German spokesman of the Enlightenment, the 18th-century philosophical movement characterized by Rationalism.

Wolff was educated at the universities of Breslau, Jena, and Leipzig and was a pupil of the philosopher and mathematician Gottfried Wilhelm Leibniz. On the recommendation of Leibniz he was appointed professor of mathematics at the University of Halle in 1707, but he was banished in 1723 as a result of theological disputes with Pietists, who were followers of the German movement for an increase of piety in Lutheran churches. He became professor of mathematics and philosophy at the University of Marburg, Hesse (1723–40), and, as science adviser to Peter the Great (1716–25), he helped found the St. Petersburg Academy of Sciences in Russia. After returning to the University of Halle, at the request of the king of Prussia, Frederick II the Great, he became chancellor (1741–54).



Christian von Wolff, engraving by J.M. Bernigeroth, 1755

Archiv fur Kunst und Geschichte, Berlin

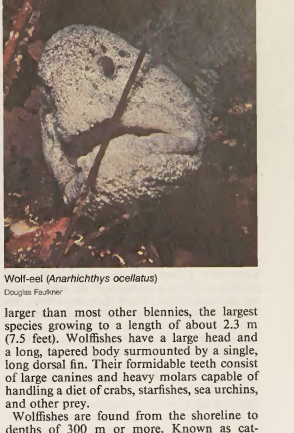
Wolff wrote numerous works in philosophy, theology, psychology, botany, and physics. His series of essays all beginning under the title *Vernünftige Gedanken* ("Rational Ideas") covered many subjects and expounded Leibniz's theories in popular form. Wolff emphasized that every occurrence must have an adequate reason for happening or there arises the impossible alternative that something might come out of nothing. He applied the rational thought of the Anglo-French Enlightenment and of Leibniz and René Descartes in the development of his own philosophical system, the Wolffian philosophy. Rationalism and mathematical methodology formed the essence of this system, which was an important force in the development of German philosophical thought.

Wolff, Magda: *see* Lupescu, Magda.

Wolffian duct, also called ARCHINEPHRIC DUCT, one of a pair of tubes that carry urine from primitive or embryonic kidneys to the exterior or to a primitive bladder. In amphibians the reproductive system encroaches on the Wolffian duct; in some species the duct carries both urine and sperm, but most amphibians develop a separate tube to carry urine from the kidney.

In advanced vertebrates the Wolffian duct develops in conjunction with the embryonic kidneys. The mature kidney drains through the ureter, however, and the Wolffian duct develops into parts of the male reproductive system, such as the epididymis and the vas deferens.

wolffish, any of nine species of large, long-bodied blennies of the family Anarhichadidae (order Perciformes), found in northern Atlantic and Pacific waters. Wolffishes are much



Wolf-eel (*Anarhichthys ocellatus*)

Douglas Faulkner

larger than most other blennies, the largest species growing to a length of about 2.3 m (7.5 feet). Wolffishes have a large head and a long, tapered body surmounted by a single, long dorsal fin. Their formidable teeth consist of large canines and heavy molars capable of handling a diet of crabs, starfishes, sea urchins, and other prey.

Wolffishes are found from the shoreline to depths of 300 m or more. Known as catfishes in Europe, they are taken there and in the United States for food. Species include the wolffish (*Anarhichas lupus*), a vertically banded North Atlantic species; the spotted wolffish, or spotted catfish (*A. minor*), also of the North Atlantic; and the wolf-eel (*Anarhichthys ocellatus*), a black-spotted form found in the eastern Pacific.

Wölfflin, Heinrich (b. June 21, 1864, Basel, Switz.—d. July 19, 1945, Basel), writer on aesthetics and the most important art historian of his period writing in German.

Wölfflin was educated at the universities of Basel, Berlin, and Munich. His doctoral thesis, *Prolegomena zu einer Psychologie der Architektur* (1886), already showed the approach that he was later to develop and perfect: an analysis of form based on a psychological interpretation of the creative process. He pursued this method in books on the Renaissance and Baroque periods and on Albrecht Dürer: *Renaissance und Barock* (1888); *Die klassische Kunst* (1899; *The Art of the Italian Renaissance;* also titled *Classic Art*); and *Die Kunst Albrecht Dürers* (1905). His chief work was *Kunstgeschichtliche Grundbegriffe* (1915; *Principles of Art History*), which synthesized his ideas into a complete aesthetic system that was to become of great importance in art criticism.

In contrast to the anecdotal approaches that had proved popular in the 19th century, Wölfflin emphasized the formal stylistic analysis of drawing, composition, light, colour, subject matter, and other pictorial elements as they were handled similarly by the painters of a particular period or national school. With this system of comparative stylistic analysis he hoped to establish a set of objective criteria for understanding and evaluating individual works of art. Though his theoretical approach is no longer very useful, it had great influence

on subsequent art historians and helped establish art history as an intellectually rigorous discipline of modern scholarship.

Wölfflin's work as a professor at the universities of Basel (1893–1901), Berlin (1901–12), Munich (1912–24), and Zürich (1924–34) contributed greatly to the spread of his ideas.

wolfram: *see* tungsten.

Wolfram VON ESCHENBACH (b. *c.* 1170—d. *c.* 1220), German poet whose epic *Parzival,* distinguished alike by its moral elevation and its imaginative power, is one of the most profound literary works of the Middle Ages.

An impoverished Bavarian knight, Wolfram apparently served a succession of Franconian lords: Abensberg, Wildenberg, and Wertheim are among the places he names in his work. He also knew the court of the landgrave Hermann I of Thuringia, where he met the great medieval lyric poet Walther von der Vogelweide. Though a self-styled illiterate, Wolfram shows an extensive acquaintance with French and German literature, and it is probable that he knew how to read, if not how to write.

Wolfram's surviving literary works, all bearing the stamp of his unusually original personality, consist of eight lyric poems, chiefly *Tageslieder* ("Dawn Songs," describing the parting of lovers at morning); the epic *Parzival;* the unfinished epic *Willehalm,* telling the history of the crusader Guillaume d'Orange; and short fragments of a further epic, the so-called *Titurel,* which elaborates the tragic love story of Sigune from book 3 of *Parzival.*

Parzival, probably written between 1200 and 1210, is a poem of 25,000 lines in 16 books. Likely based on an unfinished romance of Chrétien de Troyes, *Perceval, ou Le Conte du Graal,* it introduced the theme of the Holy Grail into German literature. Its beginning and end are new material, probably of Wolfram's own invention, although he attributes it to an unidentified and probably fictitious Provençal poet, Guiot. The story of the ignorant and naive Parzival, who sets out on his adventures without even knowing his own name, employs the classic fairy-tale motif of "the guileless fool" who, through innocence and artlessness, reaches a goal denied to wiser men.

Wolfram uses Parzival's dramatic progress from folk-tale dunce to wise and responsible keeper of the Grail to present a subtle allegory of man's spiritual education and development. Parzival also figures as the hero of Richard Wagner's last opera, *Parsifal* (1882). The complexity of Wolfram's theme is matched by his eccentric style, which is characterized by rhetorical flourishes, ambiguous syntax, and the free use of dialect.

Wolfram's influence on later poets was profound, and he is a member, with Hartmann von Aue and Gottfried von Strassburg, of the great triumvirate of Middle High German epic poets.

wolframite, chief ore of tungsten, commonly associated with tin ore in and around granite. Such occurrences include Cornwall, Eng.; northwestern Spain and northern Portugal; eastern Germany; Myanmar (Burma); the Malay Peninsula; and Australia.

Wolframite consists of a mixture in varying proportions of the tungstates of iron and manganese, $FeWO_4$ and $MnWO_4$; varieties with dominant iron (Fe:Mn>4:1) are called ferberite, and those with dominant manganese (Mn:Fe>4:1) are called hübnerite. Wolframite's colour is brown to black, and it has a submetallic to metallic lustre and a perfect cleavage. The Mohs hardness is 5–5½; specific gravity, 7–7.5; and crystal system, monoclinic.

wolfsbane (plant): *see* monkshood.

Wolfsburg, city, Lower Saxony *Land* (state), northern Germany. It lies along the Mittelland Canal, about 43 miles (70 km) east of Hannover, the state capital. A modern industrial community founded in 1938, it is dominated by the Volkswagen plant, where much of the working population is employed.

The village of Hesslingen, dating from about 700, was the first settlement near the site of Wolfsburg; the town was first mentioned in 1132. There is a 16th-century castle and a modern-style cultural centre designed by the Finnish architect Alvar Aalto. Pop. (1998 est.) 122,798.

Wolgemut, Michael, Wolgemut also spelled WOHLGEMUT, or WOHLGEMUTH (b. 1434, Nürnberg [Germany]—d. Nov. 30, 1519), leading late Gothic painter of Nürnberg in the late 15th century.



"Saint Anne with the Virgin and Child," panel painting by Michael Wolgemut, *c.* 1510; in the Germanic National Museum, Nürnberg, Ger.
SCALA/Art Resource, New York City

After an obscure early period Wolgemut married (1472) Barbara, widow of the Nürnberg painter Hans Pleydenwurff. In the next 40 years he produced a series of large altarpieces, rich with carving and gilding, as well as portraits and book illustrations. The altarpiece of St. Jacob, Straubing, is attributed to the beginning of this activity (*c.* 1475–76), and those of the Marienkirche, Zwickau (1476–79), the Stiftskirche, Feuchtwangen (1484), the Heiligkreuzkirche, Nürnberg (1486), and the Stadtkirche of Schwabach (1506–08) are all known to be products of his workshop. With his stepson Wilhelm Pleydenwurff, Wolgemut completed the designs for the 650 woodcuts of Hartmann Schedel's *Liber chronicarum* in 1493 and the woodcuts for Stephan Fridolin's *Schatzbehalter der wahren Reichtümer des Heils* (1491).

No powerful artistic personality emerges from these works. As a painter, Wolgemut was a competent technician, adapting 15th-century early Netherlandish styles to local taste. His designs for woodcut extended the range of that medium but were rapidly surpassed by his most famous pupil, Albrecht Dürer.

Wolin, island off the northwestern coast of Poland, in Szczecin *województwo* (province). It is surrounded by the Baltic Sea on the north, the Dziwna River on the east, the Szczecinski Lagoon on the south, and the Świna River on the west. Its area is 95 square miles (245 square km). The main towns are Wolin in the south and Międzyzdroje in the north. The central area contains the Wolin National Park, which encompasses a coastal moraine.

Wolin, a town and *powiat* (county) capital, is situated on the Dziwna River. An ancient Slavic stronghold, the town is over 1,000 years old. In the 10th and 11th centuries it served as an important trade centre for the Oder River basin and was administered by Pomerania. The modern town was laid out in 1279. In 1630 it was seized by Sweden and passed to Prussia in 1730, becoming part of Poland in 1945. Pop. (1970) island, 17,763; (1988 est.) town, 4,413.

Consult the INDEX *first*

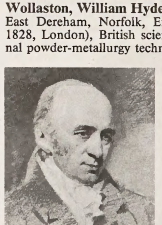
Wollaston, Lake, lake, northeastern Saskatchewan. It lies in the southern part of the Barren Grounds (a subarctic prairie region of northern Canada), 30 miles (50 km) northwest of Reindeer Lake. It is 70 miles (113 km) long and 25 miles (40 km) wide, has an area of 1,035 square miles (2,681 square km), and drains through two outlets: one northwestward through Fond du Lac River to Lake Athabasca and the Mackenzie River system, the other northeastward via Caochraine River to Reindeer Lake and the Churchill River system. Used as a link between the two river systems after it was discovered by Peter Fidler about 1800, Lake Wollaston was named (1821) by the explorer Sir John Franklin for William Hyde Wollaston, the English scientist. The lake is noted for its fishing.

Wollaston, William (b. March 26, 1659, Coton Clanford, Staffordshire, Eng.—d. Oct. 29, 1724, London), British Rationalist philosopher and moralist whose ethical doctrines influenced subsequent philosophy as well as that of his own time.

After studies at the University of Cambridge, Wollaston became a schoolteacher in Birmingham (1682) and soon afterward was ordained a priest. In 1688 he inherited the major part of his family's fortune from a cousin and was able to move to London to devote his life to scholarship and philosophy. There he and his wife lived a secluded life among a few friends; he wrote prolifically, but his exaggerated standards of taste caused him to destroy many of his manuscripts. His penchant for literary elegance is evident from his major work, *The Religion of Nature Delineated* (1724).

Though some critics have seen seeds of some 20th-century ethical theories in his views, his theism was subjected to severe attacks by the end of the 18th century, notably by David Hume in his *Dialogues Concerning Natural Religion* (1779).

Wollaston, William Hyde (b. Aug. 6, 1766, East Dereham, Norfolk, Eng.—d. Dec. 22, 1828, London), British scientist whose original powder-metallurgy techniques served as a



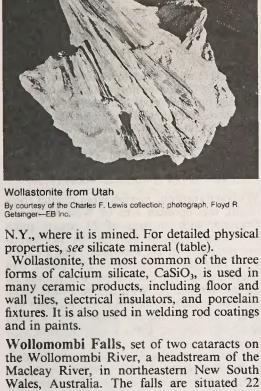
William Hyde Wollaston, detail of a pencil drawing by J. Jackson; in the National Portrait Gallery, London
By courtesy of the National Portrait Gallery, London

model for the modern industrial processing of platinum, tungsten, molybdenum, and other transition metals. His studies of platinum also resulted in his discovery of two related elements, palladium (1803) and rhodium (1804).

Though he was formally educated as a physician, his great curiosity led him into the study of chemistry, physics, astronomy, and botany. His work with platinum, completed in 1804, came at a time when large quantities of platina (crude platinum) remained unused for lack of an efficient method of obtaining the pure metal in the malleable form valuable in chemical research and manufacture. The success of his method, which he kept secret until shortly before his death, yielded him financial independence for the rest of his life.

The amount and variety of his research made Wollaston one of the most influential scientists of his time. Of his 56 papers in chemistry, mineralogy, crystallography, physics, astronomy, botany, physiology, and pathology, many represented notable scientific advances.

wollastonite, white, glassy silicate mineral that commonly occurs as masses or tabular crystals with other calcium-containing silicates (*e.g.,* diopside, tremolite, garnet, and epidote) in metamorphosed limestones. Deposits are found in Ciclova Romînă, Rom.; Monte Somma, Italy; and Pargas, Fin. Occurrences in the United States include Utah; Isle Royale, Mich.; Riverside, Calif.; and Essex county,



Wollastonite from Utah
By courtesy of the Charles F. Lewis collection; photograph Floyd R Getsinger—EB Inc.

N.Y., where it is mined. For detailed physical properties, *see* silicate mineral (table).

Wollastonite, the most common of the three forms of calcium silicate, $CaSiO_3$, is used in many ceramic products, including floor and wall tiles, electrical insulators, and porcelain fixtures. It is also used in welding rod coatings and in paints.

Wollombi Falls, set of two cataracts on the Wollombi River, a headstream of the Macleay River, in northeastern New South Wales, Australia. The falls are situated 22 miles (35 km) east of Armidale in the New England Range of the Eastern Highlands. The Wollombi Falls rank among the highest in the world, with an uninterrupted leap of 1,100 feet (335 m) and a total fall of 1,580 feet (480 m).

Wollongong, city, coastal New South Wales, Australia, in the Illawara district. The village of Wollongong (founded 1816) became a town in 1843, a municipality in 1859, and a city in 1942. It was amalgamated with other municipalities and shires in 1947 to form the City of Wollongong, which extends for 30 miles (48 km) along the coast and occupies 276 square miles (715 square km). Originally dependent upon grazing and lumbering, the area early became the focus of prosperous dairy farming.

Heavy industries have been increasingly attracted by the rich Bulli coal deposits; much of the coal is exported. Wollongong manufactures metallurgical products, including steel, refined copper, and brass as well as bricks, fertilizers, machinery, processed foods, chemicals, clothing, and coke. A fishing fleet operates from the artificial harbour of Port Kembla. Linked to Sydney (40 miles [64 km] north) by road and rail, it is the site of the University of Wollongong (until 1975, Wollongong College of the University of New South Wales) and a college of technical and further education. Pop. (1991 prelim.) 236,010.

Wollstein, Martha (b. Nov. 21, 1868, New York, N.Y., U.S.—d. Sept. 30, 1939, New York City), American physician and investigator in pediatric pathology.

Wollstein graduated from the Woman's Medical College of the New York Infirmary in 1889. In 1890 she joined the staff of the Babies Hospital in New York City, where she was appointed pathologist in 1892. Her first experimental work involved infant diarrhea and confirmed earlier studies relating the dysentery bacillus to the disease. Her study brought her to the attention of the Rockefeller Institute of Medical Research in New York City, where she collaborated on the first experimental work on polio in the United States. There she also worked on an early investigation of pneumonia and developed, with Harold Amoss, a method for preparing antimeningitis serum. She also pioneered in early research on mumps, indicating, though not proving, its viral nature.

After 1921 Wollstein investigated pediatric pathology at the Babies Hospital, especially jaundice, congenital anomalies, tuberculosis, meningitis, and leukemia. Her publications and reports during that period are considered her greatest contribution, for she deeply influenced the physicians affiliated with the hospital during her tenure there. Wollstein published 80 scientific papers during her lifetime.

Wollstonecraft, Mary, married name MARY WOLLSTONECRAFT GODWIN (b. April 27, 1759, London, Eng.—d. Sept. 10, 1797, London), English writer, noted as a passionate advocate of educational and social equality for women. Her early *Thoughts on the Education of Daughters* (1787) foreshadowed her mature work on woman's place in society, *A Vindication of the Rights of Woman* (1792); the core of the *Vindication* is educational, and its central plea is for the illumination of woman's mind.

Wollstonecraft worked for the London publisher James Johnson, but in 1792 she left England to observe the French Revolution in Paris, where she passed as the wife of an American, Captain Gilbert Imlay. In the spring of



Mary Wollstonecraft (Godwin), detail, oil on canvas by John Opie, *c.* 1797; in the National Portrait Gallery, London
National Portrait Gallery, London

1794 she gave birth to a daughter, Fanny. The following year, distraught over the breakdown of her relationship with Imlay, she attempted suicide.

She returned to London to work again for Johnson and became one of the influential radical group that centred upon his home and that included William Godwin, Thomas Paine, Thomas Holcroft, William Blake, and, after 1793, William Wordsworth. In 1796 she began a liaison with Godwin, and on March 29, 1797, Mary being pregnant, they were married. The marriage was happy but brief; Mary Wollstonecraft died 11 days after the birth of her second daughter, Mary (*see* Shelley, Mary Wollstonecraft).

The life of Mary Wollstonecraft has always been of interest to biographers, beginning with her husband. Biographies in the 19th century tended to emphasize the scandalous aspects of her life at the expense of the intellectual. With the renewed interest in women's rights in the later 20th century, she again became the subject of a number of books.

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Wolof, also spelled OUOLOF, a Muslim people of Senegal and The Gambia speaking a language of the West Atlantic branch of the Niger-Congo family.

The typical rural community is small (about 100 persons). Most Wolof are farmers, growing groundnuts (peanuts) as a cash crop and millet and sorghum as staples; many, however, live and work in Dakar and Banjul as traders, goldsmiths, tailors, carpenters, teachers, and civil servants. Traditional groups were characterized by a markedly hierarchical social stratification, including royalty, an aristocracy, a warrior class, commoners, slaves, and members of despised artisan castes; at their head was a paramount chief.

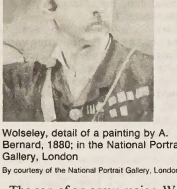
The Wolof traditionally observed double descent; *i.e.,* descent has been traced through both the male and female lines. Islamic influence, however, has tended to make the male line dominant. A household unit may consist of a nuclear family (husband, wife, and minor children) or a polygynous family (a husband, his several wives, and their children); other close kin may, however, sometimes be found together with the nuclear family. Wolof women are renowned for their elaborate hair styles, abundant gold ornaments, and voluminous dresses.

Wolof empire, also spelled OUOLOF (fl. 14th–16th century), state that dominated what is now inland Senegal during the early period of European contact with West Africa. Founded soon after 1200, the Wolof state was ruled by a king, or *burba,* whose duties were both political and religious. During the 14th century, it began to develop satellite states, of which the most important was Cayor. During the 15th century Wolof was a powerful empire, on the border of which lay the tributary state of Sine-Solum, ruled by the Serer, a kindred people to the Wolof.

With the advent of the Portuguese in about 1440, the Wolof were drawn first into a profitable trading partnership and then into a political alliance—though they remained sufficiently independent to repel Portugal's more blatant attempts at infiltration.

In 1556 the nobles of Cayor threw off Wolof domination and established an independent state of their own on the Senegal coast. This action cut off Wolof's access to the sea and to the European trade; its importance subsequently declined.

Wolseley (of Wolseley), Garnet Joseph Wolseley, 1st Viscount, BARON WOLSELEY OF CAIRO AND OF WOLSELEY (b. June 4, 1833, Golden Bridge, County Dublin, Ire.—d. March 26, 1913, Mentone, Fr.), British field marshal who saw service in battles throughout the world and was instrumental in modernizing the British army.



Wolseley, detail of a painting by A. Bernard, 1880; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

The son of an army major, Wolseley entered the army as second lieutenant in 1852 and fought with distinction in the Second Anglo-Burmese War, the Crimean War, and the Indian Mutiny. Surviving many wounds, which cost him the sight of one eye, Wolseley became at 25 the youngest lieutenant colonel in the British army. As a staff officer under Sir James Hope Grant, he sailed to China in 1860. His planning and deeds are described in his *Narrative of the War with China in 1860* (1862).

Late in 1861 the U.S. seizure of two Confederate agents on the British ship *Trent* created a temporary crisis. Wolseley was then sent to Canada to improve that colony's defenses in case of war with the United States. In 1870 he led the Red River expedition through 600 miles (950 km) of wilderness to suppress the rebel Louis Riel, who had proclaimed a republic in Manitoba. Success in the field and dedication to improvement of the service, as revealed in his *Soldier's Pocket-book for Field Service* (1869), led to his appointment (May 1871) as assistant adjutant general at the War Office.

A highly efficient commander with an admiring public, Wolseley was employed by successive governments as chief troubleshooter of the British Empire. In 1873 he was sent to West Africa to lead a punitive expedition against the Ashanti kingdom, resulting in the destruction of its capital at Kumasi. Two years later he was sent to Natal in southern Africa to induce the colonists to surrender some of their political rights to promote federation in South Africa. When calamity struck the British forces battling the Zulus in 1879, Wolseley was given command in South Africa. After restoring order in Zululand, he moved on to the Transvaal, where he discouraged rebellion among the Boers.

Returning to the War Office, first as quartermaster general (1880) and then as adjutant general (1882), he devoted himself to reform until interrupted by a nationalist uprising in Egypt under 'Urabi Pasha. In his most brilliant campaign, Wolseley swiftly seized the Suez Canal and, after a night march, surprised and defeated 'Urabi at Tall al-Kabīr (Sept. 13, 1882). Prime Minister William Gladstone rewarded him with a barony. Back in Egypt in 1884, he organized and headed an expedition to the Nile to rescue his friend General Charles "Chinese" Gordon, besieged at Khartoum in the Sudan. An advance party arrived on Jan. 28, 1885, two days after the city had fallen and Gordon had been killed. For his efforts, Wolseley was elevated to viscount. (The title devolved on his only daughter upon his death.)

After serving as commander of the troops in Ireland (1890–94), he became a field marshal and commander in chief of all Britain's forces (1895–1901). In that office his greatest contribution was in mobilizing the army with characteristic thoroughness for the South African War (1899–1902).

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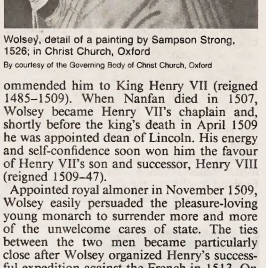
Wolsey, Thomas, Cardinal (b. *c.* 1475, Ipswich, Suffolk, Eng.—d. Nov. 29, 1530, Leicester, Leicestershire), cardinal and statesman who dominated the government of England's King Henry VIII from 1515 to 1529. His unpopularity contributed, upon his downfall, to the anticlerical reaction that was a factor in the English Reformation.

The son of a butcher of Ipswich, Wolsey was educated at the University of Oxford. In 1498 he was ordained a priest, and five years later he became chaplain to Sir Richard Nanfan, deputy lieutenant of Calais, who recommended him to King Henry VII (reigned 1485–1509). When Nanfan died in 1507, Wolsey became Henry VII's chaplain and, shortly before the king's death in April 1509 he was appointed dean of Lincoln. His energy and self-confidence soon won him the favour of Henry VII's son and successor, Henry VIII (reigned 1509–47).



Wolsey, detail of a painting by Sampson Strong, 1526; in Christ Church, Oxford

By courtesy of the Governing Body of Christ Church, Oxford

Appointed royal almoner in November 1509, Wolsey easily persuaded the pleasure-loving young monarch to surrender more and more of the unwelcome cares of state. The ties between the two men became particularly close after Wolsey organized Henry's successful expedition against the French in 1513. On Henry's recommendation Pope Leo X made him bishop of Lincoln (February 1514), archbishop of York (September 1514), and cardinal (1515). In December 1515 Wolsey became lord chancellor of England. Three years later the pope appointed him a special papal representative with the title legate *a latere*. Wolsey used his vast secular and ecclesiastical power to amass wealth second only to that of the king.

The first priority for both Wolsey and Henry was to make England the arbiter of power in Europe. At that time western Europe was split into two rival camps, with France, England's traditional enemy, on the one side and the Holy Roman Empire of the Habsburgs on the other. Wolsey attempted to make peace with France by promoting a European-wide peace treaty in 1518 and by arranging meetings between Henry and the French king Francis I and between Henry and the emperor Charles V in 1520. Nevertheless, war broke out between France and the Empire in 1521, and two years later Wolsey committed English troops against France. In order to finance this campaign Wolsey raised taxes, thereby arousing widespread resentment. In 1528 he sided with the French against Charles, but by August 1529 France and the emperor had made peace, and England was diplomatically isolated.

Although Wolsey had obtained his legatine commission with the intent of reforming the English church, his incessant diplomatic activities left him little time for ecclesiastical concerns. Besides, he was worldly, greedy for wealth, and unchaste—he had an illegitimate son and daughter. Nevertheless, he did at least propose some monastic reforms and even suppressed about 29 monasteries, mainly to obtain the revenues that he needed to found Cardinal's College (later Christ Church) at the University of Oxford.

Wolsey's influence on England's judicial institutions was far more substantial. Possessed of a great legal mind, he extended the jurisdiction of the Star Chamber—the King's Council sitting as a court—and used it to impose Henry's justice on lawless nobles. The conciliar committee that he delegated to hear suits involving the poor soon evolved into the Court of Requests (1529).

The immediate cause of Wolsey's fall from power was his failure to persuade Pope Clement VII to grant Henry an annulment of his marriage to Catherine of Aragon. There had long been a party of nobles who hated the lowborn, overbearing cardinal. When his final attempt to obtain the annulment collapsed in July 1529, these enemies easily turned the king against him. In October Wolsey was indicted on a *praemunire* charge of having overstepped his legatine authority. Stripped of all his offices and preferments except York, he left London for York in April 1530. Nevertheless, Henry was led to believe that he was conspiring to recover his position. Wolsey was arrested on November 4 on charges of treason (for corresponding with the French court), but he died at the end of the month while on his way south to face the king.

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Wolverhampton, metropolitan district (borough), metropolitan area of West Midlands, England, with an area of 27 square miles (69 square km). It lies on the northwestern perimeter of the industrial "Black Country," near the farmlands of Shropshire and Staffordshire. The early town was mainly an agricultural centre. With the development of the Staffordshire coal and ironstone deposits, Wolverhampton became known for its metal manufactures, especially from the 18th century.

A wide range of products is produced today, including paints and rubber tires, as well as the output of the metal foundries. The town centre has been transformed by the construction of two large traffic-free shopping precincts. Wolverhampton has many nonwhite immigrants from Commonwealth nations. Pop. (1987 est.) 250,500.

wolverine, also called GLUTTON, CARCAJOU, or SKUNK BEAR (species *Gulo gulo,* or sometimes *G. luscus* in North America), member of the weasel family (Mustelidae) that lives in cold northern latitudes, especially in timbered areas, around the world. It resembles a small, squat, broad bear 65–90 cm (26–36 inches) long, excluding the bushy, 13–26-centimetre tail; shoulder height is 36–45 cm, and weight is 9–30 kg (20–66 pounds). The legs are short, somewhat bowed; the soles, hairy; the semiretractile claws, long and sharp; the ears, short; and the teeth, strong. The coarse, long-haired coat is blackish brown with a light brown stripe extending from each side of the neck along the body to the base of the tail.



Wolverine (*Gulo gulo*)
Alan G. Nelson—Root Resources

The animal has anal glands that secrete an unpleasant-smelling fluid.

The wolverine is noted for its strength, cunning, fearlessness, and voracity. It may follow traplines to cabins and devour food stocks or carry off portable items; its offensive odour permeates the invaded cabin. The wolverine is a solitary, nocturnal hunter, preying on all manner of game and not hesitating to attack sheep, deer, or small bears. No animal except humans hunts the wolverine. Its fur is valued as trimming for parkas because frost and frozen breath can easily be brushed off the smooth hairs. Solitary during most of the year, the wolverine has a short courtship in February or March. A litter contains one to five young; the female's gestation period is about nine months.

Wolyń (Ukrainian region): *see* Volhynia.

woman suffrage, the right of women by law to vote in national and local elections.

Women were excluded from voting in ancient Greece and Republican Rome, as well as in those few democracies that had emerged in Europe by the end of the 18th century. And when the franchise was widened, as it was in the United Kingdom in 1832, women continued to be denied all voting rights. The question of women's voting rights finally became an issue in the 19th century, and the struggle was particularly intense in Great Britain and the United States; but these countries were not the first to grant women the right to vote, at least not on a national basis. By the early years of the 20th century, women had won the right to vote in national elections in New Zealand



British suffragette under arrest after participating in an attack on Buckingham Palace, London, in 1914
BBC Hulton Picture Library

(1893), Australia (1902), Finland (1906), and Norway (1913). In Sweden and the United States, they had voting rights in some local elections.

World War I and its aftermath speeded up the enfranchisement of women in the countries of Europe and elsewhere. In the period 1914–39, women in 28 additional countries acquired either equal voting rights with men or the right to vote in national elections. These countries included Soviet Russia (1917); Canada (1918); Germany, Austria, Poland, and Czechoslovakia (1919); the United States and Hungary (1920); Great Britain (1918 and 1928); Burma (now Myanmar; 1922); Ecuador (1929); South Africa (1930); Brazil, Uruguay, and Thailand (1932); Turkey and Cuba (1934); and the Philippines (1937). In a number of these countries, women were initially granted the right to vote in municipal or other local elections or perhaps in provincial elections; only later were they granted the vote in national elections.

Immediately after World War II, France, Italy, Romania, Yugoslavia, and China had been added to the group. Full suffrage for women was introduced in India by the constitution in 1949; in Pakistan women received full voting rights in national elections in 1956. In another decade the total had reached more than 100, partly because nearly all countries that gained independence after World War II guaranteed equal voting rights to men and women in their constitutions. By 1971

led the American suffragist movement for the next 50 years.

Other woman suffrage conventions were held as the movement gained its first mass strength, but at first no way of extending the vote to women was known except by amendments to the constitutions of the various states. Several attempts were made in this regard after the American Civil War (1861–65), but even though the Territory of Wyoming granted women the right to vote in all elections in 1869, it soon became apparent that an amendment of the federal Constitution would be a preferable plan. Accordingly, the National Woman Suffrage Association was formed in 1869 with the declared object of securing the ballot for women by an amendment to the Constitution. Anthony and Stanton were



International gathering of woman suffrage advocates in Washington, D.C., 1888; seated (left to right) Alice Scotchard (England), Susan B. Anthony (United States), Isabella Bogelot (France), Elizabeth Cady Stanton (United States), Matilda Joslyn Gage (United States), Baroness Alexandra Gripenberg (Finland)
By courtesy of the Library of Congress, Washington, D.C.

Switzerland allowed women to vote in federal and most cantonal elections, and in 1973 women were granted full voting rights in Syria. Women continue to be denied voting rights in the conservative Arab countries bordering the Persian Gulf. The United Nations Convention on the Political Rights of Women, adopted in 1952, provides that "women shall be entitled to vote in all elections on equal terms with men, without any discrimination."

Historically, the United States and the United Kingdom provide characteristic examples of the struggle for woman suffrage in the 19th and 20th centuries. From the founding of the United States, women were almost universally excluded from voting. The movement for woman suffrage started in the early 19th century during the agitation against slavery. Such women as Lucretia Mott showed a keen interest in the antislavery movement and proved to be admirable public speakers. When Elizabeth Cady Stanton joined the antislavery forces, she and Mott decided that the rights of women, as well as those of black slaves, needed redress. In July 1848 they issued a call for a convention to discuss the issue of women's rights; this convention met in Stanton's hometown, Seneca Falls, N.Y., on July 19–20, 1848, and issued a declaration that called for woman suffrage and for the right of women to educational and employment opportunities. (*See* Seneca Falls Convention.) It was followed in 1850 by the first national convention of the women's movement, held in Worcester, Mass., by Lucy Stone and a group of prominent Eastern suffragists. Another convention, this one held in Syracuse, N.Y., in 1852, was the occasion of the first joint venture between Stanton and the dynamic suffragist leader Susan B. Anthony; together these two figures the leaders of this organization, which held a convention every year for 50 years after its founding. In 1869 another organization, the American Woman Suffrage Association, was founded by Lucy Stone with the aim of securing woman suffrage by securing amendments to that effect in the constitutions of the various states. In 1890 the two organizations united under the name of the National American Woman Suffrage Association and worked together for almost 30 years.

When Wyoming entered the Union in 1890, it became the first state whose constitution accorded women the right to vote. Subsequently, vigorous campaigns were conducted to persuade state legislatures to submit to their voters amendments to state constitutions conferring full suffrage to women in state affairs. Efforts were also made to give women the right to vote in presidential elections and, in some states, the right to vote in municipal and local elections. In the next 25 years, various individual states yielded to the movement's demands and enfranchised their women; each such state increased the members of Congress elected partly by women. These members were thus at least partly obliged by the nature of their constituency to vote for a woman suffrage amendment to the United States Constitution. By 1918 women had acquired equal suffrage with men in 15 states.

World War I, and the major role played in it by women in various capacities, broke down the remaining opposition to woman suffrage in the United States. Amendments to the federal Constitution concerning woman suffrage had been introduced into Congress in 1878 and 1914, but the 1878 amendment had been overwhelmingly defeated, and the 1914 amendment had narrowly failed to gain even

a simple majority of the votes in the House of Representatives and the Senate (a two-thirds majority vote in Congress was needed for the amendment to be sent to the state legislatures for ratification). By 1918, however, both major political parties were committed to woman suffrage, and the amendment was carried by the necessary two-thirds majorities in both the House and Senate in January 1918 and June 1919, respectively. Vigorous campaigns were then waged to secure ratification of the amendment by two-thirds of the state legislatures, and on Aug. 18, 1920, Tennessee became the 36th state to ratify the amendment. On August 26 the 19th Amendment was proclaimed by the secretary of state as being part of the Constitution of the United States. Women in the United States were enfranchised on an equal basis with men.

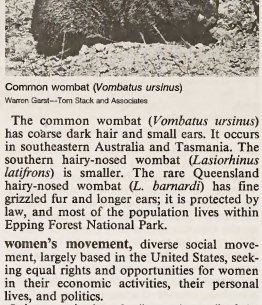
In Great Britain, woman suffrage was first advocated by Mary Wollstonecraft in her book *A Vindication of the Rights of Woman* (1792) and was demanded by the Chartist movement of the 1840s. The demand for woman suffrage was increasingly taken up by prominent liberal intellectuals in England from the 1850s on, notably by John Stuart Mill and his wife, Harriet. The first woman suffrage committee was formed in Manchester in 1865, and in 1867 Mill presented to Parliament this society's petition, which demanded the vote for women and contained about 1,550 signatures. The Reform Bill of 1867 contained no provision for woman suffrage, but meanwhile woman suffrage societies were forming in most of the major cities of Britain, and in the 1870s these organizations submitted to Parliament petitions demanding the franchise for women and containing a total of almost three million signatures.

The succeeding years saw the defeat of every major suffrage bill brought before Parliament. This was chiefly because neither of the leading politicians of the day, William Gladstone and Benjamin Disraeli, cared to affront Queen Victoria's implacable opposition to the women's movement. In 1869, however, Parliament did grant women taxpayers the right to vote in municipal elections, and in the ensuing decades women became eligible to sit on county and city councils. The right to vote in parliamentary elections was still denied to women, however, despite the considerable support that existed in Parliament for legislation to that effect. In 1897 the various suffragist societies united into one National Union of Women's Suffrage Societies, thus bringing a greater degree of coherence and organization to the movement. Out of frustration at the lack of governmental action, however, a segment of the woman suffrage movement became more militant under the leadership of Emmeline Pankhurst and her daughter Christabel. After the return to power of the Liberal Party in 1906, the succeeding years saw the defeat of seven suffrage bills in Parliament. As a consequence, many suffragists became involved in increasingly violent actions as time went on. These women militants, or suffragettes, as they were known, were sent to prison and continued their protests there by engaging in hunger strikes. Meanwhile, public support of the woman suffrage movement grew in volume, and public demonstrations, exhibitions, and processions were organized in support of women's right to vote. When World War I began, the woman suffrage organizations shifted their energies to aiding the war effort, and their effectiveness did much to win the public wholeheartedly to the suffragist cause. The need for the enfranchisement of women was finally recognized by most members of Parliament from all three major parties, and the resulting Representation of the People Act was passed by the House of Commons in June 1917 and by the House of Lords in February 1918. Under this act, all women aged 30 or over received the complete franchise. An act to enable women to sit in the House of Commons was enacted shortly afterward. In 1928 the voting age for women was lowered to 21 to place women voters on an equal footing with male voters.

womb (anatomy): *see* uterus.

wombat, any of three species of Australian marsupial mammals constituting the family Vombatidae. They are virtually tailless animals 70 to 120 cm (28 to 47 inches) long and of heavy, woodchucklike build. Unlike other marsupials, they have continuously growing, rootless teeth; the incisors are rodentlike. The eyes are small, and the ears are rather short. The pouch opens rearward. Wombats bear one young at a time, which develops in the pouch five months or longer.

Wombats are chiefly nocturnal and strictly herbivorous, eating grasses and the inner bark of tree and shrub roots. They make a grassy nest at the end of a large underground burrow, which may be 30 m (100 feet) long. Wombats are considered pests because they dig in cultivated fields and pastures and because their burrows harbour rabbits.



Common wombat (*Vombatus ursinus*)
Warren Garst—Tom Stack and Associates

The common wombat (*Vombatus ursinus*) has coarse dark hair and small ears. It occurs in southeastern Australia and Tasmania. The southern hairy-nosed wombat (*Lasiorhinus latifrons*) is smaller. The rare Queensland hairy-nosed wombat (*L. barnardi*) has fine grizzled fur and longer ears; it is protected by law, and most of the population lives within Epping Forest National Park.

women's movement, diverse social movement, largely based in the United States, seeking equal rights and opportunities for women in their economic activities, their personal lives, and politics.

It is recognized as the "second wave" of the larger feminist movement. While first-wave feminism of the 19th and early 20th centuries focused on women's legal rights, such as the right to vote, the second-wave feminism of the "women's movement" peaked in the 1960s and '70s and touched on every area of women's experience—including family, sexuality, and work.

Prologue to a social movement. In the aftermath of World War II, the lives of women in developed countries changed dramatically. Household technology eased the burdens of homemaking; life expectancies increased significantly; and the growth of the service sector opened up thousands of jobs not dependent on physical strength. Despite these socioeconomic transformations, cultural attitudes (especially concerning women's work) and legal precedents still reinforced sexual inequalities. A hint of the desire for change appeared in Simone de Beauvoir's *Le Deuxième Sexe* (1949; *The Second Sex*). It became a worldwide bestseller and raised feminist consciousness by stressing that liberation for women was liberation for men too.

The first public indication that change was imminent came with women's reaction to the 1963 publication of Betty Friedan's *The Feminine Mystique*. Friedan spoke of the problem that "lay buried, unspoken" in the minds of the suburban housewife: utter boredom and lack of fulfillment. Women who had been told that they had it all—nice houses, lovely children, responsible husbands—were deadened by domesticity, she said, and they were too socially conditioned to recognize their own desperation. *The Feminine Mystique* was an immediate best-seller. Friedan had struck a chord.

Reformers and revolutionaries. Initially, women energized by Friedan's book joined with government leaders and union representatives who had been lobbying the federal government for equal pay and for protection against employment discrimination. By June 1966 they had concluded that polite requests were insufficient. They would need their own national pressure group—a women's equivalent of the National Association for the Advancement of Colored People. With this, the National Organization for Women (NOW) was born.

The organization was not an instant success. By the end of its second year, NOW had just 1,035 members and was racked by ideological divisions. When the group tried to write a Bill of Rights for Women, it found consensus on six measures essential to ensuring women's equality: enforcement of laws banning employment discrimination; maternity leave rights; childcare centres that could enable mothers to work; tax deductions for child-care expenses; equal and unsegregated education; and equal job-training opportunities for poor women.

Two other measures stirred enormous controversy: one demanded immediate passage of the Equal Rights Amendment (ERA) to the U.S. Constitution (to ensure equality of rights, regardless of sex); the other demanded the liberalization of contraception and abortion. When NOW threw its support behind passage of the ERA, the United Auto Workers union—which had been providing NOW with office space—withdrew its support because the ERA would prohibit protective labour legislation for women. When some NOW members called for repeal of all abortion laws, other members left the fledgling organization, convinced that this latest action would undermine their struggles against economic and legal discrimination.

NOW's membership was also siphoned off from the left. Impatient with a top-heavy, traditional organization, activists in New York City, where half of NOW's membership was located, walked out. Over the next two years, as NOW struggled to establish itself as a national organization, more radical women's groups were formed by female antiwar, civil rights, and leftist activists who had grown disgusted by the New Left's refusal to address women's concerns. Ironically, sexist attitudes had pervaded 1960s radical politics, with some women being exploited or treated unequally within those movements. In 1964, for example, when a woman's resolution was brought up at a Student Nonviolent Coordination Committee (SNCC) conference, Stokely Carmichael flippantly cut off all debate: "The only position for women in SNCC is prone."

While NOW focused on issues of women's rights, the more radical groups pursued the broader themes of women's liberation. Although they lacked the kind of coherent national structure NOW had formed, the more radical women's liberation groups—as opposed to women's rights groups—sprang up in Chicago, Toronto, Seattle, Detroit, and elsewhere. Suddenly, the women's liberation movement was everywhere—and nowhere. It had no officers, no mailing address, no printed agenda. What it did have was attitude. In September 1968, activists converged on Atlantic City, New Jersey, to protest the image of

womanhood conveyed by the Miss America Pageant. In February 1969, one of the most radical feminist groups, the Redstockings, published its principles as "The Bitch Manifesto." Based in New York City, the Redstockings penned the movement's first analysis of the politics of housework, held the first public speak-out on abortion, and helped to develop the concept of "consciousness-raising" groups—rap sessions to unravel how sexism might have coloured their lives. The Redstockings also held speak-outs on rape to focus national attention on the problem of violence against women.

Responding to these diverse interests, NOW called the Congress to Unite Women, which drew more than 500 feminists to New York City in November 1969. The meeting was meant to establish common ground between the radical and moderate wings of the women's movement, but it was an impossible task. Well-dressed professionals convinced that women needed to reason with men could not unite with wild-haired radicals whose New Left experience had soured them on polite discourse with "the enemy." NOW's leadership seemed more comfortable lobbying politicians in Washington or corresponding with NASA about the exclusion of women from the astronaut program, while the young upstarts preferred disrupting legislative committee hearings. NOW leaders were looking for reform; the more radical women were plotting a revolution.

Successes and failures. Despite such dissension in its leadership and ranks, the women's movement achieved much in a short period of time. With the eventual backing of the Equal Employment Opportunity Commission (1965), women gained access to jobs in every corner of the U.S. economy, and employers with long histories of discrimination were required to provide timetables for increasing the number of women in their workforces. Divorce laws were liberalized; employers were barred from firing pregnant women; and women's studies programs were created in colleges and universities. Record numbers of women ran for—and started winning—political office. In 1972 Congress passed Title IX of the Higher Education Act, which prohibited discrimination on the basis of sex in any educational program receiving federal funds and thereby forced all-male schools to open their doors to women and athletic programs to sponsor and finance female sports teams. And in 1973, in its controversial ruling on *Roe* v. *Wade*, the United States Supreme Court legalized abortion.

Political movements, however, rarely last more than a decade, and the dwindling of the women's movement was hastened by NOW's singular focus on the passage of the Equal Rights Amendment. Led by women such as Bella Abzug, Betty Friedan, and Gloria Steinem, the ERA passed Congress in 1972. But its ratification by the states became a rallying point for the backlash against feminism. Antifeminists such as Phyllis Schlafly organized a crusade against the amendment, warning—correctly or not—that it would, among other things, invalidate state sodomy laws, outlaw single-sex bathrooms in public places, legalize same-sex marriage, and make taxpayer-funded abortion a constitutional right. Needing 38 states to ratify within 10 years of its passage by Congress, the amendment fell three states short.

The failure of the ERA was followed by the gradual demise of organized, often bellicose activity by masses of women in the United States. Moreover, there was a growing national sense that the core goals of the women's movement had been achieved. NOW continued to work for women's rights into the new millennium—to defend abortion rights (a cause made more prominent by the National Abortion Rights Action League) and sexual harassment laws, to promote full equality in the military (including combat duty), and to secure greater federal funding for child care and for programs to prevent violence against women. But despite NOW's growth, both in budget and in membership, its activism became fragmented and fraught with dissension.

On college campuses, feminists argued among themselves and against their colleagues over such questions as whether male professors involved in consensual relationships with female students were guilty of "sexual harassment." They debated the validity of women's studies as an academic major. The role of women in the armed forces became a point of contention as some hoisted the standard of equality while others protested that mothers should not be sent off to war.

By the 1990s a movement that was once defined by its radical pitch had taken on new tones—some of them conservative. The divide over abortion continued to alienate many women, such as the Feminists for Life, who believed fervently in women's rights but disagreed with the mainstream movement's position on abortion. That divide deepened when, in 1998, Norma McCorvey, the plaintiff in *Roe* v. *Wade*, declared her opposition to abortion on demand.

Eventually, a backlash cast doubt on many of the social and economic achievements fostered by the women's movement. Faced with increasing numbers of single mothers and older divorced women living in poverty, many Americans began to wonder whether no-fault divorce and the end of most alimony had, in fact, served women's best interests. With a growing number of young children spending their early years in institutional day care, debates erupted over whether women were abdicating their maternal responsibilities and whether federal policies that gave tax breaks to working mothers were encouraging a further deterioration of the family unit. Feminists were further targeted as the primary culprits behind the many by-products of the sexual revolution, from the increased rate of teen pregnancy to the spread of AIDS. Ironically, however, many of the purveyors of those opinions were women who had achieved prominent status—thanks to the gains of the women's movement. (E.C.B.)

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wondjina style (cave painting): *see* wandjina style.

wongar (mythology): *see* Dreaming, the.

Wonhyŏ Daisa, also called WONHYŎ (b. 617, Korea—d. 686, Korea), Buddhist priest who is considered the greatest of the ancient Korean religious teachers and one of the Ten Sages of the Ancient Korean Kingdom.

A renowned theoretician, Wonhyŏ was the first to systematize Korean Buddhism, bringing the various Buddhist doctrines into a unity that was sensible to both the philosophers and the common people. The comprehensibility of his doctrines is seen in the five commandments he formulated for the people to follow in order to achieve nirvana. These commandments are noteworthy not only for the systematic way in which they show how to achieve the final land of true peace, unity, and freedom but also for their common-sense approach to the everyday problems of achieving spiritual harmony.

Wonhyŏ's realization of the need to practice a life that maintained harmony between the ideal and the real is illustrated by an anecdote that tells how he, as a priest, assumed to be practicing asceticism, one night slept with a beautiful royal princess. Rather than chastise himself the next morning, he merely admitted that true spirituality was obtained not by pursuing unreal ends but by admitting the limitations of one's person. He is said to have led the people in dancing and singing in the streets to show how to lead this harmonized life of the present and the eternal.

His works had profound influence on Chinese and Japanese as well as on Korean Buddhists. Most famous among them are "A Commentary on the Awakening of Faith in the Mahāyāna," "A Commentary on the Avataṃsaka-sūtra," "A Study on the Diamond Samādhi Sūtra," and "The Meaning of Two Desires."

Woni (people): *see* Hani.

Wŏnju, city, Kangwŏn *do* (province), north-central South Korea. Historically, its location in the eroded basin of the T'aebaek Mountains on the South Han River has been militarily strategic. After the Korean War (1950–53), it developed as a military base. Wŏnju, a transportation junction, is connected with Seoul, Pusan, and Taegu by rail and road and is a market and processing centre for forest products from the nearby mountains. Most of the city's other industries are related to military use. Traditional lacquerware from the vicinity, made with inlaid mother-of-pearl, is famous. Pop. (1995) 237,460.

Wŏnsan, city, southeastern North Korea. Situated on the coast of the Sea of Japan (East Sea), about 80 miles (130 km) east of P'yŏngyang, it is protected by two promontories and 20 islands in the Yŏnghŭng Bay and has the best natural harbour along the east coast of Korea. During the Yi dynasty (1392–1910) it was a market, fishing, and warehousing centre under the name of Wŏnsanjin. It became a commercial port in



Sports centre and harbour at Wŏnsan, North Korea
Jean Mohr

1880. Rail lines were constructed to the southwest to Seoul in 1914, to northeastern cities in 1928, and west to P'yŏngyang in 1941.

After independence in 1945 the city's major economy shifted from trade to fishing and marine products. Its petroleum refineries and other facilities, damaged by bombing during the Korean War, have been rebuilt. Wŏnsan's industries include shipbuilding and railway, chemical, and textile manufacturing. Wŏnsan

has also become a cultural, educational, and medical centre. The beaches of Songdowŏn, Myŏngsan, and Simp'o-ri, on the eastern coast of the city, are known for bathing and recreation. Pop. (1987 est.) 274,000.

Wonthaggi, town, southern Victoria, Australia. It lies 5 miles (8 km) inland from the coast on Bass Strait. The explorer William Hovell discovered black-coal deposits at nearby Cape Paterson in 1826, but early attempts at mining were unsuccessful. Coal deposits at Wonthaggi were known by the 1850s, but development was delayed until 1909, when a labour strike in the Newcastle fields of New South Wales forced the Victorian railroads to turn to new sources of coal.

The town, whose name is derived from an Aboriginal term meaning "to drag," or "to pull along," was founded in 1910 and was made a borough and municipality in 1911. As the railroads are now diesel-powered, the Wonthaggi's coal reserves are no longer actively exploited. The town, however, manufactures blankets and medical supplies and is the service centre for the Bass Valley and Glen Alvie dairy districts. Connected to Melbourne (65 miles [105 km] northwest) by the Bass Highway, it is closely linked to the growing resort of Cape Paterson. Pop. (1991 prelim.) 6,446.

wood, hard, fibrous substance, technically known as xylem, that is the principal strengthening and water-conducting tissue found in the stems and roots of trees and shrubs.

A brief treatment of wood follows. For full treatment, *see* MACROPAEDIA: Forestry and Wood Production.

Wood is one of the most abundant and versatile natural materials on Earth, and unlike such resources as coal, ores, and petroleum, it is renewable. It has been utilized by man since the earliest days of human existence, first as a source of fuel and later for an enormous variety of uses. Despite the widespread use of metals and synthetics in modern society, the demand for such wood products as lumber, plywood, paper, and chemical derivatives of cellulose continues to increase annually.

The most widely used woods come from two groups of trees: the conifers, or softwoods, such as pine, spruce, or fir; and the broadleaves, or hardwoods, which include such trees as oak, walnut, and maple. Trees classified as hardwoods are not necessarily harder than softwoods: balsa, for example, is a hardwood but is one of the softest woods. Hardwoods and softwoods differ, rather, in their cellular form and structure. The cells of hardwoods consist of vessel members, fibres, and parenchyma; those of softwoods are tracheids and parenchyma.

The three basic parts of a tree—the bark, wood, and pith—can easily be seen in cross section; the fourth, the cambium, is a thin layer of living cells between the bark and the wood where tree growth takes place. The wood forms around the pith (the central core) in a series of concentric layers, called growth rings, which usually represent the yearly or seasonal cycle of growth. Each ring is composed of two parts: the inner part, called earlywood, or springwood, is lighter and softer and is produced in the spring; the outer part, called latewood, or summerwood, is added later in the growing season.

Another characteristic of wood evident in cross section is the distinction between heartwood and sapwood. Heartwood, the central portion, is darker in colour and composed of inactive cells that do not participate in the life processes of the tree. Sapwood, the lighter area surrounding the heartwood, contains cells that conduct water and dissolved minerals up to the leaves and store food after photosynthesis. The wood in most trees exhibits a radiating pattern from pith to bark, with rays varying in size from species to species; many softwoods also possess visible resin canals.

Other identifying physical characteristics of wood include colour, varying from the white of a holly tree to the red of a redwood or the black of an ebony; odour, especially noticeable in such trees as the cedar but indiscernible in others; texture, the uniformity of a wood's surface; and grain, the direction of the wood fibres.

Wood is also hygroscopic (moisture-absorbing) to varying degrees among different species. The water content in harvested wood causes shrinkage and swelling and affects weight, volume, density, hardness, strength, heat-producing capacity, and resistance to decay.

The mechanical properties of wood include strength, stiffness, relative lightness in weight, and flexibility. Different woods vary considerably in their degrees of strength, and the strength of an individual piece will change according to the direction in which a load is applied—a board, for example, is strongest along the grain (axially) but when subjected to bending is strongest perpendicular to the grain (transversely). Commercial producers evaluate these basic properties to determine the best use for a particular wood.

Two important steps in wood processing are drying and preservation. Wood is dried in the open air or in kilns in order to reduce shrinkage, swelling, and weight and to better prepare it for finishing. Wood must also be protected from deterioration and decay, which is caused by such agents as insects and fungi. Chemical preservatives, including oils and water-soluble salts, are most commonly used; the methods of application include spraying, brushing, and immersion.

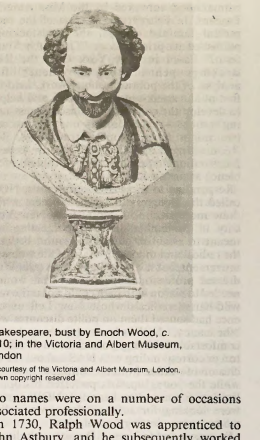
After a tree is felled, the wood is processed for roundwood products (such as poles and posts) or as sawnwood (sawed lumber). Logs for roundwood are ready for use after simply being debarked and treated with preservatives. Sawnwood is treated and cut at a sawmill and then transported to other manufacturing facilities to be fashioned into particular wood products. Some basic wood products include veneer, a thin layer sliced from a larger piece of wood; plywood, a laminated panel made of a wood core that is glued between layers of veneer; particleboard, a processed board or panel made by gluing chunks, shavings, and splinters of wood together; and fibreboard, a panel formed from wood-pulp fibres.

There are an estimated 10,000 different wood products commercially available, ranging from fine furniture to toothpicks. Wood and wood residues are also the basic materials used in the manufacture of many chemically derived products, including cellophane, charcoal, dyestuffs, explosives, lacquers, turpentine, and yeast.

Wood pulp is also the chief constituent used in the manufacture of paper and packaging materials. Pulp is produced by either mechanically grinding up wood, cooking it with chemicals, or pretreating it with chemicals and then reducing it mechanically. Finished products range in quality from fine stationery to newsprint and corrugated cardboard boxes.

Consult the INDEX *first*

Wood FAMILY, celebrated English family of Staffordshire potters, a major force in the development of Staffordshire wares from peasant pottery to an organized industry. The family's most prominent members were Ralph Wood (1715–72), the "miller of Burslem"; his brother Aaron (1717–85); and his son Ralph, Jr. (1748–95). Through his mother, Ralph, Jr., was related to Josiah Wedgwood, and the two names were on a number of occasions associated professionally.



Shakespeare, bust by Enoch Wood, *c.* 1810; in the Victoria and Albert Museum, London

By courtesy of the Victoria and Albert Museum, London. Crown copyright reserved

In 1730, Ralph Wood was apprenticed to John Astbury, and he subsequently worked with Thomas Whieldon at Fenton Low, there learning the manufacture of coloured glazes. He began producing his own salt-glazed wares in 1754 at Burslem, where he also practiced as a block cutter (*i.e.*, a carver of the original patrix from which the potters' working molds were taken). Aaron apprenticed with the Thomas Wedgwood, Jr., firm from 1731 to 1746, when he left to work with Whieldon. He opened his own pottery four years later.

By about 1760 Ralph Wood was making extremely well-modeled figures with coloured glazes. These started with a manganese-brown, to which he added greens, blues, and a greyish olive. Subjects were in great variety; the best is probably the equestrian "Hudibras" glazed in manganese and orange. The "Vicar and Moses," afterward repeated by his son and many other potters, appeared at this time and enjoyed great popularity. Of the animals, the stags are particularly well-known. Wood was among the first of English potters to impress his name on his wares, and he is credited with introducing the Toby jug, his first model of the kind being "Toby Philpot" about 1762.

Ralph, Jr., produced a number of figures, both from his father's molds and from new ones of a variety of subjects. His figures were coloured with enamels instead of glazes, and many of them were impressed with the mold number in the base. An extant invoice shows him supplying figures to Josiah Wedgwood in 1783. About this time or soon afterward, Wood appears to have employed Jean Voyez (*c.* 1740–after 1791), a modeler of French extraction who for a brief time had been employed by Wedgwood. Voyez probably modeled his "Fair Hebe" jug for Wood, and several models in the style of Paul-Louis Cyfflé of Lunéville may also be his.

Specimens made by the Woods, father and son, are sometimes impressed with a name, *R. WOOD* or *R. WOOD BURSLEM* being associated with the father and *Ra. Wood/Burslem* with the son, but this is uncertain.

For some years Ralph, Jr., was in partnership with his brother John (1746–97), but in 1787 John started his own pottery at Brownhills; 10 years later he was murdered by a rejected suitor for his daughter's hand. Ralph Wood III (1781–1801) continued the firm after his father's death.

William Wood (1746–1808), son of Aaron, was employed as a modeler by Wedgwood.

His brilliant younger brother, Enoch (1759–1840), apprenticed with Wedgwood for a time and later with Humphrey Palmer. By 1783 Enoch was established in Burslem as an independent potter in partnership with his cousin Ralph Wood, and in 1790 he entered a partnership with James Caldwell, when the style of the firm became Wood & Caldwell.

In 1818 Enoch Wood continued alone, under the style Enoch Wood & Sons. The firm made all the wares that were current in Staffordshire at the time, including black basaltes, jasper, and probably porcelain. Large quantities of blueprinted earthenware were produced, much of which was exported to the United States. Busts modeled by Enoch Wood himself are fairly numerous. The Wood factory closed in 1846.

Wood, Anthony, byname ANTHONY À WOOD (b. Dec. 17, 1632, Oxford, Oxfordshire, Eng.—d. Nov. 29, 1695, Oxford), English antiquarian whose life was devoted to collecting and publishing the history of Oxford and its university.

Wood's historical survey of the University of Oxford and its various colleges was published as *Historia et Antiquitates Universitatis Oxoniensis* (1674; *History and Antiquities of the University of Oxford*). His vast biographical dictionary of the writers and ecclesiastics



Anthony Wood, detail of a watercolour drawing by an unknown artist, 1677
By courtesy of the curators of the Bodleian Library, Oxford

who had been educated at Oxford appeared as *Athenae Oxonienses* (1691–92). Wood lived in Oxford as a near recluse close to Merton College, where he matriculated and in whose chapel he was buried.

A deaf, bitter, and suspicious man, Wood quarreled with his family, patrons, and the fellows of his college. His biographical sketches contain many spiteful criticisms of contemporaries. One such passage in the *Athenae Oxonienses* accused the 1st Earl of Clarendon of corruption, and it led to Wood's conviction of libel and his expulsion from the university. At his death he left his papers (including correspondence, an autobiography, and diaries) to Oxford's Ashmolean Library. The autobiography and diaries were edited by Andrew Clark as *The Life and Times of Anthony Wood* (1891–1900) and abridged by L. Powys (1932, 1961). Wood's *Survey of the Antiquities of the City of Oxford* was edited by Andrew Clark and published in 1889–99.

Wood, Evelyn, *née* NIELSEN (b. Jan. 9, 1909, Ogden, Utah, U.S.—d. Aug. 26, 1995, Tucson, Ariz.), American educator who developed a widely used system of high-speed reading.

The daughter of Mormon parents, she graduated from the University of Utah in 1929 and married Douglas Wood that same year. In the 1930s she helped her Mormon husband in his missionary activities and then began teaching in a Mormon high school in Utah. She received a master's degree from the University of Utah in 1947. While teaching remedial reading at various high schools in the 1950s, she began developing techniques to help slow readers read more quickly with increased comprehension. She undertook a systematic study of high-speed reading and its associated skills, and by 1958 she was teaching students at the University of Utah to read at speeds of several thousand words per minute. The key technique in her system, which she called Reading Dynamics, was the use of the hand as a pacer as the eyes followed its rapid zigzag motion down each page. In 1959 she opened the first Evelyn Wood Reading Dynamics Institute, in Washington, D.C., which was followed by many more such learning centres. Wood's system stressed overall improvements in reading efficiency, including comprehension and word retention, as well as large increases in reading speeds.

Wood, Fernando (b. June 14, 1812, Philadelphia, Pa., U.S.—d. Feb. 14, 1881, Hot Springs, Ark.), American congressional representative and mayor of New York City who led the Northern peace Democrats—or "Copperheads"—during the American Civil War.

Wood grew up in Philadelphia and New York City, acquiring considerable wealth as a merchant and real estate investor. He entered politics as a Democrat in 1834 and shortly thereafter emerged a leader of Tammany Hall. He served one term in Congress (1841–43), and he was defeated in his first run for mayor of New York City in 1850.

He triumphed in the 1854 mayoral election, however, and he was reelected in 1856 and 1859. Although upstate Republicans accused Wood of graft and Tammany Hall charged him with failing to award patronage to his own party, Wood did succeed in creating Central Park and making important reforms. When he lost the backing of Tammany Hall, Wood formed his own powerful political organization, Mozart Hall.

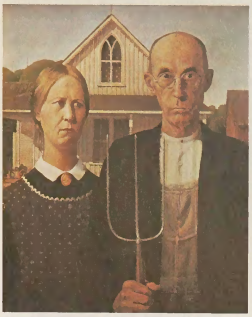
In 1860 Wood led a pro-Southern delegation to the Democratic National Convention, and as civil war loomed early in 1861, he called for New York City to secede and become a free city. Although he briefly supported President Abraham Lincoln and the Northern war effort, by 1863 he was organizing the peace Democrats (called "Copperheads" by Republicans) and demanding that the North negotiate an immediate end to the war.

Elected to Congress in 1862 and again from 1866 to 1880, Wood opposed Republican Reconstruction policies but generally supported Republican fiscal measures. His independence alienated fellow Democrats, and they refused to elect him speaker of the House, he called. But in 1877 Wood was elected majority floor leader and made chairman of the Ways and Means Committee. He served in the House of Representatives until his death.

Wood, Grant (b. Feb. 13, 1892, near Anamosa, Iowa, U.S.—d. Feb. 12, 1942, Iowa City, Iowa), American painter who was one of the major exponents of Midwestern Regionalism, a movement that flourished in the United States during the 1930s.

Wood was trained as a craftsman and designer as well as a painter. After spending a year (1923) at the Académie Julian in Paris, he returned to Cedar Rapids, Iowa, where in 1927 he was commissioned to do a stained-glass window. Knowing little about stained glass, he went to Germany to seek craftsmen to assist him. While there he was deeply influenced by the sharply detailed paintings of various German and Flemish masters of the 16th century. Wood subsequently abandoned his Impressionist style and began to paint in the sharply detailed, realistic manner by which he is now known.

A portrait of his mother in this style, "Woman with Plants" (1929), did not attract attention, but in 1930 his "American Gothic" caused a sensation when it was exhibited at the Art Institute of Chicago. The hard, cold realism of this painting and the honest, direct, earthy quality of its subject were unusual in American art. The work ostensibly portrays a farmer-preacher and his daughter in front of their farmhouse, but Wood actually used his sister, Nan, and his dentist, B.H. McKeeby,



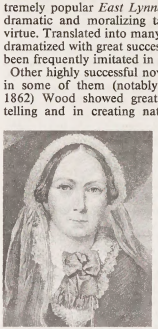
"American Gothic," oil painting by Grant Wood, 1930; in the Art Institute of Chicago
By courtesy of the Art Institute of Chicago, collection of the Friends of American Art

as models. As a telling portrait of the sober and hard-working rural dwellers of the Midwest, the painting has become one of the best-known icons of American art.

Wood became one of the leading figures of the Regionalist movement. Another well-known painting by him is "Daughters of Revolution" (1932), a satirical portrait of three unattractive old women who appear smugly satisfied with their American Revolutionary ancestry. In 1934 Wood was made assistant professor of fine arts at the University of Iowa, Iowa City. Among his other principal works are several paintings illustrating episodes from American history and a series of Midwestern rural landscapes that communicate a strong sense of American ambience by means of a skillful simplification of form.

Wood, Mrs. Henry, *née* ELLEN PRICE (b. Jan. 17, 1814, Worcester, Worcestershire, Eng.—d. Feb. 10, 1887, London), English novelist who wrote the sensational and extremely popular *East Lynne* (1861), a melodramatic and moralizing tale of the fall of virtue. Translated into many languages, it was dramatized with great success, and its plot has been frequently imitated in popular fiction.

Other highly successful novels followed, and in some of them (notably *The Channings*, 1862) Wood showed great ability in storytelling and in creating natural middle-class

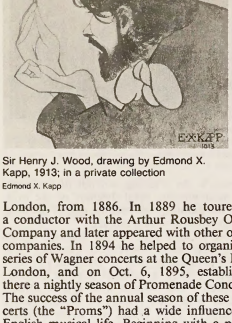


Mrs. Henry Wood, engraving by L. Stocks after a portrait by R. Easton
The Mansell Collection

characters and relationships. In 1867 she became proprietor and editor of *Argosy* magazine.

Wood, Sir Henry J(oseph), pseudonym PAUL KLENOVSKY (b. March 3, 1869, London —d. Aug. 19, 1944, Hitchin, Hertfordshire, Eng.), conductor, the principal figure in the popularization of orchestral music in England in his time.

Originally an organist, Wood studied composition at the Royal Academy of Music,



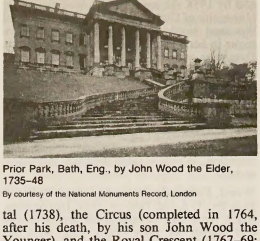
Sir Henry J. Wood, drawing by Edmond X. Kapp, 1913; in a private collection
Edmond X. Kapp

London, from 1886. In 1889 he toured as a conductor with the Arthur Rousbey Opera Company and later appeared with other opera companies. In 1894 he helped to organize a series of Wagner concerts at the Queen's Hall, London, and on Oct. 6, 1895, established there a nightly season of Promenade Concerts. The success of the annual season of these concerts (the "Proms") had a wide influence on English musical life. Beginning with a popular repertory, Wood systematically broadened the appeal of his concerts to include the entire range of 18th- and 19th-century orchestral music. Later he introduced the works of prominent contemporary figures, among them Richard Strauss, Debussy, and Schoenberg. The Promenade Concerts were managed from 1927 by the British Broadcasting Corporation and after the destruction of the Queen's Hall in World War II were transferred to the Royal Albert Hall. In 1898 Wood married the Russian singer Olga Urusova, who had been his pupil; after her death he married, in 1911, Muriel Greatorex.

He published a mass, songs, arrangements of works of Handel and Purcell, an orchestral arrangement of a toccata and fugue of J.S. Bach (which appeared under the pseudonym Paul Klenovsky), and the books *The Gentle Art of Singing*, 4 vol. (1927–28), *My Life of Music* (1938), and *About Conducting* (1945). Wood was knighted in 1911.

Wood, John, THE ELDER, byname WOOD OF BATH (b. *c.* 1704, Yorkshire?, Eng.—d. May 23, 1754, Bath, Somerset), English architect and town planner, a resident of Bath from 1727 who fixed the physical character of that resort city. Though some of his individual buildings were noteworthy exercises in Palladianism (a kind of 16th-century Italian Renaissance Classicism), he was most highly regarded for his planning of streets and groups of houses as visual units.

After helping to build the Cavendish-Harley housing estate in London, Wood designed his first important "townscapes" in Bath, the North and South Parades (1728). These were followed by Queen Square (1735), Prior Park (1735–48), the Royal Mineral Water Hospi-

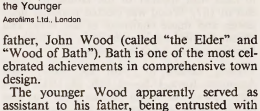


Prior Park, Bath, Eng., by John Wood the Elder, 1735–48
By courtesy of the National Monuments Record, London

tal (1738), the Circus (completed in 1764, after his death, by his son John Wood the Younger), and the Royal Crescent (1767–69; executed by the younger Wood from his father's design). Afterward a school, Prior Park was originally the residence of Ralph Allen, Wood's chief patron and the principal supplier of Bath building stone (an oolitic limestone).

Wood's major works outside Bath were the exchanges in Bristol (1740–43) and Liverpool (1748–55; with his son). His *Description of the Exchange at Bristol* (1745) was reprinted in 1969. Among his other projects were the Bath-Bristol Canal and the Llandaff cathedral (restoration, from 1735; now incorporated into Cardiff, Glamorgan).

Wood, John, THE YOUNGER (b. Feb. 25, 1728, Bath, Somerset, Eng.—d. June 18, 1782, Batheaston, Somerset), British architect whose work at Bath represents the culmination of the Palladian tradition initiated there by his



The Royal Crescent, Bath, designed by John Wood the Younger
Aerofilms Ltd., London

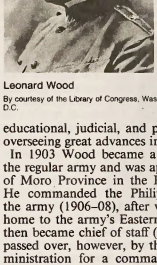
father, John Wood (called "the Elder" and "Wood of Bath"). Bath is one of the most celebrated achievements in comprehensive town design.

The younger Wood apparently served as assistant to his father, being entrusted with completion of the elder Wood's design for the Exchange, Liverpool (1748–55). Upon his father's death in 1754, Wood became Bath's principal architect. He completed the work on the Circus, after his father's design, and planned the Royal Crescent (1767–75), the latter being an enormous semicircle of 30 attached townhouses facing a broad park. The unified facade of the imposing structure conveys a palatial effect; it was the first such design in English town architecture and was widely imitated. A well-known individual structure by Wood at Bath is the Assembly Rooms (1769–71), which were partially destroyed by bombing in 1942 but later extensively reconstructed and restored.

Wood, Leonard (b. Oct. 9, 1860, Winchester, N.H., U.S.—d. Aug. 7, 1927, Boston), medical officer who became chief of staff of the U.S. Army and governor general of the Philippine Islands (1921–27).

A graduate of Harvard Medical School (1884), Wood began his military career the next year as a civilian contract surgeon with the U.S. Army in the Southwest, achieving the rank of captain and assistant surgeon by 1891. He was awarded a Medal of Honor for his service with the expedition against the Apache Indians who were resisting the capture of their leader, Geronimo (1886).

After the outbreak of the Spanish–American War (1898), Wood and his friend Theodore Roosevelt recruited the 1st U.S. Volunteer Cavalry (the famous "Rough Riders"), of which Wood was the commanding officer. Meritorious conduct at the battles of Las Guasimas and San Juan Hill, Cuba, brought him promotion to brigadier general. After the war he served as military governor of Cuba (1899–1902). He earned a notable reputation there as an administrator, establishing modern



Leonard Wood
By courtesy of the Library of Congress, Washington, D.C.

educational, judicial, and police systems and overseeing great advances in sanitation.

In 1903 Wood became a major general in the regular army and was appointed governor of Moro Province in the Philippine Islands. He commanded the Philippine division of the army (1906–08), after which he returned home to the army's Eastern Department and then became chief of staff (1910–14). He was passed over, however, by the Democratic administration for a command post either at home or abroad during World War I (1917–18). A strong advocate of preparedness, Wood was largely responsible for establishment of the summer camp at Plattsburg, N.Y., to give civilians officer training—a model for similar camps elsewhere.

Regarded by many as the political heir of Theodore Roosevelt, Wood became an active candidate for the Republican presidential nomination in 1920. Despite a large following, however, he lost to Warren G. Harding on the tenth ballot. The following year, President Harding—recognizing Wood's administrative talent and experience—appointed him to the Wood–Forbes Mission to the Philippines. The mission reported that a grant of immediate independence to the islands would be premature and urged the U.S. government not to be left in a position of responsibility without authority. Wood was then appointed governor general of the Philippines, a post he held until forced to resign by a terminal illness in 1927. An authoritative biography in two volumes was written by Hermann Hagedorn in 1931.

Wood, Matilda Alice Victoria (entertainer): *see* Lloyd, Marie.

Wood, Robert E(lkington) (b. June 13, 1879, Kansas City, Mo., U.S.—d. Nov. 6, 1969, Lake Forest, Ill.), U.S. business executive under whose leadership Sears, Roebuck and Co. grew to become the world's largest merchandising company.

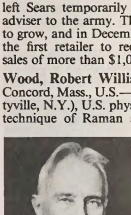
Wood, a graduate of the U.S. Military Academy in 1900, was sent in 1905 to the Panama Canal Zone and worked with Gen. George W. Goethals, then in charge of constructing the canal. After completion of the



Robert E. Wood
By courtesy of Sears, Roebuck and Co.

canal late in 1914, Wood resigned his army commission and entered private business in 1915. During World War I, he returned to the service as a lieutenant colonel with the Rainbow Division in France. In April 1918 he returned to the U.S., was promoted to brigadier general, and served briefly as acting quartermaster general. Leaving the army again in 1919 to enter private industry, Wood worked for five years with Montgomery Ward & Company. He then moved to Sears, Roebuck and Co., where he became president in 1928, chairman of the board in 1939, and continued as a director of the company after his retirement in 1954. Active in public affairs, Wood supported Pres. Franklin D. Roosevelt's New Deal policies in the early 1930s but denounced them toward the end of the decade as "disastrous." During the period immediately preceding entry of the U.S. into World War II, he headed the America First Committee, whose purpose was to keep the nation out of war. In December 1941 Wood left Sears temporarily to serve as a civilian adviser to the army. The company continued to grow, and in December 1967 Sears became the first retailer to record a single month's sales of more than $1,000,000,000.

Wood, Robert Williams (b. May 2, 1868, Concord, Mass., U.S.—d. Aug. 11, 1955, Amityville, N.Y.), U.S. physicist who extended the technique of Raman spectroscopy, a useful



Robert Williams Wood
By courtesy of the Johns Hopkins University, Baltimore

method of studying matter by analyzing the light scattered by it.

In 1897 Wood was the first to observe field emission, charged particles emitted from a conductor in an electric field. This electrical phenomenon is used in the field-emission microscope for studying atomic structure. From 1901 he was at Johns Hopkins University, Baltimore, Md., as professor and, later, research professor of experimental physics. In addition to his fundamental discoveries in physical optics, he introduced improvements in the ruling of closely spaced lines in diffraction gratings and in other spectrometric methods used in astronomical studies. Wood also made important contributions to the fields of supersonics and biophysics. His publications include *Physical Optics* (1905) and a book of nonsense verse, *How To Tell the Birds from the Flowers* (1907).

wood alcohol: *see* methyl alcohol.

wood-boring beetle: *see* long-horned beetle.

Wood Buffalo National Park, park in northern Alberta and southern Northwest Territories, Canada, between Athabasca and Great Slave lakes. It has an area of 17,300 sq mi (44,807 sq km) and was established in 1922. A vast region of forests and plains crossed by the Peace River, it has many lakes (including Lake Claire) and is the world's largest park. It is the habitat of the largest remaining herd of plains and wood buffalo (bison) on the North American continent, as well as of bears, caribou, moose, deer, and beavers. In the park are nesting grounds for the whooping crane, on the verge of extinction.

wood duck, also called WOODIE (*Aix sponsa*), small colourful North American perching duck (family Anatidae), a popular game bird. Once in danger of extinction from overhunting and habitat destruction, the species has been saved by diligent conservation efforts. Wood ducks nest in tree cavities up to 15 me-

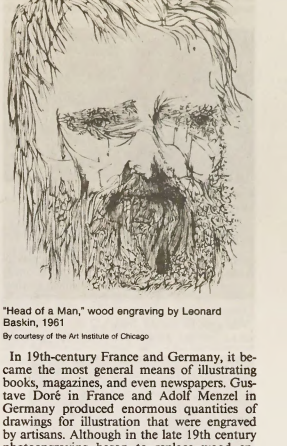


Drake wood duck (*Aix sponsa*)
Grant Heilman

tres (50 feet) off the ground. The construction of artificial nest boxes, placed atop poles over and about bodies of water, was instrumental in halting the decline of breeding populations.

The wood duck is about 43–52 centimetres (17–20.5 inches) long. Both male and female have a characteristic head crest (absent in eclipse—or summer—plumage). The crest of the male has two longitudinal white stripes. His purple and green head, red-brown breast flecked with white, and bronze sides are readily identifiable. The distinguishing feature of the female is a white eye-ring; her body is a sooty gray-brown, with white throat and white streaked breast. An average clutch contains about 12 eggs; the ducklings hatch in about 30 days, and the next day they follow the female from the nest, jumping as far as 15 m to the ground unharmed. The ducklings eat aquatic insects and other small organisms; adult woodies prefer acorns—or other nuts, depending on habit—to other foods.

wood engraving, a printmaking technique in which a print is made from a design incised on the transverse section, or end, of a hardwood block. The technique was developed in England in the last half of the 18th century, and its first master was the printmaker Thomas Bewick, whose illustrations for such natural history books as *A History of British Birds* (1797 and 1804) were the first extended use of the technique. After Bewick's death, however, wood engraving served merely as a method to reproduce other works of art. The English poet and artist William Blake (1757–1827) engraved his own designs on wood, but his work is an isolated example of original work done in the technique in his day.



"Head of a Man," wood engraving by Leonard Baskin, 1961
By courtesy of the Art Institute of Chicago

In 19th-century France and Germany, it became the most general means of illustrating books, magazines, and even newspapers. Gustave Doré in France and Adolf Menzel in Germany produced enormous quantities of drawings for illustration that were engraved by artisans. Although in the late 19th century photoengraving began to replace wood engraving for reproduction, the other technique survived and was used to great advantage in the mid-20th century by such artists as M.C. Escher, Leonard Baskin, and Misch Kohn.

wood fern: *see* shield fern.

Wood–Forbes Mission (1921), fact-finding commission sent to the Philippines by newly elected U.S. president Warren Harding in March 1921, which concluded that Filipinos were not yet ready for independence from the United States.

In 1913 Woodrow Wilson had appointed the liberal Francis B. Harrison as governor general of the Philippines. Harrison was convinced that the best method of preparing Filipinos for independence was to give them as wide a latitude as possible in managing their internal affairs. Passage of the Jones Act in 1916, which announced the U.S. intention of granting Philippine independence, encouraged Harrison in his policy of replacing Americans in the Philippine civil service with Filipinos.

Republicans in the United States argued that Harrison's policy of Filipinization was premature and that the takeover of jobs by Filipinos resulted only in a marked deterioration of services. To support this position, Harding sent out Gen. Leonard Wood and W. Cameron Forbes. The two reported in October 1921 that the islands were not prepared for independence and that many educated Filipinos wished to remain under American tutelage.

News of the Wood–Forbes report was received with anger in the Philippines. Wood, who served as governor general for the next six years, though an honest and efficient administrator, remained highly unpopular with Filipinos.

wood frog (*Rana sylvatica*), terrestrial frog (family Ranidae) found from the southeastern United States to Alaska. In the United States and parts of Canada the wood frog generally inhabits damp woodlands; in the north it frequents areas that, in spring, are supplied with water for breeding.

The wood frog can change from yellowish to

pink, brown, or blackish. A dark facial mask is present but not always immediately noticeable. Maximum length is approximately



Wood frogs (*Rana sylvatica*)
Karl H. Maslowski

8.25 cm (3.25 inches). The voice is a ducklike quack.

wood hoopoe, also called KAKELAAR, any of 6 species of tropical African birds of the family Phoeniculidae (order Coraciiformes). Sometimes they are placed in the hoopoe family, Upupidae.

Ranging in length from 22 to 38 cm (8.5 to 15 inches), all are predominately greenish



Wood hoopoe (*Phoeniculus purpureus*)
Anthony Mercieca from Root Resources—EB Inc.

or purplish black with long, graduated tails, sometimes tipped with white. The bill is slender, pointed, and slightly to strongly downcurved. The two species of *Rhinopomastus* are often called scimitarbills, or scimitar-billed hoopoes, from the shape of the bill.

wood louse, plural WOOD LICE, either of two related terrestrial crustaceans, the pill bug (*q.v.*) and the sow bug (*q.v.*).

wood mouse: *see* field mouse.

wood oil: *see* tung oil.

wood oil tree: *see* varnish tree.

wood owl, any of 11 species of birds of prey of the genus *Strix,* family Strigidae, characterized by a conspicuous facial disk but lacking ear tufts. Wood owls occur in woodlands and forests in the Americas, Europe, and Asia. The name wood owl is also applied to members of the genus *Ciccaba,* found in Africa and the



Barred owl (*Strix varia*)
Karl Maslowski

Americas. They eat insects, birds, and small mammals, primarily rodents and hares.

The barred owl (*Strix varia*) of eastern North America has an overall barred pattern in brown and white. It is about 40 to 50 cm (1.3 to 1.7 feet) long.

The great gray owl (*S. nebulosa*), of northern Europe, Asia, and North America, is among the largest owls, often more than 70 cm (2.3 feet) long. Much of its apparent size results from its plumage. It is gray to brownish, barred underneath, and heavily streaked.

The spotted owl (*S. occidentalis*), of western North America, spotted above and barred beneath, is about 40 to 50 cm long.

The tawny owl (*S. aluco*), of Europe, Asia, and Africa, is brown or tawny, spotted with white, and barred in dark brown.

wood pigeon (species *Columba palumbus*), bird of the subfamily Columbinae (in the pigeon family, Columbidae), found from the forested areas of Europe, North Africa, and western Asia east to the mountains of Sikkim state in India. It is about 40 cm (16 inches) long, grayish with a white collar and white bars on the wings. Mating is preceded by "courtship feeding" of the female by the male. They lay two eggs per clutch and may raise three broods a year. This large pigeon is a ground feeder, eating seeds, grains, and berries; it has been known to hold more than 60 acorns in its crop. It may be a pest in agricultural areas.

Some other members of the Columbinae are also called wood pigeons—*e.g.,* the speckled wood pigeon, ashy wood pigeon, purple wood pigeon, Japanese wood pigeon, and others, all *Columba* species. They are widely distributed in Southeast Asia and the Pacific.

wood rat, also called PACK RAT, or TRADE RAT (genus *Neotoma*), any of 22 species of



White-throated wood rat (*Neotoma albigula*)
G.C. Kelley—Photo Researchers, Inc.

North and Central American rodents, belonging to the family Cricetidae (order Rodentia), found from deserts and forests to high, rocky mountainsides. Wood rats are pale buff, gray, or reddish brown, usually with white undersides and feet. They have relatively large ears and, usually, hairy or bushy tails. They are 23 to 47 cm (9 to 18.5 inches) long, including the 8- to 24-centimetre (3- to 9-inch) tail.

Basically nocturnal and vegetarian, wood rats live in nests built of plant material, such as twigs or cactus. The nest, which may be more than 1 m (3 feet) across, is placed in a tree or on the ground at the base of a tree, rock ledge, or cactus. The nests of desert-dwelling wood rats, built in and of cactus, may present an impregnable barrier to predators.

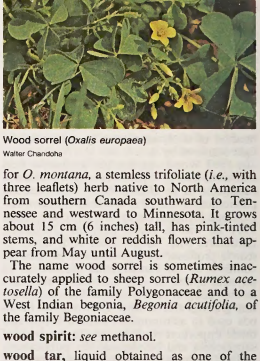
Wood rats are commonly called pack, or trade, rats because they collect various bits of material to deposit in their dens. They sometimes pick up shiny objects in camps and may at the same time leave something they were carrying, thus giving the impression that they are "trading" one item for the other.

Wood River, city, Madison county, southwestern Illinois, U.S., near the confluence of the Wood and Mississippi rivers. It was from the mouth of the Wood River that Meriwether Lewis and William Clark embarked on their trip to the Pacific Northwest (May 14, 1804).

Wood River was founded and incorporated as a village in 1908 with the establishment in the vicinity of a Standard Oil Company refinery. After joining with two other communities (East Wood River in 1911 and Benbow City in 1917), Wood River was chartered as a city in 1923.

Now part of the Wood River–East Alton industrial complex, its economy depends mainly on petroleum and the manufacture of tank cars, as well as stone, clay, and glass products. Pop. (1990) 11,490.

wood sorrel, any plant of the genus *Oxalis,* numbering several hundred species, within the family Oxalidaceae. The name is chiefly used



Wood sorrel (*Oxalis europaea*)
Walter Chandoha

for *O. montana,* a stemless trifoliate (*i.e.,* with three leaflets) herb native to North America from southern Canada southward to Tennessee and westward to Minnesota. It grows about 15 cm (6 inches) tall, has pink-tinted stems, and white or reddish flowers that appear from May until August.

The name wood sorrel is sometimes inaccurately applied to sheep sorrel (*Rumex acetosella*) of the family Polygonaceae and to a West Indian begonia, *Begonia acutifolia,* of the family Begoniaceae.

wood spirit: *see* methanol.

wood tar, liquid obtained as one of the products of the carbonization, or destructive distillation, of wood. There are two types: hardwood tars, derived from such woods as

oak and beech; and resinous tars, derived from pine wood, particularly from resinous stumps and roots. Crude wood tar may be used as fuel or for preserving rope and wood and for caulking. The tar may be fractionated to yield creosote, oils, and pitch.

Hardwood tars are obtained from pyroligneous acid, either as a deposit from the acid or as a residue from the distillation of the acid. Crude pyroligneous acid is the condensed, volatile product of wood distillation. Resinous wood tars differ from hardwood tar in containing the pleasant-smelling mixture of terpenes known as turpentine. Pine-wood tar, commonly called Stockholm, or Archangel, tar, is made extensively in the forests of Russia, Sweden, and Finland. It is the residue after the turpentine has been distilled, usually with the aid of steam. It is widely used in manufacturing tarred ropes and twine and in impregnating hemp fibre for oakum. In pharmacy, it has some slight use as a component of some ointments and antiseptics. Distillates of pine-wood tar, particularly the creosote fraction, are used in metallurgy in the froth flotation processes.

wood thrush (bird): *see* nightingale thrush.

wood turtle (*Clemmys insculpta*), long-tailed turtle of the family Emydidae, found from Nova Scotia through the eastern and central United States. The rough upper shell of the wood turtle is about 15–20 cm (6–8 inches) long and bears concentrically grooved pyramids on each of the large plates (scutes). The upper shell is brown, and the neck and legs are reddish.

The wood turtle is partly terrestrial. Although it is a capable swimmer, it often strays into meadows and woody regions to feed on soft vegetation and small invertebrates. It makes a satisfactory pet and was formerly marketed as food.

wood wasp, insect belonging to any of three families of the order Hymenoptera: Xiphydriidae, Orussidae (sometimes spelled Oryssidae), and Syntexidae. Orussidae are known as parasitic wood wasps; Syntexidae are known as cedar wood wasps.

Xiphydriids, found in Europe and North America, are about 20 to 25 mm (about 0.8 to 1 inch) long, cylindrical in shape, and blackish in colour. The larvae bore into the wood of dead or dying deciduous trees.

Parasitic wood wasps are relatively rare but are widely distributed over the world. In North America and Europe one genus, *Orussus,* occurs. Adults are black and about 8 mm (0.3 inch) in length; larvae are parasitic on wood-boring beetles (Buprestidae).

The cedar wood wasps, represented in North America by the species *Syntexis libocedrii,* are found in the Pacific coastal states. Adults are about 8 to 14 mm (0.3 to 0.5 inch) in length. The larva bores into the wood of the incense cedar (*Calocedrus decurrens*).

woodbine, any of many species of vines belonging to a number of flowering-plant families, especially the Virginia creeper (*q.v.; Parthenocissus quinquefolia*) of North America and a Eurasian species of honeysuckle (*q.v.; Lonicera periclymenum*).

Woodbridge, parish (town) in Suffolk Coastal district, county of Suffolk, England, at the head of the River Deben estuary. The community was originally a Saxon settlement near the site of the Sutton Hoo ship burial, which yielded one of England's greatest archaeological treasures. Woodbridge developed into a market town, and ships for the British Royal Navy were at one time built there. The town was also well known for rope and sail-cloth manufacture. Boatbuilding at Woodbridge is now restricted to the construction of pleasure craft. Horticulture is also carried on. Pop. (1981) 7,263.

Woodbridge, township, Middlesex county, New Jersey, U.S. It lies across the Arthur Kill (a narrow channel) that separates New Jersey from Staten Island and immediately north of Perth Amboy. Founded as a farming community in the 17th century, it now has heavy industries, including oil refining and plastic and chemical production. The community, settled in 1665 by Puritans from Massachusetts Bay and New Hampshire, was incorporated in 1669. It includes the industrial villages of Fords and Sewaren.

Woodbridge township is where the first cloverleaf highway interchange in the United States was constructed in 1929. Woodbridge State School for mentally retarded children was established in the township in 1965. Pop. (1990) 93,086.

Woodbury, Levi (b. Dec. 22, 1789, Francestown, N.H., U.S.—d. Sept. 4, 1851, Portsmouth, N.H.), American politician who was an associate justice of the Supreme Court from 1846 to 1851.

Woodbury graduated from Dartmouth College in 1809, and after studying law he was admitted to the bar in 1812. He thereafter served as an associate justice of the New Hampshire Superior Court (1817–23), was governor of New Hampshire (1823–25), and sat in the U.S. Senate from 1825 to 1831. He served as secretary of the Navy from 1831 to 1834 and was appointed secretary of the Treasury in 1834. In this post he assisted President Andrew Jackson in the latter's opposition to the rechartering of the Bank of the United States. During the Panic of 1837 Woodbury was able to maintain the credit of the federal government and benefited many state banks by doing so. He headed the Treasury until he left the Cabinet in 1841, upon which he was reelected to the Senate.

In 1845 President James K. Polk appointed him to the Supreme Court, and he was confirmed in January 1846. He served on the Court until his death. Woodbury had always been rather conservative for a New Englander, and on the Court he took a strictly constructed view of the Constitution. He was best known for his dissenting opinions, in which he frequently upheld the states' rights over those of the federal government.

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woodchuck, also called GROUNDHOG, or WHISTLE-PIG (*Marmota monax*), stout-bodied marmot of the family Sciuridae (order Rodentia). Woodchucks are black-footed, reddish-brown or brown animals, ranging from 42 to 51 cm (17 to 20 inches) in length, with 10- to 15-centimetre (4- to 6-inch) tails. They weigh between 2 and 6 kg (4 and 14 pounds). Found from the eastern and central United States northward across Canada and into Alaska, woodchucks are animals of open fields and woodland edges, where they feed mainly on low green vegetation. They are mainly terrestrial but are good swimmers and climbers. They feed heavily in summer, storing fat to see them through their winter hibernation. They are also excellent diggers, constructing a burrow with a main entrance and an escape tunnel. Woodchucks are solitary except during the spring, when litters of four to five young are born. The young stay with the mother for about two months.

Woodchucks are sometimes destructive to gardens and pasture lands. They are edible, and their abandoned burrows provide shelter for rabbits, foxes, and other small animals. According to popular legend in the United States, the groundhog emerges from hibernation each year on February 2, designated as Groundhog Day, and the duration of winter may be foretold from that day's conditions: the presence of the groundhog's shadow warns of continued cold weather, while its absence signals an early spring.

woodcock, any of five species of squat-bodied, long-billed birds of damp, dense woodlands, allied to the snipes in the waterbird family Scolopacidae (order Charadriiformes). The



Eurasian woodcock (*Scolopax rusticola*)
D. Middleton—Bruce Coleman Inc./EB Inc

woodcock is a startling game bird: crouched among dead leaves, well camouflaged by its buffy-brown, mottled plumage, a woodcock remains motionless until almost stepped upon and then takes off in an explosive movement. With its eyes set farther back on the head than those of any other bird, a woodcock has a 360° field of vision. The ear opening is located below, rather than behind, the eye socket.

A solitary bird that is most active at dusk, the woodcock lives chiefly on earthworms; it attracts the worms to the suface by drumming with its feet and then extracts them from the ground with its long, sensitive bill, which opens at the tip like a forceps. This feeding habit makes it necessary for woodcocks to migrate; they leave an area as soon as the ground starts to freeze. A single bird may eat twice its weight, or about 450 g (1 pound), in worms per day.

Woodcock nest in early spring. The female alone incubates the clutch of about four eggs, laid in a leaf nest, often at the foot of a tree. If alarmed, the female may fly off, carrying a chick between her legs. The young reach full size within a month.

The female American woodcock (*Scolopax, or Philohela, minor*) is about 28 cm (11 inches) long, including the bill. Her mate is slightly smaller. The wings are very rounded, and the outermost wing feathers are attenuated to produce vibratory sounds during flight, apparently at will. The male's aerial song, a sweet and varied whistling, accompanies his courtship display—a spiraling flight upward to 60–90 m (200–300 feet) followed by a fluttering drop back to the starting point. The display takes place at dusk, and the soaring and dropping sequence may be performed repeatedly for a period of 30 minutes. The American woodcock breeds in temperate North America, and it winters in the southeastern United States.

The Eurasian woodcock (*Scolopax rusticola*) breeds in the temperate Old World from Great Britain to Japan; occasional migrants wander to the eastern United States. Its colouring differs from that of the American woodcock in that the pale underparts of the European species are barred with brown. Both sexes are approximately the same in size, about 35 cm long. In the courtship display, known as roding, the male utters croaking sounds as he flies

low over the treetops, following a triangular path.

Other woodcocks are found in India and the East Indies.

Woodcock, George (b. Oct. 20, 1904, Bamber Bridge, Lancashire, Eng.—d. Oct. 30, 1979, Epsom, Surrey), English labour leader who was general secretary of the Trades Union Congress (TUC) from 1960 to 1969.

A weaver at the age of 12, Woodcock won a scholarship to Ruskin College in 1929 and then received high honours in philosophy and political economy at Oxford in 1933. He joined the TUC staff in 1936, becoming assistant general secretary in 1947 and general secretary in 1960. In 1969 he resigned to become chairman of a new Commission on Industrial Relations and held that post until 1971.

Woodcock was known as an adroit administrator and conciliator who fought to make the TUC more of a partner of government and industry in solving national economic ills. He was successful in convincing English unions to accept wage restraints and higher productivity standards. Woodcock was made a Commander of the British Empire in 1953 and appointed a Privy Councillor in 1967.

Woodcock, George (b. May 8, 1912, Winnipeg, Man., Can.—d. Jan. 28, 1995, Vancouver, B.C.), Canadian poet, critic, historian, travel writer, playwright, scriptwriter, and editor, whose work, particularly his poetry, reflects his belief that revolutionary changes would take place in society.

Woodcock's family returned to England soon after he was born. Too poor to attend university, he worked as a farmer, railway administrator, and freelance writer. In the 1940s he founded and edited the radical literary magazine *Now* and also worked for the anarchist publisher Freedom Press. He and his wife moved to Canada in 1949. Woodcock then taught at the University of Washington, Seattle (1954–55), and at the University of British Columbia, Vancouver, where he became an associate professor. He stopped teaching in 1963 to concentrate on writing and editing.

Woodcock published more than 100 books. His poetry, particularly that published before World War II, expressed his anarchistic, rather than communistic, expectation of revolutionary changes in society. His poetry includes *The White Island* (1940), *Notes on Visitations* (1975), and *Collected Poems* (1983). Among his travel books are *To the City of the Dead* (1957), *Faces of India* (1964), and *Caves in the Desert* (1988). *Anarchism: A History of Libertarian Ideas and Movements* appeared in 1962. Woodcock also wrote innumerable essays on Canadian literature, many for the quarterly *Canadian Literature,* which he helped found in 1959 and edited until 1977. He published biographies of his friend George Orwell (1966), Mordecai Richler (1970), Herbert Read (1972), and others, as well as two volumes of autobiography: *Letter to the Past* (1982) and *Beyond the Blue Mountains* (1987).

woodcreeper, also called WOODHEWER, any of about 48 species of tropical American birds comprising the subfamily Dendrocolaptinae, family Furnariidae, order Passeriformes. Some authorities classify the birds as a separate family Dendrocolaptidae. Woodcreepers work their way up the trunks of trees, probing the bark and leaves in search of insects; some species also feed on the ground. Most are 20–38 cm (8–15 inches) long (some smaller) and have brownish body plumage with pale streaks or bars on head and underparts; the wings and tail usually are reddish brown. In most species the laterally compressed bill is stout and moderately long; in a few it is downcurved or else wedge-shaped. The tail feathers



Ivory-billed woodcreeper (*Xiphorhynchus flavigaster*)
Painting by H. Jon Jaroslik

are broad and stiff and serve as a prop in climbing. Flight from tree to tree is undulating.

Woodcreepers are solitary birds of forests, where they are detected by voice; some repeatedly utter harsh or sad notes and others trill. Their reproductive habits are little known, except that some species make nests of plant materials in tree cavities.

A typical form is the barred woodcreeper (*Dendrocolaptes certhia*), of southern Mexico to northern Brazil; it is 28 cm long, is heavy-billed, and has scalloped, black markings. *Xiphorhynchus* woodcreepers, such as the ivory-billed woodcreeper (*X. flavigaster*) of Central America, are among the more prominently streaked woodcreepers. Like others of its genus, the plain-brown woodcreeper (*Dendrocincla fuliginosa*), of Honduras to northeastern Argentina, often follows marching ant columns, eating the insects and other creatures routed out by the ants. *See also* scythebill.

woodcut, technique of printing designs from planks of wood incised parallel to the vertical axis of the wood's grain. It is one of the oldest methods of making prints from a relief surface, having been used in China to decorate textiles since the 5th century AD. In Europe, printing from wood blocks on textiles was known from the early 14th century, but it had little development until paper began to be manufactured in France and Germany at the end of the 14th century. Cuts with heavy outline and little shading, as the "Christ Before Herod" (British Museum), may date from



"The Kiss," coloured woodcut by Edvard Munch, 1902
By courtesy of the Victoria and Albert Museum, London; photograph, John Webb

1400, while the earliest dated print of German origin is the Buxheim St. Christopher of 1423. In Bavaria, Austria, and Bohemia, religious images and playing cards were first made from wood blocks in the early 15th century, and the development of printing from movable type led to widespread use of woodcut illustrations in the Netherlands and in Italy. With the 16th century, black-line woodcut reached its greatest perfection with Albrecht Dürer and his followers Lucas Cranach and Hans Holbein.

The woodcut process was widely used for popular illustrations in the 17th century, but no major artist employed it. In the early 19th century, it was replaced by wood engraving (*q.v.*), which reproduced paintings and sculpture more easily and accurately than did woodcuts. With the mid-19th-century development of photoengraving, however, wood engraving lost its popularity. About that time, artists rediscovered the expressive potential of woodcuts. Instead of the fine-grained hardwoods traditionally used in woodcuts, the Norwegian artist Edvard Munch began to incorporate the grain of softwood into his designs, and the French painter Paul Gauguin achieved new tones and textures by treating the wood surface with sandpaper. Woodcut became an important medium to the German Expressionists, who, inspired by the vitality of medieval woodcuts, gouged and roughly hewed the wood to achieve a brutal effect. In the United States, woodcuts gained importance in the 1920s and '30s through the illustrations of Rockwell Kent and artists working in the Work Projects Administration. Misch Kohn, Leonard Baskin, and Carol Summers further developed the woodcut medium in the United States after World War II.

Woodcuts also play an important role in the history of Japanese art. During the 17th century, a style of genre art called ukiyo-e (*q.v.*) gained prominence in Japan. Woodcuts served as a convenient and practical way of filling the large demand for inexpensive ukiyo-e pictures. The creation of the ukiyo-e woodcut is attributed to Hishikawa Moronobu (*c.* 1618–*c.* 1694), whose designs for illustrations of popular literature were immediately successful. A special branch of ukiyo-e was the making of miniature prints, called *suri-mono,* to commemorate special occasions. They usually carried a poem and were made on special paper decorated with gold or silver dust. In the 18th century, ukiyo-e culminated in the landscape prints of Hokusai and Hiroshige. Many ukiyo-e woodcuts found their way to the West in the late 19th century and influenced avant-garde artists. In the 20th century the technique was revived by such Japanese *hanga* masters as Munakata Shiko, Hiratsuka Un'ichi, Maekawa Sempan, and Onchi Kōshirō.

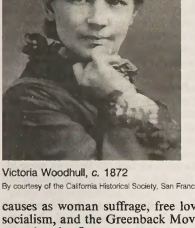
Wooden, John, in full JOHN ROBERT WOODEN (b. Oct. 14, 1910, Hall, Ind., U.S.), American basketball coach who directed teams of the University of California at Los Angeles (UCLA) to 10 National Collegiate Athletic Association championships in 12 seasons (1964–65, 1967–73, 1975). Several of his UCLA players became professional basketball stars, notably Lew Alcindor (afterward Kareem Abdul-Jabbar) and Gail Goodrich.

At Purdue University, West Lafayette, Ind., Wooden, a guard, gained All-America honours as a basketball player for three seasons (1930–32) and won a Western Conference (Big Ten) medal for athletic and scholastic excellence. He coached high school basketball in Kentucky and Indiana before entering the U.S. Navy in 1943. After World War II, in which he served as a physical education instructor, he was head basketball coach and athletic director at Indiana State Teachers' College (now Indiana State University), Terre Haute, from 1946 to 1948. He was appointed head coach at UCLA in 1948 and retired in 1975 with a record of 620 wins and 147 losses

for an .808 percentage. His 40-year record was 885 wins and 203 losses, a percentage of .813. He is the only person named in the Basketball Hall of Fame, in Springfield, Mass., as both a player and a coach. The John Wooden award annually honours the nation's outstanding player in a media poll conducted by the Los Angeles Athletic Club.

woodhewer (bird): *see* woodcreeper.

Woodhull, Victoria, *née* CLAFLIN (b. Sept. 23, 1838, Homer, Ohio, U.S.—d. June 10, 1927, Norton Park, Bremons, Worcestershire, Eng.), unconventional American reformer who at various times championed such diverse



Victoria Woodhull, c. 1872
By courtesy of the California Historical Society, San Francisco

causes as woman suffrage, free love, mystical socialism, and the Greenback Movement. She was also the first woman ever to run for the U.S. presidency (1872).

Reared in an atmosphere of spiritualism, Victoria and her sister Tennessee traveled in a family medicine and fortune-telling show, offering psychic and other remedies to the public. Even after her marriage to Canning Woodhull at the age of 15, she continued to give demonstrations in clairvoyance with her sister. After divorcing Woodhull in 1864, she was said to have been married to Colonel James H. Blood, who introduced her to a number of 19th-century reform movements.

In 1868 the entire family moved to New York City, where the two sisters gained the favour of Cornelius Vanderbilt, the railroad promoter, through their mutual interest in spiritualism. With Vanderbilt's support and guidance, they established a successful stock-brokerage firm, Woodhull, Claflin, & Co. Woodhull was also influenced by Stephen Pearl Andrews, an aberrant philosopher who involved her in his socialist group called "Pantarchy"—a theory rejecting conventional marriage and advocating a perfect state of free love combined with communal management of children and property. She espoused Andrews' views in a series of articles collected as *Origin, Tendencies and Principles of Government* (1871).

In 1870 the sisters began to publish *Woodhull and Claflin's Weekly,* advocating among other things equal rights for women and a single standard of morality for both sexes. At first Woodhull's advocacy of free love made her suspect by leaders of the woman suffrage movement, but she won their support after pleading for woman suffrage before the Judiciary Committee of the U.S. House of Representatives. When a dissident group called the National Radical Reformers broke away from the National Woman Suffrage Association in 1872, Woodhull—by now an accomplished public speaker—was nominated for the presidency by the Equal Rights Party.

Theodore Tilton, a prominent sympathizer in the woman suffrage movement, became interested in Woodhull, and, as a result of their relationship, the widely rumoured charges of a love affair between Henry Ward Beecher and Tilton's wife were first printed in the sisters' weekly (Nov. 2, 1872), creating a national scandal. The sisters claimed that it proved the need for a single standard of morality. They were indicted for sending improper material through the mails but were acquitted the following year. In 1872 they published in their weekly the first English translation of Karl Marx and Friedrich Engels' *Communist Manifesto.*

Woodhull divorced Blood in 1876, and when Vanderbilt died, in the following year, the sisters went to England—the trip apparently financed by the Vanderbilt heirs to prevent a challenge to the will. In London a lecture by Woodhull charmed a wealthy English banker, John Biddulph Martin, who proposed to her. Objections by his family, however, prevented their marriage until 1883. (Two years later Tennessee Claflin married Francis Cook, an English merchant and art collector, and she later became Lady Cook.) Both sisters became widely known for their philanthropy and were largely accepted in high British social circles. With the help of her daughter, Zula Maud Woodhull, Victoria Woodhull published *Humanitarian* (1892–1910), a journal emphasizing eugenics. She also became an early patron of aviation, offering a prize of $5,000 in 1914 for the first transatlantic flight.

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Woodland, city, seat (1862) of Yolo county, central California, U.S., in the Sacramento Valley. Founded in 1853 by Henry Wyckoff, it was first known as Yolo City; the present name, suggested by its location in a grove of oak trees, was adopted in 1859 when the first post office was opened.

Woodland is a trading, shipping, and processing centre for a large agricultural area producing beet sugar, vegetables, fruit, rice, and olive oil. Light manufactures include plastics, mobile homes, and farm machinery. Inc. 1874. Pop. (1990) 39,802.

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Woodland cultures, prehistoric cultures of eastern North America dating from the 1st millennium BC. A variant of the Woodland tradition was found on the Great Plains. Over most of this area these cultures were replaced by the Mississippian culture (*q.v.*) in the 1st millennium AD, but in some regions they survived until historic times.

The Woodland cultures were characterized by the raising of corn (maize), beans, and squash, the fashioning of particular styles of pottery, and the building of burial mounds.

woodpecker, any of about 180 species of birds that constitute the subfamily Picinae (true woodpeckers) of the family Picidae (order Piciformes), noted for probing for insects in tree bark and for chiseling nest holes in dead wood. Woodpeckers occur nearly worldwide, except in the region of Australia and New Guinea, but are most abundant in South America and Southeast Asia. Most woodpeckers are resident, but a few temperate-zone forms, such as the North American yellow-bellied sapsucker (*Sphyrapicus varius*) and the flicker (*Colaptes*), are migratory.

Most woodpeckers spend their entire lives in trees, spiraling up the trunks in search of insects; only the few ground-feeding forms are capable of perching on horizontal branches, as passerine birds do. Most woodpeckers eat insects, but some (especially *Melanerpes*) feed on fruits and berries, and sapsuckers regularly feed on sap from certain trees in some seasons. In spring the loud calls of woodpeckers, often augmented by drumming on hollow wood or occasionally on metal, are the sounds of males holding territories; at other seasons woodpeckers are usually silent. Most are not social, tending rather to be solitary or to travel in pairs.



Downy woodpecker (*Dendrocopos pubescens*)
Kenneth and Brenda Formanek

The acorn woodpecker (species *Melanerpes formicivorus*) is about 20 cm (8 inches) long and is found from the deciduous woodlands of western North America south to Colombia. The red-headed woodpecker (*M. erythrocephalus*) is roughly the same size (19–23 cm [7.5–9 inches]) as the acorn woodpecker, but it is sparsely distributed in open woodlands, farmland, and orchards of temperate North America east of the Rocky Mountains.

Well-known species of *Dendrocopus* include the downy woodpecker (*Dendrocopos pubescens*), only about 15 cm (6 inches) long and inhabiting the woodlands and gardens of temperate North America; the great spotted woodpecker (*Dendrocopos major*), about 23 cm (9 inches) long and found from the forests and gardens of west temperate Eurasia, south to North Africa; and the hairy woodpecker (*Dendrocopos villosus*), which is 20–25 cm (8–9.8 inches) long and found in temperate North America.

Dryocopus includes two well-known species, the black woodpecker (*Dryocopus martius*), which is some 46 cm (18 inches) long and is found in coniferous and beech woodlands of temperate Eurasia; and the pileated woodpecker (*Dryocopus pileatus*), which is some 40–47 cm (15.5–18.25 inches) in size and inhabits mature forests of much of temperate North America.

Two species make up the genus *Picoides,* three-toed woodpeckers—the northern three-toe (*P. tridactylus*), which ranges across subarctic Northern Hemisphere, south in some mountains; and the black-backed three-toe (*P. arcticus*), found across forested central Canada.

The crimson-backed woodpecker (*Chrysocolaptes lucidus*) is common in open woodlands from India to the Philippine Islands. The green woodpecker (*Picus viridis*) ranges throughout the woodlands of temperate Eurasia and south to North Africa. The deciduous forests of the southeastern United States are the habitat of the red-bellied woodpecker (*Centurus carolinus*). *See also* ivory-billed woodpecker.

woodpecker finch, species of Galápagos finch (*q.v.*).

woodruff, any of various species of plants of a genus (*Asperula*) belonging to the madder family, Rubiaceae. The woodruff is found growing wild in woods and shady places in many countries of Europe, and its leaves are used as herbs. The genus *Asperula* includes annuals and perennials, usually with square stems. Their small, funnel-shaped flowers are clustered, and a few species are cultivated for ornamental uses. Sweet woodruff (*Galium odoratum*) is in a separate genus; it was formerly classified as *A. odorata.*

Woods, Lake of the, scenic lake astride the Canadian–United States boundary where the provinces of Ontario and Manitoba and the state of Minnesota meet. Relatively shallow and irregular in shape, it is 70 miles (110 km) long and up to 60 miles (95 km) wide and has an area of 1,727 square miles (4,472 square km). The lake has an estimated 25,000 miles (40,000 km) of shoreline and more than 14,000 islands. Fed from the southeast by the Rainy River, the lake drains northwestward through the Winnipeg River into Lake Winnipeg. Its elevation is 1,060 feet (323 m) above sea level, and the drainage area is 27,170 square miles (70,370 square km). Visited by the French explorer Jacques de Noyon in 1688, the lake later became an important fur-trading route between the Great Lakes and western Canada. It is now the site of four Ontario provincial parks. Kenora, at its northern end, is the chief lakeside city. Separated from the remainder of Minnesota by a part of the lake is the Northwest Angle (Lake of the Woods county), which is the northernmost point of the coterminous United States.

Woods, Tiger, byname of ELDRICK WOODS (b. Dec. 30, 1975, Cypress, Calif., U.S.), American golfer who enjoyed one of the greatest amateur careers in the history of the game and became a dominant player on the professional circuit in the late 1990s. The child of an African American father and a Thai mother, Woods in 1997 became the first golfer of either African American or Asian descent to win the Masters Tournament, one of the most prestigious events in the sport.

A naturally gifted player, Woods took up golfing at a very young age and soon became a prodigy, taking swings on a television program when he was two years old and shooting a 48 over nine holes at age three. In 1991, at age 15, he became the youngest winner of the U.S. Junior Amateur championship; he also captured the 1992 and 1993 Junior Amateur titles. In 1994 he won the first of his three consecutive U.S. Amateur championships. He enrolled at Stanford University in 1994, but, after claiming his third U.S. Amateur title, Woods left college and turned professional on Aug. 29, 1996. He won two titles during his first season and was named the PGA Tour's outstanding rookie.

Woods's club speed allowed him to routinely hit drives of more than 300 yards. His booming long game, coupled with his expert putting and chipping and his reputation for mental toughness, made him an intimidating opponent and a popular player among fans. His six consecutive 1999–2000 victories tied Ben Hogan's 1948 streak, the second longest in PGA history (Byron Nelson holds the record with 11 straight wins). In June 2000 Woods again made history with his record-breaking win at the U.S. Open. He became the first player to finish the tournament at 12 under par, tying Jack Nicklaus for the lowest 72-hole score (272), and his 15-stroke victory was the largest winning margin at a major championship. With his win of the British Open on July 23, 2000, Woods became the fifth player in golf history, and the youngest, to complete a career Grand Slam in golf—that is, the U.S. and British Opens, the PGA championship, and the Masters Tournament.

Woods, William B., in full WILLIAM BURNHAM WOODS (b. Aug. 3, 1824, Newark, Ohio, U.S.—d. May 14, 1887, Washington, D.C.), associate justice of the United States Supreme Court (1880–87).

After being admitted to the bar in 1847, Woods entered private practice, in which he remained until the outbreak of the American Civil War. He joined the Union army in 1862 and saw action repeatedly, rising to the rank of brigadier general. He resumed his practice and took an active role in Reconstruction after the war. In 1869 he was appointed a judge of the Circuit Court for the fifth circuit by President Ulysses S. Grant and moved to Atlanta.

In 1880 Woods was appointed to the U.S. Supreme Court by President Rutherford B. Hayes. In six years on the bench he wrote 218 opinions, many of them in equity cases that revealed his rare ability to analyze cogently an intricate record. His two most memorable opinions were in *United States* v. *Harris,* which struck down the Ku Klux Klan Act on grounds that the government had no right, under the 14th Amendment, to regulate the activities of individuals, and in *Presser* v. *Illinois,* which declared that the Bill of Rights limited the power of the federal, but not a state, government. Both positions were later reversed.

Woods Hole, unincorporated village in Falmouth town (township), Barnstable county, southeastern Massachusetts, U.S. It lies at the southwestern tip of Cape Cod. Woods Hole is the cape's principal port and a point of departure for the islands of Martha's Vineyard and Nantucket. The Woods Hole Oceanographic Institution (1930), the Marine Biological Laboratory, the cape's Coast Guard units, and the National Marine Fisheries Services' Laboratory and Aquarium are located there. The Nobska Light, off the coast, was installed in 1829. Pop. (1990) 3,908.

Woodson, Carter G., in full CARTER GODWIN WOODSON (b. Dec. 19, 1875, New Canton, Va., U.S.—d. April 3, 1950, Washington, D.C.), American historian who first opened the long-neglected field of black studies to scholars and also popularized the field in the schools and colleges of black people. To focus attention on black contributions to civilization, he founded (1926) Negro History Week.

Of a poor family, Woodson supported himself by working in the coal mines of Kentucky and was thus unable to enroll in high school until he was 20. After graduating in less than two years, he taught high school, wrote articles, studied at home and abroad, and received his Ph.D. from Harvard University (1912). In 1915 he founded the Association for the Study of Negro Life and History to encourage scholars to engage in the intensive study of the black past. Prior to this work, the field had been largely neglected or distorted in the hands of historians who accepted the traditionally biased picture of blacks in American and world affairs. In 1916 Woodson edited the first issue of the association's principal scholarly publication, *The Journal of Negro History,* which, under his direction, remained an important historical periodical for more than 30 years.

Woodson was dean of the College of Liberal Arts and head of the graduate faculty at Howard University, Washington, D.C. (1919–20), and dean at West Virginia State College, Institute, W.Va. (1920–22). While there, he founded and became president of Associated Publishers to bring out books on black life and culture since experience had shown him that the usual publishing outlets were rarely interested in scholarly works on blacks.

Important works by Woodson include the widely consulted college text *The Negro in Our History* (1922; 10th ed., 1962); *The Education of the Negro Prior to 1861* (1915); and *A Century of Negro Migration* (1918). He was at work on a projected six-volume *Encyclopaedia Africana* at the time of his death.

Woodstock, city, seat of Oxford county, southeastern Ontario, Canada, on the Thames River. The first settler was Zacharius Burtch, who built a log cabin (1798) on a hill overlooking the townsite. The actual founder was Rear Admiral Henry Vansittart of the Royal Navy, who in 1834 formed the nucleus of a village, which he named for Woodstock, Eng.

The city hall (1853), housing the Oxford Museum, and Old St. Paul's Church (1834) are historic buildings. Dairying and livestock rearing are important activities in the area, and Woodstock's manufacturing is well diversified. Oil was discovered just east of the city. Pop. (1996) 32,086.

Woodstock, town (township) in Ulster county, southeastern New York, U.S. It lies in the foothills of the southern Catskills near the Ashokan Reservoir, 10 miles (16 km) northwest of Kingston. A year-round resort, the village is also a noted artists' colony, which developed after 1902 when Ralph R. Whitehead, inspired by William Morris and John Ruskin, established a handicraft community, Byrdcliffe, just north of the village. In 1906 L. Birge Harrison moved the summer school of the Art Students' League of New York there. Artists such as George Bellows were attracted to the colony, which has flourished ever since.

Woodstock gave its name to the Woodstock Art and Music Fair, a rock festival that was held near Bethel, N.Y., in neighbouring Sullivan county on Aug. 15–17, 1969. (The festival had been forced to move from its planned location in Woodstock after protests from the local townsfolk.) The Woodstock Festival occasioned the harmonious gathering of a crowd of about 450,000 young rock-music devotees and marked the high point of the American youth counterculture of the 1960s. The festival was documented in the motion picture *Woodstock* (1970) and the book *Woodstock: The Oral History* (1989).

Woodstock town has art and craft galleries, a theatre school, and frequent music concerts. Dairy, poultry, and fruit farms are in the area. Pop. (1999 est.) 6,182.

woodswallow, also called SWALLOW-SHRIKE (*Artamus*), any of 10 species of songbirds constituting the family Artamidae (order Passeriformes). Woodswallows are found from eastern India, Southeast Asia, and the Philippines southward to Australia and Tasmania. They



Woodswallow (*Artamus*)
Graeme Chapman—Ardea, London

resemble swallows in wing shape and aerial feeding habits. All are gray, with white, black, or reddish touches (sexes alike). They have stout, wide-gaped bills and brush-tipped tongues.

These noisy, belligerent birds capture insects in midair in open country and roost in close bodily contact; some species breed in colonies. Australian examples are the 15-centimetre (6-inch) little woodswallow (*Artamus minor*) and the 22-centimetre (9-inch) white-browed woodswallow (*A. superciliosus*)—among the smallest and largest members of the family.

Woodville, Anthony: *see* Rivers, Anthony Woodville, 2nd Earl.

Woodville, Elizabeth (b. 1437—d. June 7/8, 1492, London), wife of King Edward IV of England. After Edward's death popular dislike of her and her court facilitated the usurpation of power by Richard, Duke of Gloucester (King Richard III).

A woman of great beauty, she was already a widow with two sons when Edward IV married her in May 1464. The match was repugnant to the ruling nobility of the House of York because she was a daughter of the Lancastrians, the traditional enemies of the Yorkists, and because she was not of royal rank. Her penchant for procuring high offices and titles of nobility for her relatives increased her widespread unpopularity.

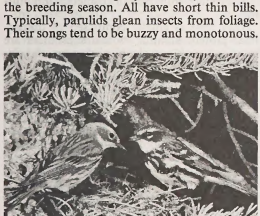
Because Elizabeth bore Edward two surviving sons and five daughters, the Yorkist succession seemed secure. Within three months after the death (on April 9, 1483) of Edward IV, however, Gloucester had defeated Elizabeth's party and seized the throne from Edward IV's son and successor, the 12-year-old Edward V. It is not entirely clear why Elizabeth, who had taken sanctuary, surrendered her younger son (on June 16) and later her daughters to Richard III. Soon both sons disappeared from Richard's custody, presumably murdered.

After Henry Tudor became king as Henry VII in 1485, he married Elizabeth's eldest daughter, but in 1487 Elizabeth was disgraced—probably for treasonable activities—and forced to withdraw to a convent, where she died five years later. David MacGibbon's biography, *Elizabeth Woodville, 1437–1492,* was published in 1938.

Woodville, Richard: *see* Rivers, Richard Woodville, 1st Earl.

woodwarbler, any of several members of the songbird family Parulidae (formerly Compsothlypidae or Mniotiltidae, order Passeriformes). They are New World birds distinct from the true warblers of the Old World (*see* warbler).

The more than 100 species of woodwarblers are small, active birds commonly found in woodlands but present also in marshes and dry scrub. Most are brightly coloured, at least in the breeding season. All have short thin bills. Typically, parulids glean insects from foliage. Their songs tend to be buzzy and monotonous.



Female and male myrtle warblers (*Dendroica coronata*) at nest
S. Roberts—Ardea London

The usual nest is a tidy cup in a bush or a tree; some (*e.g.,* ovenbird; *q.v.*) make a domed nest on or near the ground. Woodwarblers lay two to five (rarely six) speckled eggs.

Best-known is the yellow warbler (*Dendroica petechia*), breeding from Alaska and Newfoundland to the West Indies, Peru, and the Galápagos Islands; sometimes miscalled the wild canary, it is 13 cm (5 inches) long, yellow, with faintly red-streaked underparts (males). It belongs to the largest, and chiefly North American, genus of woodwarblers; this genus has 27 species, most of which have contrasting plumage, such as the black, white, and yellow of the myrtle warbler (*D. coronata*). A common but less striking species is the blackpoll warbler (*D. striata*). Some authors merge *Dendroica* in *Vermivora,* a less colourful genus of 11 species, most of them well known in the United States. The family's namesake, the northern, or American, parula warbler (*Parula americana*), breeding in eastern North America, is pale blue, with white wing bars, partial white eye-ring, and yellow breast crossed by a narrow dark band. The black and white warbler (*Mniotilta varia*), common east of the Rockies, is streaked and has creeperlike habits. A large tropical genus is *Basileuterus;* the 22 species are typified by the golden-crowned warbler (*B. culicivorus*), found from Mexico to Argentina.

The yellowthroats, any of the eight species of the genus *Geothlypis,* live in marshes and wet thickets. The male of the common yellowthroat (*G. trichas*)—often called Maryland yellowthroat in the United States—is yellow with a black mask; his song, a strong, repeated "wicheree," is heard from Alaska and Newfoundland to Mexico. The other species are resident in the tropics. For other woodwarblers *see* chat; redstart.

Woodward, city, seat (1907) of Woodward County, northwestern Oklahoma, U.S. The city lies along the North Canadian River. It was originally a train stop, settled in 1893 when the Cherokee Strip was opened for homesteading, and was probably named for Brinton W. Woodward, an official of the Santa Fe Railway.

Woodward is a marketing and processing centre for a wheat and cattle region and is the base for several oil and gas companies. The U.S. Great Plains Experiment Station at Woodward is concerned primarily with crops and range pasturing. A tornado destroyed much of Woodward on April 9, 1947. Boiling Springs State Park is nearby. Inc. 1907. Pop. (1990) 12,340.

Woodward, C(omer) Vann (b. Nov. 13, 1908, Vanndale, Ark., U.S.—d. Dec. 17, 1999, Hamden, Conn.), American historian and educator who became the leading interpreter of the post-Civil War history of the American South.

Woodward graduated from Emory University, Ga., in 1930, took a master's degree from Columbia University in 1932, and received a Ph.D. from the University of North Carolina in 1937. After holding various teaching positions, he was a member of the history faculty at Johns Hopkins University from 1946 to 1961 and was a professor of history at Yale University from 1961until his retirement in 1977.

Woodward's writings represented an extremely subtle and thoughtful revision of the history of the American South. In his first major work, the biography *Tom Watson, Agrarian Rebel* (1938), he interpreted the conversion of that fiery agrarian reformer into a racist demagogue as reflecting the defeat of the Populist reform movement in Southern politics. In *Origins of the New South 1877–1913,* he examined the disenfranchisement of Southern blacks in the 1890s in the light of political struggles between poor white farmers, agrarian reformers, and Populist politicians on the one hand and the large mercantile, industrial, and landholding interests on the other. His analysis of the political deals associated with the contested Hayes–Tilden presidential election, *Reunion and Reaction: The Compromise of 1877 and the End of Reconstruction* (1951), emphasized the economic motives that influenced that historic compromise. Woodward's most widely read book was *The Strange Career of Jim Crow* (1955). In this book he showed that the legal segregation of whites and blacks was not rooted in "time immemorial" as had been routinely claimed by Southerners, but was actually a relatively recent phenomenon that had been erected in the South following the defeat of the Populist movement in the 1890s. The book helped provide a rationale for attempts at desegregation in the 1950s and '60s because it showed that whites had lived on basically equal terms with blacks for two decades even after the end of Reconstruction in 1876.

Woodward's other works include his reediting of some important original Civil War-era manuscripts, published as *Mary Chesnut's Civil War* (1981), and his autobiographical work *Thinking Back: The Perils of Writing History* (1986).

Woodward, R(obert) B(urns) (b. April 10, 1917, Boston—d. July 8, 1979, Cambridge, Mass., U.S.), American chemist best-known for his syntheses of complex organic substances, including quinine (1944), cholesterol and cortisone (1951), and vitamin B_{12} (1971). He was awarded the Nobel Prize for Chemistry in 1965.

Education and early career. Woodward was attracted to chemistry at an early age and entered the Massachusetts Institute of Technology in 1933. Involvement with chemistry at the expense of other subjects caused his suspension for a semester but also resulted in his collaboration on three research papers. Awarded the B.S. degree in 1936 and the Ph.D. degree a year later, he immediately became associated with Harvard, becoming professor (1950–60) and Donner Professor of Science (1960–79). He was uniquely honoured by the founding of the Woodward Research Institute in Basel, Switz., by the Ciba pharmaceutical company in 1963. He then directed research activities both in Cambridge and in Basel. Woodward was married in 1938 to Irja Pullman and in 1946 to Eudoxia Muller; he had three daughters and a son.



R.B. Woodward, 1966
By courtesy of the Harvard University News Service

The chemistry of natural products served as the base for Woodward's broad engagement in organic chemistry. The first result of this involvement was a series of four papers (1940–42), based on work in the steroid field, delineating rules for the correlation of ultraviolet spectra with molecular structure. His early

recognition that physical measurement had greater power than chemical reaction to reveal structural features led to his development of those rules (Woodward's rules). During World War II, the extensive research in England and the United States to unravel the structure of penicillin foundered on incorrect deductions from misleading chemical behaviour until it was ultimately clarified by spectroscopic measurements. Woodward correlated the work of this project into a final deduction of structure (1945) and, during the next two decades, championed the development of several spectroscopic techniques, which have reduced the problem of structure determination to a relatively commonplace procedure.

Woodward's achievements in the field of structure determination were more than mere solutions of particular problems: they were demonstrations of new approaches and reasoning that have guided others and increased the power of the discipline. The structures of complex natural products deduced by Woodward include those of penicillin (1945), patulin (1948), strychnine (1947), oxytetracycline (1952), cevine (1954), carbomycin (1956), gliotoxin (1958), ellipticine (1959), calycanthine (1960), oleandomycin (1960), streptonigrin (1963), and tetrodotoxin (1964). His delineation of the structure of magnamycin revealed a previously unknown family of natural products, the macrolide antibiotics, for which he also proposed a mode of formation in nature. He also first proposed the correct biosynthetic pathway to the steroidal hormones in living organisms.

Woodward, widely considered the father of modern organic synthesis, was, without doubt, the most accomplished synthesist of complex molecules. Beginning with his synthesis of quinine in 1944, he demonstrated that the understanding of chemical reaction mechanisms made possible the planning and successful execution of extended sequences of reactions to build up complex compounds in the laboratory. The conception and planning of these elaborate programs, requiring a balanced utilization of all the tools and knowledge of the subject, is considered by many the most demanding form of organic chemical research. The requisite intellectual discipline, largely initiated by Woodward, did indeed become a major endeavour in organic chemistry.

Synthesis of steroids. Following the synthesis of quinine, he undertook and completed the first total synthesis of the steroids cholesterol and cortisone (1951) and then the related terpene lanosterol (1954). In 1954 syntheses of strychnine and lysergic acid were announced, followed in 1956 by a synthesis of reserpine that has become a model of elegant technique and has been used commercially for reserpine production. Subsequent achievements included the synthesis of chlorophyll (1960), tetracycline (1962), colchicine (1963), and cephalosporin C (1965). In collaboration with Albert Eschenmoser of the Federal Institute of Technology in Zürich (and, over a decade, about 100 co-workers in the two laboratories), Woodward completed in 1971 the synthesis of the complicated co-enzyme vitamin B_{12} (cyanocobalamin) by a sequence of more than 100 reactions. This monumental work involved a scale of concerted activity quite unprecedented in any previous synthetic effort in chemistry. The work on vitamin B_{12} led to the recognition and formulation, with Roald Hoffmann, of the concept of conservation of orbital symmetry, explicating a broad group of fundamental reactions—probably the most important theoretical advance of the 1960s in organic chemistry. At the time of his death Woodward was working on the synthesis of erythromycin.

Woodward's work was central to the chemical thought of the times, and his influence on other organic chemists was greater than that of any other. He was awarded numerous honorary degrees and held many honorary lectureships. His other honours included the Davy Medal of the Royal Society (England, 1959), the Pius XI Gold Medal (Pontifical Academy of Science, Vatican, 1961), the National Medal of Science (United States, 1964), the Order of the Rising Sun (Japan, 1970), the Nobel Prize for Chemistry (1965), and other medals and awards. Woodward was a member of the National Academy of Sciences, Washington, D.C.; the Royal Society, London; and honorary member, or fellow, of several other scientific societies in various countries.

(J.B.He.)

Woodward, William (b. April 7, 1876, New York City—d. Sept. 26, 1953, New York City), U.S. banker and an influential breeder, owner, and racer of horses.

Woodward was educated at Groton School, Groton, Mass., and Harvard College and, upon graduation from Harvard Law School in 1901, became secretary to Joseph H. Choate, U.S. ambassador to the Court of St. James. In 1903 he returned to New York to join the Hanover Bank, where he became vice president in 1904 and president in 1910. He also became a member of the first Federal Reserve Board in 1914 and, from 1927 to 1929, was president of the New York Clearing House. Thereafter, he served as board chairman of Central Hanover Bank and Trust but retired in 1933 to devote his time to his stud farm and Thoroughbred nursery, Belair, near Annapolis, Md., where the first English Thoroughbred racehorses imported into Maryland had been bred. At Belair, with the help of the outstanding trainer James ("Sunny Jim") Fitzsimmons, he bred two winners of the U.S. Triple Crown: Gallant Fox, who captured the three events in 1930, and Gallant Fox's colt Omaha, who won in 1935. Among his other successful horses were Happy Gal, Faireno, Granville, Vagrancy, and Nashua. In 1939 Woodward's horse Johnstown won the Kentucky Derby and the Belmont Stakes. Woodward also entered horses in the English classic races. Every year he sent some of his yearling foals to his English trainer Cecil Boyd-Rochfort. Among his winners in the English classic races were Boswell, 1936, the Saint Leger; Black Tarquin, 1948, the Saint Leger; Hycilla, 1944, the Oaks; and Flares, 1938, the Ascot Gold Cup.

A member of the U.S. Jockey Club from 1917, Woodward served as chairman of the board of stewards from 1930 until 1950. During this time horse racing turned from a questionable gambling operation into a major spectator sport.

Articles are alphabetized word by word, not letter by letter

woodwind, any of a group of wind musical instruments, composed of the flutes and reed pipes (*i.e.,* clarinet, oboe, bassoon, and saxophone). Both groups were traditionally made of wood, but now they may also be constructed of metal.

Woodwinds are distinguished from other wind instruments by the manner in which the sound is produced. Unlike the trumpets or other instruments of the brass family, in which the airstream passes through the player's vibrating lips directly into the air column, the flutes are sounded by directing a narrow stream of air against the edge of a hole in a cylindrical tube. With the reed pipes (*e.g.,* clarinets and saxophones), a thin strip of flexible material, such as cane or metal, is placed against the opening of the mouthpiece, forcing the airstream to pass through the reed before it reaches the column of air that is to vibrate. In double-reed instruments (oboes and bassoons), two thicknesses of reeds are used. The woodwind section of a band or orchestra usually consists of three flutes, one piccolo, three oboes, one English horn, three clarinets, one bass clarinet, three bassoons, and one contrabassoon.

Woodworth, Robert S(essions) (b. Oct. 17, 1869, Belchertown, Mass., U.S.—d. July 4, 1962, New York City), U.S. psychologist who conducted major research in learning and developed a system of "dynamic psychology" into which he sought to incorporate several different schools of psychological thought.

Woodworth worked as a mathematics instructor before turning to psychology. He pursued graduate studies under William James at Harvard University and James McKeen Cattell at Columbia University, where he received his Ph.D. in 1899. In 1901 Woodworth and Edward Lee Thorndike demonstrated that training could not be transferred; learning one subject did not produce an overall improvement in learning ability. He continued his research at Columbia and became professor of psychology there in 1909.

Woodworth asserted that both behaviour and consciousness were the subject matter of psychology. He believed that behaviour was a function of both environmental stimuli and the makeup of the organism. He also suggested that a mechanism (how a thing is done) can take on the function of a drive (the motive force for doing it).

Woodworth designed the first questionnaire to detect and measure abnormal behaviour; it served as a rough screening device for behavioral disorders. His *Dynamic Psychology* (1918) attempted to explain behaviour by combining theories of motivation, perception, learning, and thinking, while his *Psychology* (1921) became a standard textbook. Throughout his career, he attempted to develop a unified theory of psychology based on thorough scientific observations and cautious generalizations from them.

woof (weaving): *see* filling.

wool, animal fibre forming the protective covering, or fleece, of sheep or of other hairy mammals, such as goats and camels. Prehistoric man, clothing himself with sheepskins, eventually learned to make yarn and fabric from their fibre covering. Selective sheep breeding eliminated most of the long, coarse hairs forming a protective outer coat, leaving the insulating fleecy undercoat of soft, fine fibre.

Wool is mainly obtained by shearing fleece from living animals, but pelts of slaughtered sheep are sometimes treated to loosen the fibre, yielding an inferior type called pulled wool. Cleaning the fleece removes "wool grease," the fatty substance purified to make lanolin (*q.v.*), a by-product employed in cosmetics and ointments.

Wool fibre is chiefly composed of the animal protein keratin. Protein substances are more vulnerable to chemical damage and unfavourable environmental conditions than the cellulose material forming the plant fibres. Coarser than such textile fibres as cotton, linen, silk, and rayon, wool has diameters ranging from about 16 to 40 microns (a micron is about 0.00004 inch). Length is greatest for the coarsest fibres. Fine wools are about 1.5 to 3 inches (4 to 7.5 centimetres) long; extremely coarse fibres may be as much as 14 inches in length. Wool is characterized by waviness with up to 30 waves per inch (12 per centimetre) in fine fibres and 5 per inch (2 per centimetre) or less in coarser fibres. Colour, usually whitish, may be brown or black, especially in coarse types, and coarse wools have higher lustre than fine types.

Single wool fibres can resist breakage when subjected to weights of 0.5 to 1 ounce (15 to 30

grams) and when stretched as much as 25 to 30 percent of their length. Unlike vegetable fibres, wool has a lower breaking strength when wet. The resilient fibre can return to its original length after limited stretching or compression, thus imparting to fabrics and garments the ability to retain shape, drape well, and resist wrinkling. Because crimp encourages fibres to cling together, even loosely twisted yarns are strong, and both crimp and resilience allow manufacture of open-structured yarns and fabrics that trap and retain heat-insulating air. The low density of wool allows manufacture of lightweight fabrics.

Wool fibre has good to excellent affinity for dyestuffs. Highly absorbent, retaining as much as 16 to 18 percent of its weight in moisture, wool becomes warmer to the wearer as it absorbs moisture from the air, thus adjusting its moisture content and, consequently, its weight, in response to atmospheric conditions. Because moisture absorption and release are gradual, wool is slow to feel damp and does not chill the wearer by too-rapid drying.

Wool that has been stretched during yarn or fabric manufacture may undergo relaxation shrinkage in washing, with fibres resuming their normal shape. Felting shrinkage occurs when wet fibres, subjected to mechanical action, become matted into packed masses. Wool has good resistance to dry-cleaning solvents, but strong alkalies and high temperatures are harmful. Washing requires the use of mild reagents at temperatures below 20° C (68° F), with minimum mechanical action. The performance of wool has been improved by development of finishes imparting insect and mildew resistance, shrinkage control, improved fire resistance, and water repellency.

Woolen yarns, usually made from shorter fibres, are thick and full and are used for such full-bodied items as tweed fabrics and blankets. Worsteds, usually made from longer fibre, are fine, smooth, firm, and durable. They are used for fine dress fabrics and suitings. Wool that has had no previous use is described as new wool, or, in the United States, as virgin wool. The limited world supply results in the use of recovered wools. In the United States, wool recovered from fabric never used by the consumer is called reprocessed wool; wool recovered from material that has had use is called reused wool. Recovered wools, employed mainly in woolens and blends, are often of inferior quality because of damage suffered during the recovery process.

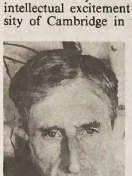
Australia, Russia, New Zealand, and Kazakhstan lead in fine-wool production, and India leads in the production of the coarser wools known as carpet wools. Leading consumers include the United Kingdom, the United States, and Japan.

Woolf, Arthur (baptized Nov. 4, 1766, Camborne, Cornwall, Eng.—d. Oct. 26, 1837, Guernsey), British engineer who pioneered in the development of the compound steam engine.

Woolf began as a carpenter and then worked for the engineer and inventor Joseph Bramah. As engineer for a London brewery, he began experimenting with steam power and patented the Woolf high-pressure compound engine in 1804 and 1805. Its thermal efficiency was 7.5 percent, almost twice that of James Watt's expansion engine. In 1810, after Watt's patent expired, Woolf revived and improved Jonathan Hornblower's compound engine of 1781. He returned to Cornwall in 1812 to introduce his engine for pumping mines. It was widely used until it was superseded in the next decade by Richard Trevithick's more efficient high-pressure engine.

Woolf, Leonard (Sidney) (b. Nov. 25, 1880, London—d. Aug. 14, 1969, Rodmell, Sussex, Eng.), British man of letters, publisher, political worker, journalist, and internationalist who influenced literary and political life and thought more by his personality than by any one achievement.

Woolf's most enduring accomplishment was probably his autobiography, an expression of the toughness of moral fibre and quality of mind and spirit that made him one of the outstanding men of his time. Its first three volumes, *Sowing* (1960), *Growing* (1961), and *Beginning Again* (1964), re-create the world of liberal Jewry into which he was born, the intellectual excitement of life at the University of Cambridge in the early years of the



Leonard Woolf, 1939
Gisele Freund/Photo Researchers

20th century, the experience as a civil servant in Ceylon (1904–11) that made him an anti-imperialist, and the atmosphere of the Bloomsbury group of artists and writers, in which he and his wife, novelist Virginia Woolf, played a formative part. In 1917 they founded their own publishing house, the Hogarth Press, and their discerning understanding encouraged such writers as T.S. Eliot and E.M. Forster.

The last volumes of the autobiography (*Downhill All the Way,* 1967; *The Journey Not the Arrival Matters,* 1969) span the years 1919 to 1969, a period during which Woolf exercised a certain amount of political influence through editorial activity on left-wing and internationalist journals and through his writings. His work helped to lay the foundations of the policy of the League of Nations and the United Nations and of the welfare state.

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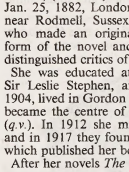
Woolf, (Adeline) Virginia, *née* **STEPHEN** (b. Jan. 25, 1882, London—d. March 28, 1941, near Rodmell, Sussex, Eng.), British author who made an original contribution to the form of the novel and was one of the most distinguished critics of her time.

She was educated at home by her father, Sir Leslie Stephen, and, after his death in 1904, lived in Gordon Square, London, which became the centre of the Bloomsbury group (*q.v.*). In 1912 she married Leonard Woolf, and in 1917 they founded the Hogarth Press, which published her books.

After her novels *The Voyage Out* (1915) and



Virginia Woolf
Gisele Freund

Night and Day (1919) appeared, she began to experiment. She wanted to stress the continuous flow of experience, the indefinability of character and external circumstances as they impinge on consciousness. She was also interested in the way time is experienced both as a sequence of disparate moments and as the flow of years and of centuries. From *Jacob's Room* (1922) onward, she tried to convey the impression of time present and of time passing in individual experience and also of the characters' awareness of historic time.

In *Mrs. Dalloway* (1925) and *To the Lighthouse* (1927), she extended her technical mastery; above all, she gave to each of these novels a tightly organized form, partly by using poetic devices such as recurrent images and partly by restricting the time of the action. *Orlando* (1928) is a historical fantasy with evocations of England, and especially literary England, from Elizabeth I to 1928. In her long essay, *A Room of One's Own* (1929), she described the difficulties encountered by women writers in a man's world.

Returning to the novel, in *The Waves* (1931) she confined herself to recording the stream of consciousness. The reader lives within the minds of one or the other of six characters from their childhood to their old age. Human experience of the "seven ages of man" rather than character or event, is paramount. *The Years* (1937) is more expansive and traditional. In *Between the Acts* (1941), the action, as in *Mrs. Dalloway,* occurs on a single day, but extended time is suggested by the staging of a village pageant recording English history, while the reader is also kept aware of impending war. In a recurrence of mental illness, after finishing *Between the Acts,* she drowned herself near her Sussex home.

Woolf wrote two biographies: one is fanciful, a fragment of the life of the Brownings through the imagined memories of Elizabeth Barrett Browning's dog (*Flush;* 1933); the other is a full-length biography of the art critic Roger Fry (1940). Her best critical studies are in *The Common Reader* (1925), *The Common Reader: Second Series* (1932), *The Death of the Moth* (1942), and *Granite and Rainbow* (1958).

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Woollcott, Alexander (Humphreys) (b. Jan. 19, 1887, Phalanx, N.J., U.S.—d. Jan. 23, 1943, New York City), American author, critic, and actor known for his acerbic wit. A large, portly man, he was the self-appointed leader of the Algonquin Round Table, an informal luncheon club at New York City's Algonquin Hotel in the 1920s and '30s.

After graduating from Hamilton College, Clinton, N.Y., in 1909, he joined the staff of *The New York Times* as cub reporter and succeeded to the post of drama critic in 1914. After a brief stint (1917–18) in the U.S. Army, reporting for *The Stars and Stripes,* he returned to the *Times* and subsequently worked for the *New York Herald* and the *New York World.* He also wrote for *The New Yorker,* and in 1929 he branched out into the radio field as "The Town Crier" of the air, establishing a nationwide reputation as raconteur,

gossip, conversationalist, wit, and man-about-town. As a literary critic he wielded great influence on the nation's book-buying public.

Woollcott played the title role of *The Man Who Came to Dinner* (1940), a play by George S. Kaufman and Moss Hart in which the bilious and autocratic Woollcott was himself lampooned. He was the author of *Mrs. Fiske, Her Views on Actors, Acting, and the Problems of Production* (1917), *Two Gentlemen and a Lady* (1928), and *While Rome Burns* (1934) and publisher of two anthologies, *The Woollcott Reader* (1935) and *Woollcott's Second Reader* (1937).

Woolley, Frank Edward (b. May 27, 1887, Tonbridge, Kent, Eng.—d. Oct. 18, 1978, Chester, Nova Scotia, Can.), Canadian cricketer, one of the greatest of all time, remembered especially for his graceful left-handed batting. His impressive record in first-class cricket included an aggregate of 58,969 runs, 145 centuries (100 runs in a single innings), more than 2,000 wickets, and 1,018 catches, which remains a world record. In each of three successive seasons, he scored 2,000 runs and took 100 wickets.

During his career (1906–38), Woolley played for the Kent County Cricket Club, and in 64 Test (international) matches he scored 3,283 runs for England. After retirement he coached at King's School, Canterbury, and later moved to Canada.

Woolley, Sir (Charles) Leonard (b. April 17, 1880, London—d. Feb. 20, 1960, London), British archaeologist whose excavation of the ancient Sumerian city of Ur (in modern Iraq) greatly advanced knowledge of ancient Mesopotamian civilization. His discovery of geological evidence of a great flood suggested a possible correlation with the deluge described in Genesis.

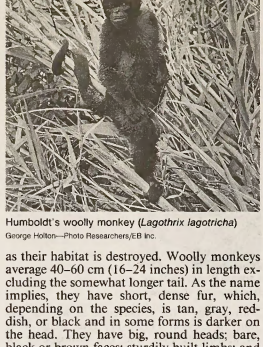
From 1907 to 1911 Woolley served with an archaeological expedition near Wadi Halfa, Sudan, an area rich in Egyptian antiquities. With T.E. Lawrence ("Lawrence of Arabia"), he conducted the principal excavation of the Hittite city of Carchemish in northern Syria (1912–14) and recorded his findings in *Carchemish* (part 2, 1921, and part 3, with R.D. Barnett, 1953). He then worked at Tell el-Amarna, capital of the Egyptian king Akhenaton.

His excavation of Ur (1922–34), conducted for the British Museum, London, and the University of Pennsylvania, Philadelphia, enabled scholars to trace the history of the city from its final days during the 4th century BC back to its prehistoric beginnings (*c.* 4000 BC). Woolley's findings revealed much about everyday life, art, architecture, literature, government, and religion in what has come to be called "the cradle of civilization."

One of his most dramatic discoveries, royal tombs dating from about 2700 BC, disclosed the practice of the sacrificial burial of a deceased king's personal retinue. With the help of contributors, he began publishing a projected 10 volumes of *Ur Excavations* in 1927. His other books include *The Sumerians* (1928), *Ur of the Chaldees* (1929), and *Digging up the Past* (1930).

Woolley also sought to establish a relationship between the civilizations of Mesopotamia and those of Greece and the Aegean. To this end, he excavated at Tell Atchana (ancient Alalakh) in southeastern Turkey north of Antioch (1937–39 and 1946–49). There he discovered the remains of a small kingdom of largely Hurrian population and levels of habitation dating back to the 4th millennium BC. His findings appeared in *Alalakh, an Account of the Excavations at Tell Atchana in the Hatay, 1937–1949* (1955) and *A Forgotten Kingdom* (1953). He was knighted in 1935.

woolly monkey (*Lagothrix*), any of two or three species of South American monkeys, family Cebidae, found in forests along the Amazon basin and becoming increasingly rare



Humboldt's woolly monkey (*Lagothrix lagotricha*)
George Holton—Photo Researchers/EB Inc.

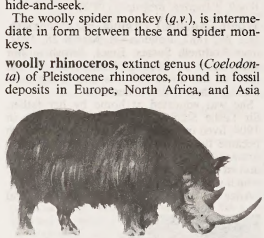
as their habitat is destroyed. Woolly monkeys average 40–60 cm (16–24 inches) in length excluding the somewhat longer tail. As the name implies, they have short, dense fur, which, depending on the species, is tan, gray, reddish, or black and in some forms is darker on the head. They have big, round heads; bare, black or brown faces; sturdily built limbs; and heavy, prehensile tails. Their bodies are thick, and their protruding bellies have given them the Portuguese name *barrigudo,* or "big belly."

Woolly monkeys are active during the day. Gregarious, they live in small groups and are often found in company with capuchins, howlers, and other monkeys. They are rather slow in their movements and generally travel on all fours, although they often swing by their hands, feet, and tail or by their tail alone. On the ground they stand erect, using the tail for support.

Woolly monkeys mature at about four years. They bear single young after about 225 days' gestation. Food in the wild is primarily fruit and leaves, but in captivity these monkeys accept almost any food and for that reason often have nutritional problems. They are placid and gentle, but they need attention and must be coddled to some extent. They weep when upset. Pets have appeared to enjoy playing hide-and-seek.

The woolly spider monkey (*q.v.*), is intermediate in form between these and spider monkeys.

woolly rhinoceros, extinct genus (*Coelodonta*) of Pleistocene rhinoceros, found in fossil deposits in Europe, North Africa, and Asia



Woolly rhinoceros (*Coelodonta*)
By courtesy of the trustees of the British Museum (Natural History); photograph, imiter

of the Pleistocene epoch (1,600,000 to 10,000 years ago). The genus probably evolved from an earlier form, *Dicerorhinus,* somewhere in northeastern Asia, entered the European region, and became extinct at the end of the most recent glacial period. Frozen carcasses of woolly rhinoceroses have been found preserved in Siberia, and others have been found well preserved in oil seeps in central Europe. The animal was massive, with two large horns in the anterior region of the skull, and was covered with a thick coat of hair.

The woolly rhinoceros was also present in more temperate, nonglacial regions, where it inhabited grasslands. It was a popular subject for Stone Age painters and sculptors; representations of the woolly rhinoceros, some of which are very accurate, are known from several localities.

woolly spider monkey (*Brachyteles arachnoides*), extremely rare Brazilian monkey, family Cebidae, confined primarily to mountain forests of southeastern Brazil. It is listed in the *Red Data Book* as critically endangered. The woolly spider monkey is intermediate in structure and appearance between woolly (*Lagothrix*) and spider (*Ateles*) monkeys. Its thick fur, heavy body, and protruding abdomen are similar to those of woolly monkeys, while its reduced thumbs and long limbs resemble those of spider monkeys. The woolly spider monkey is 45–63 cm (17–25 inches) long excluding the 65–80-centimetre (25–30-inch) tail. It is yellowish or brown with a hairless face and a prehensile tail. Little is known of its habits. It is active by day and moves among the treetops, gathering its food of leaves, seeds, and fruit.

Woolman, John (b. Oct. 19, 1720, Ancocas, N.J. [U.S.]—d. Oct. 7, 1772, York, Yorkshire, Eng.), British-American Quaker leader and Abolitionist whose *Journal* is recognized as one of the classic records of the spiritual inner life.

Until he was 21 Woolman worked for his father, a Quaker farmer. He then moved to Mount Holly, N.J., to enter trade. At that time he made his first appearance as a preacher of Quaker doctrine, exercising his ministry without financial remuneration, in keeping with his religion's practice. In 1743 he took up tailoring, which afforded a modest income, augmented at times by other work. From 1743 he made frequent and often arduous preaching journeys, visiting, among other places, Maryland's east shore, where he carried his message against slaveholding, and the Rhode Island coast, where he brought his antislavery doctrine to the attention of shipowners. In Indian villages of the Pennsylvania frontier, he supported Moravian missionary attempts, sought to curtail the sale of rum to the Indians, and worked for a more just Indian land policy.

Woolman maintained a strict manner of life, making his trips on foot whenever possible, wearing undyed garments, and abstaining from the use of any product connected with the slave trade. He was successful in getting Quaker communities to go on record against slavery and in persuading many individuals to free their slaves.

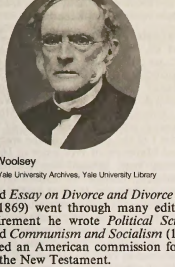
His *Journal,* published in 1774, was begun in his 36th year and continued until his death; it is a major document of his religious experience, written in a style distinguished by purity and simplicity of expression. He also wrote several other works expressing his spiritual and antislavery convictions. All his writings were collected in *The Works of John Woolman* (1774). The most complete edition of the *Journal* is that of A.M. Gummere (1922).

Woolsey, Theodore Dwight (b. Oct. 31, 1801, New York City—d. July 1, 1889, New Haven, Conn., U.S.), American educator and scholar, president of Yale (1846–71), whose many innovations later became common in institutions of higher learning.

Woolsey graduated as head of his class at Yale in 1820, and in 1831 he was appointed professor of Greek there. Elected president of Yale in 1846, Woolsey improved scholarly standards and expanded the university. Under his leadership the scientific school was founded, the first American Ph.D. was awarded (1861), the first college school of fine arts was established, the law and divinity schools were reju-

venated, the corporation was reorganized, and the "government of the faculty" was affirmed.

Woolsey's editions of the Greek tragedies brought the advanced methods of German scholarship to American colleges, and his *Introduction to the Study of International Law*



Theodore Woolsey
By courtesy of Yale University Archives, Yale University Library

(1860) and *Essay on Divorce and Divorce Legislation* (1869) went through many editions. After retirement he wrote *Political Science* (1877) and *Communism and Socialism* (1880) and headed an American commission for revision of the New Testament.

Woolston, Thomas (b. 1670, Northampton, Northamptonshire, Eng.—d. Jan. 27, 1733, London), English religious writer and an extremist among English Deists.

Woolston became a fellow at the University of Cambridge in 1691. After studying the work of Origen, a 3rd-century theologian of Alexandria who in his allegorical interpretation of Scripture stressed the spiritual qualities of creation over the material, Woolston also began to interpret Scripture allegorically rather than literally. He soon came into conflict with the government, and, when it was reported that his mind had become defective, he was deprived of his fellowship, and in 1721 went to live in London. He formally entered into the Deist controversy with his book *The Moderator Between an Infidel and an Apostate* (1725). In addition to questioning prophecies and the Resurrection of Christ, Woolston insisted on an allegorical interpretation of biblical miracles. He applied his principles in detail to *A Discourse on Our Saviour's Miraculous Power of Healing* (1730), which reportedly sold 30,000 copies. In 1729 Woolston was arrested and tried for publishing the series, sentenced to a year's imprisonment, and ordered to pay a fine, with imprisonment until the fine was paid. Unable to raise funds to pay the penalty, he died in confinement.

Woolwich, historic town in the borough of Greenwich, London. It lies on the south bank of the River Thames. Formerly a metropolitan borough of London, it was made part of the enlarged borough of Greenwich in 1965. It is the centre of local government for Greenwich.

The site was occupied in ancient times; there is evidence of a Roman cemetery, and the place-name Uulunich, from which Woolwich is derived, appears in legal records from 918. Early in the 16th century Woolwich rose to prominence as a dockyard and naval station. In 1512–13 Henry VIII established a royal dockyard there, to build the *Henry Grâce à Dieu,* or *Great Harry,* the flagship of his new navy. (In 1553 the ship was destroyed in a fire at the port.) Ships were built there for Sir Francis Drake and Sir Walter Raleigh. Woolwich remained the chief dockyard of the British navy until the introduction of ironclad ships; the dockyard was closed in 1869.

In 1805 a group of military establishments in Woolwich Warren became known collectively as the Royal Arsenal. The Royal Military Academy, begun in 1721 in the arsenal, was moved to Woolwich Common in 1808, into a building designed by the architect James Wyatt. Many of Britain's military leaders emerged from this institution, including Lord Kitchener, Charles George Gordon, and Orde Charles Wingate. The academy was amalgamated with the Royal Military College at Sandhurst in 1947 to form the new Royal Military Academy, Sandhurst. On Woolwich Common are the barracks and museums of the Royal Artillery; its Rotunda Museum of Artillery is housed in a building that was originally created as a tent in St. James's Park in 1814.

About 40,000 workers were employed at the Royal Arsenal during World War II, but by the late 20th century much of the site had been turned over to housing development.

Woolworth Co., in full F.W. WOOLWORTH CO., multinational company of retail stores that was incorporated on Dec. 15, 1911, in the consolidation of five American retail chains, the largest of which was headed by Frank Winfield Woolworth (1852–1919). Renamed Venator Group, Inc., in 1998, the company operated retail stories in 14 countries in North America, Europe, and Australia by the start of the 21st century. The company's longtime headquarters, the Woolworth Building in New York City (the world's tallest building from 1913 to 1930), was sold in 1998.

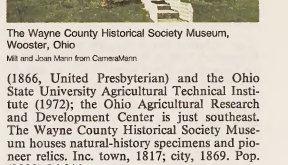
Frank Woolworth founded his first five-and-tens in Utica, N.Y., and Lancaster, Pa., in 1879; the former failed, but the latter was so successful that he opened some 21 more stores in the next decade in various towns in Pennsylvania, New Jersey, New York, Delaware, and Connecticut, the majority of which were highly successful and were financed and managed in partnerships. By the end of 1904 there were 120 stores in 21 states and the District of Columbia, extending westward as far as Colorado. Woolworth founded his success on volume buying, counter-display merchandising, and cash-and-carry transactions.

In 1905 he incorporated, as F.W. Woolworth & Co., and five years later he founded F.W. Woolworth and Co., Limited, to serve Great Britain and Ireland. Then in 1911 he invited four of his rival retailers together at the Waldorf Astoria Hotel in New York City for the purpose of merging his and their businesses into a single national corporation. They were Seymour Horace Knox (Woolworth's first cousin), with 108 five-and-tens; Fred Morgan Kirby, with 84; Charles Sumner Woolworth (Frank's brother), with 14; and Earle Perry Charlton, with 48. Woolworth's own giant company at the time of the merger had 319 stores, from Maine to North Carolina, New York to Colorado. Agreements were signed on Nov. 12, 1911; the new consolidated company was incorporated on December 15, capitalized and on March 1, 1912, all 596 stores, coast to coast, assumed the F.W. Woolworth Co. name.

Over the years Woolworth acquired other store chains. The company's Foot Locker chain of athletic-shoe retailers proved especially successful. By 1982 the company had more than 8,000 stores worldwide, but it was facing increased competition from the Kmart Corporation and other discount retailers. These pressures compelled Woolworth to rely more and more on its Foot Locker, Kinney Shoes, and other specialty stores. Woolworth closed its remaining variety stores in the United States in 1997, thus abandoning its traditional general-merchandise retail business there.

Woonsocket, city, Providence county, northern Rhode Island, U.S., on the Blackstone River just south of the Massachusetts border. The first European occupation of the site was made by Richard Arnold, who built a sawmill in 1666; his brother John built a house there in 1695. Waterpower brought industrial development: a cotton-spinning mill was built there about 1810, and the first plant for spinning and weaving wool was erected by Edward Harris in 1840. Many of Woonsocket's residents are of French Canadian ancestry; their forebears came from Canada to work in the textile industry. French is still the second language of the city. Woonsocket, once part of Cumberland and Smithfield and not set off as a separate town until 1871, was incorporated as a city in 1888. Textile manufacturing has declined but is still a leading industry. Clothing, electronic products, machinery and machine tools, and plastic goods also are produced. Pop. (2000) 43,224.

Wooster, city, seat (1811) of Wayne county, north-central Ohio, U.S., on Killbuck Creek, 28 miles (45 km) southwest of Akron. The site was laid out in 1808 by John Bever, William Henry, and Joseph Larwill and named for the American Revolutionary War general David Wooster. The community claims to have had the first Christmas tree in America, introduced (1847) by a German immigrant, August Imgard. It is the home of the College of Wooster



The Wayne County Historical Society Museum, Wooster, Ohio
Milt and Joan Mann from CameraMann

(1866, United Presbyterian) and the Ohio State University Agricultural Technical Institute (1972); the Ohio Agricultural Research and Development Center is just southeast. The Wayne County Historical Society Museum houses natural-history specimens and pioneer relics. Inc. town, 1817; city, 1869. Pop. (2000) 24,811.

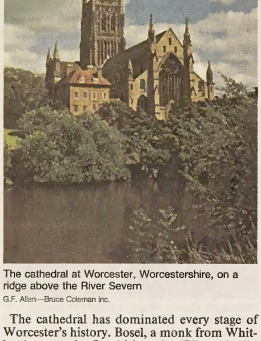
Worcester, city (district), administrative and historic county of Worcestershire, west-central England. Worcester is the historic county town (seat) of Worcestershire. Except for the small residential suburb of St. John's, it lies on the east bank of the River Severn. The city has little river frontage because much of the land adjacent to the river is liable to flooding. Pitchcroft Meadow (on the east bank) is one of the oldest racecourses in England.

The first recorded occupation of the site was prior to AD 680, and the *cester* in its name (from Latin *castra,* "camp") suggests earlier Roman habitation. In 1086 the town consisted of a castle, cathedral, and small settlement, all surrounded by a wall and deep ditch. The River Severn was forded at Worcester until 1313, when the first bridge was built.

During the Middle Ages Worcester was an important wool town, and glove making has been important since the 13th century. *Berrow's Worcester Journal,* Britain's oldest surviving newspaper, was founded in 1690. In 1751 John Wall founded the porcelain industry for which the town is now famous. Another famous product is Worcestershire, or Worcester, sauce, a complex fermented condiment that was introduced by Lea & Perrins in 1838. Various light engineering concerns are also found in the modern town.

The town played a crucial role in English history with the Battle of Worcester (1651), which brought to an end the English Civil Wars. Charles II, in an attempt to regain the throne, had gathered together a Scottish army and marched south with it. It reached Worcester on August 22, and the king selected the Commandery (a 16th-century structure locat-

ed east of the cathedral) as his headquarters. Oliver Cromwell, the leader of the Parliamentary faction, with forces far outnumbering those of the king, attacked the town from both east and west and finally captured it. Charles II managed to escape to France.



The cathedral at Worcester, Worcestershire, on a ridge above the River Severn
G.F. Allen—Bruce Coleman Inc.

The cathedral has dominated every stage of Worcester's history. Bosel, a monk from Whitby, became the first bishop, in 679 or 680. In 983 Bishop Oswald (St. Oswald) constructed a new cathedral. The present building was begun by Bishop Wulfstan (St. Wulfstan) in 1084, but there have been many additions and alterations over the centuries, and little remains of the original except the crypt. In 1224 the Early English-style Lady Chapel and choir were begun, while the present nave and the tower were completed in 1317 and 1374, respectively. A thorough restoration, internal and external, was carried out between 1857 and 1874. Among the notable monuments in the cathedral are the tombs of King John and Prince Arthur, the eldest son of Henry VII.

The town has two long-established grammar schools: the Cathedral Grammar School (King's School) was founded in 1541, and the Royal Grammar School was given a charter by Queen Elizabeth I in 1561. Area 13 square miles (33 square km). Pop. (1998 est.) 95,300.

Worcester, town, Western Cape province, South Africa. It lies in the Breë River valley, between the rugged Dutoits and Hex River mountains, east-northeast of Cape Town. Worcester was founded in 1820 and attained municipal status in 1842. It is a prominent viticultural centre, and fruit processing and canning, brandy distilling, wool milling, and light manufacturing are its economic mainstays. The town has schools for the blind and the deaf. The Karoo National Botanic Garden (371 acres [150 hectares]), just north of the town, specializes in succulent plants indigenous to the Karoo (*q.v.*). Pop. (1996) 76,894.

Worcester, city, seat of Worcester county, central Massachusetts, U.S., on the Blackstone River, about midway between Boston and Springfield. A major commercial and industrial centre and the state's second largest city, it is the hub of an urbanized area composed of a number of towns (townships), including Holden, Shrewsbury, Boylston, Millbury, Auburn, and Leicester. The original settlement (1673) was disbanded during King Philip's War (1675–76), and permanent settlement was not realized until 1713. The community was incorporated as a town in 1722 and named for Worcester, Eng.

Textile manufacturing began in 1789, and the first corduroy cloth in the United States was produced there. Early economic development was hindered by a lack of waterpower, but, with the advent of steam power and the opening (1828) of the Blackstone Canal linking the community to Providence, R.I., a period of expansion and industrialization began; the building of railway connections further stimulated the city's growth. Modern industries are highly diversified and include the production of metals, textiles, clothing, paper, electrical machinery, and precision instruments. There are also hospitals, colleges, and other services.

The city was an early centre of Abolitionist sentiment and became an important stop on the Underground Railroad, a route for escaped slaves. The Massachusetts branch of the Free-Soil Party, which opposed the extension of slavery, evolved out of a meeting (1848) held in Worcester. The city has several education institutions, including the College of the Holy Cross (1843; the oldest Roman Catholic college in New England), the Worcester State College (1874), Clark University (1887), Assumption College (opened 1904; university status 1950), and the Worcester campus of Becker College (1887). Landmarks include the Worcester Art Museum, the EcoTarium (formerly the New England Science Center), the Worcester Historical Museum, and the Higgins Armory Museum (with a notable collection of medieval armour). The annual Worcester Music Festival has provided classical music since 1858 and is the oldest music festival in the United States. Lake Quinsigamond and the Quinsigamond State Park are to the north. Inc. city, 1848. Pop. (2000) city, 172,648; Worcester PMSA, 511,389.

Worcester, EARLS AND MARQUESSES OF, titled English nobility of several creations, grouped below chronologically and indicated by the symbol •.

• Worcester, Thomas Percy, Earl of (b. *c.* 1344—d. July 23, 1403), English noble, brother of Henry Percy, 1st Earl of Northumberland, and uncle of Sir Henry Percy, called "Hotspur," and a party to their rebellions against Henry IV of England.

Thomas Percy served with distinction in France during the reign of Edward III; he also held an official position on the Scottish borders, and under Richard II he was the admiral of a fleet. He deserted Richard II in 1399 and was employed and trusted by Henry IV, but in 1403 he joined the other Percys in their revolt; he was taken prisoner at the Battle of Shrewsbury (July 21, 1403) and subsequently beheaded, the earldom becoming extinct.

• Worcester, John Tiptoft, 1st Earl of, Tiptoft also spelled TIBETOT (b. *c.* 1427, Everton, Bedfordshire, Eng.—d. Oct. 18, 1470, London), noted English Yorkist leader during the Wars of the Roses, known for his brutality and abuse of the law and called the "butcher of England."

The son of the 1st Baron Tiptoft, he was educated at Oxford, and in 1449 he was created Earl of Worcester. In 1456–57 he was deputy of Ireland, and in 1457 and again in 1459 he was sent on embassies to the pope. He was abroad three years, during which he made a pilgrimage to Jerusalem; the rest of the time he spent in Italy, at Padua, Ferrara, and Florence, studying law, Latin, and Greek. He returned to England early in the reign of Edward IV and on Feb. 7, 1462, was made constable of England. In 1462 he condemned John de Vere, 12th Earl of Oxford, and in 1464 Sir Ralph Grey and other Lancastrians. In 1467 he was again appointed deputy of Ireland. During a year's office there he had the Earl of Desmond attainted and cruelly put to death the earl's two infant sons. In 1470, as constable, he condemned 20 of the Earl of Warwick's adherents and had them impaled. On the Lancastrian restoration Worcester fled into hiding but was discovered and tried before John de Vere, 13th Earl of Oxford, son of the man whom he had condemned in 1462. He was executed on Tower Hill.

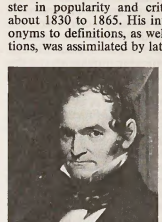
On the death of his son, Edward, in 1485 the earldom reverted to the crown.

• Worcester, Edward Somerset, 2nd Marquess of, also called (1628–44) LORD HERBERT OF RAGLAN, also called EARL OF GLAMORGAN (b. 1601—d. April 3, 1667, Lambeth?, near London, Eng.), prominent Royalist during the English Civil Wars.

His father, Henry Somerset, 5th Earl of Worcester, advanced large sums of money to Charles I at the outbreak of the wars and was created Marquess of Worcester in 1643. In the following year, Edward was created Earl of Glamorgan, though by somewhat irregular patents, and on the death of his father in 1646 succeeded to the marquessate of Worcester.

Somerset became prominent in 1644 and 1645 in connection with Charles's scheme for obtaining military help from Ireland and abroad, and in 1645 he signed at Kilkenny, on behalf of Charles, a treaty with the Irish Roman Catholics; but the king was obliged by the opposition of Ormonde and the Irish loyalists to repudiate his action. Under the Commonwealth he was banished from England and his estates were seized. At the Restoration his estates were restored, and he claimed the dukedom of Somerset promised to him by Charles I, but he did not obtain this, nor was his earldom of Glamorgan recognized.

Worcester, Joseph Emerson (b. Aug. 24, 1784, Bedford, N.H., U.S.—d. Oct. 27, 1865, Cambridge, Mass.), American lexicographer whose dictionaries rivaled those of Noah Webster in popularity and critical esteem from about 1830 to 1865. His introduction of synonyms to definitions, as well as other innovations, was assimilated by later lexicographers.



Joseph Worcester, detail of an oil portrait by Cephas Giovanni Thompson; in the collection of the Massachusetts Historical Society
By courtesy of the Massachusetts Historical Society; photograph, George M. Cushing

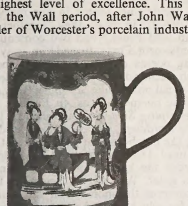
Beginning in 1817 Worcester wrote several works that were widely used as textbooks, including *A Gazetteer of the United States* (1818) and *Elements of History, Ancient and Modern* (1826). From about 1828 until his death, however, he devoted himself almost entirely to lexicography. His abridgment of Webster's large *American Dictionary of the English Language* in 1829 was followed by his own *Comprehensive Pronouncing and Explanatory Dictionary of the English Language* (1830), which introduced the "compromise vowel" in such words as half, past, and dance, a sound intermediate between the *a* in "cat" and the *a* in "father." The later work also elicited a charge of plagiarism from Webster and thus began a bitter publishing battle known as the "Dictionary War," which lasted until Worcester's death.

His *Universal and Critical Dictionary of the English Language* (1846) was followed by enlarged editions of the 1830 *Comprehensive.* Most notable among them was the 1855 edition with the new title *A Pronouncing, Explanatory, and Synonymous Dictionary of the English Language.* In addition to its pioneering introduction of synonymy, it also included, for the first time in an English dictionary, given names and their etymological derivations. Worcester's largest and most successful work was the illustrated quarto *Dictionary of the English Language* (1860).

In the second half of the 19th century Worcester's dictionaries gradually lost out in competition with those of Webster, and they eventually ceased to be published. This was due largely to the more enterprising promotional and editorial policies undertaken by the publisher of the Webster dictionaries.

Worcester Art Museum, in Worcester, Mass., one of the finest small art museums in the United States, whose collections span 50 centuries and whose exhibitions are often major events in the art world. The John Chandler Bancroft collection of some 3,000 Japanese prints is internationally renowned, as is the reconstructed 12th-century Romanesque chapter house from a French monastery near Poitiers. The museum opened in 1898.

Worcester porcelain, pottery ware made, under various managements, at a factory in Worcester, Eng., from 1751 until the present; the factory became the Worcester Royal Porcelain Company in 1862. Although the technical level of Worcester has been high at all periods, that between 1752 and 1783 marks the highest level of excellence. This era is called the Wall period, after John Wall, the founder of Worcester's porcelain industry.



Worcester porcelain mug; transfer-printed outlines were used for the chinoiserie design that is surrounded by a gilded scroll frame and contained within a fish-scale-patterned, "wet blue" ground, *c.* 1770; in the Victoria and Albert Museum, London

By courtesy of the Victoria and Albert Museum, London; photograph, EB Inc.

Of the many Worcester styles of the Wall period, a few examples may be singled out: painting in underglaze blue on vessels either molded or plain; from about 1756, transfer-printed designs in black, over the glaze, and later in blue under the glaze; transfer-printed outlines filled in by hand with overglaze colours by semiskilled workers; Japanese patterns of conventionalized plum blossoms, chrysanthemums, fish, and the like on panels alternating with panels of a wide range of formal or geometric patterns; and exotic birds, also in "reserves," or panels, on coloured grounds, especially a deep-blue ground heightened with gilding.

The ground colours of Worcester were an especial achievement, several shades being developed in emulation of Sèvres. Blue and other background colours were often painted in a way suggestive of fish scales. The Worcester palette also included a near-vermilion; reddish brown; pink and claret; sea green, leaf green, and pea green; pale yellow; turquoise; blues from pale sky to deepest cobalt. The gilding that often formed scrolls and curls defining the designs was delicate. In the 19th century Worcester remained one of the principal makers of ornamental porcelain, with many designs inspired by the Aesthetic Movement. In the 20th century their production included the American birds of Dorothy Doughty.

Worcestershire, administrative and historic county of England, located in the West Midlands region. The administrative county of Worcestershire comprises six districts: Bromsgrove, Malvern Hills, Wychavon, Wyre Forest, the borough of Redditch, and the city of Worcester. The administrative county covers a smaller and somewhat different area than the historic county and includes several small areas belonging to other historic counties.

A fertile lowland plain at the centre of the county is drained by the Rivers Severn and Avon (Upper Avon) and their tributaries, the Rivers Stour and Teme. To the west lie the Malvern Hills, more than 1,300 feet (400 metres) high; they consist of Precambrian gneisses and volcanic rocks. In the south the Avon valley, known as the Vale of Evesham, contains young Lias clays, which provide excellent soil for orchards and market gardening. The Jurassic escarpment of the Cotswolds rises sharply in the southeast. Silurian, Cambrian, and Precambrian rocks make up the Lickey Hills, which rise to 956 feet (291 m) and cross the county's northeastern part.

Worcestershire was heavily wooded in early times and consequently is not rich in prehistoric remains. There are, however, great Iron Age earthworks on the Malvern and the Bredon Hills that have been dated to the 2nd–1st centuries AD. A few traces of the area's Roman occupation have been found in Worcester. The earliest Anglo-Saxon settlers of the area were the Hwicce tribe in the 6th century BC. By 679 the Hwicceан kingdom formed a separate diocese at Worcester, which became not only an ecclesiastical centre but also the chief point of trade and military communications between England and Wales. The region was subsequently part of the kingdom of Mercia and was temporarily conquered by the Danes in the 9th century. The shire (county) originated as an administrative area after the Anglo-Saxons had recovered Mercia from the Danes.

The monastic movement was important during the Middle Ages, with at least 13 monastic foundations existing in the county between the 8th and 13th centuries. The monks of Evesham and Pershore began the cultivation of the flowers, fruits, and vegetables in the Vale of Evesham. At the time of Domesday Book (1086) the church owned more than half of Worcestershire, inhibiting the rise of a local aristocracy. Still, the ruins of the 11th-century Dudley Castle bear witness to the military interests of the county's Norman nobility.

Two decisive battles in English history were fought in Worcestershire. At Evesham in 1265 Simon de Montfort was slain by the forces of Edward (later Edward I), and at Worcester in 1651 a Parliamentary army led by Oliver Cromwell resoundingly defeated Charles II's Scottish forces and thus brought to an end the English Civil Wars.

From the late Middle Ages until the 17th century, Worcester and much of southern Worcestershire thrived on the production of wool and woolen cloth, and coal and iron were mined in the north as early as the 13th century. With the construction of canals in the 18th century and railways in the 19th century, its northern fringes became part of the growing metropolis of Birmingham and the heavily industrialized Black Country, famed for its coal mining and metal production.

Today, agriculture is a major activity. Fruits and vegetables are intensively cultivated in the southeast. In other rural areas, dairy farming predominates, and Worcestershire is also an important producer of hops. Heavy industry is important in Worcester and Bromsgrove, and there are machinery and metal industries in Redditch and Kidderminster (also famous for carpets). The manufacture of agricultural machinery, fruit canning and processing, cider production, and milk processing occur in Worcester and several market towns. Area administrative county, 670 square miles (1,735 square km). Pop. (1998 est.) administrative county, 538,200.

Word (theology and philosophy): *see* logos.

word processing, operation by which written, verbal, or recorded information is transformed into typewritten or printed form. A word-processing system can produce a wide variety of documents, including letters, memoranda, and manuals, rapidly and at relatively low cost.

The precursor of the modern word-processing system was developed in 1936. This device consisted of a kind of automatic typewriter, called an autotypist, that could store and reproduce simple documents. The autotypist used punched paper tape for its storage medium. In 1964 researchers at IBM produced the Selectric Typewriter, a relatively high-speed, automatic typewriter that had a magnetic tape data storage unit and retrieval device. The development of electronic digital minicomputers and microcomputers during the late 1960s and 1970s gave rise to faster word-processing systems with greater capabilities.

A typical advanced word-processing system consists of a laser printer that is linked to a computer. In many such systems the input terminal consists of an alphanumerical keyboard and a visual display composed of a cathode-ray tube (CRT). The CRT display enables the keyboard operator to input and also check, edit, or revise the information to be entered. The text of the document, including all corrections, additions, and deletions made by the keyboard operator, is recorded by the computer. When the final draft is ready, the operator prints as many copies of the document as required. The information can also be stored by the computer for later retrieval.

Worde, Wynkyn de, original name JAN VAN WYNKYN (d. 1534/35), Alsatian-born printer in London, an astute businessman who published a large number of books (at least 600 titles from 1501). He was also the first printer in England to use italic type (1524).

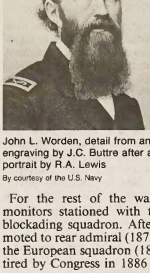
He was employed at William Caxton's press, Westminster (the first printing enterprise in England), upon its foundation in 1476 until Caxton's death in 1491, when he assumed control of the business. In 1500/01 he moved his press from Westminster to Fleet Street, London. Whereas Caxton and numerous continental European contemporaries were also editors and translators, Wynkyn was purely a commercial printer.

Worden, John L(orimer) (b. March 12, 1818, Westchester county, N.Y., U.S.—d. Oct. 18, 1897, Washington, D.C.), U.S. naval officer who commanded the Union warship *Monitor* against the Confederate *Virginia* (formerly *Merrimack*) in the first battle between ironclads (March 9, 1862) in the American Civil War (1861–65).

Appointed a midshipman in 1834, Worden received his early naval training with the Brazilian squadron (1835–38). He served on the Pacific Coast during the Mexican War (1846–48) and afterward in both the Mediterranean and the home fleets.

On Jan. 16, 1862, Worden was appointed to command John Ericsson's experimental ship, the *Monitor.* In March he took the cumbersome "cheese box on a raft" down the Atlantic Coast in perilous, stormy weather and engaged the larger ironclad *Virginia* at the

mouth of the James River. The three-hour battle ended when both withdrew from the conflict. Worden, stationed in the pilothouse, had been wounded in the face, however, and nearly blinded by a shell.



John L. Worden, detail from an engraving by J.C. Buttre after a portrait by R.A. Lewis
By courtesy of the U.S. Navy

For the rest of the war, he commanded monitors stationed with the South Atlantic blockading squadron. Afterward he was promoted to rear admiral (1872) and commanded the European squadron (1875–77). He was retired by Congress in 1886 at full pay for life.

Wordsworth, Dorothy (b. Dec. 25, 1771, Cockermouth, Cumberland, Eng.—d. Jan. 25, 1855, Rydal Mount, Westmorland), English prose writer whose *Alfoxden Journal 1798* and *Grasmere Journals 1800–03* are read today for the imaginative power of their description of nature, their perfection of style, and their revelation of a personality of unusual quality. The journals are also important for the light they throw on her brother, the Romanic poet William Wordsworth.



Dorothy Wordsworth, detail of an oil painting by Samuel Crosthwaite, 1835
By courtesy of Gordon Wordsworth; photograph, Hammonds, Hereford

Their mother's death in 1778 separated Dorothy from her brothers, and from 1783 they were without a family home. The sympathy between William and Dorothy was strong; she understood him as no one else could and provided the "quickening influence" he needed. When in 1795 he was lent a house in Dorset, she made a home for him there. At Alfoxden, Somerset, in 1796–98, she enjoyed with Wordsworth and Samuel Taylor Coleridge a companionship of "three persons with one soul." She went with them to Germany (1798–99), and in December 1799 she and William settled for the first time in a home of their own, Dove Cottage, Grasmere, in the Lake District, remaining there after his marriage (1802) and moving with the family to Rydal Mount in 1813.

In 1829 she was dangerously ill and henceforward was obliged to lead the life of an invalid. Her ill-health apparently affected her intellect, and during the last 20 years of her life her mind was clouded.

The descriptions in her *Journals* gave inspiration to Coleridge and Wordsworth, but she had no thought of professional authorship, writing only to please William. Her prose is spontaneous, transparent, and completely natural. As a record of her brother's life and the dates and circumstances of writing of almost all his poems in the years of his greatest poetic achievement, the *Grasmere Journals* is invaluable. The *Alfoxden Journal* is a record of William's friendship with Coleridge that resulted in their *Lyrical Ballads* (1798), with which the Romantic movement began; and the *Grasmere Journals* provides a picture of early 19th-century cottage life in a remote part of England.

None of her writings was published in her lifetime. The fullest edition of the *Journals*, with shorter descriptive pieces, is that by Ernest de Selincourt (1941). Helen Derbishire's edition of *The Alfoxden and Grasmere Journals*, and of poems by Wordsworth mentioned in them (1958), has an excellent introduction.

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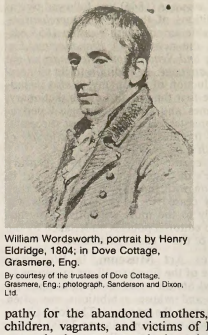
Wordsworth, William (b. April 7, 1770, Cockermouth, Cumberland, Eng.—d. April 23, 1850, Rydal Mount, Westmorland), major English Romantic poet and poet laureate of England (1843–50). His *Lyrical Ballads* (1798), written with Samuel Taylor Coleridge, helped launch the English Romantic movement.

Wordsworth was born in the Lake District of northern England, the second of five children of a modestly prosperous estate manager. He lost his mother when he was 7 and his father when he was 13, upon which the orphan boys were sent off by guardian uncles to a grammar school at Hawkshead, a village in the heart of the Lake District. At Hawkshead Wordsworth received an excellent education in classics, literature, and mathematics, but the chief advantage to him there was the chance to indulge in the boyhood pleasures of living and playing in the outdoors. The natural scenery of the English lakes could terrify as well as nurture, as Wordsworth would later testify in the line "I grew up fostered alike by beauty and by fear," but its generally benign aspect gave the growing boy the confidence he articulated in one of his first important poems, "Lines Composed a Few Miles Above Tintern Abbey . . . ," namely, "that Nature never did betray the heart that loved her."

Wordsworth moved on in 1787 to St. John's College, Cambridge. Repelled by the competitive pressures there, he elected to idle his way through the university, persuaded that he "was not for that hour, nor for that place." The most important thing he did in his college years was to devote his summer vacation in 1790 to a long walking tour through revolutionary France. There he was caught up in the passionate enthusiasm that followed the fall of the Bastille, and became an ardent republican sympathizer. Upon taking his Cambridge degree—an undistinguished "pass"—he returned in 1791 to France, where he formed a passionate attachment to a Frenchwoman, Annette Vallon. But before their child was born in December 1792, Wordsworth had to return to England and was cut off there by the outbreak of war between England and France. He was not to see his daughter Caroline until she was nine.

The three or four years that followed his return to England were the darkest of Wordsworth's life. Unprepared for any profession, rootless, virtually penniless, bitterly hostile to his own country's opposition to the French, he knocked about London in the company of radicals like William Godwin and learned to feel a profound sympathy for the abandoned mothers, beggars, children, vagrants, and victims of England's wars who began to march through the sombre poems he began writing at this time. This dark period ended in 1795, when a friend's legacy made possible Wordsworth's reunion with his beloved sister Dorothy—the two were never again to live apart—and their move in 1797 to Alfoxden House, near Bristol. There Wordsworth became friends with a fellow poet, Samuel Taylor Coleridge, and they formed a partnership that would change both poets' lives and alter the course of English poetry.



William Wordsworth, portrait by Henry Eldridge, 1804; in Dove Cottage, Grasmere, Eng.
By courtesy of the trustees of Dove Cottage, Grasmere, Eng.; photograph, Sanderson and Dixon, Ltd.

Their partnership, rooted in one marvelous year (1797–98) in which they "together wantoned in wild Poesy," had two consequences for Wordsworth. First it turned him away from the long poems on which he had laboured since his Cambridge days. These included poems of social protest like *Salisbury Plain*, loco-descriptive poems such as *An Evening Walk* and *Descriptive Sketches* (published in 1793), and *The Borderers*, a blank-verse tragedy exploring the psychology of guilt (and not published until 1842). Stimulated by Coleridge and under the healing influences of nature and his sister, Wordsworth began in 1797–98 to compose the short lyrical and dramatic poems for which he is best remembered by many readers. Some of these were affectionate tributes to Dorothy, some were tributes to daffodils, birds, and other elements of "Nature's holy plan," and some were portraits of simple rural people intended to illustrate basic truths of human nature.

Many of these short poems were written to a daringly original program formulated jointly by Wordsworth and Coleridge, and aimed at breaking the decorum of Neoclassical verse. These poems appeared in 1798 in a slim, anonymously authored volume entitled *Lyrical Ballads*, which opened with Coleridge's long poem "The Rime of the Ancient Mariner" and closed with Wordsworth's "Tintern Abbey." All but three of the intervening poems were Wordsworth's, and, as he declared in a preface to a second edition two years later, their object was "to choose incidents and situations from common life and to relate or describe them . . . in a selection of language really used by men, . . . tracing in them . . . the primary laws of our nature." Most of the poems were dramatic in form, designed to reveal the character of the speaker. The manifesto and the accompanying poems thus set forth a new style, a new vocabulary, and new subjects for poetry, all of them foreshadowing 20th-century developments.

The second consequence of Wordsworth's partnership with Coleridge was the framing of a vastly ambitious poetic design that teased and haunted him for the rest of his life. Cole-

ridge had projected an enormous poem to be called "The Brook," in which he proposed to treat all science, philosophy, and religion, but he soon laid the burden of writing this poem upon Wordsworth himself. As early as 1798 Wordsworth began to talk in grand terms of this poem, to be entitled *The Recluse*. To nerve himself up to this enterprise and to test his powers, Wordsworth began writing the autobiographical poem that would absorb him intermittently for the next 40 years, and which was eventually published in 1850 under the title *The Prelude, or, Growth of a Poet's Mind*. *The Prelude* extends the quiet autobiographical mode of reminiscence that Wordsworth had begun in "Tintern Abbey" and traces the poet's life from his school days through his university life and his visits to France, up to the year (1799) in which he settled at Grasmere. It thus describes a circular journey—what has been called a long journey home. But the main events in the autobiography are internal: the poem exultantly describes the ways in which the imagination emerges as the dominant faculty, exerting its control over the reason and the world of the senses alike.

The Recluse itself was never completed, and only one of its three projected parts was actually written; this was published in 1814 as *The Excursion* and consisted of nine long philosophical monologues spoken by pastoral characters. The first monologue (Book I) contained a version of one of Wordsworth's greatest poems, "The Ruined Cottage," composed in superb blank verse in 1797. This bleak narrative records the slow, pitiful decline of a woman whose husband had gone off to the army and never returned. For later versions of this poem Wordsworth added a reconciling conclusion, but the earliest and most powerful version was starkly tragic.

In the company of Dorothy, Wordsworth spent the winter of 1798–99 in Germany, where, in the remote town of Goslar, in Saxony, he experienced the most intense isolation he had ever known. As a consequence, however, he wrote some of his most moving poetry, including the "Lucy" and "Matthew" elegies and early drafts toward *The Prelude*. Upon his return to England, Wordsworth incorporated several new poems in the second edition of *Lyrical Ballads* (1800), notably two tragic pastorals of country life, "The Brothers" and "Michael." These poems, together with the brilliant lyrics that were assembled in Wordsworth's second verse collection, *Poems, in Two Volumes* (1807), help to make up what is now recognized as his great decade, stretching from his meeting with Coleridge in 1797 until 1808.

One portion of a second part of *The Recluse* was finished in 1806, but, like *The Prelude*, was left in manuscript at the poet's death. This portion, *Home at Grasmere*, joyously celebrated Wordsworth's taking possession (in December 1799) of Dove Cottage, at Grasmere, Westmorland, where he was to reside for eight of his most productive years. In 1802, during the short-lived Peace of Amiens, Wordsworth returned briefly to France, where at Calais he met his daughter and made his peace with Annette. He then returned to England to marry Mary Hutchinson, a childhood friend, and start an English family, which had grown to three sons and two daughters by 1810.

In 1805 the drowning of Wordsworth's favorite brother, John, the captain of a sailing vessel, gave Wordsworth the strongest shock he had ever experienced. "A deep distress hath humanized my Soul," he lamented in his "Elegiac Stanzas" on Peele Castle. Henceforth he would produce a different kind of poetry, defined by a new sobriety, a new restraint, and a lofty, almost Miltonic elevation of tone and diction. Wordsworth appeared to anticipate this turn in "Tintern Abbey," where he had learned to hear "the still, sad music of humanity," and again in the "Ode: Intimations of Immortality" (written in 1802–04; published in *Poems, in Two Volumes*). The theme of this ode is the loss of his power to see the things he had once seen, the radiance, the "celestial light" that seemed to lie over the landscapes of his youth like "the glory and freshness of a dream." Now, in the Peele Castle stanzas, he sorrowfully looked back on the light as illusory, as a "Poet's dream," as "the light that never was, on sea or land."

These metaphors point up the differences between the early and the late Wordsworth. It is generally accepted that the quality of his verse fell off as he grew more distant from the sources of his inspiration and as his Anglican and Tory sentiments hardened into orthodoxy. Today many readers discern two Wordsworths, the young Romantic revolutionary and the aging Tory humanist, risen into what John Keats called the "Egotistical Sublime." Little of Wordsworth's later verse matches the best of his earlier years.

In his middle period Wordsworth invested a good deal of his creative energy in odes, the best known of which is "On the Power of Sound." He also produced a large number of sonnets, most of them strung together in sequences. The most admired are the Duddon sonnets (1820), which trace the progress of a stream through Lake District landscapes and blend nature poetry with philosophic reflection in a manner now recognized as the best of the later Wordsworth. Other sonnet sequences record his tours through the European continent, and the three series of *Ecclesiastical Sketches* (1822) develop meditations, many sharply satirical, on church history. But the most memorable poems of Wordsworth's middle and late years were often cast in elegaic mode. They range from the poet's heart-felt laments for two of his children who died in 1812—laments incorporated in *The Excursion*—to brilliant lyrical effusions on the deaths of his fellow poets James Hogg, George Crabbe, Coleridge, and Charles Lamb.

In 1808 Wordsworth and his family moved from Dove Cottage to larger quarters in Grasmere, and five years later they settled at Rydal Mount, near Ambleside, where Wordsworth spent the remainder of his life. In 1813 he accepted the post of distributor of stamps for the county of Westmorland, an appointment that carried the salary of £400 a year. Wordsworth continued to hold back from publication *The Prelude*, *Home at Grasmere*, *The Borderers*, and *Salisbury Plain*. He did publish *Poems, in Two Volumes* in 1807; *The Excursion* in 1814, containing the only finished portions of *The Recluse;* and the collected *Poems* of 1815, which contained most of his shorter poems and two important critical essays as well. Wordsworth's other works published during middle age include *The White Doe of Rylstone* (1815), a poem about the pathetic shattering of a Roman Catholic family during an unsuccessful rebellion against Elizabeth I in 1569; a *Thanksgiving Ode* (1816); and *Peter Bell* (1819), a poem written in 1798 and then modulated in successive rewritings into an experiment in Romantic irony and the mock-heroic and coloured by the poet's feelings of affinity with his hero, a "wild and woodland rover." *The Waggoner* (1819) is another extended ballad about a North Country itinerant.

Through all these years Wordsworth was assailed by vicious and tireless critical attacks by contemptuous reviewers; no great poet has ever had to endure worse. But finally, with the publication of *The River Duddon* in 1820, the tide began to turn, and by the mid-1830s his reputation had been established with both critics and the reading public.

Wordsworth's last years were given over partly to "tinkering" his poems, as the family called his compulsive and persistent habit of revising his earlier poems through edition after edition. *The Prelude*, for instance, went through four distinct manuscript versions (1798–99, 1805–06, 1818–20, and 1832–39) and was published only after the poet's death in 1850. Most readers find the earliest versions of *The Prelude* and other heavily revised poems to be the best, but flashes of brilliance can appear in revisions added when the poet was in his seventies.

Wordsworth succeeded his friend Robert Southey as Britain's poet laureate in 1843 and held that post until his own death in 1850. Thereafter his influence was felt throughout the rest of the 19th century, though he was honoured more for his smaller poems, as singled out by the Victorian critic Matthew Arnold, than for his masterpiece, *The Prelude*. In the 20th century his reputation was strengthened both by recognition of his importance in the Romantic movement and by an appreciation of the darker elements in his personality and verse.

William Wordsworth was the central figure in the English Romantic revolution in poetry. His contribution to it was twofold. First, he formulated in his poems and his essays a new attitude toward nature. This was more than a matter of introducing nature imagery into his verse; it amounted to a fresh view of the organic relation between man and the natural world, and it culminated in metaphors of a wedding between nature and the human mind, and beyond that, in the sweeping metaphor of nature as emblematic of the mind of God, a mind that "feeds upon infinity" and "broods over the dark abyss." Second, Wordsworth probed deeply into his own sensibility as he traced, in his finest poem, *The Prelude*, the "growth of a poet's mind." *The Prelude* was in fact the first long autobiographical poem. Writing it in a drawn-out process of self-exploration, Wordsworth worked his way toward a modern psychological understanding of his own nature, and thus more broadly of human nature. Third, Wordsworth placed poetry at the centre of human experience; in impassioned rhetoric he pronounced poetry to be nothing less than "the first and last of all knowledge—it is as immortal as the heart of man," and he then went on to create some of the greatest English poetry of his century. It is probably safe to say that by the late 20th century he stood in critical estimation where Coleridge and Arnold had originally placed him, next to John Milton—who stands, of course, next to William Shakespeare.

(S.M.P.)

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Abrams (ed.), *Wordsworth: A Collection of Critical Essays* (1972); Kenneth R. Johnston and Gene W. Ruoff (eds.) *The Age of William Wordsworth* (1987); Kenneth R. Johnston *et al.* (eds.), *Romantic Revolutions: Criticism and Theory* (1990); and Pauline Fletcher and John Murphy (eds.), *Wordsworth in Context* (1992).

work, in economics and sociology, the activities and labour necessary to the survival of society.

A brief treatment of work follows. For full treatment, *see* MACROPAEDIA: Work and Employment.

The major activity of early humans was hunting and gathering food. As early as 40,000 BC, hunters began to work in groups to track and kill animals. Younger or weaker members of the tribe were more naturally suited to gathering food. It seems likely that women, because of the requirements of pregnancy and nursing, did not generally participate in hunting.

Some primitive peoples demonstrated an aptitude for making weapons, thus providing an early instance of the division of labour. When agricultural cultivation replaced simple gathering, the resulting modest surplus of food freed some members of the tribe to pursue crafts such as pottery making, textiles, and metallurgy.

A sufficient food supply and the development of copper and bronze tools laid the groundwork for more complex societies that could support larger populations; as towns were established, new specialized occupations developed in commerce, law, medicine, and defense. The increasing complexity of these economies required permanent records; thus, writing and bookkeeping evolved.

These civilizations, and the later societies of Greece and Rome, were characterized by rigid, hereditary, hierarchical class structures. Kings and nobles ruled, supported by warriors; priests served as government officials; merchants dealt in the products of artisans and craftsmen; peasants worked family farms; and slaves worked in mines and craft workshops. These craft workshops were prototypes of the modern factory, producing metal weapons and tools with fewer than a dozen workers under the direction of a master craftsman. Larger projects, such as pyramids and aqueducts, were directed by master builders, who were assisted by foremen and scribes. The work required labourers of varying degrees of skill ranging from craftsmen to slaves.

Some of this organizational sophistication was lost in Europe immediately after the disintegration of the Roman Empire, as social life contracted into smaller, self-enclosed spheres. Nobles owned tracts of land that were farmed by peasants, who were bound to their plots by inheritance. The peasants turned over much of their produce to the nobles in return for military protection. The church was also an important feature of the medieval economy, offering work to masons, carvers, and glaziers.

As town life grew more vigorous, craft guilds assumed greater importance, reaching their peak in the 14th century. Their purpose was to limit the supply of labour in a profession and to control production. Guild members were ranked according to experience: masters, journeymen, and apprentices. Strains developed within the guilds as some masters discovered that trading in raw materials and finished products held greater rewards than craftsmanship; others discovered that they could secure greater profits by excluding journeymen from promotion to the master class. Thus, apprentices and journeymen became a class of free labourers, and the employer-employee relationship was established.

Beginning about AD 1000, wind and water power began to replace or assist human labourers in tanning, grain processing, olive pressing, and the operation of bellows in mines and blast furnaces. Mechanization had little effect on large construction projects, however: churches and castles were built by strongly individualistic craftsmen under the direction of a master mason who not only designed the building but handled accounts and bought raw materials.

Technological advances, combined with worldwide exploration and colonization by European powers, did eventually change economic life profoundly. Some guild masters were able to accumulate large amounts of capital, forcing less-successful masters to become wage labourers. This transition was most pronounced in England, where it was encouraged through the granting of monopolistic charters, the evolution of finance and trade, and the development of machinery, particularly steam power, in the 18th century.

Early factories divided the work previously done by a single craftsman into a number of distinct tasks, each performed by low-paid unskilled or semiskilled workers with the assistance of machinery. This new organization shortened the time required to produce an item, lowered its cost, and often improved its quality. Workers, however, who previously had controlled production, rebelled at the discipline required in such factories, and it became necessary to install a supervisory hierarchy far more complex than that required for preindustrial management.

The factory system both encouraged and required the growth of large cities. Urbanization demanded greater agricultural productivity, which was achieved through the use of fertilizers, scientific breeding practices, and mechanization. The colonies of the New World provided Europe's cities with agricultural products, often produced by slaves.

The production of large quantities of goods at low cost through the use of standardized parts and extensive division of labour was made possible by the development of machine tools (lathe-like machines for shaping metals) in the 19th century. Mass production encouraged manufacturing firms to grow much larger, demanding ever more specialized positions for managers, supervisors, accountants, scientists, engineers, technicians, salesmen, and others. Clerical work in some cases came to be organized according to principles similar to those of the industrial assembly line.

Continuing trends toward specialization and professionalization of work gave rise in industrial nations in the 20th century to a number of disciplines concerned with various aspects of work, including personal comfort and motivation of workers, efficiency of technology, efficiency of entire systems, productivity, and the application of science to industry. Among these disciplines, some of whose functions overlap, are production management, industrial relations, personnel administration, research and development, human-factors engineering, operations research, and systems engineering.

work, in physics, measure of energy transfer that occurs when an object is moved over a distance by an external force at least part of which is applied in the direction of the displacement. If the force is constant, work may be computed by multiplying the length of the path by the component of the force acting along the path. Work done on a body is accomplished not only by a displacement of the body as a whole from one place to another but also, for example, by compressing a gas, by rotating a shaft, and even by causing invisible motions of the particles within a body by an external magnetic force.

No work, as understood in this context, is done unless the object is displaced in some way and there is a component of the force along the path over which the object is moved. Holding a heavy object stationary does not transfer energy to it, because there is no displacement. Holding the end of a rope on which a heavy object is being swung around at constant speed in a circle does not transfer energy to the object, because the force is toward the centre of the circle at a right angle to the displacement. No work is done in either case.

The mathematical expression for work depends upon the particular circumstances. Work done in compressing a gas at constant temperature may be expressed as the product of pressure times the change in volume. Work done by a torque in rotating a shaft may be expressed as the product of the torque times the angular displacement.

Work done on a body is equal to the increase in the energy of the body, for work transfers energy to the body. If, however, the applied force is opposite to the motion of the object, the work is considered to be negative, implying that energy is taken from the object. The units in which work is expressed are the same as those for energy, for example, in the metre-kilogram-second system, joule (newton-metre); in the centimetre-gram-second system, erg (dyne-centimetre); and in the English system, foot-pound.

work function, electronic: *see* electronic work function.

work hardening, in metallurgy, increase in hardness of a metal induced, deliberately or accidentally, by hammering, rolling, drawing, or other physical processes. Although the first few deformations imposed on metal by such treatment weaken it, its strength is increased by continued deformations. The reason for this seeming paradox lies in the crystalline structure of metal. As stresses are exerted, the crystals slip against each other; but, because of the complexity of the crystal structure, the more such slips are multiplied, the more they tend to place obstacles in the way of further slippage, because the various dislocation lines crisscross each other. *See also* tempering.

Work Projects Administration: *see* Works Progress Administration.

work song, any song that belongs to either of two broad categories: songs used as a rhythmic accompaniment to a task and songs used to make a statement about work. Used by workers of innumerable occupations worldwide, work songs range from the simple hum of a solitary labourer to politically and socially conscious protests against working conditions or the quality of workers' lives.

Distinctive songs exist for different kinds of work and in different geographic variations. The *gayap* are traditional agricultural working songs of Trinidad; Japanese labourers sing *min-yo;* work cooperatives in the Dominican Republic rally around the *plena.* During and after the era of slavery, black American workers developed a vast repertoire of spirituals and, ultimately, the blues, out of older work song traditions. Rarely have work songs been written down. Even as recently as 100 years ago the majority of labourers were illiterate.

Work songs sung on the job usually are intended to relieve the boredom of a repetitive task or to increase efficiency by maintaining a regular rhythm. These songs often incorporate the grunts and movements of workers and the sounds of their implements as counterpoint. The words of such songs may reflect the nature of the work (as in the "mark twain quarter twain" of Mississippi River boatmen) or tell a story little related to the task except in its rhythm (*e.g.,* the shanty; *q.v.*). The advent of loud machinery drastically diminished the use of on-the-job work songs.

Songs of the second type voice commonly held feelings of exploitation, pride, bitterness, and boredom and have in recent centuries been widely used to disseminate ideas or gen-

erate support. In 16th- and 17th-century England ballads and topical political songs often had to be kept secret; they gathered listeners with opening lines such as "Come lad and listen to my song, a song of honest toil." Songs of American blacks frequently expressed despair and sadness over the oppressed labourer's plight (*e.g.*, "What's the use of working so hard in the morning?/ My gal works in a white man's yard").

American industrial workers in the early 20th century rallied around songs calling the workers to progressive action. Immigrant groups, textile workers, and notably the Industrial Workers of the World organization, or "Wobblies," gave rise to numerous such songs, often associated with leftist movements.

Worker, The (newspaper): *see* Daily World.

worker-priest, in the Roman Catholic church, member of a movement, especially in France and Belgium after World War II, seeking to reach the working classes, who had become largely alienated from the church. The worker-priests set aside their clerical garb and left their clerical dwellings to take jobs in factories and on construction sites, sharing the living conditions and social and economic problems of their coworkers. The movement was given support by Cardinal Emmanuel Suhard of Paris. Their experiences impelled some of the worker-priests to become politically active, joining their fellow workers in various demonstrations regarding such matters as housing, antiracism, and peace. The movement was ordered discontinued in 1954 by Pius XII and again in 1959 by John XXIII. In 1965 Paul VI approved it in modified form.

workers' compensation, also called WORK INJURY COMPENSATION, social-welfare program through which employers bear some of the cost of their employees' work-related injuries and occupational diseases. Workers' compensation was first introduced in Germany in 1884, and by the middle of the 20th century most countries in the world had some kind of workers' compensation or employment injuries legislation. Some systems take the form of compulsory social insurance; in others the employer is legally required to provide certain benefits, but insurance is voluntary. Employment injury benefits are financed by employers in most countries.

In common-law countries such legislation is based upon a doctrine of strict liability, or liability without fault. This is a departure from the principle of tort law, in which the injured party receives no damages unless it can be shown that someone else maliciously or negligently caused the damage. The rationale for the "social fault doctrine" is that, under conditions of modern industrial employment, employers are in the best position to prevent accidents and disease and should therefore be given economic incentive to take preventive action.

Because the older common law made it difficult for a worker to obtain compensation from an employer, there was a movement in the latter part of the 19th century in Great Britain and the United States to modify, by court decisions and by employer liability statutes, the common-law defenses of the employer and to specify, through safety codes, the employer's particular duties to provide safe working conditions. The system of workers' compensation gradually displaced the safety codes.

Workers' Opposition, Russian RABOCHAYA OPPOZITSIYA, in the history of the Soviet Union, a group within the Communist Party that achieved prominence in 1920–21 as a champion of workers' rights and trade union control over industry. Its defeat established a precedent for suppressing dissent within the party, thus enabling Joseph Stalin eventually to establish his dictatorial control.

The group began to develop in 1919, resisting the domination of central party organs over local party units and trade unions. The group also resisted the party's minimization of the role of workers in controlling industrial enterprises, the increasing use of so-called bourgeois specialists in industry, and the party's efforts to replace group control of enterprises with one-man management. It became a distinct opposition group in 1920–21 when it objected to Leon Trotsky's plan to transform trade unions into state organs.

The Workers' Opposition, composed largely of trade unionists and led by A.G. Shlyapnikov, S.P. Medvedev, and later Aleksandra Kollontay, not only objected to the subordination of the trade unions but also insisted that the unions, as the institutions most directly representing the proletariat, should control the national economy and individual enterprises. Although the group received substantial support from the rank-and-file party membership, no major leaders joined its cause.

At the 10th Party Congress (March 1921) its platform was rejected, its ideas were condemned, and it was ordered to disperse. Its members, nevertheless, continued to agitate, complaining particularly about the lack of democracy within the party, the central leadership's lack of respect for the workers and local autonomy, and the manner in which the party leaders were endeavouring to break up the opposition by transferring its adherents to remote regions.

The 11th Party Congress (March–April 1922) refrained from expelling the Workers' Opposition leaders from the party but censured them and forced them to curtail their activities. In 1926 the remaining members of the Workers' Opposition briefly joined other opposition elements in an unsuccessful effort to prevent Stalin from gaining complete control over the party. By 1933 all the leaders of the Workers' Opposition had been expelled from the party; with the purges of the 1930s all except Kollontay disappeared.

workhouse, institution to provide employment for paupers and sustenance for the infirm, found in England from the 17th through the 19th century and also in such countries as The Netherlands and in colonial America.

The Poor Law of 1601 in England assigned responsibility for the poor to parishes, which later built workhouses to employ paupers and the indigent at profitable work. It proved difficult to employ them on a profitable basis, however, and during the 18th century workhouses tended to degenerate into mixed receptacles where every type of pauper, whether needy or criminal, young or old, infirm, healthy, or insane, was dumped. These workhouses were difficult to distinguish from houses of correction. According to prevailing social conditions, their inmates might be let out to contractors or kept idle to prevent competition on the labour market.

The Poor Law Amendment of 1834 standardized the system of poor relief throughout Britain, and groups of parishes were combined into unions responsible for workhouses. Under the new law, all relief to the able-bodied in their own homes was forbidden, and all who wished to receive aid had to live in workhouses. Conditions in the workhouses were deliberately harsh and degrading in order to discourage the poor from relying on parish relief. Conditions in the workhouses improved later in the 19th century, and social-welfare services and the social-security system supplanted workhouses altogether in the first half of the 20th century.

Works Progress Administration (WPA), also called (1939–43) WORK PROJECTS ADMINISTRATION, work program for the unemployed that was created in 1935 under U.S. President Franklin D. Roosevelt's New Deal. While critics called the WPA an extension of the dole or a device for creating a huge patronage army loyal to the Democratic Party, the stated purpose of the program was to provide useful work for millions of victims of the Great Depression and thus to preserve their skills and self-respect. The economy would in turn be stimulated by the increased purchasing power of the newly employed, whose wages under the program ranged from $15 to $90 per month.

During its eight-year existence the WPA put some 8.5 million people to work (over 11 million were unemployed in 1934) at a cost to the federal government of approximately $11 billion. The agency's construction projects produced more than 650,000 miles (1,046,000 km) of roads; 125,000 public buildings; 75,000 bridges; 8,000 parks; and 800 airports. The Federal Arts Project, Federal Writers' Project, and Federal Theater Project—all under WPA aegis—employed thousands of artists, writers, and actors in such cultural programs as the creation of art work for public buildings, the documentation of local life, and the organization of community theatres. The WPA also sponsored the National Youth Administration, which sought part-time jobs for young people.

In 1939 the Works Progress Administration altered its name to Work Projects Administration, in that year increasing charges of mismanagement and of abuse of the program by workers led to a reduction in appropriations, and a strike by construction workers against wage cuts was unsuccessful. In 1943, with the virtual elimination of unemployment by a wartime economy, the WPA was terminated.

Worksop, town in Bassetlaw district, county of Nottinghamshire, England. It lies along the Chesterfield Canal close to Sherwood Forest. The priory church in the town dates partly from the 12th–13th century. Granted a royal charter in 1296, Worksop became a centre of coal mining in the 19th century when the deep coal seams of the area began to be exploited. The town's industry has expanded since World War II; the 100-acre (400-hectare) Dukeries Industrial Area is named for a group of former ducal estates, parts of which are still preserved as parkland. Pop. (1981) 34,993.

workstation, a high-performance computer system that is basically designed for a single user and has advanced graphics capabilities, large storage capacity, and a powerful microprocessor (central processing unit). A workstation is more capable than a personal computer (PC) but is less advanced than a midrange computer (which can manage a large network of peripheral PCs or workstations and handle immense data-processing and reporting tasks). The term workstation is also sometimes ascribed to dumb terminals (*i.e.*, without any processing capacity) that are connected to mainframe computers.

Most workstation microprocessors employ reduced instruction set computing (RISC) architecture, as opposed to the complex instruction set computing (CISC) used in most PCs. Because it reduces the number of instructions permanently stored in the microprocessor, RISC architecture streamlines and accelerates data processing. A corollary of that feature is that applications software run by workstations must include more instructions and complexity than CISC-architecture applications. Workstation microprocessors typically offer 32-bit addressing (indicative of data-processing speed), compared to the exponentially slower 16-bit systems found in most PCs. Some advanced workstations employ 64-bit processors, which possess four billion times the data-addressing capacity of 32-bit machines.

Their raw processing power allows high-end workstations to accommodate high-resolution

or three-dimensional graphic interfaces, sophisticated multitask software, and advanced abilities to communicate with other computers. Workstations are used primarily to perform computationally intensive scientific and engineering tasks. They have also found favour in some complex financial and business applications. In addition, high-end workstations often serve a network of attached "client" PCs, which use resident tools and applications to access and manipulate data stored on the workstation.

The workstation was developed in the United States in 1981 by the National Aeronautics and Space Administration for its Apollo space program and was introduced commercially in 1983. The chief delineation between PCs and workstations has traditionally been the latter's advanced graphics and data-processing capabilities. But advanced graphic interfaces, powerful microprocessors, and the integration of RISC technology into high-end PCs makes them barely distinguishable from low-end workstations. Likewise, high-end, 64-bit workstations closely mimic the processing prowess of some midrange computer systems.

World Alliance of Reformed Churches (Presbyterian and Congregational), cooperative international organization of Presbyterian, Congregational, and Reformed churches that was formed in Nairobi, Kenya, in 1970 by the merger of the International Congregational Council with the Alliance of the Reformed Churches Throughout the World Holding the Presbyterian System (also called the World Alliance of Reformed Churches).

The International Congregational Council, organized in London in 1891, was an association of Congregational and some Independent and United churches. Its purpose was to foster fellowship and service among its members, but it had no authority over them.

The Alliance of the Reformed Churches Throughout the World Holding the Presbyterian System was organized in London in 1875 by Presbyterian and Reformed churches. It was the oldest international Protestant confessional body in the world. A voluntary organization, the Alliance encouraged fellowship and cooperation among its member churches and promoted their common interests. The World Alliance of Reformed Churches had approximately 70 million members in the late 20th century.

World Bank: *see* International Bank for Reconstruction and Development.

World Book Encyclopedia, The, American encyclopaedia designed to meet the curriculum needs of elementary through high-school students. It is published in Chicago, Ill.

The World Book was first published in 1917 and was revised annually from 1925. This specific-entry reference work, generally issued in 22 volumes, emphasizes geography and biography and gives broad treatment to such subject areas as business, psychology, government, energy, ecology, and criminology. Patterns of use by students are tested continually in classrooms throughout the United States and Canada. Contributors include authorities in the physical, biological, and social sciences and other fields.

It features thorough cross-references, and lists of related articles are included at the end of entries on major subjects. A general index is augmented by some numerous reading and study guides. Illustrations and maps are extensive and of high quality. Yearbooks are issued.

In 1990 the first CD-ROM version of the encyclopaedia, *The World Book Information Finder*, was issued in DOS format. It contained the encyclopaedia's text and tables. *The World Book Multimedia Encyclopedia,* available for Windows and Macintosh operating systems, followed in 1995 and provided illustrations, maps, tables, and text. In 1998 the company launched World Book Online, a comprehensive Internet version of the printed encyclopaedia.

World Council of Churches (WCC), ecumenical organization founded in 1948 in Amsterdam as "a fellowship of Churches which accept Jesus Christ our Lord as God and Saviour." The WCC is not a church, nor does it issue orders or directions to the churches. It works for the unity and renewal of the Christian denominations and offers them a forum in which they may work together in the spirit of tolerance and mutual understanding.

The WCC originated out of the ecumenical movement, which, after World War I, resulted in two organizations. The Life and Work Movement concentrated on the practical activities of the churches, and the Faith and Order Movement focused on the beliefs and organization of the churches and the problems involved in their possible reunion. Before long, the two movements began to work toward establishing a single organization. In 1937 the Faith and Order Conference at Edinburgh and the Life and Work Conference at Oxford accepted the plan to create one council. A conference of church leaders met in 1938 in Utrecht, Neth., to prepare a constitution; but World War II intervened, and the first assembly of the WCC could not be held until 1948. In 1961 the International Missionary Council united with the WCC.

The WCC's members include most Protestant and Eastern Orthodox bodies but not the Roman Catholic church. The Southern Baptists of the United States are among Protestant nonmembers. The controlling body of the WCC is the assembly, which meets at intervals of approximately six years at various locations throughout the world. The assembly appoints a large central committee that in turn chooses from its membership an executive committee of 26 members, which, along with specialized committees and 6 copresidents, carries on the work between assemblies. The headquarters of the council, in Geneva, has a large staff under a general secretary.

The work of the WCC is divided into three main divisions: church relations, ecumenical study and promotion, and interchurch aid and service to refugees. Under these divisions are a number of groups and commissions, such as faith and order, the commission on the life and work of the laity in the church and on the cooperation of men and women in church and society.

World Cup, formally FIFA WORLD CUP, in association football (soccer), trophy that symbolizes the world championship. The first competition for the cup was organized in 1930 by the Fédération Internationale de Football Association (FIFA) and was won by Uruguay. Held every four years since that time, except during World War II, the competition consists of international sectional tournaments leading to a final elimination event made up of 16 national teams. Unlike Olympic association football, World Cup teams are not limited to amateur players, and so the competition serves more nearly as a contest between the world's best players. Referees are selected from lists that are submitted by all the national associations.

The trophy cup awarded from 1930 to 1970 was the Jules Rimet Trophy, named for the Frenchman who proposed the tournament. This cup was permanently awarded in 1970 to four-time winner Brazil (1958, 1962, 1970, and 2002), and a new trophy called the FIFA World Cup was put up for competition. For winners, *see* Sporting Record: *Football*.

World Cup, formerly (until 1967) CANADA CUP, in golf, trophy awarded to the winner of an annual competition for two-man professional teams representing nations. It was initiated in 1953 by the Canadian industrialist John Jay Hopkins. The event involves teams from more than 40 nations in a four-day, 72-hole stroke competition. The team with the lowest final total is the winner. An award is also made to the individual with the lowest score. For winning teams, *see* Sporting Record: *Golf*.

World Cup, in skiing, trophy awarded annually since 1967 to the top male and female alpine skiers. In World Cup competition, skiers accumulate points in the three alpine events (downhill, slalom, and giant slalom) at designated meets throughout the winter. The winners are the male and female skiers with the highest point totals. The World Cup competition is supervised by the Fédération Internationale de Ski. For winners, *see* Sporting Record: *Skiing*.

world dawn (myth): *see* Dreaming, the.

World Evangelical Fellowship, international fellowship of organizations that hold biblically conservative interpretations of the Christian faith. *See* Evangelical Alliance.

World Federation of Trade Unions (WFTU), French FÉDÉRATION SYNDICALE MONDIALE, leftist-oriented international labour organization founded in 1945 by the World Trade Union Congress. Its principal organizers were the British Trades Union Congress, the U.S. Congress of Industrial Organizations, and the All-Union Central Congress of Trade Unions. The organization was initially oriented toward the Soviet Union. Despite vigorous attempts to reconcile the differences between communist and noncommunist factions within the WFTU, the intensification of the Cold War finally led to a split. The noncommunist elements withdrew from the WFTU and in 1949 formed the International Confederation of Free Trade Unions (*q.v.*). The largest WFTU affiliates are now in the developing nations of Asia, Latin America, and Africa, although France and Italy also have sizable affiliates. The WFTU maintains its headquarters in Prague, Czech Republic.

world grief (critical term): *see* Weltschmerz.

World Health Organization (WHO), French ORGANISATION MONDIALE DE LA SANTÉ, specialized agency of the United Nations established in 1948 to further international cooperation for improved health conditions. Although it inherited specific tasks relating to epidemic control, quarantine measures, and drug standardization from the Health Organization of the League of Nations (set up in 1923) and the International Office of Public Health at Paris (established in 1909), WHO was given a broad mandate under its constitution to promote the attainment of "the highest possible level of health" by all peoples. WHO defines health positively as "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity."

With administrative headquarters in Geneva, WHO operates through three principal organs: the World Health Assembly, which meets annually as the general policy-making body; an Executive Board of health specialists elected for three-year terms by the assembly; and a Secretariat, which has regional offices and field staff throughout the world. The organization is financed primarily from annual contributions made by member governments on the basis of relative ability to pay. In addition, after 1951, WHO was allocated substantial resources from the expanded technical-assistance program of the UN.

The work of WHO may be divided into three categories:

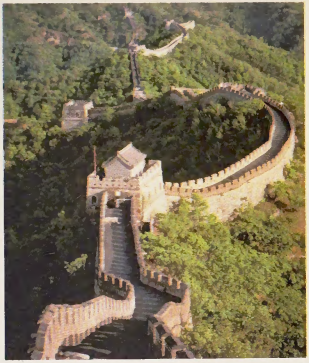
1. It provides a central clearinghouse and research services. It established a codified set of international sanitary regulations, for example, designed to standardize quarantine measures



Kilauea erupting, in Hawaii Volcanoes National Park, Hawaii, U.S.



African elephants traveling across the Serengeti Plain after a thunderstorm, in Serengeti National Park, northern Tanzania.



The Great Wall of China, sections of which were begun during the 7th century BC. Most of the sections still standing date from c. AD 1500.

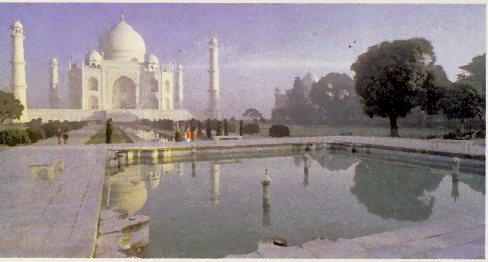


One of several figures among the Nazca Lines, which date from c. 200 BC to AD 600, in southern Peru.

Plate 1: Photographs. Centre (top left) Douglas Peebles; (top right) W. Perry Conway; (centre right) Dallas and John Heaton; (bottom) Charles and Josette Lenars



The Segovia aqueduct, built during the reign of the Roman emperor Trajan (AD 98–117), in Segovia, Spain.



The Tāj Mahal, considered the world's finest example of Mughal architecture, in Āgra, northern India.



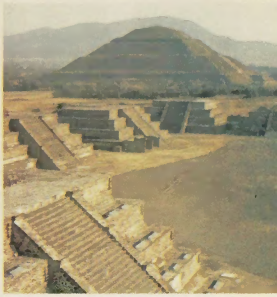
The ancient Acropolis of Athens, Greece.

San Bartolomé Island, one of the Galapagos Islands, located about 600 miles (1,000 km) west of the mainland of Ecuador.



Plate 2: (Bottom) Andrea Toback; all other photographs, Corbis: (top) Vanni Archive; (centre left) Robert Holmes; (centre right) Wolfgang Kaehler





The Pyramid of the Sun, in the ancient ruined city of Teotihuacán, Mexico.

(Left) Ṣan'ā', the historic capital of Yemen.

(Below) The limestone pillars of Ha Long Bay, on the Gulf of Tonkin, northern Vietnam.

Plate 3: Photographs, Corbis: (top left) Charles and Josette Lenars; (top right) Werner Forman; (bottom) Catherine Karnow



Selected UNESCO World Heritage sites

site*	country	notes
Africa		
Abū Ruwaysh	Egypt	archaeological remains
Aksum	Ethiopia	historic monuments
Carthage	Tunisia	remains of ancient city
Dahshūr	Egypt	pyramids and funerary complex
Giza	Egypt	pyramids and funerary complex
Gorée Island	Senegal	slave-trading depot
Great Zimbabwe	Zimbabwe	ruins of Shona capital
Hadar	Ethiopia	early hominid remains
Karnak	Egypt	Theban temple ruins
Kilimanjaro	Tanzania	montane national park and reserve
Kings, Valley of the	Egypt	Theban necropolis
Lalibela	Ethiopia	rock-hewn medieval churches
Leptis Magna	Libya	remains of Roman architecture
Luxor	Egypt	Theban ruins
Marrakech	Morocco	historic medina
Memphis	Egypt	remains of ancient city
Mount Kenya	Kenya	national park and forest reserve
Ngorongoro	Tanzania	wildlife conservation area
Olduvai Gorge	Tanzania	early hominid remains
Philae	Egypt	Nubian monuments
Saqqārah	Egypt	step pyramid and funerary complex
Serengeti	Tanzania	national park, wildlife refuge
Thebes	Egypt	ruins of ancient Egyptian capital
Timbuktu	Mali	medieval centre of Islāmic culture
Victoria Falls	Zambia and Zimbabwe	national parks, cataracts, Zambezi River, rainforest, and wildlife
Virunga	Congo (Kinshasa)	national park, diversity of habitats
Asia		
Ajanta Caves	India	rock-cut Buddhist monasteries
Angkor	Cambodia	archaeological remains
Ayutthaya	Thailand	ruins of capital complex
Baikal, Lake	Russia	unique freshwater environment
Borobudur	Indonesia	Buddhist temple compound
Ch'in tomb	China	archaeological site, terra-cotta army
Choghā Zanbīl	Iran	ruins of Elamite city
Chou-k'ou-tien	China	early hominid habitation
Damascus	Syria	historic city centre
Delhi	India	historic monuments and tomb
Elephanta Island	India	Hindu cave temple
Ellora Caves	India	Hindu, Buddhist, Jaina cave temples
Everest, Mount	Nepal	montane national park
Forbidden City	China	imperial palace in Beijing
Great Wall of China	China	extensive fortification
Ha Long Bay	Vietnam	picturesque island group
Hatra	Iraq	ruins of Parthian city
Hiroshima	Japan	peace memorial
Hōryū Temple	Japan	Buddhist monuments
Hue	Vietnam	imperial citadel
Jerusalem	Israel	Jewish, Islāmic, Christian holy city
Kandy	Sri Lanka	sacred Buddhist city
Khiva	Uzbekistan	Islāmic architecture
Kyōto	Japan	historic imperial capital
Lahore	Pakistan	Mughal fortress, palace, gardens
Palmyra	Syria	ruins of ancient city
Petra	Jordan	remains of ancient city
Potala Palace	China	former residence of the Dalai Lama, in Lhasa, Tibet
Ṣan'ā'	Yemen	historic architecture
Sundarbans	Bangladesh and India	national park (India), sanctuary, mangrove forest and wetlands
Tāj Mahal	India	monumental funerary complex
Tyre	Lebanon	ruins of three millennia of habitation
Ujong-Kulon	Indonesia	national park and reserve on Java
Australia and Oceania		
Great Barrier Reef	Australia	marine national park
Lord Howe Island	Australia	diversity of habitats
Rennell Island	Solomon Islands	unique island ecosystem
Shark Bay	Australia	rare marine and terrestrial life-forms
Uluru (Ayers Rock)	Australia	national park, sandstone monolith
Europe		
Acropolis of Athens	Greece	complex of monuments
Alhambra	Spain	Moorish palace and fortress
Altamira	Spain	prehistoric cave paintings
Amiens Cathedral	France	Romanesque and Gothic styles
Arles	France	Roman, Romanesque monuments
Auschwitz	Poland	Nazi concentration camp
Avebury	England	prehistoric megalith group
Bergen	Norway	Hanseatic wharf
Bern	Switzerland	medieval city centre
Canterbury	England	cathedral and abbey
Chartres Cathedral	France	Gothic architecture
Delphi	Greece	remains of sanctuary complex
Ferrara	Italy	Renaissance architecture
Florence	Italy	historic city centre
Fontainebleau	France	royal château and gardens
Giant's Causeway	Northern Ireland	coastal rock formations

site*	country	notes
Europe (continued)		
Granada	Spain	Moorish, Andalusian structures
Hadrian's Wall	England	Roman fortification
Herculaneum	Italy	ruins of Vesuvius-destroyed town
Istanbul	Turkey	numerous historic sites
Kraków (Cracow)	Poland	medieval city centre
Lascaux Grotto	France	prehistoric cave paintings
Lübeck	Germany	Hanseatic architecture
Luxembourg city	Luxembourg	fortifications and old city
Metéora	Greece	Orthodox Christian monasteries
Mont-Saint-Michel	France	medieval village and abbey
Moscow	Russia	Kremlin and Red Square
Naples	Italy	historic city centre
Olympia	Greece	ruins of ancient sacred city
Palatine Chapel (Aachen Cathedral)	Germany	imperial chapel of Charlemagne, Carolingian and Gothic styles
Paris	France	banks of Seine River
Pompeii	Italy	ruins of Vesuvius-destroyed town
Porto (Oporto)	Portugal	historic city centre
Prague	Czech Republic	historic city centre
Reims Cathedral	France	High Gothic architecture
Rhodes	Greece	medieval city centre
Rila Monastery	Bulgaria	cradle of Bulgarian "National Revival"
Saint Petersburg	Russia	historic city centre and monuments
Salzburg	Austria	historic city centre
Samos	Greece	ancient port and temple remains
Santiago	Spain	old city and pilgrimage route
Segovia	Spain	old town and Roman aqueduct
Split	Croatia	Roman palace, other monuments
Stonehenge	England	prehistoric megalith group
Tallinn	Estonia	historic city centre
Toledo	Spain	historic structures
Transylvania	Romania	Saxon fortified churches, villages
Vatican City	Vatican City	seat of Roman Catholic church
Venice	Italy	island city and surrounding lagoon
Versailles	France	royal palace and park
Visby	Sweden	historic Hanseatic town
North America		
Banff	Canada	national park, Rocky Mountains
Chaco Canyon	United States	historical park, Pueblo ruins
Chichén Itzá	Mexico	Mayan-Toltec architecture
Cocos Island	Costa Rica	national park, forest and marine life
Copán	Honduras	remains of major Mayan city
Glacier Bay	United States	subarctic national park, preserve
Grand Canyon	United States	national park
Havana	Cuba	colonial city centre
Hawaii Volcanoes	United States	national park
Jasper	Canada	national park, Rocky Mountains
Kluane	Canada	subarctic national park
Kootenay	Canada	national park, Rocky Mountains
L'Anse aux Meadows	Canada	remains of medieval Norse settlement in Newfoundland
Mammoth Cave	United States	cave system and national park
Mesa Verde	United States	prehistoric cliff dwellings
Mexico City	Mexico	historic city centre
Palenque	Mexico	national park, Mayan city
Santo Domingo	Dominican Rep.	colonial city
Statue of Liberty	United States	national monument
Teotihuacán	Mexico	extensive pre-Hispanic ruins
Tikal	Guatemala	national park, Mayan ruins
Uxmal	Mexico	Mayan city and ceremonial centre
Wrangell-St. Elias	United States	subarctic national park, preserve
Xochimilco	Mexico	Aztec canals and floating gardens
Yellowstone	United States	national park, geothermal formations
Yoho	Canada	national park, Rocky Mountains
South America		
Arequipa	Peru	colonial architecture
Brasília	Brazil	urban planning and architecture
Cartagena	Colombia	colonial port, fortresses, monuments
Chan Chan	Peru	ruins of pre-Inca Chimú capital
Colonia del Sacramento	Uruguay	Portuguese, Spanish colonial architecture
Córdoba	Argentina	Jesuit institutions and estates
Coro	Venezuela	Spanish, Dutch, local architecture
Cuzco	Peru	Inca and colonial architecture
Easter Island	Chile	monumental sculptures
Galapagos Islands	Ecuador	national park, unique ecosystem
Huascarán, Mount	Peru	montane national park
Iguaçu (Iguazú)	Brazil and Argentina	national parks, waterfalls, subtropical rainforests
Los Katíos	Colombia and Panama	national parks on the frontier, rainforest, wetlands
Machu Picchu	Peru	Inca ruins
Nazca Lines	Peru	extensive geoglyphs
Pantanal	Brazil	freshwater wetland ecosystem
Potosí	Bolivia	colonial industrial city
Quito	Ecuador	colonial city centre
Valdés Peninsula	Argentina	seals, whales

*The spelling or styling of place-names in this table may differ from those given on the World Heritage List; in addition, some place-names represent one or more constituent parts of larger World Heritage sites.

without interfering unnecessarily with trade and air travel across national boundaries.

2. It sponsors measures for the control of disease by promoting vaccination programs, the use of antibiotics and insecticides, the improvement of laboratory and clinical facilities, pure-water supplies and sanitation systems, and health education for rural communities.

3. It helps strengthen and expand the public health administrations of member nations. It provides technical advice in the preparation of long-term national health plans, sends out international teams of experts to conduct field surveys, and helps develop health centres and training institutions for medical personnel.

World Heritage site, any of various areas or objects inscribed on the United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage List. The sites are designated as having "outstanding universal value" under the Convention Concerning the Protection of the World Cultural and Natural Heritage, which was adopted by UNESCO in 1972. The World Heritage List includes hundreds of cultural treasures (*e.g.,* major monuments and archaeological sites), wilderness parks and other natural areas, and sites of mixed cultural and natural value. Several new sites are added to the list each December.

World Heritage designations often boost local economies by encouraging tourism; in addition, UNESCO funds numerous efforts to preserve and restore sites in developing nations. Sites subject to unusual levels of pollution, natural hazards, or other problems may be placed on the associated List of World Heritage in Danger until improvements are made.

For a listing and photographs of selected World Heritage sites, *see* the accompanying Table and Plates.

World Intellectual Property Organization (WIPO), French ORGANISATION MONDIALE DE LA PROPRIÉTÉ INTELLECTUELLE, organization designed to promote the worldwide protection of both industrial property (inventions, trademarks, and designs) and copyrighted materials (literary, musical, photographic, and other artistic works). The organization was established by a convention signed in Stockholm in 1967 and came into force in 1970. It became a United Nations specialized agency in 1974. It is headquartered in Geneva, Switz.

World Meteorological Organization (WMO), specialized agency of the United Nations created to promote establishment of a worldwide meteorological observation system, application of meteorology to other fields, and development of national meteorological services in less-developed countries.

The WMO was preceded by the International Meteorological Organization, a nongovernmental organization founded in 1873. The WMO was created by the World Meteorological Convention, which was adopted in 1947. The WMO began operations in 1951.

World Methodist Council (WMC), cooperative organization of Methodist churches that provides for consultation and cooperation on an international level. Its various committees are concerned with doctrine, evangelism, education, lay activities, youth, publications, and social and international affairs.

World Series, a postseason play-off match between champions of the two major professional baseball leagues of the United States and Canada: the American League (AL) and National League (NL). The World Series began in 1903 after the cessation of hostilities between the National League and the newly formed American League; Boston (AL) defeated Pittsburgh (NL) 5 games to 3 in a best-of-nine series. In 1904 the New York Giants (NL) refused to play Boston, again the American League champion; but the series resumed in 1905 and continued annually until 1994, when a players' strike forced its cancellation that year. A seven-game format has been standard since 1922. The New York Yankees (AL) have won the most series, including the 2000 "subway series" with the New York Mets (NL).

For major league World Series results, *see* Sporting Record: *Baseball.*

World Trade Center, complex of buildings around a central plaza in New York City, located at the southwestern tip of Manhattan, near Wall Street. It was built by the Port Authority of New York and New Jersey as a central facility for businesses and government agencies involved in international trade. The complex was notable for its huge twin towers, each of which had 110 stories. One World Trade Center reached 1,368 feet (417 m), and Two World Trade Center was 1,362 feet (415 m) tall. Designed by Minoru Yamasaki and officially opened in 1972, the towers were the world's tallest buildings until surpassed in 1973 by the Sears Tower in Chicago. The complex sustained two major terrorist attacks. In 1993 a large bomb planted by terrorists exploded in the underground garage of one of the towers, damaging its base (subsequently repaired), killing 6 people and injuring some 1,000. In 2001, the September 11 attacks (*q.v.*) were far more disastrous: Muslim militants piloted two hijacked airliners into the twin towers, the first striking the north tower at 8:46 AM (local time) and the second hitting the south tower at 9:03. Badly damaged and engulfed in flames, the weakened south tower collapsed at 9:59; the north tower fell about a half hour later. Some 2,750 people were killed. The city spent nearly a year removing the debris and recovering bodies from the Trade Center's ruins. As the clean-up effort neared completion in the summer of 2002, the question of how best to rebuild on that site became a subject of national discussion. The winning design in a national competition was announced on Jan. 6, 2004. Called "Reflecting Absence," it contrasted lush green landscaping with stark footprint voids of the twin towers, incorporating a memorial centre below ground level. Work began on the new structure on July 4, 2004.

World Trade Organization (WTO), international organization established to supervise and liberalize world trade. The WTO is the successor to the General Agreement on Tariffs and Trade (*q.v.;* GATT), which was created in 1947 in the expectation that it would soon be replaced by a specialized agency of the United Nations (UN) to be called the International Trade Organization (ITO). The ITO never materialized, yet the GATT proved remarkably successful in liberalizing world trade over the next five decades. By the 1980s there were calls for a stronger multilateral organization to monitor trade, and following the completion of the Uruguay Round (1986–94) of multilateral trade negotiations, the WTO began operations on Jan. 1, 1995.

Objectives and operation. The agreements that established the WTO were negotiated in Marrakech, Mor., in April 1994, and, following their ratification, the former contracting parties to the GATT treaty became charter members of the WTO. The WTO has six key objectives: (1) to set and enforce rules for international trade; (2) to provide a forum to negotiate and monitor further trade liberalization; (3) to resolve trade disputes; (4) to improve the transparency of decision making; (5) to cooperate with other major international economic institutions involved in global economic management; and (6) to help developing countries benefit fully from the global trading system. The GATT had similar goals, but in practice they have been pursued more comprehensively by the WTO. For example, whereas the GATT focused almost exclusively on goods (though much of agriculture and textiles were excluded) the WTO encompasses all goods, services, and intellectual property, as well as some investment policies. In addition, the interim GATT Secretariat was replaced with a permanent WTO Secretariat, which strengthened and formalized mechanisms for reviewing trade policies and settling disputes. Because many more products are covered under the WTO than under the GATT, and because the number and extent of participation by member countries has grown steadily—the share of international trade of WTO members exceeds 90 percent of the global total—open access to markets has increased substantially.

The rules embodied in both the GATT and the WTO serve at least three purposes. First, they attempt to protect the interests of small and weak countries against discriminatory trade practices by large and powerful countries. The WTO's most-favoured-nation and national-treatment articles stipulate that each member must grant equal market access to all other members and that both domestic and foreign suppliers must be treated equally. Second, the rules require members to limit trade only through tariffs and to provide market access not less favourable than that specified in their schedules (*i.e.,* the commitments that they agreed to when they were granted WTO membership or subsequently). Third, the rules are designed to help governments resist lobbying efforts by domestic interest groups seeking special favours. Although some exceptions to the rules were made, they were intended to stave off the worst excesses and to bring greater certainty and predictability to international markets, thereby enhancing economic welfare and reducing political tensions.

The pace of international economic integration via the GATT and WTO rounds of multilateral trade negotiations has been slower and less comprehensive than some members would prefer. Some have suggested that there should be additional integration among subgroups of (often neighbouring) member economies—*e.g.,* those party to the European Union, the North American Free Trade Agreement, and the Asia-Pacific Economic Cooperation—for political, military, or other reasons. Notwithstanding the most-favoured-nation clauses in the agreements establishing the WTO, the organization does allow such integration under certain conditions.

Assessment. Since its founding, the WTO has faced fierce criticism. Opponents of globalization argue that the WTO infringes upon national sovereignty and promotes the interests of large corporations at the expense of smaller local firms struggling to cope with import competition. Environmental and labour groups claim that trade liberalization leads to environmental damage and harms the interests of low-skilled workers. Protests by these and other groups have become large and frequent, in part because the Internet and e-mail have facilitated large-scale organizing and collective action. In response to such criticism, supporters of the WTO claimed that there are more efficient ways to protect the environment and labour rights than trade-policy measures. Moreover, some WTO members, especially developing countries, have resisted attempts to allow sanctions against countries that failed to meet strict environmental and labour standards, arguing that they would amount to veiled protectionism. (K.An.)

world tree, also called COSMIC TREE, centre of the world, a widespread motif in many myths and folktales among various preliterate peoples, especially in Asia, Australia, and North America, by which they understand the human and profane condition in relation to the divine and sacred realm. Two main forms are known and both employ the notion of the

world tree as centre. In the one, the tree is the vertical centre binding together heaven and earth; in the other, the tree is the source of life at the horizontal centre of the earth. Adopting biblical terminology, the former may be called the tree of knowledge; the latter, the tree of life.

In the vertical, tree-of-knowledge tradition, the tree extends between earth and heaven. It is the vital connection between the world of the gods and the human world. Oracles and judgments or other prophetic activities are performed at its base.

In the horizontal, tree-of-life tradition, the tree is planted at the centre of the world and is protected by supernatural guardians. It is the source of terrestrial fertility and life. Human life is descended from it; its fruit confers everlasting life; and if it were cut down, all fecundity would cease. The tree of life occurs most commonly in quest romances in which the hero seeks the tree and must overcome a variety of obstacles on his way.

World War I, also called FIRST WORLD WAR, or GREAT WAR, an international conflict that in 1914–18 embroiled most of the nations of Europe along with Russia, the United States, the Middle East, and other regions. The war pitted the Central Powers—mainly Germany, Austria-Hungary, and Turkey—against the Allies—mainly France, Great Britain, Russia, Italy, Japan, and, from 1917, the United States. It ended with the defeat of the Central Powers.

A brief treatment of World War I follows. For full treatment, *see* MACROPAEDIA: International Relations, 20th-Century; World Wars.

By 1910 the major nations of Europe had aligned themselves into two potentially hostile alliances, with Germany and Austria in one and France, Great Britain, and Russia in the other. When a Serbian nationalist assassinated Archduke Francis Ferdinand of Austria at Sarajevo on June 28, 1914, a chain of threats, ultimatums, and mobilizations was set in motion that resulted in a general war between these two alliances by mid-August.

Germany had long been prepared to fight a land war on two fronts—*i.e.,* against France on the west and against Russia on the east. In the west its armies outflanked France's main defensive forces and swept westward through Belgium, thereby bringing Great Britain into the war by treaty obligation. The German armies then turned south toward Paris. The French, reinforced by a British Expeditionary Force, managed to stabilize their defensive lines by November along the Aisne River, thereby saving Paris, but this meant that the rest of the war in that theatre was fought on French territory. Because of the tremendous firepower of modern artillery and machine guns, the war quickly evolved into one of attrition fought from lines of trenches. Frontal infantry assaults typically gained ground only by yards, and these attacks, whether successful or not, were enormously costly in human life. A deadlock soon ensued on the Western Front that could not be broken even by the enormous battles of the Somme and Verdun (both 1916) or by the massive German offensives of early 1918.

In the east an early Russian offensive in 1914 drove deep into East Prussia, German Poland, and Galicia, but the Russians were stopped by German and Austrian forces by the end of the year, and, in a startling German offensive begun in May 1915, they were thrown back into their own territory. Though it mounted several more offensives and suffered enormous casualties, the Russian army proved unable either to break through the German defensive lines or to take any German territory.

Other fronts in the war were to a greater or lesser extent peripheral to the main theatres but were nonetheless bloody. They included Gallipoli and the Dardanelles, where Britain unsuccessfully attempted to invade Turkey proper; the Caucasus and Persia, where Russia and Turkey fought; Mesopotamia and Egypt, where British forces (and, in Egypt, the Arabs organized by T.E. Lawrence) fought the Turks; and the Isonzo valley northwest of Trieste, where Italian and Austrian troops fought a long series of costly battles.

At sea only Germany and Great Britain had substantial fleets. Britain attempted, with considerable success, to blockade Germany and cut off its maritime access to food and raw materials from overseas. In response Germany turned to one of its newest weapons, the submarine, to interrupt the maritime supply lines of the British Isles. Germany's policy of unrestricted submarine warfare, however, which led to the sinking of much neutral shipping, ultimately persuaded the United States to enter the war against Germany in 1917. The major naval engagement of the war—indeed, one of the largest naval battles in history—was the inconclusive Battle of Jutland fought between the British Grand Fleet and the German High Seas Fleet in May 1916.

Russia's poor performance in the war and its grievous losses inspired widespread domestic discontent that led to the overthrow of the Russian monarchy in early 1917 and to the Bolshevik Revolution in November of that year. At the Bolshevik leader Lenin's order, Russia unilaterally ceased hostilities on November 26 and a month later signed a formal armistice with Germany, thus withdrawing from participation in the war. The release of German forces in the east for service on the deadlocked Western Front, however, was offset by the arrival of U.S. troops in France. Used tentatively at first, the rapidly reinforced American forces—1,200,000 by September 1918—soon proved their worth.

By autumn 1918 the position of the Central Powers had deteriorated rapidly. The Austro-Hungarian Empire, shaken by military defeats and by nationalist uprisings encouraged by the Russian Revolution, virtually disintegrated during October. Germany's great offensives on the Western Front during April-July failed, and the Allied forces then began a steady advance that recovered almost all of German-occupied France and part of Belgium by October 1918. German military and civilian morale thereupon collapsed, and amid widespread political unrest the German kaiser William II abdicated on November 9. Two days later an Armistice was signed between Germany and the Allies at Rethondes, Fr., thus ending World War I.

World War II, also called SECOND WORLD WAR, a conflict that involved virtually every part of the world during the years 1939–45. The principal belligerents were the Axis powers—Germany, Italy, and Japan—and the Allies—France, Great Britain, the United States, the Soviet Union, and, to a lesser extent, China. The war was in many respects a continuation, after an uneasy 20-year hiatus, of the disputes left unsettled by World War I.

A brief treatment of World War II follows. For full treatment, *see* MACROPAEDIA: International Relations, 20th-Century; World Wars.

German bitterness over their defeat in World War I and the harsh terms of the Treaty of Versailles, together with the social unrest and political instability that beset the Weimar Republic, resulted in the coming to power of Adolf Hitler, leader of the intensely nationalistic and anti-Semitic National Socialist (Nazi) Party. Given dictatorial powers in 1933, Hitler began the secret rearmament of Germany almost immediately. Playing on the reluctance of other European powers to actively oppose him, he ordered the military occupation of the Rhineland, in contravention of the Treaty of Versailles, in March 1936. Later that year Benito Mussolini, the fascist dictator of Italy, who had already embarked on aggression in Ethiopia, declared a Rome-Berlin "axis"; the next year Italy joined the 1936 Anti-Comintern Pact between Germany and Japan. Germany and Italy both intervened, in the name of anticommunism, in the Spanish Civil War from 1936.

In March 1938 Hitler sent German troops to occupy Austria, which was promptly incorporated into Germany. By a combination of external and internal pressures he succeeded in annexing or neutralizing all of what had been Czechoslovakia by March 1939. In April 1939 Italy annexed Albania. On September 1, secure behind the new German-Soviet Nonaggression Pact that had stunned the world in August, Hitler began an invasion of Poland. Great Britain and France declared war on Germany two days later. By the end of 1939 Germany and the Soviet Union had divided Poland between themselves, and the Soviets had occupied Estonia, Latvia, and Lithuania and had attacked Finland, which they finally defeated in March 1940. For some months Germany's main activities were at sea, including an effective submarine campaign against merchant shipping bound for Britain. In April 1940 Germany occupied several Norwegian ports and all of Denmark. On May 10 the major German offensive in the west began with a lightning sweep through The Netherlands and Belgium into France; by June 22 three-fifths of France, including Paris, was occupied, and the rest had become a neutral state with its government at Vichy. During August-September the German Luftwaffe (Air Force) launched massive bombing raids on Great Britain in an attempt to soften it up for a cross-Channel invasion. The Battle of Britain was won by the Royal Air Force, however, and Hitler postponed the invasion indefinitely.

Following Italy's abortive invasion of Greece in November 1940, Hitler drew Hungary, Romania, and Slovakia into the Axis; Bulgaria joined in March 1941. In April Germany attacked Yugoslavia and Greece, both of which were overrun by the end of the month. In June Hitler abandoned the Nonaggression Pact of 1939 and launched a massive surprise invasion of the Soviet Union. German armoured units drove deep into Soviet territory and at one point reached the outskirts of Moscow before Soviet counterattacks and winter weather slowed the offensive to a halt.

Japan, the other Axis member, had meanwhile been tiring of its long, unproductive war in China and decided to take advantage of the situation in Europe to seize European colonial holdings in the Far East. To cripple what it foresaw would be its main opponent in a Pacific war of aggrandizement, Japan attacked United States installations at Pearl Harbor, Hawaii, and the Philippines on Dec. 7–8, 1941. Within days the United States was at war with all the Axis powers. Japan swiftly invaded and occupied the Philippines, most of Southeast Asia and Burma (Myanmar), the Netherlands East Indies (now Indonesia), and many Pacific Ocean islands. Despite the enormous initial advantage gained by its sudden offensives, Japan lost the crucial sea battle of Midway in June 1942. The American strategy in the Pacific was to use naval and amphibious forces to advance up the chains of islands toward Japan while smaller land forces cooperated with Chinese and British efforts on the Asian mainland.

In North Africa the British, who in 1940–41 had defeated much larger Italian forces, were locked in a seesaw battle with the German Afrika Korps. In November 1942 the first Allied offensive began with U.S. and British landings in North Africa. German forces were gradually squeezed into Tunisia and were finally eliminated in May 1943. In July Allied

troops from North Africa landed in Sicily and thence invaded Italy in September. The fascist government was overthrown, and in October, Italy joined the Allies; fighting against German troops continued in Italy for the rest of the war.

After a bitterly opposed and finally unsuccessful attack on Stalingrad (August 1942–February 1943), German forces in the Soviet Union lost momentum, and, as the Red Army continued to draw on its huge manpower reserves, it began during 1943 to push the Germans back from the western portions of the Soviet Union. Germany was meanwhile preparing for an expected Allied invasion of western Europe. The invasion came on June 6, 1944—D-Day—on the beaches of Normandy in northern France, where 156,000 British, Canadian, and U.S. troops under the command of the U.S. general Dwight D. Eisenhower were landed. With command of the air the Allies quickly consolidated their foothold and began the advance eastward that ended in the occupation of the German homeland in March–April 1945. Meanwhile, the Soviet forces in 1944 had pushed the Germans completely out of the Soviet Union and had advanced into Poland, Czechoslovakia, Hungary, and Romania. In early 1945 they occupied the eastern one-third of Germany. At the climax of the German collapse, with Berlin encircled by Soviet troops, Hitler committed suicide on April 30; on May 8 the surrender of all German forces was signed.

In the Pacific the "island-hopping" strategy of the U.S. general Douglas MacArthur led to the Allied invasion of the Philippines by October 1944. The naval battle in Leyte Gulf that followed all but eliminated the Japanese navy. The capture, after bitter fighting, of the islands of Iwo Jima and Okinawa in March and June of 1945 opened the way for both the heavy strategic bombing of Japan itself and a possible invasion. The war in the Pacific came to a sudden and dramatic close after the atomic bombing of Hiroshima and Nagasaki on Aug. 6 and 9, 1945; Japan's formal surrender was signed on September 2.

World Weather Watch, program established in 1961–62 by the World Meteorological Organization to improve the global system for meteorological observation and prediction. It is designed to avoid duplication in preparing analyses and prognoses, while still providing each meteorological service with the data and background information it requires to carry out its responsibilities. The system is based on the establishment of world and regional centres at strategic locations around the globe. A selected, representative sample of various sources of global conventional and satellite meteorological observations, enough to establish the broad picture of the world weather situation, is transmitted to world centres where world and hemispheric analyses are prepared both for climatological and research uses and for transmission to the various research centres. The latter select from the daily output of world observations the data required for preparing regional analyses and prognoses for the benefit of countries within the region.

World Wide Web (www), byname THE WEB, the leading information retrieval service of the Internet (*q.v.*; the worldwide computer network). The Web gives users access to a vast array of documents that are connected to each other by means of hypertext or hypermedia links—*i.e.,* hyperlinks, electronic connections that link related pieces of information in order to allow a user easy access to them. Hypertext allows the user to select a word from text and and thereby access other documents that contain additional information pertaining to that word; hypermedia documents feature links to images, sounds, animations, and movies. The Web operates within the Internet's basic client-server format; servers are computer programs that store and transmit documents to other computers on the network when asked to, while clients are programs that request documents from a server as the user asks for them. Browser software allows users to view the retrieved documents.

A hypertext document with its corresponding text and hyperlinks is written in HyperText Markup Language (HTML) and is assigned an online address called a Uniform Resource Locator (URL).

The development of the World Wide Web was begun in 1989 by Tim Berners-Lee and his colleagues at CERN, an international scientific organization based in Geneva, Switz. They created a protocol, HyperText Transfer Protocol (HTTP), which standardized communication between servers and clients. Their text-based Web browser was made available for general release in January 1992. The World Wide Web gained rapid acceptance with the creation of a Web browser called Mosaic, which was developed in the United States by Marc Andreessen and others at the National Center for Supercomputing Applications at the University of Illinois and was released in September 1993. Mosaic allowed people using the Web to use the same sort of "point-and-click" graphical manipulations that had been available in personal computers for some years. In April 1994 Andreessen cofounded Netscape Communications Corporation, whose Netscape Navigator became the dominant Web browser soon after its release in December 1994. By the mid-1990s the World Wide Web had millions of active users.

World's Columbian Exposition, fair held in 1893 in Chicago, Ill., to celebrate the 400th anniversary of Christopher Columbus' discovery of America.

In the United States there had been a spirited competition for this exposition among the nation's leading cities. Chicago was chosen in part because it was a railroad centre and in part because it offered a guarantee of $10,000,000.

Continuing the precedent set at the Philadelphia Centennial (1876) of creating a vast gardened layout containing numerous separate buildings rather than a single great hall, the World's Columbian Exposition was planned to spread over 686 acres (278 hectares) along the city's south lakefront area; part of this location is now Jackson Park in Chicago. The chief planner was the Chicago architect Daniel H. Burnham; Charles B. Atwood was designer in chief; and Frederick Law Olmsted was entrusted with landscaping. The fair's new buildings had impressive classical facades with a uniform cornice height of 60 feet (18.25 m). The plaster palace fronts bore little functional relationship to exhibition halls inside; but the grandeur of the "White City," electrically lighted at night, temporarily led to a resurgent interest in classical architecture.

Behind the calm pillared facades and classical porticoes of the great "White City" the visitor found unexpected excitement and novelty. The Ferris wheel (invented by G.W.G. Ferris, a Pittsburgh engineer) and a dazzling new wonder—electricity—were presented for the first time in America. Electricity had been introduced and exploited at the Paris Exposition of 1889, but in 1893 it was still unfamiliar to most Americans. The exposition was opened by a dramatic act when President Grover Cleveland pushed a button in the White House and set the great Allis engine in motion in Chicago, turning on the electric power for the exposition. The engine, the dynamo, and the alternating-current generator displayed for the first time by George Westinghouse later became the basic tools of the electric power industry.

The Columbian Exposition's gross outlays amounted to $28,340,700, of which $18,678,000 was spent on grounds and buildings. More than 21,400,000 visitors attended the exposition, and the cash balance remaining at closing was $446,832, making it the first American international exposition to close with a profit. The Palace of Fine Arts, a 600,000-square-foot building, was rebuilt in permanent limestone in 1928–32 to house the public exhibitions of the Museum of Science and Industry.

worm, any of various unrelated invertebrate animals that typically have soft, slender, elongated bodies and usually lack appendages. Worms are members of several invertebrate phyla, including Platyhelminthes (flatworms), Annelida (segmented worms), Nemertea (ribbon worms), Aschelminthes (roundworms, pinworms, eelworms, threadworms, hairworms, etc.), Sipuncula (peanutworms), Echiura (spoonworms), Acanthocephala (spinyheaded worms), Pogonophora (beardworms), and Chaetognatha (arrowworms).

The term is also loosely applied to centipedes and millipedes; to larval (immature) forms of other invertebrates, particularly those of certain insects; and to some vertebrates—*e.g.,* the blindworm (*Anguis fragilis*), a limbless, snakelike lizard. At one time all phyla of wormlike animals were classed as Vermes, a term no longer in common use.

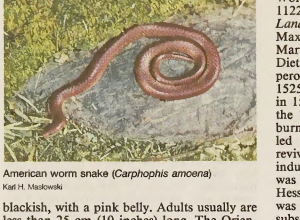
The major groups of worms include various species of flatworm, annelid, ribbon worm, spiny-headed worm, and aschelminth (*qq.v.*). Worms typically have an elongated, tubelike body, usually rather cylindrical, flattened, or leaflike in shape and often without appendages. They vary in size from less than 1 mm (0.04 inch) in certain aschelminths to more than 30 m (100 feet) in certain ribbon worms.

Worms are universal in distribution, occurring in marine, freshwater, and terrestrial habitats. Some types of worms are parasitic, others are free-living. From a human perspective, worms are important as soil conditioners (*e.g.,* annelids, aschelminths) and as parasites of people and domestic animals (*e.g.,* platyhelminths, aschelminths) and of crops (*e.g.,* aschelminths). Ecologically, worms form an important link in the food chains in virtually all ecosystems of the world.

worm lizard (*Rhineura floridana*), lizard that has no limbs or external eyes or ears and is a North American member of the family Amphisbaenidae. The worm lizard can be found burrowing in soil, sand, and leaf mold on the Florida peninsula. When disturbed, this pinkish, 18-35-centimetre- (7–12-inch-) long wormlike creature backs into its hole tail first. The worm lizard spends the greater part of its life underground, eating spiders, worms, and termites.

worm shell, any marine snail of the family Vermetidae (subclass Prosobranchia, class Gastropoda). The shell of these snails consists of an irregularly coiled, narrow tube that resembles a worm. Most species of both families live cemented to rock or coral substrates, and many are found in coral reef habitats. They feed on suspended particulate matter in seawater, which they obtain by secreting a mucous net from a gland in the foot. This net spreads out in the current, and food particles stick to it. After a few minutes the net is pulled in by the mouth and ingested and a new net spread. The snails often form a distinct zone on tropical shores and reach densities of more than 60,000 per square metre, producing thick deposits of intertwined shells.

worm snake, any of various harmless burrowing snakes of wormlike appearance. This name is often given to blind snakes of the family Typhlopidae. The American worm snake (*Carphophis amoenus*), of the eastern United States, of the family Colubridae, is brown or



American worm snake (*Carphophis amoena*)
Karl H. Maslowski

blackish, with a pink belly. Adults usually are less than 25 cm (10 inches) long. The Oriental worm snakes of the genus *Trachischium* resemble the American species.

Wormley Conference (Feb. 26, 1877), in American history, meeting at Wormley's Hotel in Washington, D.C., at which leaders of the Republican and Democratic parties resolved the disputed Rutherford B. Hayes–Samuel J. Tilden presidential election of 1876.

Democrat Tilden had won a 250,000-vote popular plurality, but he fell one electoral vote short of a majority. The electoral votes of Florida, South Carolina, and Louisiana (as well as one vote in Oregon) were in dispute as a result of widespread vote fraud on both sides.

After the selection of a special group called the Electoral Commission (*q.v.*) and several meetings between Republicans and Democrats, the Wormley Conference reached a compromise. The Democrats gave up their claim to the presidency in return for promises from the Republicans to withdraw the remaining federal troops from the former Confederate states, to end Northern interference in local Southern politics, to share Southern patronage with Democrats, and to appoint at least one Southern Democrat to the cabinet. Perhaps the most important concession of all was the Republicans' vow to support congressional appropriations for much-needed railroad construction and other internal improvements to help the war-struck Southern economy. This plan was facilitated by Hayes's sympathy with Southern whites and his desire to end Radical Reconstruction, as well as by general agreement among Southern whites with Hayes's conservative economic views.

Hayes was declared the winner on March 2, 1877, and was inaugurated three days later. In April he withdrew the troops, marking the end of Radical Reconstruction and signaling the return of white rule in the South.

Worms, city, Rhineland-Palatinate *Land* (state), southwestern Germany. Worms is a port on the left (west) bank of the Rhine River, just northwest of Mannheim. Known originally as Celtic Borbetomagus, by Julius Caesar's time it was called Civitas Vangionum, the chief town of the Vangiones. In AD 413 it became the capital of the Burgundians, who, after disputes with the Romans, rose in revolt in 435 against the Roman governor Flavius Aelius. He called upon his Hun allies, who destroyed the city in 436. The Hun destruction of Worms and the Burgundian kingdom inspired heroic legends in the epic poem of the *Nibelungenlied* (*c.* 1200).

Rebuilt by the Merovingian kings, Worms became a bishopric about 600 and a favourite residence of the Carolingian and Salian emperors. The bishopric (secularized in 1803) grew steadily in temporal power and territory, particularly under Bishop Burchard I (1000–1025), and Worms became a free imperial city of the Holy Roman Empire in 1156, remaining free until 1801.

More than 100 imperial diets (assemblies) were held in the city. The Concordat of Worms closed the Investiture Controversy in 1122, the "perpetual public peace" (*Ewiger Landfriede*) was proclaimed by the emperor Maximilian I there at the Diet of 1495, and Martin Luther appeared before the famous Diet of 1521 to defend his doctrines to the emperor Charles V. Worms became Protestant in 1525 and was the site of religious conferences in 1540 and 1557. It suffered severely during the Thirty Years' War and was looted and burned by the French in 1689. These events led to a precipitous decline, until the city revived and expanded under the stimulus of industrial development in the 19th century. It was annexed to France in 1797 and passed to Hesse-Darmstadt in 1816. Although Worms was severely damaged in World War II, it was subsequently rebuilt.

The Cathedral of SS. Peter and Paul ranks with those of Speyer and Mainz as one of the finest Romanesque churches of the Rhine. The original building was consecrated in 1018 and was completed and remodeled in the 12th century. Additions were made in the 13th and 14th centuries, and the whole has often been damaged and restored. In the crypt are tombs of the dukes of the Salian line. Other noteworthy churches include the Church of Our Lady (Liebfrauenkirche; consecrated 1467) whose vineyards produce the famous white wine known as Liebfraumilch; St. Paul's Church (1002); St. Andrew's (1016; now the municipal museum); and the Trinity Church (1726). The old synagogue (1034, restored 13th century), which was destroyed in 1938, was rebuilt and modernized after World War II. The Jewish community of Worms claims to be the oldest in Germany and to have existed since the earliest Christian era, although the first authenticated mention of it was in 588. The city's other historic landmarks include the Hagen Monument and the Siegfried Fountain, both commemorating the *Nibelungen* legends, and the 19th-century Luther Monument.

Worms has an important wine trade. Its industries include the manufacture of leather, machinery, chemicals, textiles, paints, ceramics, and electrical appliances. Pop. (1993 est.) 78,415.

Worms, Concordat of, compromise arranged in 1122 between Pope Calixtus II (1119–24) and the Holy Roman emperor Henry V (reigned 1106–25) settling the Investiture Controversy, a struggle between the empire and the papacy over the control of church offices. It had arisen between Emperor Henry IV (1056–1106) and Pope Gregory VII (1073–85). The concordat marked the end of the first phase of the conflict between these two powers. A similar conflict, between the papacy and the king of England, had been composed in 1107; that settlement provided the basis for the Concordat of Worms, which made a clear distinction between the spiritual side of a prelate's office and his position as a landed magnate and vassal of the crown. Bishops and abbots were to be chosen by the clergy, but the emperor was authorized to decide contested elections. The man chosen was first to be invested with the *regalia,* or powers, privileges, and lands pertaining to his office as vassal, for which he did homage to the emperor, and then with the *spiritualia,* or ecclesiastical powers and lands, symbolized by the staff and ring, which he acquired by his consecration and from his ecclesiastical superior, who represented the authority of the church.

Worms, Diet of (1521), meeting of the Diet (assembly) of the Holy Roman Empire held at Worms, Ger., in 1521, that was made famous by Martin Luther's appearance before it to defend his beliefs. Because of the confused political and religious situation of the time, Luther was called before the political authorities rather than the pope or a council of the Roman Catholic church.

Pope Leo X had condemned 41 propositions of Luther's in June 1520, but Luther continued to produce works critical of the papacy and its teachings. The pope excommunicated him on Jan. 21, 1521, but it was several months before the condemnation was received in Germany. Luther's prince, Frederick III the Wise, elector of Saxony, refused to take any action against Luther. Frederick negotiated with the Holy Roman emperor, Charles V, and it was agreed that Luther would appear for a hearing at the Diet under the emperor's safe-conduct.

On April 17, 1521, Luther went before the Diet for the first time. In response to questioning, he admitted that the books displayed before the court were his, but, when asked to repudiate them, he asked for time to consider the question. The next day, again before the assembled Diet, Luther refused to repudiate his works unless convinced of error by Scripture or by reason. Otherwise, he stated, his conscience was bound by the Word of God. According to tradition, he said, "Here I stand; I can do no other." Disorder broke out at the conclusion of Luther's refusal to recant, and the emperor dismissed the Diet for the day.

A hero to the Germans but a heretic to others, Luther soon left Worms but spent the next nine months in hiding at the Wartburg, near Eisenach. In May the Diet passed the Edict of Worms, which declared that Luther was an outlaw and a heretic who should be captured and turned over to the emperor and whose writings were forbidden. The edict, never enforced, nevertheless inhibited Luther's travels throughout his lifetime and made him dependent on his prince for protection.

wormwood, any bitter or aromatic herb or shrub of the genus *Artemisia* of the family Asteraceae, distributed throughout many parts of the world. These plants have many small, greenish yellow flower heads grouped in clusters. The leaves are usually divided and alternate along the stem; they may be green, grayish green, or silvery white.



Wormwood (*Artemisia absinthium*)
Ingmar Holmasen

The leaves of the common wormwood (*A. absinthium*), probably the best-known species, have been used in medicines and such beverages as absinthe (*q.v.*). Common wormwood is native to Europe but has become naturalized in Canada and the United States. The leaves of the tarragon (*A. dracunculus*), another well-known species, are employed as a seasoning,

and those of the mugwort (*A. vulgaris*) are often used to flavour beverages.

Worpswede school, group of artists who settled after 1889 in the north German village of Worpswede, near Bremen, in order to paint the local landscape. They depicted the heaths, meadows, forests, streams, bridges, windmills, and peasants of the area in a romantic and sentimental style, somewhat reminiscent of the earlier 19th-century Barbizon school in France. Fritz Mackensen and Otto Modersohn were the first to arrive; during the 1890s they were joined by Paula Becker (who later married Modersohn), Hans am Ende, Fritz Overbeck, and Heinrich Vogeler. Clara Westoff, a talented sculptor, also worked at Worpswede, where she met the German poet Rainer Maria Rilke, whom she married in 1901. Two years later Rilke published a book, *Worpswede,* discussing the artists and the landscape.

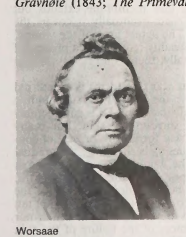
The Worpswede painters exhibited their works at the Glaspalast in Munich in 1895, achieving recognition when Mackensen was awarded a gold medal for his painting "Sermon in the Moors." Although popular with the public during the late 1890s, the Worpswede painters' success did not endure. As regionalist painters they were isolated from the advanced achievements of French art and, with the exception of Paula Modersohn-Becker, were unaware of Postimpressionist painting. Inspired by the works of Vincent van Gogh, Paul Gauguin, and Paul Cézanne, which she saw on her trips to Paris, Modersohn-Becker's style evolved toward flatness and simplification, anticipating the Expressionist movement in Germany.

Worrell, Sir Frank, in full SIR FRANK MORTIMER MAGLINNE WORRELL (b. Aug. 1, 1924, Bridgetown, Barbados—d. March 13, 1967, Kingston, Jam.), exceptional all-around cricket player and captain (1960–63) of the West Indies international team, which under his leadership achieved world cricket supremacy in the early 1960s. Worrell, Everton D. Weekes, and Clyde L. Walcott (the "Three W's") made up what was considered to be the best group of middle innings batsmen in cricket.

Educated in England at the University of Manchester, Worrell played for the West Indies against England in his first Test series (1947–48 season). Afterward he played professional cricket for Radcliffe in the strong Central Lancashire League. In his chief triumph as West Indies captain, his team defeated England (3 tests to 1, with 1 drawn) in a series played in England, June–August 1963.

Worrell sat in the Jamaican Senate from 1962 to 1964, and subsequently he served as dean of students of the University of the West Indies (Trinidad division). In 1964 he was knighted for his contributions to cricket.

Worsaae, Jens Jacob Asmussen (b. March 14, 1821, Vejle, Den.—d. Aug. 15, 1885, Copenhagen), Danish archaeologist, a principal founder of prehistoric archaeology. His *Danmarks Oldtid oplyst ved Oldsager og Gravhøie* (1843; *The Primeval Antiquities of Denmark*) was one of the most influential archaeological works of the 19th century.



Worsaae
By courtesy of the Royal Danish Embassy, London

At an early age Worsaae studied stone monuments in Denmark and proved them to be tombs rather than altars, as had been supposed. From 1838 to 1843, while a student, he served as an assistant to Christian J. Thomsen, curator of Danish antiquities, and prepared *Danmarks Oldtid.* He then spent several years in Germany, France, England, and Ireland carrying on stratigraphic study and research that enabled him to refine Thomsen's tripartite (Stone, Bronze, and Iron ages) classification of prehistory.

Appointed inspector of Danish historic and prehistoric monuments in 1847, he discovered early kitchen middens (heaps of refuse from human habitation) in 1851 and thus was able to establish the Old Stone Age (covering human activity before about 10,000 BC) as a period of prehistory. He joined the faculty of the University of Copenhagen in 1855 and succeeded Thomsen as curator in 1865.

Throughout his life Worsaae did much to establish scientific methods for archaeology. He considered it essential not only to study excavated artifacts, particularly those that were most commonly found, but also to examine their geographic and stratigraphic contexts.

worsted knitting yarn, wool yarn made of long-staple fibres that have been combed to remove undesirable short fibres and make them lie parallel. In the spinning operation, which imparts the necessary twist to hold the fibres together, worsted yarns are more tightly twisted than are the bulkier woolen yarns.

Two yarns may be twisted together to form two-ply yarn, or three or four yarns may be twisted together to form three- or four-ply yarn. The soft, heavy yarn is strong and durable and is often used for sweaters.

Worth, Charles Frederick (b. Oct. 13, 1825, Bourne, Lincolnshire, Eng.—d. March 10, 1895, Paris, France), pioneer fashion designer and founder of Parisian haute couture.



Charles Frederick Worth, detail of an engraving
BBC Hulton Picture Library

In 1845 Worth left England, where he had been an indentured bookkeeper in a London yard-goods firm. He first worked in a Paris dress-accessories shop and then, in 1858, established his own ladies' tailor shop. Through Princess Metternich, wife of the Austrian ambassador to France, he gained the patronage of the fashionable empress Eugénie, wife of Napoleon III of France.

Worth was the first to prepare and show a collection in advance, the first man to become prominent in the field of fashion, and the first to use young girls as models. He pioneered in designing dresses to be copied in French workrooms and distributed throughout the world.

Worth became the dictator of Paris fashion. He is especially noted for designing sumptuous crinolined gowns that reflected the elegance of the Second Empire period (1852–70) and for introducing the bustle, which became a standard in women's fashion throughout the 1870s and '80s.

Worth, Irene, original name HARRIET ABRAMS (b. June 23, 1916, Fairbury, Neb., U.S.—d. March 10, 2002, New York, N.Y.), American actress noted for her versatility and aristocratic bearing. Although she had her greatest success on the stages of London's West End, she also earned three Tony Awards for her work on Broadway.

Worth trained as a teacher at the University of California, Los Angeles (B.Ed., 1937), and taught for a few years before turning to the theatre. She made her stage debut in a touring production of *Escape Me Never* (1942) and her Broadway debut in *The Two Mrs. Carrolls* (1943). In 1944 she settled in London, where she remained for much of her career. While a pupil of legendary dramatics coach Elsie Fogerty, Worth made her London debut in *The Time of Your Life* in 1946. She quickly established herself as an actress of uncommon versatility and presence. Her other roles during this period included performances in *Native Son* (1948) and *The Cocktail Party* (1949–50).

With the Old Vic Theatre during the early 1950s, Worth portrayed numerous Shakespearean characters, including Desdemona (*Othello*), Helena (*A Midsummer Night's Dream*), and Portia (*The Merchant of Venice*). In 1953 she helped found the Stratford Festival in Ontario, Canada, and appeared there as well. She later gave an acclaimed and erotically charged portrayal of Goneril in the Royal Shakespeare Company's production of *King Lear* (1962). In 1965 Worth premiered the lead role in Edward Albee's *Tiny Alice* in New York City; she won her first Tony Award for that performance. She later appeared internationally in *Sweet Bird of Youth* (1975), receiving a second Tony Award. Her best-known role of later years was that of the domineering Grandma Kurnitz in Neil Simon's *Lost in Yonkers* (1991). She was awarded another Tony for this role, which she repeated in the film adaptation two years later.

Worth's other motion pictures included *Orders to Kill* (1958), for which she received the British Film Academy Award, *The Scapegoat* (1959), and *Seven Seas to Calais* (1963). Worth was equally adept at classical drama, standard modern repertory fare, farce, and avant-garde theatre (the genre she enjoyed most). She was made an honorary Commander of the Order of the British Empire in 1975. After suffering a stroke in 1999, Worth recovered and returned to the stage; her final role was in the two-character play *I Take Your Hand in Mine* (2001).

Worthing, borough (district), administrative county of West Sussex, historic county of Sussex, Eng., on the English Channel. Road and railway links to London, 58 miles (93 km) northwest, have spurred Worthing's growth as a seaside resort and as a residential town for retired people. Its mild and notably sunny climate also favours the cultivation of salad crops in the vicinity. Area 12 square miles (32 square km). Pop. (2001) 97,540.

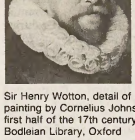
Wotruba, Fritz (b. April 23, 1907, Vienna, Austria—d. Aug. 25, 1975, Vienna), Austrian sculptor of spare, architectonic images of the human form.

Wotruba learned engraving at age 14; in 1925–26 he was the student of sculptor Anton Hanak. His early works were representational, but they became more abstract as he struggled to develop a personal style that would express his intellectual as well as aesthetic perceptions. Between 1939 and 1945 Wotruba's technique continued to evolve, and the pieces produced during 1945 were especially significant in his stylistic development. Few of the traditional concepts of form remained in his figures built up like towers from roughly trimmed blocks of stone. The power of these often life-size

works derives from their impassive simplicity. From 1952, Wotruba worked with blocks of a more refined texture. His works in bronze include "Standing Figure" (1949–50).

Wotton, Sir Henry (b. March 30, 1568, Boughton Malherbe, Kent, Eng.—d. December 1639, Eton, Buckinghamshire), English poet, diplomat, and art connoisseur who was a friend of Donne and Milton.

Of his few surviving poems, "You Meaner Beauties of the Night," written to Elizabeth of



Sir Henry Wotton, detail of an oil painting by Cornelius Johnson, first half of the 17th century; in the Bodleian Library, Oxford

By courtesy of the curators of the Bodleian Library, Oxford

Bohemia, is the most famous. Izaak Walton's *Life of Wotton* was prefixed to the *Reliquiae Wottonianae* (1651), the volume in which most of Wotton's writings first appeared.

Wotton was knighted in 1604, served as ambassador to Venice intermittently from 1604 to 1623, and was a member of Parliament in 1614 and 1625. In 1624 he became provost of Eton and in 1627 he took holy orders.

Long residence in Venice developed in Wotton a taste for architecture and painting far more sophisticated than that of his contemporaries. In *The Elements of Architecture* (1624) he expresses his views clearly and briefly.

Wouk, Herman (b. May 27, 1915, New York City), U.S. novelist best known for his epic war novels.

During World War II Wouk served in the Pacific aboard the destroyer-minesweeper "Zane". One of his best known novels, *The Caine Mutiny* (1951), grew out of these years. This drama of naval tradition presented the unforgettable character Captain Queeg and won the Pulitzer Prize for fiction in 1952.

Wouk's novels are all meticulously researched, and they provide an accurate and in-depth portrait of a particular slice of the world. They are built on a belief in the goodness of man or, in the case of *Marjorie Morningstar* (1955), the purity of women, and revolve around moral dilemmas. Wouk wrote with little technical innovation, but his novels have been tremendously popular. Most have been made into screenplays. Popular television mini-series were based on his expansive two-volume historical novel set in World War II: *The Winds of War* (1971) and *War and Remembrance* (1978).

wound, a break in the continuity of any bodily tissue due to violence, where violence is understood to encompass any action of external agency, including, for example, surgery. Within this general definition many subdivisions are possible, taking into account and grouping together the various forms of violence or of tissue damage.

The most important distinction is between open and closed wounds. Open wounds are those in which the protective body surface (the skin or mucous membranes) has been broken, permitting the entry of foreign material into the tissues. In closed wounds, by contrast, the damaged tissues are not exposed to the exterior, and the process of repair can take place without the interference that contamination always brings, in greater or lesser degree. Further divisions may be made on the basis of the mode of production of the wound.

Closed wounds. The degree of injury sustained from a direct blow depends upon the force of the blow and its direction. Obviously the degree of damage increases with increasing force; the effects of direction are equally important, although not so readily appreciated. For example, a hammerblow to the side of the head may severely bruise the scalp or, delivered with equal force but directed in a slightly different way, may cause extensive damage to the base of the skull. Anatomic and physiologic factors may also affect the degree of injury. Thus, a fall on the outstretched hand may have extremely different effects on a child, a young man, and an elderly person.

A relatively slight blow may damage the skin and underlying soft tissues, as shown by bruising, or contusion, which results from the infiltration of blood into the tissues from ruptured small vessels and by swelling caused by the passage of fluid through the walls of damaged capillaries. As a rule, the hemorrhage ceases abruptly, the blood and fluid are absorbed within a few days, and the part is restored to normal. When larger vessels are injured, much more blood escapes; it collects in the tissues and forms a mass called a hematoma.

A direct, forceful blow may damage any of the underlying tissues; blood vessels, nerves, muscles, bones, joints, or the internal organs may be affected.

Damage to the deeper tissues may result from the direct impact of the blow upon a tissue, as in the fracturing of a skull by a hammer or, more commonly, from the transmission of the force of impact through the body to a relatively weak point. Thus, a fall on the outstretched hand may injure the flesh and bones of the hand itself, but a common result is a break at some other site in the arm through which the force is transmitted—the scaphoid bone in the wrist; the radius in the forearm just above the wrist; at the elbow; or at the shoulder—the breaking point being determined by the direction of force and the anatomy of the individual.

Other common forms of indirect injury result from twisting, as occurs when a person's foot becomes caught and he or she twists upon it, suffering, if the force is great enough, a sprained or broken ankle or a broken leg or hip; from bending: or from deceleration, a form of injury frequently encountered in automobile and aircraft accidents, where one part of the body is fixed while another is relatively mobile, giving rise, in abrupt stops, to a displacement of the mobile parts, commonly called a whiplash.

Open wounds. When the skin (or, in the case of injuries of the base of the skull or the sinuses, the mucous membrane) is broken, a wound is exposed to additional hazards, since the tissues may be invaded by foreign material such as bacteria, dirt, and fragments of clothing, which may give rise to serious local or general complications from infection. Furthermore, if the break in the skin is large, the resulting exposure of the wounded tissues to the drying and cooling effects of the air may increase the damage caused by the wounding agent itself.

A needle, a sharp knife, or a rifle bullet that passes through the tissues with ease, dividing them cleanly or separating them, will produce relatively little damage except to those tissues directly in its course; and, indeed, unless an important structure is injured, the wounds caused are seldom serious. On the other hand, a bomb fragment, irregular and jagged, will, as it churns and rips through the soft tissues, produce extensive damage for a considerable distance in all directions. Likewise, the injury caused by crushing is frequently serious.

Skin, being sturdy and elastic and well supplied with blood, tolerates injury well and recovers quickly. The subcutaneous fatty tissues are more delicate and more easily deprived of their blood supply. Muscle, likewise, is sensitive to the damaging effect of missiles, being readily torn and unable to survive diminished blood supply for any appreciable time. Muscle, when damaged, is particularly prone to infection.

An injury to bone in an open wound is always serious, for any broken fragment detached from its blood supply will not survive if infection occurs, and it will remain as a foreign body in the wound to cause further complications. Even if the bone is cleanly broken and there are no loose fragments, infection may enter the raw surfaces of the fracture with disastrous results.

Clearly the seriousness of a wound is greatly increased if there is injury to a joint, a nerve, a major blood vessel, or an internal organ.

Contamination of a wound may occur at the moment of wounding or at any time thereafter until healing is complete. The effects of various nonbacterial contaminants vary considerably (*e.g.,* organic substances tend to be more irritating than others); in general, the critical factor for nonbacterial contaminants is the extent of the contamination. In the case of bacterial contaminants the type of contaminant is of greater importance. Infection caused by virulent bacteria nourished by dead tissue and organic foreign material in the wound may take several forms, of which the three most important are gas gangrene, the most dreaded, arising almost exclusively in damaged muscle tissue and spreading with alarming rapidity to cause death if unchecked by surgical or medical treatment; infections caused by such organisms as *Streptococcus* and *Staphylococcus* and the coliform bacteria, in which the local production of pus is a prominent feature accompanying a general reaction that may be severe; and tetanus, a treacherous, often fatal infection that becomes evident some days after the wound has occurred, frequently without any marked local manifestations but characterized by generalized muscle spasms.

The final healing of a wound is the result of a series of complex biological events taking place over a long period. Viewed in the simplest way, in an untreated but uncomplicated wound, as from a clean knife cut, the process is as follows: When tissues are cut, the edges of the wound separate, apparently pulled apart by the elasticity of the skin. Blood from the severed blood vessel fills the cavity of the wound and overflows its edges. The blood clots and eventually the surface of the clot dries out and becomes hard, forming a scab. During the first 24 hours the scab shrinks, drawing the edges of the wound closer together. If the scab sloughs off or is removed after about a week, a layer of reddish granulation tissue will be seen to have covered the cut edges of the subcutaneous tissue. Gradually a pearly, grayish, thin membrane extends out from the skin edge; eventually it covers the whole surface. The actual area of the wound, meanwhile, is steadily reduced by a process of contraction; finally, there is no raw surface to be seen.

The thin linear scar that forms is at first red and raised above the level of the surrounding skin but gradually fades until it is considerably paler than the surrounding skin. For many weeks after the scar forms, this process of contracture continues as is shown by the gradual shortening of the wound. Wounds that cross normal "skin lines" tend, after several months, to widen and become depressed below the level of the surrounding skin. Scars do not tan in sunlight, and they produce neither hair nor sweat, all evidences of the failure of the skin to return to full function.

Microscopically one can observe in the clot the whole process of the development of fibrin that causes the clot to contract, the arrival of the white blood cells and the macrophages that digest the debris in the wound, and the growth of blood capillaries followed by the growth inward of fibrous tissue migrating from the cells on the margin of the wound. The fibres arising from these cells can be identified and seen to increase, eventually filling the wound cavity with a network of interlacing threads of the protein collagen that, influenced by lines of tension, finally range themselves in firm bands. Meanwhile, the surface of the wound is being covered by a process of enlargement and flattening and by multiplication of the preexisting skin cells at the edge of the wound. These covering, or epithelial, cells start very early to spread down into the wound, clearing a way for themselves beneath the scab, perhaps by the production of an enzyme that dissolves the deeper layers of the crust. Eventually the proliferating epithelial sheets from the two sides of the wound coalesce to heal the wound superficially.

Wounded Knee, hamlet and creek on the Pine Ridge Indian Reservation in southwestern South Dakota, U.S. It was the site of two conflicts between North American Indians and representatives of the U.S. government.

On Dec. 29, 1890, more than 200 Sioux men, women, and children were massacred by U.S. troops in what has been called the Battle of Wounded Knee, an episode that concluded the conquest of the North American Indian. Reaching out for some hope of salvation from hard conditions, such as semistarvation caused by reduction in the size of their reservation in the late 1880s, the Teton Sioux responded affirmatively to Wovoka, a Paiute prophet who promised the disappearance of the white man and a return of native lands and buffalo if certain rites and dances were performed. These rites, known as the Ghost Dance (*q.v.*), caused alarm among whites and led to federal military intervention. The army subdued the Ghost Dance movement, but Chief Sitting Bull was killed by reservation police while being arrested (December 14), and a few hundred Sioux left their reservation at Pine Ridge, seeking to hide in the Badlands. Technically classified as hostiles because they had left the reservation, the Indians gathered around Chief Big Foot (who was dying of pneumonia) but surrendered quietly to pursuing troops of the 7th Cavalry on the night of December 28. Following an overnight encampment near Wounded Knee Creek, the Indians were surrounded and were nearly disarmed when a scuffle broke out over a young brave's new rifle. A shot was fired from within the group of struggling men, and a trooper fell. From close range the soldiers, supported by machine guns, fired into the Indians, whose only arms were the clubs and knives that they had hidden in blankets. Fleeing Indians were pursued, and some were killed miles from the camp. Although the number of Indian dead is unknown (the Indians removed some of the dead later), 144 Indians, including 44 women and 16 children, were buried in a mass grave the following spring when the weather permitted the army to return. About 30 soldiers were killed during the hostilities.

On Feb. 27, 1973, some 200 members of the American Indian Movement (AIM), led by Russell Means and Dennis Banks, took the reservation hamlet of Wounded Knee by force, declared it the "Independent Oglala Sioux Nation," and vowed to stay until the U.S. government met AIM demands for a change in tribal leaders, a review of all Indian treaties, and a U.S. Senate investigation of treatment of Indians in general. The Indians were immediately surrounded by federal marshals, and a siege began, ending on May 8, when the Indians surrendered their arms and evacuated Wounded Knee in exchange for a promise of negotiations on Indian grievances. Two Indians were killed and one federal marshal was seriously wounded during the siege, which alternated between negotiation and exchanges of gunfire.

Wouri River, Wouri also spelled VOURI, or VURI, stream in southwestern Cameroon, whose estuary on the Atlantic Ocean is the site of Douala, the country's major industrial centre and port. Two headstreams—the Nkam and the Makombé—join to form the Wouri, 20 mi (32 km) northeast of Yabassi. The river then flows in a southwesterly direction for about 100 mi to empty into the Gulf of Guinea. It is navigable for 40 mi along its lower course, below Yabassi.

The Portuguese navigator Fernão do Po was probably the first European to reach the estuary of the river, which he named Rio dos Camaroēs ("River of the Prawns") because of its abundance of prawns. The Spanish form of the word, *camarones,* prevailed and later gave rise to the German Kamerun, the English Cameroons, and the French Cameroun.

Wouwerman, Philips, Wouwerman also spelled WOUWERMANS (baptized May 24, 1619, Haarlem, Neth.—d. May 19, 1668, Haarlem), Dutch Baroque painter of animals, landscapes, and genre scenes, best known for his studies of horses.

First trained under his father, Paul Joosten Wouwerman, a painter from Alkmaar, he may also have studied with Pieter Cornelisz., Pieter Verbeeck, and Frans Hals. He appears, however, to have been much influenced by Pieter van Laer (called Bamboccio), a Dutch artist who had lived in Rome and whose pictures of peasants, soldiers, and brigands were influential in northern Europe. Wouwerman became a member of the guild of painters at Haarlem in 1640.

Wouwerman is credited with more than 1,000 pictures, but many of these were painted by his brothers Pieter (1623–82) and Jan (1629–66) and by many other imitators. Three different styles have been observed as characteristic of the various periods of his art. His earlier works are marked by the prevalence of brown tonalities and by a tendency to angularity in draftsmanship; the paintings of his middle period have greater purity and brilliance; and his last and greatest pictures possess more force and breadth and are full of a delicate silvery gray tone.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Wovoka, also called JACK WILSON (b. 1858?, Utah Territory—d. Oct. 1932, Walker River Indian Reservation, Nev.), American Indian religious leader who spawned the second messianic Ghost Dance cult, which swept the reservations in about 1890.

His father, Tavibo, had been an assistant to Wodziwob, the Paiute leader of the first Ghost Dance movement of the 1870s. Himself a Paiute, Wovoka (whose name means "the Cutter") worked during his early teens for a rancher, David Wilson, whose family name he adopted while among whites.

By 1888, having returned to his own people, he had acquired a reputation as a medicine man. In 1889 Wovoka claimed that he had fallen into a trance state during which God informed him that in two years the ancestors of his people would rise from the dead, buffalo once again would fill the plains, and the white man would vanish. But to bring this about, Wovoka warned his increasing numbers of followers, Indians must remain peaceful and profess their faith in the resurrection of the dead, or ghosts, by taking part in a ritual dance, the so-called Ghost Dance. The cult quickly spread to other tribes, notably the militant Sioux, who saw in it the ultimate revenge against the white man. Wovoka was worshipped far and wide as a new messiah. The religious frenzy engendered by the cult frightened nearby white settlers, as did the prospect that Sitting Bull would try to exploit the movement to engineer an uprising. Hostility between the two cultures grew increasingly, culminating in the massacre by U.S. troops of about 200 Sioux men, women, and children at Wounded Knee (*q.v.*), S.D. on Dec. 29, 1890. After this tragic incident many of Wovoka's followers despaired of their redemption, and the movement eventually died out.

wow (sound reproduction): *see* flutter and wow.

WPA (U.S.): *see* Works Progress Administration.

WPA Federal Art Project, first major attempt at government patronage of the visual arts in the United States and the most extensive and influential of the visual arts projects conceived during the Depression of the 1930s by the administration of Pres. Franklin D. Roosevelt. It is often confused with the Department of the Treasury art programs (Treasury Section of Painting and Sculpture, Public Works of Art Project, and Treasury Relief Art Project; *qq.v.*), but, unlike the Treasury's endeavours the Works Progress (later Projects) Administration Federal Art Project (WPA/FAP) employed artists with a wide range of experience and styles, sponsored a more varied and experimental body of art, and had a far greater influence on subsequent American movements. This was chiefly the result of the leadership of its national director, Holger Cahill, a former museum curator and expert on American folk art, who saw the potential for cultural development in what was essentially a work-relief program for artists. Cahill and his staff learned from the Public Works of Art Project of 1933–34 that any relief program faced the problem of attempting to produce art of high quality while trying to help the unemployed regardless of talent. In the fall of 1935 a range of creative, educational, research, and service projects was organized to preserve the skills of professional artists in mural, easel, sculpture, and graphic art divisions, of commercial artists in the poster and Index of American Design divisions, and of the less experienced in art education and clerical jobs. The project also developed an audience by establishing more than 100 community art centres and galleries across the country in regions where art and artists were almost unknown. Cahill stated in 1936 that "The organization of the Project has proceeded on the principle that it is not the solitary genius but a sound general movement which maintains art as a vital, functioning part of any cultural scheme. Art is not a matter of rare, occasional masterpieces." This was in direct opposition to the philosophy of the Department of the Treasury programs, which sought to commission outstanding works rather than to provide work relief.

The WPA/FAP employed most of its artists from relief rolls, while maintaining a small number of nonrelief artists for supervisory positions. Artists received a basic wage of $23.50 per week and were expected to turn in one work within a specified number of weeks or to work a certain number of days on a mural or architectural sculpture project. Most easel painters, sculptors, and graphic artists worked at home; muralists and poster artists laboured in the field or in project workshops. The project's greatest problem was to balance the whims and irregular schedules of the creative process with the rigid timekeep-

ing rules of the WPA bureaucracy. Another basic problem arose when budget reductions required the WPA to eliminate artists from its rolls; when too many termination notices were received, riots and sit-down strikes often occurred among the artists. To protect their precarious employment and to improve working conditions, artists organized nationally in an Artists' Union. Its leaders worked with the WPA/FAP administrators and emulated the practices of the labour movement; in 1937 Artists' Union became Local 60 of the United Office and Professional Workers of the CIO.

The project employed more than 5,000 artists at its peak in 1936 and probably double that number over the eight years of its existence. It produced 2,566 murals, more than 100,-000 easel paintings, about 17,700 sculptures, nearly 300,000 fine prints, and about 22,000 plates for the Index of American Design, along with innumerable posters and objects of craft. The total federal investment was about $35,-000,000. *Violins and Shovels: The WPA Arts Projects,* by Milton Meltzer, was published in 1976.

WPA Federal Theatre Project, national theatre project sponsored and funded by the U.S. government as part of the Works Projects Administration (WPA). The purpose was to create jobs for unemployed theatrical people in the Great Depression years of 1935–39.

Ten thousand professionals were employed in all facets of the theatre. About 1,000 productions were mounted in four years in 40 states, often presented free to the public. These productions included classical and modern drama, children's plays, puppet shows, musical comedies, and documentary theatre known as Living Newspaper (*q.v.*). Other projects included producing plays by young, unknown American playwrights, establishing black American theatre, and presenting radio broadcasts of dramatic works. Following a series of controversial investigations by the House Committee on Un-American Activities and Subcommittee on Appropriations regarding the Federal Theatre's outspoken leftist commentary on social and economic issues, the Federal Theatre Project was terminated in 1939 by congressional action.

WPA Federal Writers' Project, a program established in the United States in 1935 by the Works Progress Administration (WPA) as part of the New Deal struggle against the Great Depression. It provided jobs for unemployed writers, editors, and research workers. Directed by Henry G. Alsberg, it operated in all states and at one time employed 6,600 men and women. The American Guide series, the project's most important achievement, included guides for every state and territory (except Hawaii), as well as for Washington, D.C., New York City, Los Angeles, San Francisco, New Orleans, and Philadelphia; for several major highways (U.S. 1, Ocean Highway, Oregon Trail); and for scores of towns, villages, and counties. The state guides, encyclopaedic in scope, combined travel information with essays on geography, architecture, history, and commerce. The project also produced ethnic studies, folklore collections, local histories, nature studies—a total of more than 1,000 books and pamphlets.

In accordance with WPA regulations, most of the project's personnel came from the relief rolls. It included such prominent authors of the 1930s as Conrad Aiken, Maxwell Bodenheim, and Claude McKay and such future luminaries as Richard Wright, Ralph Ellison, Nelson Algren, Frank Yerby, Saul Bellow, Loren Eiseley, and Weldon Kees. Congress ended federal sponsorship of the project in 1939 but allowed it to continue under state sponsorship until 1943.

Wrangel, Ferdinand Petrovich, Russian FERDINAND PETROVICH VRANGEL (b. Jan. 9, 1797 [Dec. 29, 1796, Old Style], Pskov, Russia—d. June 6 [May 25], 1870, Tartu, Estonia, Russian Empire), Russian explorer who completed the mapping of the northeastern coast of Siberia (1820–24). Wrangel Island off the Siberian coast was named in his honour.

Graduating from the Russian naval academy in 1815, Wrangel sailed around the world in the sloop *Kamchatka* under V.M. Golovnin (1817–19). After his explorations in Siberia he led another expedition around the world in the sloop *Krotky* (1825–27). He was governor of the Russian settlements in America (1829–35), director of the Russian American Company (1840–49), and naval minister (1855–57), retiring in 1864. A member of the St. Petersburg Academy of Sciences, he helped found the Russian Geographical Society.

Wrangel, Karl Gustav, Greve (Count) (b. Dec. 13, 1613, Skokloster, near Uppsala, Swed.—d. June 25, 1676, Spieker, Rügen Island, off Pomerania [Germany]), Swedish soldier who succeeded Lennart Torstenson as Swedish military and naval commander during the Thirty Years' War (1618–48) and subsequent Baltic conflicts.



Count Wrangel, detail from an oil painting by M. Merian the Younger, 1652; in Gripsholm Castle, Sweden

By courtesy of the Svenska Portrattarkivet, Stockholm

Wrangel began his military career in Germany during the Thirty Years' War and by 1638 was a major general. He participated in victories at Wolfenbüttel (1641) and Leipzig (1642) and won a naval victory off Fehmarn (1644). He received successive promotions and, in 1646, returned to Germany as Swedish commander in chief. He proved an able strategist in operations largely coordinated with those of the French commander, Turenne; when the future Charles X of Sweden took his place as commander in chief, Wrangel became governor of Swedish Pomerania.

Although appointed vice admiral in 1653, Wrangel achieved most success with the land forces in the First Northern War (1655–60). He therefore participated prominently in Charles X's wars against Poland, Brandenburg, and Denmark (1655–58). From 1657 he commanded the navy as grand admiral.

During Charles XI's minority, Wrangel sat on the Regency Council (1660–72), first as grand admiral and (from 1664) as grand marshal and president of the War Board. He favoured the French alliance (1672) against the Dutch. Two years later, despite his poor health, he went again to Germany as commander when the Swedes invaded Brandenburg.

Wrangel, Pyotr Nikolayevich, Baron (b. Aug. 27 [Aug. 15, Old Style], 1878, Novo-Aleksandrovsk, Lithuania, Russian Empire—d. April 25, 1928, Brussels), general who led the "White" (anti-Bolshevik) forces in the final phase of the Russian Civil War (1918–20).

A member of an old German baronial family, he served in the Russian imperial guards and became commander of a Cossack division during World War I. He continued to serve in the army after the February Revolution of 1917, which overthrew the Romanov dynasty. However, when General Lavr G. Kornilov, whom he supported, was arrested for attempting to overthrow the provisional government (August 1917), Wrangel resigned his commission and went to the Crimea.

After the Bolshevik coup d'état (October 1917), he joined the White forces of General Anton I. Denikin and was given command of an army. During Denikin's offensive (summer 1919), Wrangel captured Tsaritsyn (now Volgograd; July 2); he succeeded Denikin as commander of the White armies in April 1920, after the Whites had been forced back into the Crimea and Denikin had resigned. Wrangel tried to rally the support of the peasants, Cossacks, and western allies for the Whites, then launched a new offensive in the Ukraine (June 1920). By early November, however, the Red Army had defeated the Whites, who retreated into the Crimea and were evacuated to Constantinople (Nov. 8–16, 1920). After leaving Russia, Wrangel lived in exile in western Europe and wrote his memoirs, which appeared in English translation in 1929.

Wrangel Island, Russian OSTROV VRANGELYA, Chukchi autonomous *okrug* (district), far northeastern Russia, in the Arctic Ocean, separating the East Siberian Sea from the Chukchi Sea. The long, narrow island is about 78 miles (125 km) wide and occupies an area of some 2,800 square miles (7,300 square km). It is separated from the Siberian mainland by Long Strait. Wrangel Island is part of the region of Arctic tundra, much of it low-lying lichen. Although the highest part of the island reaches 3,596 feet (1,096 m) at Sovetskaya Mountain, discovered in 1938, there are no glaciers. Geologically, Wrangel Island consists of crystalline slates, granites, and gneisses together with alluvial sands. There are many small lakes, and the northern and southwestern coasts are characterized by numerous sandspits enclosing lagoons. The seas around the island are rarely free from pack ice. The climate is Arctic, with a mean July temperature of 36° F (2.4° C). In summer there is a large bird population, as well as lemmings, Arctic fox, and polar bears.

Russian writings claim Russian knowledge of the island from the early 18th century. The Russian explorer Ferdinand P. Wrangel, for whom the island was later named, determined its location from accounts of Siberian natives but did not land there during his mapping of the Siberian coast in the early 1820s. Russian fur traders subsequently visited the island, and it was sighted by U.S. vessels in 1867 and 1881. Survivors of a sunken Canadian ship reached Wrangel in 1914, and the leader of the expedition, Vilhjalmur Stefansson, created an international incident in the early 1920s when he claimed Wrangel for Canada without authorization. The Soviet Union then annexed the island, and permanent occupation began with the landing of Chukchi and Russian families in 1926. Wrangel Island State Reserve, established in 1976, occupies 1,730,000 acres (700,000 hectares) and contains polar bears, walruses, and reindeer.

Wrangell Mountains, segment of the Pacific Coast Ranges, western North America, extending southward in southeastern Alaska, U.S., for about 100 miles (160 km), from the Copper River to the St. Elias Mountains near the Yukon border. Many peaks exceed 10,000 feet (3,000 m), including Mount Blackburn (16,390 feet [4,990 m]), the highest point in the range, and Mount Sanford (16,237 feet [4,950 m]). Snowfields drain into glaciers as long as 45 miles (72 km). Most of the summits are extinct volcanoes; Mount Wrangell (14,163 feet [4,320 m]) was the last

to approach the dormant stage. Rich copper deposits were discovered north of McCarthy in the early 20th century, and some gold, copper, and zinc mining continues. The mountains are named for Ferdinand P. Wrangel, a 19th-century Russian explorer, and they form a major part of the Wrangell-Saint Elias National Park and Preserve.

Wrangell-Saint Elias National Park and Preserve, formerly WRANGELL-SAINT ELIAS NATIONAL MONUMENT, national park and preserve in southeastern Alaska, U.S., on the Canadian border adjoining Kluane National Park. Proclaimed a national monument in 1978, the area underwent boundary and name changes in 1980. It is the largest unit in the U.S. national park system, with a total area of 12,318,000 ac (4,987,000 ha). At the convergence of the Chugach, Wrangell, and St. Elias mountian ranges, the park includes the largest assemblage of glaciers and the greatest collection of peaks above 16,000 ft (4,880 m) on the continent. Mt. St. Elias, at 18,008 ft (5,489 m), is the second highest peak in the United States. The park has a spectacular array of volcanic peaks, canyons, glacial systems, and broad lowland valleys. Wildlife includes caribou, brown and grizzly bears, Dall sheep, moose, wolves, trumpeter swans and other waterfowl, and marine mammals.

wrasse, any of 300 or more species of marine fishes of the family Labridae (order Perciformes). Wrasses range from about 5 centimetres (2 inches) to 2 metres (6.5 feet) or more in length. Most species are elongated and relatively slender. Characteristic features of the wrasses include: thick lips; large scales; long dorsal and anal fins; and large, often protruding canine teeth in the front of the jaw.

Wrasses are found throughout the world in tropical and temperate seas. They are often abundant among coral reefs. Most wrasses are carnivorous and prey on marine invertebrates. Some small wrasses, however, such as young blueheads (*Thalassoma bifasciatum*) and certain *Labroides* species, act as cleaners for larger fishes. They pick off and eat the external parasites of groupers, eels, snappers, and other fishes that visit them periodically. This cleaning service is also performed by various other small fishes and by certain shrimps.



Wrasse (*Labroides*) cleaning a larger fish
Douglas Faulkner

Some wrasses, such as the tautog (*Tautoga onitis*) of the western Atlantic, are drab or dusky in colour, but many, such as the rainbow wrasse (*Coris julis*) of the Mediterranean, are brilliantly and often intricately coloured or patterned. Coloration within a species may be confusingly variable, depending on age and sex. In some species, furthermore, a change in colour accompanies a change in sex, from female to male.

Though often abundant, wrasses as a group are of no great importance to people. Among the better known, or more valuable, species are the hogfish, or capitaine (*Lachnolaimus maximus*), a western Atlantic food species growing to a weight of about 7 kilograms (15 pounds); the moon wrasse (*Thalassoma lunare*), an Indo-Pacific species, green, red, and purplish in colour; the cuckoo wrasse (*Labrus ossiphagus*), an eastern Atlantic and Mediterranean species that is blue and orange if male, orange or reddish if female; and the tautog, or blackfish, a common western Atlantic food fish growing to a maximum of about 90 centimetres and 10 kilograms (22 pounds).

Wray, John (English naturalist): *see* Ray, John.

wreath, circular garland, usually woven of flowers, leaves, and foliage, that traditionally indicates honour or celebration. The wreath in ancient Egypt was most popular in the form of a chaplet made by sewing flowers to linen



"Many Happy Returns of the Day," detail showing a child on her birthday wearing a wreath and seated in the place of honour designated by the wreath surrounding her chair, oil by William Powell Frith, 1856; in the Harrogate Art Gallery, England
By courtesy of the Harrogate Art Gallery, England

bands and tying them around the head. In ancient Greece, wreaths, usually made of olive, pine, laurel, celery, or palm, were awarded to athletes victorious in the Olympic Games and as prizes to poets and orators. Young lovers in ancient Greece hung wreaths on their lovers' doorways as a sign of affection. In Rome also, laurel crowns were bestowed as a mark of honour, especially on civil officials and returning warriors. During the Italian Renaissance (*c.* 15th–16th centuries), the custom of wearing wreaths on festive occasions was revived. Later, in Victorian England, a floral wreath sometimes surrounded the chair of the guest of honour at a banquet.

Wreaths have traditionally had a religious significance: the writings of Greek and Roman mythology contain references to wreaths as symbols of honour; during the Middle Ages (*c.* 5th–15th centuries) they were often fashioned in the shape of the rosary; in 18th-century Mexico, nuns wore wreaths on their heads to signify joy on the day they professed their religious vows; the advent wreath with four candles is a Christian symbol of the four Sundays preceding Christmas.

The displaying of a decorative Christmas wreath, usually of holly leaves and berries, is a custom found in northern Europe, the United States, and Canada. It is also customary to hang a funeral wreath on a family's door to indicate sorrow or to place a wreath of flowers at the grave site, where its circular shape signifies continuing life. *See also* garland.

wreckfish, also called STONE BASS (*Polyprion americanus*), large, grayish fish of the family Percichthyidae (order Perciformes), found in the Mediterranean and in both sides of the Atlantic, generally in offshore waters. The wreckfish is deep-bodied, with a large head and jutting lower jaw, and attains a length and weight of about 2 metres (6.5 feet) and 36 kilograms (80 pounds) or more. It is named wreckfish because it often lives near floating lumber and other wreckage to feed on the fishes that, in turn, gather to feed on the small organisms found there.

Wrecsam (Wales): *see* Wrexham.

Wrede, Karl Philipp, Fürst von (prince of) (b. April 29, 1767, Heidelberg, Palatinate—d. Dec. 12, 1838, Ellingen, Bavaria), Bavarian field marshal, allied with Napoleon until 1813, when he joined the coalition against France.

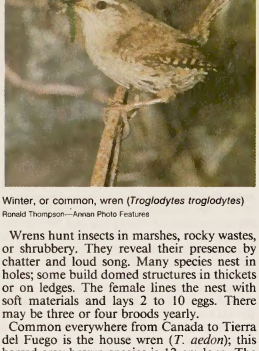
Educated for the career of a civil official in the Palatinate, he raised a volunteer corps that served with the Austrians, beginning in 1799. After the Treaty of Lunéville (1801) he was made lieutenant general in the Bavarian army and opposed the Austrian invasion of 1805. The Bavarians were for several years the active allies of Napoleon, and Wrede was engaged in a number of campaigns, notably in Prussia and the Tirol, even though the French were contemptuous of the Bavarian troops. In 1813 he returned to Bavaria in time to reorganize the Bavarian army when the nation finally resolved to join Napoleon's enemies. In 1814 he led a corps in the invasion of France and supported field marshal Blücher's vigorous policy. Made a prince in 1814, he played no part in subsequent campaigns but entered Bavarian politics as the opponent of Montgelas, whom he succeeded in 1817.

Wrekin, The, also called WREKIN, district, county of Shropshire (formerly Salop), west central England, occupying an area of 112 sq mi (291 sq km) in the east central part of the county. The primarily agricultural district, drained in the south by the River Severn, is a plain covered by glacial drift soils in the north. Historically important iron-manufacturing industrial villages are scattered along the Shropshire Hills in the south.

The place takes its name from The Wrekin, a 1,334 ft (407 m) hill within the industrial villages area in the southern part of the district. The planned, self-contained new town of Telford, established in 1963 to accommodate surplus population from the West Midlands 20 mi (32 km) to the southeast, extends across the industrial villages (including Dawley, Madeley, Ironbridge, Coalport, Coalbrookdale, Wellington, and Oakengates) and encompasses nearly one-third of the district's total area. Historical firsts of the district's iron industry are the smelting of iron with coke (1709), the first iron bridge (cast in Coalbrookdale in 1774 and built at Ironbridge in 1779), and the first iron boat (1787); all are commemorated in a museum of industrial archaeology at Coalbrookdale. Contemporary iron foundry manufactures of the villages include steel furniture, automotive components, and stoves. Cattle and cereals are raised near Newport, a market centre in the northeastern part of The Wrekin. The district seat is at Donnington Wood (within Telford). Pop. (1983 est.) 127,600.

wren, family name TROGLODYTIDAE, any of 59 species of small, chunky, brownish birds (order Passeriformes). The family originated in the Western Hemisphere and only one species, *Troglodytes troglodytes,* which breeds circumpolarly in temperate regions, has spread

to the Old World. This species is called the winter wren in North America; in Eurasia it is known simply as the wren. Typical of the family, it is about 10 centimetres (4 inches) long, dark-barred brown (sexes alike), with short bill slightly downcurved, short rounded wings, and short cocked tail.



Winter, or common, wren (*Troglodytes troglodytes*)
Ronald Thompson—Annan Photo Features

Wrens hunt insects in marshes, rocky wastes, or shrubbery. They reveal their presence by chatter and loud song. Many species nest in holes; some build domed structures in thickets or on ledges. The female lines the nest with soft materials and lays 2 to 10 eggs. There may be three or four broods yearly.

Common everywhere from Canada to Tierra del Fuego is the house wren (*T. aedon*); this barred gray-brown species is 12 cm long. The largest U.S. species is the 20-cm cactus wren (*Campylorhynchus brunneicapillus*) of southwestern deserts; it is commoner in Mexico. Tiny wood wrens (*Henicorhina*) are found in tropical forests and the little marsh wrens (*Cistothorus, Telmatodytes*) in tropical and temperate wetlands. Exceptional singers include the Carolina wren (*Thryothorus ludovicianus*) of the eastern U.S.; the canyon wren (*Catherpes mexicanus*) of arid western North America; and the musician wren (*Cyphorhinus arada*), often called organbird, of South America. The rock wren (*Salpinctes obsoletus*), the only U.S. wren with a streaked breast, nests among rocks from the Great Plains westward.

A number of unrelated birds of small size or wrenlike appearance are called wrens. For New Zealand wrens, *see* Xenicidae. For Australian wrens, *see* emu-wren; fairy wren. In tropical America are gnatwrens (*see* gnatwren).

Wren, Sir Christopher (b. Oct. 20, 1632, East Knoyle, Wiltshire, Eng.—d. Feb. 25, 1723, London), architect, designer, astronomer, and geometrician, the greatest English architect of his time; Wren designed 53 London churches, including St. Paul's Cathedral, as well as many secular buildings of note. He was a founder of the Royal Society (president, 1680–82), and his scientific work was highly regarded by Newton and Pascal. He was knighted in 1673.

Early academic career and scientific pursuits. Wren, the son of a rector, was the youngest child, the only boy, and delicate in health. Before Christopher was three, his father was appointed dean of Windsor, and the Wren family moved into the precincts of the court. It was among the intellectuals around Charles I that the boy first developed his mathematical interests. The life at Windsor was rudely disturbed by the outbreak of civil war in 1642. The deanery was pillaged and the Dean forced to retire, first to Bristol, then to the country home of a son-in-law, William Holder, in Oxfordshire. Wren was sent to school at Westminster but spent much time under Holder's tuition, experimenting in astronomy. He translated William Oughtred's work on sundials into Latin and constructed various astronomical and meteorological devices. If the general direction of his studies was toward astronomy, however, there was an important turn toward physiology in 1647 when he met the anatomist Charles Scarburgh. Wren prepared experiments for Scarburgh and made models representing the working of the muscles. One factor that stands out clearly from these early years is Wren's disposition to approach scientific problems by visual means. His diagrams that have survived are beautifully drawn, and his models seem to have been no less elegant.

In 1649 Wren went to Wadham College, Oxford, as a "gentleman commoner," a status that carried certain privileges, and was graduated with a B.A. in 1651. Oxford at that time had passed through a rigorous purgation of its more conservative elements by the parliamentary government. New men had been introduced, some of whom possessed great ability and had a special interest in the "experimental philosophy" so eloquently heralded by the scientific philosopher Sir Francis Bacon.

Receiving his A.M. in 1653, Wren was elected a fellow of All Souls College in the same year and began an active period of research and experiment in Oxford, ending with his appointment as Gresham professor of astronomy in Gresham College, London, in 1657. In the following year, with the death of Oliver Cromwell and the ensuing political turmoil, the college was occupied by the military, and Wren returned to Oxford, where he probably remained during the events that led to the restoration of Charles II in 1660. He returned to Gresham College, where scholarly activity resumed and an intellectual circle proposed a society "for the promotion of Physico-Mathematicall Experimental Learning." After obtaining the patronage of the restored monarchy, this group became the Royal Society, Wren being one of the most active participants and the author of the preamble to its charter.

In 1661 Wren was elected Savilian professor of astronomy at Oxford, and in 1669 he was appointed Surveyor of Works to Charles II. It appears, however, that, having tested himself successfully in so many directions, he still, at 30, had not found the one in which he could find complete satisfaction.

Turn to architecture. One of the reasons why Wren turned to architecture may have been the almost complete absence of serious architectural endeavour in England at the time. The architect Inigo Jones had died 10 years previously. There were perhaps half a dozen men in England with a reasonable grasp of architectural theory but none with the confidence to bring the art of building within the intellectual range of Royal Society thought—that is to say, as an art capable of beneficial scientific inquiry. Here, for Wren, was a whole field, which, given the opportunity, he could dominate; a field in which the intuition of the physicist and the art of a model maker would join to design works of formidable size and intricate construction.

Opportunity came, for in 1662 he was engaged in the design of the Sheldonian Theatre at Oxford. This, the gift of Bishop Sheldon of London to his old university, was to be a theatre in the classical sense, where university ceremonies would be performed. It followed a classical form, inspired by the ancient Theatre of Marcellus in Rome, but was roofed with timber trusses of novel design, thereby combining the classical point of view with the empirical modern, in a way entirely characteristic of a Royal Society mind. At the same time, Sheldon probably was consulting Wren about London's battered, and in parts nearly derelict, St. Paul's Cathedral. So Wren was drawn, deeply and immediately, into building problems. What he desperately needed at that moment was contact with the European tradition of classicism, and he seized a chance to join an embassy proceeding to Paris.



Wren, detail of an oil painting by Sir Godfrey Kneller, 1711; in the National Portrait Gallery, London
By courtesy of the National Portrait Gallery, London

By 1665 architecture at the court of Louis XIV had reached a climax of creativity. The Louvre Palace was approaching completion, and the remodelling of Versailles had begun. Bernini, the great sculptor and architect, was in Paris making designs for the Louvre's east front, and the aged Italian allowed Wren to peruse his drawings. There was considerably more for Wren to see in the French capital, including the domed churches of the Val-de-Grâce and the Sorbonne and a marvellous array of châteaus within easy range of Paris.

At Oxford, in the spring of 1666, he made his first design for a dome for St. Paul's. It was accepted in principle on Aug. 27, 1666. One week later, however, London was on fire. The Great Fire of London reduced two-thirds of the City to a smoking desert and old St. Paul's Cathedral to a ruin. Wren was most likely at Oxford at the time, but the news, so fantastically relevant to his own future, drew him at once to London. Between September 5 and 11 he ascertained the precise area of devastation, worked out a plan for rebuilding the City on new and more regular lines, and submitted it to Charles II. His plan reflected both his familiarity with Versailles and his acquaintance, through engravings, with the Rome of Pope Sixtus V. Others also submitted plans, and the King proclaimed on September 13 that a new plan for London would be adopted. No new plan, however, proceeded any further than the paper on which it was drawn. The problems of survey, compensation, and redistribution were too great. A rebuilding act was passed in 1667. It allowed only for the widening of certain streets, laid down standards of construction for new houses, levied a tax on coal coming into the Port of London, and provided for the rebuilding of a few essential buildings.

In 1669 the King's Surveyor of Works died, and Wren was promptly installed. In December he married Faith Coghill and moved into the Surveyor's official residence at Whitehall, where he lived, so far as is known, until his dismissal in 1718.

In 1670 a second rebuilding act was passed, raising the tax on coal and thus providing a source of funds for the rebuilding of St. Paul's Cathedral, churches within the City of London, and a column to commemorate the Great Fire. The city was now being rebuilt at a considerable pace. Wren himself had nothing to do with the general process of rebuilding. He did give occasional advice to the City authorities on their major projects but designed no houses or City companies' halls. He was

the King's Surveyor operating from Whitehall, not an official of the City of London. St. Paul's and the City churches did not fall automatically within the sphere of the royal works, though there was a long tradition of royal responsibility for St. Paul's.

In 1670 the first churches were actually rebuilt. Eighty-seven churches were destroyed in the fire, but some parishes were united so that only 51 new churches were built. Although Wren was personally responsible for all of these, it is not to be supposed that each of them represents his own fully developed design. That there was much delegation is shown by the surviving drawings. Only a few are in Wren's hand. There is no doubt, though, that Wren initiated the design in every case, and in certain churches the impress of his personality is distinct.

Construction of St. Paul's. While the churches were being built, Wren was slowly and painfully evolving designs for St. Paul's. The initial stage is represented by the "First Model" of 1670, now in the trophy room at the cathedral. This plan was accepted, and demolition of the old cathedral began. By 1673, however, the design seemed too modest, and Wren met his critics by producing a design of spectacular grandeur. A wooden model was made of this, and the "Great Model," as it is called, is still preserved at St. Paul's. It failed to satisfy the chapter and clerical opinion generally, however, and Wren was compelled to withdraw from the ideal and compromise with the traditional. In 1674 he produced the rather meagre Classical-Gothic compromise known as the Warrant Design, which was at once accepted by the King, and in 1675 building started.

What happened then is something of a mystery. The cathedral that Wren started to build bears only a slight resemblance to the Warrant Design. A mature and superbly detailed structure began to rise. In 1694 the masonry of the choir was finished and the rest of the fabric well in hand. In 1697 the first service was held in the cathedral. There was still, however, no dome. Building had been in progress for 22 years, and some restless elements in the government seemed to think this too long. As an incentive for more rapid progress, one half of Wren's salary was suspended until the cathedral should be complete. Wren was now 65. In 1711 the cathedral was finished. Wren, 79, petitioned for the withheld moiety of his salary, which was duly paid. The cathedral had been built in 35 years under one architect.

Concurrent projects. Through all those years Wren was not only the architect of St. Paul's and the City churches but also the head of the King's Works and thus the responsible officer for all expenditure on building issuing from the royal Exchequer. He had an able staff to look after routine maintenance, but much business passed through his hands, including the control of building developments in and around Westminster. In about 1674 the University of Cambridge considered building a Senate House for purposes similar to those for which the Sheldonian Theatre had been built. Wren made designs, but the project was abandoned. The master of Trinity College, who had promoted the scheme, was disappointed, but he persuaded his own college to undertake the erection of a new library and to employ Wren to design it. Wren's classicism here is impressive. There is no hint of the Baroque style prevalent in Europe at the time, and the building could well be mistaken for a Neoclassical work of a century later.

At Oxford in 1681 the Dean of Christ Church invited Wren to complete the main gateway of the college. The lower part of this had been built by Cardinal Wolsey and was in a richly ornamental Gothic style. The octagonal tower that Wren imposed illustrates both his respect for Gothic and his reservations about it. His attitude toward Gothic design was consistent and influenced Gothic construction in England well into the 18th century. In 1682 Charles II founded the Royal Hospital at Chelsea for the reception of veterans superannuated from his standing army. The idea doubtless derived from Louis XIV's Hôtel des Invalides in 1670, but Wren's building, completed in 1685, is very different from its prototype. Charles II died in 1685. In the short reign of his brother, James II, Wren's attention was directed mainly to Whitehall. The new king, a Roman Catholic, required a new chapel; he also ordered a new privy gallery and council chamber and a riverside apartment for the Queen. All these were built by Wren but were destroyed in the Whitehall fire of 1698.

There is not much information about Wren's personal life after 1669. He was knighted in the year of the Great Model, 1673. His first wife died of smallpox in 1675, leaving him with one young son, Christopher (another had died in infancy). His second wife, Jane Fitzwilliam, by whom he had a daughter, Jane, and a son, William, died in 1679. In these years he never wholly abandoned his scientific pursuits. He was still at the centre of the Royal Society group and was president of the society from 1680 to 1682. He was sufficiently active in public affairs to be returned as member of Parliament for Old Windsor in 1680, 1689, and 1690 but did not take his seat.

With the Glorious Revolution of 1688, which drove James II from the throne, Wren found himself chief architect to William of Orange. William III and Mary II proved to be the most active builders of them all. They disliked the palace of Whitehall, and in 1689 Wren was at work on two new palaces: one at Kensington on the outskirts of London and the other at Hampton Court, 15 miles (24 kilometres) away, up the Thames River. Kensington Palace was a piecemeal conversion of an older house, with new courts and galleries added. It is not a totally satisfactory composition, but the south front is a noble piece of brickwork. Hampton Court, on the other hand, started as a project of huge dimensions—nothing less, in fact, than a rebuilding of the entire palace begun by Wolsey. Wren's first designs have survived, and in these he is seen, for the first time, spreading his wings as a palace architect. It was decided to demolish only one half of the old palace, however, and Wren's design was reduced considerably. Nevertheless, he brought to it many innovations and a unique use of English building materials. Hampton Court is a mixture of red and brown brick and Portland stone combined in masterly equilibrium.

Queen Mary died in 1694. The King lost heart, and building at Hampton Court was suspended. Two years before her death the Queen had initiated a scheme for the building of a royal hospital for seamen at Greenwich. For this, Wren made his first plans in 1694. The work began in 1696, but the whole group of buildings was not completed until several years after Wren's death. Greenwich Hospital was Wren's last great work and the only one still in progress after St. Paul's had been completed in 1711.

Queen Anne granted him a house at Hampton Court. He had, besides, a London house in St. James's Street, and it was there that his servant, noticing that he was taking an unusually long nap after dinner one evening, found him dead in his chair. Wren was buried with great ceremony in St. Paul's Cathedral, the tomb being covered by a simply inscribed slab of black marble. Later, his son placed on a nearby wall an inscription that was to become one of the most famous of all monumental inscriptions: *Lector, si monumentum requiris, circumspice* ("Reader, if you seek a monument, look around").

Assessment. At his death, Wren was 91. He had far outlived the age to which his genius belonged. Even the men he had trained and who owed much to his original and inspiring leadership were no longer young. The Baroque school they had created was already under fire from a new generation that brushed Wren's reputation aside and looked back beyond him to Inigo Jones. Architects of the 18th century could not forget Wren, but they could not forgive those elements in his work that seemed to them unclassical. The churches left the strongest mark on subsequent architecture. In France, where English architecture rarely made much impression, St. Paul's Cathedral could not be easily ignored, and the church of Sainte-Geneviève (now the Panthéon), begun in 1757, rises to a drum and dome similar to St. Paul's. Nobody with a dome to build could ignore Wren's, and there are myriad versions of it, from St. Isaac's (1840–42) in St. Petersburg to the Capitol at Washington, D.C. (1855–65).

It is only in the present century that Wren's work has ceased to be a potent and sometimes controversial factor in English architectural design. The last major architect to have been confessedly dependent on him was Sir Edwin Lutyens, who died in 1944. With the virtual elimination of historic influences from contemporary building, the study of Wren became intensified on the academic plane. The Wren Society, founded at the bicentenary of Wren's death in 1923, published 20 volumes of Wren material, the last appearing in 1943.

(J.Sum./Ed.)

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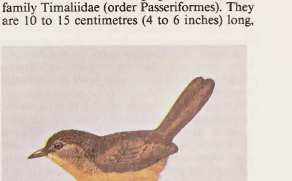
wren-babbler, any of about 20 species of small Asian birds belonging to the babbler family Timaliidae (order Passeriformes). They are 10 to 15 centimetres (4 to 6 inches) long,



Streaked long-tailed wren-babbler (*Spelaeornis chocolatinus*)
Painting by H. Douglas Pratt

rather short-tailed, and have a rather short and straight bill. These features differentiate wren-babblers from the closely related scimitar-babblers. Wren-babblers occur chiefly in southern Asia. An example is the streaked long-tailed wren-babbler (*Spelaeornis chocolatinus*) of northern Indochina, where it is found in small restless flocks in thickets.

wren-warbler, any of a number of Old World warblers, family Sylviidae (order Passeriformes), that are wrenlike in carrying their tails cocked up. The name also denotes certain birds of the family Maluridae that are found



Gray wren-warbler (*Calamonastes simplex*)
Painting by H. Douglas Pratt

in Australia and New Zealand. Among the sylviid wren-warblers are those of the African genus *Calamonastes* (sometimes included in *Camaroptera*), in which the tail is rather long and the underparts are barred. An example is the barred wren-warbler (*C. fasciolatus*) of south-central Africa, which sews its nest like a tailorbird.

wrench, also called SPANNER, tool, usually operated by hand, for tightening bolts and nuts. Basically, a wrench consists of a stout lever with a notch at one or both ends for gripping the bolt or nut in such a way that it can be twisted by a pull on the wrench at right angles to the axes of the lever and the bolt or nut. Some wrenches have ends with straight-sided slots that fit over the part being tightened; these tools are known as open-end wrenches and are made in various sizes to fit specific bolt and nut sizes.

Box-end wrenches have ends that enclose the nut and have 6, 8, 12, or 16 points inside the head. A wrench with 12 points is used on either a hexagonal or a square nut; the 8- and 16-point wrenches are used on square members. Because the sides of the box are thin, these wrenches are suitable for turning nuts that are hard to reach with an open-end wrench.

When a nut or a bolt head is in a recess below the surface of a bolted member, a socket wrench must be used; this is essentially a short pipe with a square or hexagonal hole and either an integral or a removable handle. Modern socket wrenches are made in sets, consisting of a number of short sockets with a square hole in one end that fits a removable handle and 8- or 12-point holes in the other end to fit various bolt and nut sizes. There are several types of handles and extensions, such as a T handle, screwdriver-grip handle, and a ratchet handle (*see* ratchet).

A useful accessory for a socket-wrench set is a handle equipped with a mechanism that measures the amount of torque, or turning effort, exerted by the wrench on the nut or bolt. One type of torque handle has two arms attached to the head, which carries the socket that fits the bolt or nut to be tightened; one arm carries the torque-indicating scale and remains fixed relative to the head, while the other arm carries the handgrip and is bent, relative to the head and the scale, when a bolt is tightened. A pointer on the bent arm indicates the torque on the scale. The purpose of a torque wrench is to make sure that screws and bolts in bolted assemblies are installed with sufficient tightness to prevent loosening during use, without being overtightened.

Wrenches with one fixed and one adjustable parallel jaw can be used on various sizes of bolts and nuts within a limited range. On one type the jaws are at right angles to the handle; this wrench, invented by Charles Moncky, is known as a monkey wrench. On another type, originally called a Crescent wrench, the jaws are almost parallel to the handle: on both types the movable jaw is adjusted by turning a worm that engages a rack of teeth cut into the jaw.

The adjustable pipe, or stillson, wrench is used to hold or turn pipes or circular bars. This wrench has serrated jaws, one of which is pivoted on the handle to create a strong gripping action on the work.

Recessed-head screws or set screws commonly have a hexagonally shaped recess and require a special wrench, usually referred to as an allen wrench; it consists of a hexagonal bar of tool steel shaped into the form of an L, either end of which fits into the recess.

Power or impact wrenches are used for tightening or loosening nuts quickly. They are essentially small hand-held electric or pneumatic motors that can rotate socket wrenches at high speed. They are equipped with a torque-limiting device that will stop the rotation of the socket wrench when a preset torque is reached. Pneumatic wrenches are commonly used in automobile service stations, where compressed air is available and the sparking of electric motors is a fire hazard.

wrenthrush (*Zeledonia coronata*), bird of the rain forests of Costa Rica and Panama. It resembles the wren in size (11 cm, or 4.5



Wrenthrush (*Zeledonia coronata*)
Drawing by John P. O'Neill

inches), in being brownish and short-tailed, and in its habit of skulking in undergrowth. It is thrushlike in beak and leg structure. The wrenthrush has been classified as a chat-thrush (*q.v.*; family Turdidae, order Passeriformes) but is now considered to belong nearer the woodwarbler (*q.v.*) group (Parulidae). Some authors prefer to separate it, provisionally, as the family Zeledoniidae.

wrentit (species *Chamaea fasciata*), bird of the Pacific coast of North America, believed by some authorities to be the only New World member of the babbler family Timaliidae (order Passeriformes), but often placed in its own family Chamaeidae. A fluffy brown bird about 16 cm (6.5 inches) long with a long tail, the



Wrentit (*Chamaea fasciata*)
B. Brewer Hall from The National Audubon Society Collection/Photo Researchers—EB Inc.

wrentit calls harshly and sings loudly in thick brush, where pairs forage for fruit and insects.

wrestling, sport practiced in various styles by two competitors, involving forcing an opponent to touch the ground with some part of the body other than his feet; forcing him into a certain position, usually supine (on his back); or holding him in that position for a minimum length of time. Wrestling is conducted in various styles with contestants upright or on the ground (or mat).

The three basic types of wrestling contest are the belt-and-jacket, catch-hold, and loose styles, all of which appear to have originated in antiquity. Belt-and-jacket styles of wrestling are those in which the clothing of the wrestlers provides the principal means of taking a grip on the opponent. In many cases this is no more than a special belt worn by both wrestlers, while in others a special belted jacket and special trousers are worn. Catch-hold styles require the contestants to take a prescribed hold before the contest begins; often this grip must be maintained throughout the struggle. Loose styles of wrestling, which are used in modern international competition, commence with the wrestlers separated and free to seize any grip that they choose except such as are explicitly forbidden (*e.g.*, taking hold of an opponent's clothing or using a life-threatening grip, such as a stranglehold).

Wrestling can also be classified in terms of what is required to win. These categories can be graded on an ascending scale of violence as follows: break-stance sports are those that require forcing the opponent to relinquish a certain posture or position; toppling requires that the standing opponent be forced to touch the ground with some part of his body other than his feet; touch-fall wrestling requires that the opponent be forced into a certain position, usually supine, for a brief instant; pin-fall wrestling requires that the opponent be held in such a position for a measurable length of time; and submission wrestling requires the opponent to vocally or visually signal defeat by his own choice.

Early history. No sport is older or more widely distributed than wrestling, often in highly local styles that have persisted to the present day.

Wrestling probably originated in hand-to-hand combat, and in particular as a sportive form of combat substituting the submission of a contestant for his death. Works of art from 3000 BC depict belt wrestling in Babylonia and Egypt, and the Sumerian Gilgamesh epic has a description of such wrestling. Loose wrestling in India dates to before 1500 BC. Chinese documents from 700 BC describe loose wrestling, as do Japanese records from the 1st century BC. The belt wrestling practiced locally in the 20th century by the Swiss, Icelanders, Japanese, and Cossacks differs little from that of the Egyptians in 2500 BC.

Wrestling was probably the most popular sport of the ancient Greeks. Young men belonged to palestras, or wrestling schools, as the

focal point of their social life. Illustrations of wrestling on Greek vases and coins are common throughout all periods of ancient Greece, but all that can be told from it is that the style was loose wrestling and that wrestlers, as did all Greek athletes, competed naked. Wrestling was part of the Olympic Games from 776 BC. There were two wrestling championships in these games: a toppling event for the best two of three falls; and the *pankration* (Latin: *pancratium*), which combined wrestling and boxing and ended in the submission of one contestant. Upright wrestling was also a part of the pentathlon event in the Olympic Games, a bout being fought to a clear-cut fall of one of the wrestlers. The most famous ancient Greek wrestler was Milon of Croton (*q.v.*), who won the wrestling championship of the Olympic Games six times. Wrestling was less popular among the Romans than it had been with the Greeks, and with the fall of the Roman Empire, references to wrestling disappeared in Europe until about AD 800.

Middle Ages. When the Islāmic rulers of Persia began hiring Turkic mercenaries about AD 800, the soldiers brought with them a style of loose wrestling called *koresh*, in which grips may be taken on the long, tight leather pants worn by the wrestlers and the bout ends with a touch fall of the loser briefly on his back. Gradually the Turks took over the entire Muslim dominion, and their wrestling style spread. Later Mongolian invasions in the 13th century introduced Mongolian wrestling, which received royal patronage, and wrestling became the national sport of modern Iran.

Sumo (*q.v.*), a Japanese belt-wrestling style, was a popular spectator sport under imperial patronage (710–1185). Originally a submission spectacle, sumo became highly ritualized as a toppling match with victory coming also from the forcing of an opponent out of a 12-foot (4-metre) circle. By the 17th century sumo wrestling had became a professional sport in Japan. From the samurai martial art jujitsu, judo (*q.v.*), the other prominent Japanese wrestling style, was derived in the 19th century and became an international sport in the second half of the 20th century.

Wrestling occurred in several styles throughout Europe in the Middle Ages. The first recorded English match was held in London early in the 13th century. In England and Brittany a form of jacket-wrestling commonly called Cornwall and Devon (*see* Cornish wrestling) survives from at least the 4th or 5th century. Wrestling as a martial skill was taught to the knights of the Holy Roman Empire, and wrestling instruction books appeared in manuscript before the introduction of printing and thereafter in print. Mongolian loose wrestling, introduced to India after the Mongol conquest of 1526, survives in both India and Pakistan in the 20th century. As the modern era began, the English kings Henry VIII and Charles II and the French king Francis I were notable patrons of wrestling.

Modern wrestling. From the 18th century on, a procession of wrestlers or strongmen appeared at fairs, in theatres, and in circuses, challenging all comers, beginning with the Englishman Thomas Topham of London in the 18th century and culminating with Eugene Sandow, the German-born international figure, who continued into the 20th century. Early in the 1800s wrestling became a part of the training regimen of the German turnverein gymnastic movement. In the United States, wrestling was popular as a frontier sport (Abraham Lincoln was a noted local wrestler), bouts usually going until one contestant submitted and with few holds barred.

In the second half of the 19th century, two wrestling styles developed that ultimately dominated international wrestling: Greco-Roman wrestling (*q.v.*) and catch-as-catch-can, or freestyle wrestling (*q.v.*). Greco-Roman wrestling, popularized first in France, was so called because it was thought to be the kind of wrestling done by the ancients. Greco-Roman wrestling involves holds made only above the waist and forbids wrapping the legs about an opponent when the wrestlers go down. Originally it was professional and popularized at international expositions held at Paris, but after its inclusion in the revived Olympic Games in 1896, Greco-Roman wrestling events were held at subsequent Olympic Games except in 1900 and 1904.

The second style, catch-as-catch-can, was popularized mainly in Great Britain and the United States, first as a professional sport and after 1888, when it was recognized by the Amateur Athletic Association, as an amateur sport. It was introduced into the Olympic Games of 1904 and contested thereafter except in 1912. Catch-as-catch-can permits holds above the waist and leg grips and is won by a pin-fall.

Freestyle, or international freestyle, wrestling is a synthetic form of catch-as-catch-can that came to be used in the Olympic Games after it first appeared in Antwerp in about 1920. International freestyle is loose wrestling that uses the Greco-Roman touch-fall instead of the pin-fall common to Anglo-American wrestling practice.

Notable professional wrestlers in the late 19th and early 20th centuries included the Russian George Hackenschmidt, originally an amateur Greco-Roman wrestler who turned professional and wrestled catch-as-catch-can from 1900. He was world champion until 1908. The American wrestler Frank Gotch defeated Hackenschmidt in 1908 and again in 1911. After Gotch's retirement in 1913, professional wrestling, which was already fighting a losing battle in popularity with boxing, came to an end as a serious professional sport. Thereafter, though its audience grew, especially in the United States, through radio broadcasts and later even more so through telecasts, it became pure spectacle. The winners, divided deliberately into "heroes" and "villains," were determined by promoters' financial requirements, not skill. Wrestling maneuvers became increasingly extravagant and artificial and lost most of their authenticity.

Amateur wrestling in the 20th century. Though professional wrestling steadily declined in seriousness in the 20th century, significant improvements occurred in amateur wrestling during the same period. Originally there were no weight divisions in wrestling (the only weight in the first Olympic Games was heavyweight), but weight divisions developed in amateur wrestling. (For weight classes, *see* freestyle wrestling.) Earlier wrestling had been continuous and contested to one or two of three falls, sometimes with a time limit, sometimes without. Amateur wrestling came to be limited to three three-minute rounds effective in all international competition from 1967.

Perhaps most importantly, a system was devised in amateur wrestling to award points, short of a fall, based on one wrestler's being in control of another, so that draw matches were made virtually impossible. This system arose because Greco-Roman wrestling, with its restriction to holds only above the waist and the forbidden use of legs for holds, tended to be dull once the wrestlers were on the mat. In the 1912 Olympic Games two Finnish Greco-Roman wrestlers had a six-hour bout to no decision. In response to this problem, several American colleges introduced the idea of recording the length of time each wrestler was in control of the contest during the course of a bout. (A wrestler is in control when he is applying maneuvers that will eventuate in a pin-fall if his opponent is unable to escape.) In 1928 the National Collegiate Athletic Association adopted the collegiate style of wrestling as a national sport, and this resulted in the formulation of a set of point awards to keep a running score during a bout. The rules and judging are similar to those used in international freestyle and Greco-Roman bouts and include awarding points based on reversing control, applying a pinning hold, and placing an opponent in danger of pinning. The running point score and the difference in control time are used to decide a victor in no-fall bouts. The collegiate style of wrestling became increasingly popular in the high schools and colleges of the United States after World War II.

In the 20th century a third international style of wrestling, sambo, a kind of jacket wrestling, was created by Anatoly Kharlampiev of the Soviet Union and others after a study of various traditional wrestling styles. Sambo became popular in the Soviet Union, Bulgaria, and Japan and in 1964 was internationally recognized. In sambo a wrestler wins by throwing another cleanly on his back, or if the wrestlers go to the mat, the bout ends with the submission of one opponent. Sambo is much like judo and Mongolian wrestling, and bouts are of three three-minute rounds.

Organization. There was never any attempt to organize professional wrestling in the Western world. Amateur organization was local and national from the early 19th century on, regional competition began late in the 19th century, and in 1911 the International Amateur Wrestling Federation (FILA; Fédération Internationale de Lutte Amateur) was formed (reconstituted in 1920). The FILA regulates international competition, including the Olympic Games, and has held world championships in Greco-Roman wrestling from 1950 and in freestyle from 1951. World championships and Olympic championships in judo, sponsored by the International Judo Federation (formed in 1951), have been held from 1956 and 1964, respectively. For Olympic champions in Greco-Roman and freestyle wrestling and in judo, *see* Olympic Games. For world champions, *see* Sporting Record: *Judo; Wrestling.*

Principles and practice. Under FILA rules, contests of both international freestyle and Greco-Roman styles of touch-fall wrestling are similar, the object being in each case to throw or press the opponent on his back so that his shoulder blades touch the ground simultaneously. This need occur only for an instant, but a continuous roll across the shoulders is not considered a fall.

The competitors meet on a large padded mat and commence by taking holds from a standing position. Their struggle is observed and controlled by officials, one of whom, the referee, stands on the mat with the wrestlers and signals the award of points for maneuvers leading toward a touch-fall. If no fall occurs before the expiration of the match, these points are used to determine a winner. The actual match is continuous except that it is divided into three periods with a brief rest in between. Ties or draws are common in wrestling.

The competitors make use of techniques that are best learned by practice. While standing, they strive to bring each other to the mat with a series of maneuvers known as takedowns, involving lifting, throwing, twisting, tackling, and tripping. When attacked, a wrestler applies counterattacks to convert the situation to his own advantage. If the wrestlers go down on the mat without a touch-fall, they proceed to grapple, seizing each other with various grips and countergrips to work toward a fall. Great strength, though an asset, is not a prerequisite, since most of the maneuvers employ the principle of leverage; quickness and good physical condition are far more essential. The action in wrestling proceeds at a furious pace and involves all muscles of the body. The use of weight classes prevents the pairing of any two

men with more than a few pounds difference between them.

Although the Spartans trained young girls as wrestlers in ancient Greece and an occasional female wrestler, if only legendary, such as Zenobia, has appeared, wrestling by women occurred in the 20th century only as a novelty spectacle.

Wrexham, Welsh WRECSAM, county borough, northeastern Wales, along the English border. It covers a lowland area in the east, where most of the population lives, and includes the peaks of Esclusham, Ruabon, and Cyrn-y-Brain in the northwest. In the southwest it extends into the Vale of Ceiriog and the surrounding mountains, including the Berwyn massif. Most of Wrexham county borough lies within the historic county of Denbighshire, but its southeastern portion belongs to the historic county of Flintshire.

The town of Wrexham, the county borough's administrative and main population centre, had an ironworks that was at the forefront of the Industrial Revolution in the late 18th century. The surrounding region industrialized rapidly during the 19th century with the exploitation of rich coal deposits, and Wrexham town became the main commercial centre of the North Wales coalfield. The area's coal mines and heavy industry largely ceased operation by the end of the 20th century, but Wrexham attracted new industries. Wrexham town is also the site of the North East Wales Institute of Higher Education, a University of Wales Associated College. While the area around Wrexham town is urban, the area to the southeast is mainly rural and agricultural, specializing in grains and other arable crops. Livestock production predominates in the mountainous west, where tourism is also economically important. Area 193 square miles (500 square km). Pop. (1998 est.) 125,200.

Wrexham, Welsh WRECSAM, town, Wrexham county borough, historic county of Denbighshire (Sir Ddinbych), Wales. It is an industrial centre, a market centre, and the principal town of northeastern Wales.

Wrexham was at the forefront of the Industrial Revolution in the late 18th century, when John ("Iron Mad") Wilkinson established the Bersham Ironworks there. The ironworks produced cannon for the British army during the American Revolution and cylinders for James Watt's first steam engines. Nearby coalfields began to be exploited in the 19th century, and the town acquired steel, leather, and brewing industries. After World War II Wrexham's traditional industries largely ceased to operate, but the town attracted new industries, including engineering, automotive components, packaging, pharmaceuticals, electronics, optical fibres, food processing, and chemicals. The town is the administrative centre of Wrexham county borough. The parish church of St. Giles dates from 1472, and in its churchyard is the tomb of Elihu Yale (died 1721), the founder of Yale University; a full-scale replica of the church tower stands at Yale in New Haven, Conn., U.S. Pop. (1991) 40,614.

Wright, Sir Almroth Edward (b. Aug. 10, 1861, Middleton Tyas, Yorkshire, Eng.—d. April 30, 1947, Farnham Common, Buckinghamshire), British bacteriologist and immunologist best known for advancing vaccination through the use of autogenous vaccines (prepared from the bacteria harboured by the patient) and through antityphoid immunization with typhoid bacilli killed by heat.

Wright received his medical degree at Trinity College, Dublin, in 1883. He continued his education at Leipzig, Marburg, and Strasbourg and taught at several universities before he was appointed professor of pathology at the Army Medical School, Netley, in 1892. There he developed a vaccine against typhoid that was tested on more than 3,000 soldiers in India and used successfully during the Boer War. As a result Britain was the sole combatant to enter World War I with its troops immunized against typhoid fever—a factor instrumental in making this the first war in which fewer British soldiers died from infection than from missiles. Wright investigated wound infections in France during the war.

Wright resigned from the army in 1902 and became a professor of pathology at St. Mary's Hospital in London. Wright conducted research there until his retirement in 1946. Alexander Fleming, who later developed penicillin, was one of his aides. Wright also developed vaccines against enteric tuberculosis and pneumonia and contributed greatly to the study of opsonins, blood enzymes that make bacteria more susceptible to phagocytosis by white cells. He was knighted in 1906.

Wright, Archibald Lee: *see* Moore, Archie.

Wright, Benjamin (b. Oct. 10, 1770, Wethersfield, Conn. [U.S.]—d. Aug. 24, 1842, New York, N.Y.), American engineer who directed the construction of the Erie Canal. Because he trained so many engineers on that project, Wright has been called the "father of American engineering."

He was trained as a surveyor in his youth, and, after his family moved to the vicinity of Rome, N.Y., in 1789, Wright surveyed about 500,000 acres (200,000 hectares) for farmers in Oneida and Oswego counties. He was elected county judge in 1813 and to several terms in the state legislature.

In 1811 Wright was hired by the New York State Canal Commission to determine a route between Rome (on the Mohawk River) and Waterford (on the Hudson River) for the Erie Canal. Construction began in 1817 and ended in 1825; as chief engineer, Wright himself directed work on the canal's middle division and on the especially difficult eastern division.

Wright resigned from the Erie Canal project in 1827 and served as chief engineer of the Chesapeake and Ohio Canal from 1828 to 1831 and of the St. Lawrence Canal in 1833. He also was consulting engineer to the Welland, Chesapeake and Delaware, Delaware and Hudson, and other canals, and he made land surveys for railroads in New York, Illinois, Virginia, and Cuba.

Wright, Frances, byname FANNY WRIGHT (b. Sept. 6, 1795, Dundee, Scot.—d. Dec. 13, 1852, Cincinnati, Ohio, U.S.), Scottish-born American social reformer whose revolutionary views on religion, education, marriage, and birth control made her both a popular author and lecturer and a target of vilification.

Daughter of a wealthy Scottish radical, Frances Wright was orphaned at the age of two and reared in London by conservative relatives. She first came to the United States in 1818 and the following year had a play produced and published in New York City.

Wright traveled widely through the United States before returning to England. In 1821, she published *Views of Society and Manners in America.* Shortly afterward, she became friendly with the Marquis de Lafayette and returned to the United States with him in 1824. Through Lafayette she met Thomas Jefferson and James Madison, both of whom approved of her plan to purchase slaves, educate and emancipate them, and then help them to start a colony outside the United States.

In 1825 Wright purchased a tract of land in western Tennessee. She bought slaves, freed them, and settled them at the community she called Nashoba. The emancipated slaves were supposed to work to repay Wright, but the socialist community failed, and in 1828 Wright moved to New Harmony, Indiana.

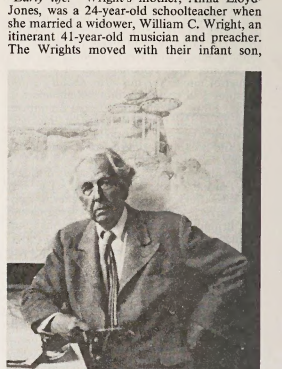
At New Harmony, she helped Robert Dale Owen edit the *New Harmony Gazette.* After a trip to Europe, Wright and Owen settled in 1829 in New York City, where they published a radical newspaper called the *Free Enquirer.* Wright defied popular convention by taking to the lecture platform to attack slavery, religion, marriage (she wanted moral rather than legal bonds of matrimony), and the unequal treatment of women. Frequently the target of ridicule and riots, she persisted in voicing her opinions and in 1829 published a transcript entitled *Course of Popular Lectures.*

She and Owen joined the Workingmen's Party and managed to oust its leader, Thomas Skidmore, who had advocated the equal distribution of property. For a time, Wright and Owen won party backing for their program of social reform through free secular education. But later, they, too, were repudiated.

In 1831 Wright married the French physician William P. Darusmont (Guillaume P. D'Arusmont), but the marriage ended in divorce in 1835. She continued writing and lecturing, became an active supporter of Andrew Jackson and the Democratic party, and lived out her final years in Cincinnati, an activist to the end.

Wright, Frank Lloyd, original name FRANK LINCOLN WRIGHT (b. June 8, 1867, Richland Center, Wis., U.S.—d. April 9, 1959, Phoenix, Ariz.), architect and writer, the most creative genius of American architecture. His "Prairie style" became the basis of 20th-century residential design in the United States.

Early life. Wright's mother, Anna Lloyd-Jones, was a 24-year-old schoolteacher when she married a widower, William C. Wright, an itinerant 41-year-old musician and preacher. The Wrights moved with their infant son,



Frank Lloyd Wright, photograph by Arnold Newman, 1947

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Frank Lincoln (he would later change his middle name to Lloyd), to Iowa in 1869 and then lived successively in Rhode Island and Weymouth, Mass., before eventually moving back to Wright's mother's home state of Wisconsin. The young Wright attended the University of Wisconsin at Madison for a few terms in 1885–86 as a special student, but as there was no instruction in architecture, he took engineering courses. In order to supplement the family income, Wright worked for the dean of engineering, but he did not like his situation nor the commonplace architecture around him. He dreamed of Chicago, where great buildings of unprecedented structural ingenuity were rising.

The early Chicago years. Wright left Madison early in 1887 for Chicago, where he found

employment with J.L. Silsbee, doing architectural detailing. Silsbee, a magnificent sketcher, inspired Wright to achieve a mastery of ductile line and telling accent. In time Wright found more rewarding work in the important architectural firm of Dankmar Adler and Louis Sullivan. Wright soon became chief assistant to Sullivan, and in June 1889 he married Catherine Tobin. He worked under Sullivan until 1893, at which time he opened his own architectural practice. His family grew to six children, while his firm grew until as many as 10 assistants were employed.

The first work from the new office, a house for W.H. Winslow, was sensational and skillful enough to attract the attention of the most influential architect in Chicago, Daniel Burnham, who offered to subsidize Wright for several years if Wright would study in Europe to become the principal designer in Burnham's firm. It was a solid compliment, but Wright refused, and this difficult decision strengthened his determination to search for a new and appropriate Midwestern architecture.

Other young architects were searching in the same way; this trend became known as the "Prairie school" of architecture. By 1900 Prairie architecture was mature, and Frank Lloyd Wright, 33 years old and mainly self-taught, was its chief practitioner. The Prairie school was soon widely recognized for its radical approach to building modern homes. Utilizing mass-produced materials and equipment, mostly developed for commercial buildings, the Prairie architects discarded elaborate compartmentalization and detailing for bold, plain walls, roomy family living areas, and perimeter heating below broad glazed areas. Comfort, convenience, and spaciousness were economically achieved. Wright alone built about 50 Prairie houses from 1900 to 1910. The typical Wright-designed residence from this period displayed a wide, low roof over continuous window bands that turned corners, defying the conventional boxlike structure of most houses, and the house's main rooms flowed together in an uninterrupted space.

During this period Wright lectured repeatedly; his most famous talk, "The Art and Craft of the Machine," was first printed in 1901. His works were featured in local exhibitions from 1894 through 1902. In that year he built the home of the W.W. Willitses, the first masterwork of the Prairie school. In 1905 he traveled to Japan.

By now Wright's practice encompassed apartment houses, group dwellings, and recreation centres. Most remarkable were his works for business and church. The administrative block for the Larkin Company, a mail order firm in Buffalo, N.Y., was erected in 1904 (demolished in 1950). Abutting the railway, it was sealed and fireroof, with filtered, conditioned, mechanical ventilation; metal desks, chairs, and files; ample sound-absorbent surfaces; and excellently balanced light, both natural and artificial. Two years later the Unitarian church of Oak Park, Unity Temple, was under way; in 1971 it was registered as a national historic landmark. Built on a minimal budget, the small house of worship and attached social centre achieved timeless monumentality. The congregation still meets in the building's intimate, top-lit cube of space, which is turned inward, away from city noises. The Unity Temple improved on the Larkin Building in the consistency of its structure (it was built of concrete, with massive walls and reinforced roof) and in the ingenious interior ornament that emphasized space while subordinating mass. Unlike many contemporary architects, Wright took advantage of ornament to define scale and accentuation.

Europe and Japan. By 1909 Wright's estrangement from his wife and his relationship with Mamah Cheney, the wife of one of his former clients, were damaging his ability to obtain architectural commissions. In that year Wright began work on his own house near Spring Green, Wis., which he named Taliesin, before he left for Europe that September. Abroad, Wright set to work on two books, both first published in Germany, which became famous; a grand double portfolio of his drawings (*Ausgeführte Bauten und Entwürfe,* 1910) and a smaller but full photographic record of his buildings (*Ausgeführte Bauten,* 1911). With a draftsman, Taylor Willey, and his eldest son, Lloyd Wright, the architect produced the numerous beautiful drawings published in these portfolios by reworking renderings brought from Chicago, Oak Park, and Wisconsin.

By 1911 Wright and Cheney, still unmarried since Wright could not get a divorce, were living at Taliesin. Wright's career suffered from unfavourable publicity generated by his relationship with Cheney, but he found a few loyal clients like the Avery Coonleys, whose suburban estate, west of Chicago, the grand masterwork of the Prairie style, he had designed in 1908. In 1912 Wright designed his first skyscraper, a slender concrete slab, prophetic but unbuilt.

At this time the Japanese began to consider Wright as architect for a new Tokyo hotel where visitors could be officially entertained and housed in Western style. Thus, early in 1913 he and Cheney spent some months in Japan. The following year Wright was occupied in Chicago with the rushed construction of Midway Gardens, a complex planned to include open-air dining, other restaurants, and clubs. Symmetrical in plan, this building was sparklingly decorated with abstract and near-abstract art and ornament. Its initial success was cut short by Prohibition, however, and it was later demolished. Just before Midway Gardens opened, Wright was dealt a crushing blow; Cheney and her children, who were visiting her at Taliesin, and four others were killed by an insane houseman, and the living quarters of the house were devastated by fire.

Stunned by the tragedy, Wright began to rebuild his home and was soon joined by a sculptress named Miriam Noel who became his mistress, although Wright was still married to Catherine Wright. In 1916 they went to Japan, which was to be their home for five years.

The Imperial Hotel (1915–22, dismantled 1967) in Tokyo was one of Wright's most significant works in its lavish comfort, splendid spaces, and unprecedented construction. Because of its revolutionary, floating cantilever construction, it was one of the only large buildings that safely withstood the devastating earthquake which struck Tokyo in 1923. No one still doubted Wright's complete mastery of his art, but he continued to experience difficulty in acquiring major commissions because of his egocentric and unconventional behaviour and the scandals that surrounded his private life.

The '20s and '30s. Wright's transpacific journeys took him to California, where he met a wealthy, demanding client, Aline Barnsdall, who, around 1920, built to Wright's designs a complex of houses and studios amid gardens on an estate called Olive Hill; these now serve as the Municipal Art Gallery in Hollywood. In 1923 and 1924 Wright built four houses in California, using textured concrete blocks with a fresh sense of form.

Late in 1922 Catherine divorced Wright at last. His relationship with Miriam Noel ended, and in 1925 Taliesin again burned, struck by lightning, and again Wright rebuilt it. That same year a Dutch publication, *Wendingen,* presented Wright's newer work fully and handsomely, with praise from Europeans. In 1924 Wright had met Olgivanna Hinzenberg; soon she came to live with Wright permanently, and they married in 1928. Meanwhile, Wright's finances had fallen into a catastrophic state; in 1926–27 he sold a great collection of Japanese prints but could not rescue Taliesin from the bank that seized it. Amid these debacles, Wright began to write *An Autobiography,* as well as a series of articles on architecture, which appeared in 1927 and 1928. Finally, some of Wright's admirers set up Wright, Incorporated—a firm that owned his talents, his properties, and his debts—that effectively shielded him. In 1929 Wright designed a tower of studios cantilevered from a concrete core, to be built in New York City; in various permutations it appeared as one of his best concepts. (In 1956 the St. Mark's Tower project was finally realized as the Price Tower in Bartlesville, Okla.)

The stock market crash of 1929 ended all architectural activity in the United States, and Wright spent the next years lecturing in Princeton, Chicago, and New York City. Meanwhile an exhibition of his architecture toured Europe and the United States. In 1932 *An Autobiography* and the first of Wright's books on urban problems, *The Disappearing City,* were published. In the same year the Wrights opened the Taliesin Fellowship, a training program for architects and related artists who lived in and operated Taliesin, its buildings, and further school structures as they built or remodeled them. From 20 to 60 apprentices worked with Wright each year; a few remained for decades, constituting his main office staff. In the winter Wright and his entourage packed up and drove to Arizona, where Taliesin West was soon to be built. At this time Wright developed an effective system for constructing low-cost homes and, over the years, many were built. Unlike the Prairie houses these "Usonians" were flat roofed, usually of one floor placed on a heated concrete foundation mat; among them were some of Wright's best works—*e.g.,* the Jacobs house (1937) in Westmorland, Wis., near Madison, and the Winckler-Goetsch house (1939) at Okemos, Mich.

International success and acclaim. Wright gradually reemerged as a leading architect; when the national economy improved, two commissions came to him that he utilized magnificently. The first was for a weekend retreat near Pittsburgh in the Allegheny mountains. This residence, "Fallingwater," was cantilevered over a waterfall with a simple daring that evoked wide publicity from 1936 to the present. Probably Wright's most-admired work, it was later given to the state and was opened to visitors. The second important commission was the administrative centre for S.C. Johnson, wax manufacturers, at Racine, Wis. Here Wright combined a closed, top-lit space with recurving forms and novel, tubular mushroom columns. The resulting airy enclosure is one of the most humane workrooms in modern architecture. Each of these buildings showed Wright to be as innovative as younger designers and a master of unique expressive forms.

Thereafter commissions flowed to Wright for every kind of building and from many parts of the world. His designs for the campus and buildings of Florida Southern College at Lakeland (1940–49) were begun, and the V.C. Morris Shop (1948) in San Francisco was executed. Among Wright's many late designs, executed and unexecuted, two major works stand out: the Guggenheim Museum in New York City and the Marin County government centre near San Francisco. The Guggenheim Museum was commissioned as early as 1943 to house a permanent collection of abstract art. Construction began in 1956, and the museum opened in 1959 after Wright's death. The Guggenheim, which has no separate floor levels but instead uses a spiral ramp, realized Wright's ideal of a continuous space and is one of his most significant buildings. The

Marin County complex is Wright's only executed work for government, and the only one that integrates architecture, highway, and automobile, a concept that had long preoccupied Wright.

A prolific author, Wright wrote *An Autobiography* (published 1932, revised 1943), *An Organic Architecture* (1939), *An American Architecture* (1955), and *A Testament* (1957).

Wright was a great originator and a highly productive architect. He designed some 800 buildings, of which 380 were actually built and about 280 are still standing. Throughout his career he retained the use of ornamental detail, earthy colours, and rich textural effects. His sensitive use of materials helped to control and perfect his dynamic expression of space, which opened a new era in American architecture. He became famous as the creator and expounder of "organic architecture," his phrase indicating buildings that harmonize both with their inhabitants and with their environment. The boldness and fertility of his invention and his command of space are probably his greatest achievements.

(E.K./Ed.)

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Wright, James C(laude), Jr. (b. Dec. 22, 1922, Fort Worth, Texas, U.S.), American politician and legislator who became speaker of the U.S. House of Representatives in 1986 but had to resign from office in 1989 owing to charges of financial improprieties.

Wright was educated at Weatherford College and the University of Texas before serving in the Army Air Force during World War II. After the war he entered politics as a Democrat and was elected to the Texas House of Representatives in 1946. He was defeated for reelection after serving one term and subsequently served as mayor of Weatherford, Texas, from 1950 to 1954. He then successfully sought election to the U.S. House of Representatives in 1954 and was reelected consecutively 16 times after that. He made an unsuccessful run for the Senate in 1961.

In 1976 Wright was elected majority leader by his fellow Democrats in the House of Representatives, and in 1986 he was elected speaker to succeed Thomas P. O'Neill. Wright was an aggressive and assertive leader of the House, but in June 1988 the House ethics committee began to investigate allegations of financial improprieties on his part. In April 1989 the committee unanimously accused Wright of five counts comprising 69 separate violations of the House's ethics rules. Wright was accused of having received unusually high fees that in essence violated the House's limits on outside earned income, and with having received discounted housing and other gifts that he had failed to list on his financial disclosure statements. Wright announced on May 31, 1989, that he would resign the speakership and his seat in Congress, and did so a week later when Thomas Foley was elected to succeed him as speaker of the House. Wright was the first speaker of the House to resign his post in midterm because of scandal.

Wright, Joseph, byname WRIGHT OF DERBY (b. Sept. 3, 1734, Derby, Derbyshire, Eng.—d. Aug. 29, 1797, Derby), English painter who was a pioneer in the artistic treatment of industrial subjects. He was also the best European painter of artificial light of his day.

Wright was trained as a portrait painter by Thomas Hudson in the 1750s. Wright's home was Derby, one of the great centres of the birth of the Industrial Revolution, and his depictions of scenes lit by moonlight or candlelight combine the realism of the new machinery with the romanticism involved in its application to industry and science. His pictures of technological subjects, partly inspired by the Dutch followers of Caravaggio, date from 1763 to 1773; the most famous are "The Air Pump" (1768) and "The Orrery" (*c.* 1763–65). Wright was also noted for his portraits of English Midlands industrialists and intellectuals.

Wright, Judith (Arundell) (b. May 31, 1915, Armidale, N.S.W., Australia—d. June 25, 2000, Canberra, A.C.T.), Australian poet whose verse, thoroughly modern in idiom, is noted for skillful technique.

After completing her education at the University of Sydney, Wright worked in an advertising agency and for the University of Sydney as a secretary, in Brisbane as a clerk, and later as a statistician. From 1949 she lectured part-time at various Australian universities, becoming honours tutor in English, University of Queensland, Brisbane, from 1967, and was active as a literary editor.

The first of her several books of poetry, *The Moving Image* (1946), was followed by such volumes as *Woman to Man* (1949), *The Gateway* (1953), *The Other Half* (1966), and *Alive* (1973). A short-story collection, *The Nature of Love*, appeared in 1966, and her *Collected Poems 1942–1970* in 1971. A further volume of poetry, *Phantom Dwelling*, was published in 1985. Wright also wrote several children's books and biographical essays on Australian literary figures.

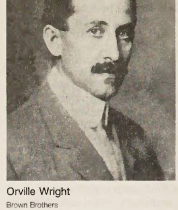
Wright, Mickey, byname of MARY KATHERYN WRIGHT (b. Feb. 14, 1935, San Diego, Calif., U.S.), American golfer who won a record number of Ladies Professional Golf Association (LPGA) tournaments (82), including an unmatched 13 in one season (1963).

Wright began playing golf at the age of 11 and won the U.S. Junior Girls' title in 1952. Turning professional in 1954, she became noted for her long drives and superior iron play. The first woman ever to capture both the U.S. Golf Association title and the LPGA championships in the same year (1958), she repeated her feat in 1961. Troubled by an arthritic wrist, she retired from the LPGA tour in 1965 but returned in 1973, crowning her comeback by sinking a 25-foot birdie putt on the final hole to win the Colgate–Dinah Shore Winner's Circle Tournament.

In 1963 and 1964 the Associated Press named her Woman Athlete of the Year, and by the late 1970s she was considered one of the greatest female athletes of the 20th century. She was inducted into the LPGA Hall of Fame in 1964 and author of *Play Golf the Wright Way* (1962). She was inducted into the World Golf Hall of Fame in 1976.

Wright, Orville and Wilbur (respectively b. Aug. 19, 1871, Dayton, Ohio, U.S.—d. Jan. 30, 1948, Dayton; b. April 16, 1867, near Millville, Ind.—d. May 30, 1912, Dayton), American brothers, inventors, and aviation pioneers who achieved the first powered, sustained, and controlled airplane flight (1903) and built and flew the first fully practical airplane (1905).

Early years. The sons of a bishop of the Evangelical United Brethren Church, the Wright brothers displayed from their earliest years unusual mechanical aptitude and talent. Mostly self-taught, they began designing and building printing machinery, then went into the business of selling bicycles and later of designing and manufacturing them. It was the



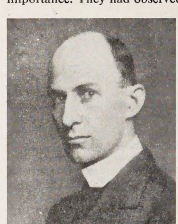
Orville Wright
Brown Brothers

income from this business that supported them during the early years of their aeronautical experiments.

The Wrights arrived on the aviation scene at the most opportune moment. Aerodynamics, structural engineering, engine design, and fuel technology had all reached a stage of development at which they could be welded together to produce a practical flying machine. The Wrights, hardworking, pertinacious, and gifted with outstanding mechanical talent, were ideally suited to achieve the final conquest of the air.

Wilbur first became interested in the idea of mechanical flight after reading of Otto Lilienthal's successful gliding experiments in Germany and then of his crash and death in 1896. But it was not until 1899, after observing how buzzards keep their balance in the air, that Wilbur realized that in order to fly successfully an airplane must operate on three axes. Like a bird, a flying machine must be able to bank to one side or the other, to climb or descend, and to steer to right or left and, if necessary, perform two or all of these operations simultaneously.

To the Wrights, flight control was of prime importance. They had observed that buzzards



Wilbur Wright
Brown Brothers

controlled their movement in roll by twisting their wings. So, when the brothers built their first machine in 1899—a biplane kite—they fitted it with wings that could be mechanically twisted. One side could thus produce more lift and the other simultaneously less, which enabled the craft to bank for a turn or to roll back to a level position if disturbed by the wind. Apart from being the first to make a powered airplane fly, the Wrights' achievement of three-axis control was their most significant contribution to aerodynamics and practical flying.

Before attempting powered flight, they decided to master gliding flight and built three biplane gliders—in 1900, 1901, and 1902. The first of these gliders was flown at Kitty Hawk, N.C., and the others at the Kill Devil Hills, five miles to the south. They developed the last glider to a state of full controllability: it had a forward elevator for up-and-down control, a rear rudder for turning right or left, and "wing-warping," or helically twisting for control in roll. Into the building and testing of these gliders went an immense amount of theoretical and experimental work, including testing in a wind tunnel, in Dayton, which the Wrights carried out in the course of their researches.

Before they could build and fly their first powered plane, two formidable difficulties had to be overcome. First, they had to design and construct efficient propellers, which did not exist at the time; and second, they had to design and build a suitable engine because the automobile engines of the day were far too heavy.

First powered flight. They completed their first powered machine, *Flyer I* (now popularly called the *Kitty Hawk*), in 1903 and made history's first powered, sustained, and controlled airplane flights—from level ground without any assistance at takeoff—at the Kill Devil Hills on the morning of Dec. 17, 1903. The first lasted 12 seconds; the last, 59 seconds, covered 852 feet (260 m) of ground, but, because of a head wind, the second flight actually covered more than one-half mile of air distance.

An improved *Flyer II*, equipped with a new engine, was flown at Huffman Prairie near Dayton in 1904. In 1905 came *Flyer III*, the world's first practical airplane, which could turn, bank, circle, fly figure eights with ease, and stay airborne for more than half an hour.

Because of exasperating and fruitless dealings with the United States Army—which refused to believe that the Wrights had a successful airplane to sell—and also in fear of industrial espionage, the brothers refused to fly again until they were offered a fair financial arrangement, either by the government or a private company. As a result, they never once left the ground between Oct. 16, 1905, and May 6, 1908, but in that period they built several new aircraft and engines.

News and illustrations of the Wright gliders directly precipitated the birth of modern aviation in Europe. At last, in 1908, the brothers were able to conclude an agreement in Europe for the production of Wright airplanes under license; in the United States, the army agreed to take a Wright machine if it passed trials to be conducted by Orville.

After a few secret practice flights in the United States, Wilbur made the first public flight of the new machines at a racecourse near Le Mans, France, on Aug. 8, 1908; he continued his exhibition flights at Auvours nearby, to the end of 1908. In those five months Wilbur made more than 100 flights, was airborne for more than 25 hours, took passengers up on some 60 occasions, and made 7 flights exceeding an hour's duration, ending with a record flight of 2 hours and 20 minutes.

In the United States, meanwhile, Orville began making equally spectacular flights in September at Fort Myer, Virginia; but on September 17 his machine suffered mechanical damage in flight and crashed, injuring Orville and killing his passenger, Lieutenant T.E. Selfridge.

Assessment. Between them, the brothers had revolutionized the primitive practice of European aviation of the time and shown the world how to control an airplane in the air. In 1909 the brothers consolidated their triumphs when Wilbur again made exhibition flights in France and Italy. Orville returned to Fort Myer with his newly built machine and easily won the U.S. Army contract with this, the world's first military airplane. He went on to Germany and demonstrated brilliantly with another Wright machine.

The Wrights continued to dominate world aviation until the end of 1909, building their machines in both Europe and the United States. Although improved Wright machines continued to appear and make excellent flights in 1910 and 1911, European competition eventually surpassed them.

Wilbur died of typhoid in 1912, but Orville lived on to make valuable contributions to aeronautics until 1948. Both the brothers died bachelors; aviation had been their only passion. (C.H.G.-S.)

BIBLIOGRAPHY. The inventors' lives and achievements are assessed in Fred Howard, *Wilbur and Orville* (1987); Tom D. Crouch, *The Bishop's Boys* (1989); John Evangelist Walsh, *One Day at Kitty Hawk* (1975); Harry Combs and Martin Caidin, *Kill Devil Hill* (1979), a readable treatment of the technical aspects; and Peter L. Jakab, *Visions of a Flying Machine* (1990), an analysis of the brothers' engineering methods.

Wright, Quincy, in full PHILIP QUINCY WRIGHT (b. Dec. 28, 1890, Medford, Mass., U.S.—d. Oct. 17, 1970, Charlottesville, Va.), American political scientist and authority on international law known for classic studies of war and international relations.

Wright received his B.A. from Lombard College, Galesburg, Ill., in 1912 and his Ph.D. from the University of Illinois in 1915. He taught at Harvard University in 1916–19 and at the University of Minnesota in 1919–23. In 1923 he became professor of political science and in 1931 professor of international law at the University of Chicago. Wright served as an adviser to the U.S. Department of State in 1943–45 and to the International Military Tribunal in Nürnberg in 1945. Retired in 1956, he subsequently engaged in research and teaching at a number of U.S. and foreign institutions.

In 1942 Wright published *A Study of War* in two volumes, in which he examined the institution of war, historically, legally, and culturally, and concluded that war could best be eliminated through a world organization that had power adequate to its responsibilities. Wright's *Study of International Relations* (1955) presented arguments for a separate discipline of international relations. He was a supporter of the League of Nations in the 1920s and '30s, and he later opposed U.S. involvement in Southeast Asia.

Wright's other works include *The Enforcement of International Law Through Municipal Law in the United States* (1916), *The Control of American Foreign Relations* (1922), *Mandates Under the League of Nations* (1930), *The Causes of War and the Conditions of Peace* (1935), *Problems of Stability and Progress in International Relations* (1954), and *The Role of International Law in the Prevention of War* (1961).

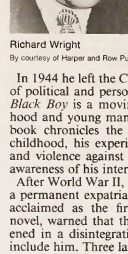
A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Wright, Richard (b. Sept. 4, 1908, near Natchez, Miss., U.S.—d. Nov. 28, 1960, Paris, France), novelist and short-story writer, who was among the first black American writers to protest white treatment of blacks, notably in his novel *Native Son* (1940) and his autobiography, *Black Boy* (1945). He inaugurated the tradition of protest explored by other black writers after World War II.

Wright's grandparents had been slaves. His father left home when he was five, and the boy, who grew up in poverty, was often shifted from one relative to another. He worked at a number of jobs before joining the northward migration, first to Memphis, Tenn., and then to Chicago. There, after working in unskilled jobs, he got an opportunity to write through the Federal Writers' Project. In 1932 he became a member of the Communist Party, and in 1937 he went to New York City, where he became Harlem editor of the Communist *Daily Worker*.

He first came to the general public's attention with a volume of novellas, *Uncle Tom's Children* (1938), based on the question: How may a black man live in a country that denies his humanity? In each story but one the hero's quest ends in death.

His fictional scene shifted to Chicago in *Native Son*. Its protagonist, a poor black youth named Bigger Thomas, accidentally kills a white girl, and in the course of his ensuing flight his hitherto meaningless awareness of antagonism from a white world becomes intelligible. The book was a best-seller and was staged successfully as a play on Broadway (1941) by Orson Welles. Wright himself played Bigger Thomas in a motion-picture version made in Argentina in 1951.



Richard Wright
By courtesy of Harper and Row Publishers, Inc.

In 1944 he left the Communist Party because of political and personal differences. Wright's *Black Boy* is a moving account of his childhood and young manhood in the South. The book chronicles the extreme poverty of his childhood, his experience of white prejudice and violence against blacks, and his growing awareness of his interest in literature.

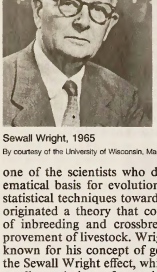
After World War II, Wright settled in Paris as a permanent expatriate. *The Outsider* (1953), acclaimed as the first American existential novel, warned that the black man had awakened in a disintegrating society not ready to include him. Three later novels were not well-received. Among his polemical writings of that period was *White Man, Listen!* (1957), which was originally a series of lectures given in Europe. *Eight Men*, a collection of short stories, appeared in 1961.

The autobiographical *American Hunger*, which narrates Wright's experiences after moving to the North, was published posthumously in 1977. Some of the more candid passages dealing with race, sex, and politics in Wright's books had been cut or omitted before original publication. Unexpurgated versions of *Native Son*, *Black Boy*, and his other works were published in 1991, however.

Wright, Sewall (b. Dec. 21, 1889, Melrose, Mass., U.S.—d. March 3, 1988, Madison, Wis.), American geneticist, one of the founders of population genetics. He was the brother of the political scientist Quincy Wright.

Wright was educated at Lombard College, Galesburg, Ill., and at the University of Illinois, Urbana, and, after earning his doctorate in zoology at Harvard University (Sc.D., 1915), he worked as a senior animal husbandman for the U.S. Department of Agriculture (1915–25). He was a professor at the University of Chicago (1926–54) and then at the University of Wisconsin, Madison (1955–60). He continued to publish scientific papers after his retirement.

Wright's earliest studies included investigation of the effects of inbreeding and crossbreeding among guinea pigs, animals that he later used in studying the effects of gene action on coat and eye colour, among other inherited characters. Along with the British scientists J.B.S. Haldane and R.A. Fisher, Wright was



Sewall Wright, 1965
By courtesy of the University of Wisconsin, Madison

one of the scientists who developed a mathematical basis for evolutionary theory, using statistical techniques toward this end. He also originated a theory that could guide the use of inbreeding and crossbreeding in the improvement of livestock. Wright is perhaps best known for his concept of genetic drift, called the Sewall Wright effect, which says that when small populations of a species are isolated, out of pure chance the few individuals who carry certain relatively rare genes may fail to transmit them. The genes may therefore disappear and their loss may lead to the emergence of new species, although natural selection has played no part in the process.

Wright, Wilbur: *see* Wright, Orville and Wilbur.

Wrigley, William, Jr. (b. Sept. 30, 1861, Philadelphia, Pa., U.S.—d. Jan. 26, 1932, Phoenix, Ariz.), American salesman and manufacturer whose company became the largest producer and distributor of chewing gum in the world.

Wrigley went to work as a traveling soap salesman for his father's company at age 13. In 1891 he went to Chicago as a soap distributor and there started offering baking powder as a premium with each box of soap. In 1892 he began selling baking powder as a sideline, offering chewing gum as a premium. The chewing gum proved more popular than the baking powder, so he dropped both soap and baking powder to sell only chewing gum. He also gave dealers premiums, such as clocks, coffee grinders, or fishing tackle, which varied with the size of the order.

Wrigley relied on advertising to boost sales of Wrigley's Spearmint chewing gum, which he introduced in 1893. By 1908, sales of Wrigley's Spearmint were more than $1,000,000 a year. In 1911 Wrigley took over Zeno Manufacturing, the company that made his chewing gum, and established the Wm. Wrigley Jr. Company. His company became one of the biggest advertisers in the United States. By 1925, when Wrigley turned the company presidency over to his son, Philip, and became chairman of the board, the Wrigley company had factories in the United States, Canada, and Australia.

Wrigley was the developer of Santa Catalina Island, off the coast of southern California. From 1921 until 1951 (except during the World War II years), a National League baseball club, the Chicago Cubs, a Wrigley family interest, spent its spring-training sessions on Catalina. Wrigley's Chicago headquarters, the Wrigley Building, became a noted architectural landmark of that city.

Wriothesley, Henry: *see* Southampton, Henry Wriothesley, 3rd earl of.

Wriothesley, Thomas: *see* Southampton, Thomas Wriothesley, 1st earl of.

wrist, also called CARPUS, complex joint between the five metacarpal bones of the hand and the radius and ulna bones of the forearm. The wrist is composed of eight or nine small, short bones (carpal bones) roughly arranged in two rows. The wrist is also made up of several component joints: the distal radioulnar joint, which acts as a pivot for the forearm bones; the radiocarpal joint, between the radius and the first row of carpal bones, involved in wrist flexion and extension; the midcarpal joint, between two of the rows of carpal bones; and various intercarpal joints, between adjacent carpal bones within the rows. The numerous bones and their complex articulations give the wrist its flexibility and wide range of motion.

A disk of fibrous cartilage between the radius and the ulna separates the radioulnar joint from the rest of the wrist, which is contained within a capsule of cartilage, synovial membrane, and ligaments. Radiocarpal ligaments carry the hand along with the forearm in rotational movements, and intercarpal ligaments strengthen the small wristbones.

The large number of bones in the wrist force blood vessels and nerves in the area to pass through a narrow opening, the carpal tunnel. In carpal tunnel syndrome, a narrowing of this opening painfully compresses the nerves during wrist flexion. Other common wrist problems include bone fractures, dislocations of the various component joints, and inflamed tendons and ligaments from overuse.

writ, in common law, order issued by a court in the name of a sovereign authority requiring the performance of a specific act. The most common modern writs are those, such as the summons, used to initiate an action. Other writs may be used to enforce the judgment of a court (attachment, delivery) or to require a lower court to furnish certain records (error) or perform a certain act (mandamus).

Writs can be traced back to the Anglo-Saxon kings, who used them primarily to convey grants of land, although they also made some effort to employ them for judicial purposes. Three main types of writ were in use by the early 13th century: charters, normally for grants of land and liberties in perpetuity; letters patent, for grants of limited duration and for commissions to royal officials; and letters close, to convey information or orders to a single person or to a definite group of people (differing from the other two types of writ in that the king's seal authenticated and closed the document).

Writs began to be used in judicial matters by the Norman kings, who developed set formulas for them. The most important were original writs, for beginning actions; in many instances they served much the same purpose as the modern summons. They were issued to the defendant, requiring that he make amends or else appear in court. Other important writs were those of assistance, for the transference of property, and entry, for the recovery of land from which one had been wrongfully dispossessed.

The European civil-law system never developed a series of clearly defined writs, although it found other means to accomplish the same ends.

writ of ———: *see under* substantive word (*e.g.,* mandamus, writ of).

Writers' Union of the U.S.S.R., Russian SOYUZ PISATELEY S.S.R., organization formed in 1932 by a decree of the Central Committee of the Communist Party of the Soviet Union that abolished existing literary organizations and absorbed all professional Soviet writers into one large union. The union supported Communist Party policies and was the defender and interpreter of the single Soviet literary method, Socialist Realism. Besides establishing fees, privileges, and other benefits for writers, it maintained institutes for training young writers, provided vacation houses and resorts for its members, and acted as a liaison between the party and its own ranks. It also had the power to reprimand and even punish writers who failed to follow its artistic mandates.

The union held its First All-Union Congress in 1934 and thereafter met at irregular intervals. It operated a publishing house and also managed several periodicals, including *Novy mir* ("New World"), the leading literary journal of the U.S.S.R. The main union actually encompassed several local unions, including one for each of the constituent republics of the Soviet Union. After the breakup of the Soviet Union in 1991, the main union was split into several groups and ceased to exist as a single entity.

writing, system of human visual communication using signs or symbols that are associated by convention with units of language—meanings or sounds—and are recorded on the surfaces of such substances as paper, stone, clay, or wood.

A brief treatment of writing follows. For full treatment, *see* MACROPAEDIA: Writing.

The precursor of writing was the use of pictorial signs, graphic representations of objects carrying some conventional meaning. Pictorial, or pictographic, signs differ from pictures in that they contain only what is important for communication and lack aesthetic embellishment. The pictorial sign is, in effect, a symbol used to depict a person or an object for the purpose of identifying it individually. A correspondence is established and gradually conventionalized between certain symbols and certain objects or beings. Because these objects and beings have names in the oral language, the correspondence is further established between the written symbols and their spoken counterparts. Once it was discovered that words could be expressed in written symbols, it was no longer necessary to record an event such as a man killing a lion by drawing the man, spear in hand, killing the lion. Instead, the spoken sentence "man killed lion" could be recorded by three conventional symbols representing the words "man," "killed," and "lion." Accordingly, "five sheep" could be expressed by two symbols corresponding to two words instead of by the five separate pictures of sheep required in the descriptive-representational device.

A device in which individual signs express individual words should naturally lead to a complete system of word signs, that is, word writing, or logography. Such a fully developed system has never existed, either in antiquity or in modern times, for to create and memorize signs for thousands of words and names is wholly impracticable. The solution to this problem is found in the phonographic principle, discovered by both the ancient Egyptians and the Sumerians. By the phonographic principle, a written symbol associated with a particular word comes to be used as well to represent other words that sound the same or similar. In a general application of this principle, written signs may come to represent not words as such but components of words, such as syllables—fixed combinations of consonant and vowel sounds. A syllabic writing system can make do with far fewer signs than a logographic system, for the signs can be combined in countless ways to represent all of the words in a language.

If the word alphabet is taken strictly to refer to a writing system that expresses all the single sounds (phonemes) of a language, then the first alphabet was formed by the Greeks. Although throughout the 2nd millennium BC

several attempts were made to indicate vowels in syllabaries of the Egyptian-Semitic type, none developed into a full vocalic system. The usual way was to add phonetic indicators as helps in reading the vowels, which normally were left unindicated in the Semitic systems of writing. But although the Semites sparingly employed these phonetic indicators, the Greeks used them systematically after each syllabic (*i.e.,* consonantal) sign. The Greeks, having accepted in full the forms of the West Semitic syllabary, evolved a system of vowel signs, which, attached to the syllabic signs, reduced the value of these syllabic signs to simple consonants and thus for the first time created a full alphabetic system of writing.

Chinese writing employs a partly logographic, partly phonographic system of writing in which a character may represent any of several homophonic words (words pronounced alike but having different meanings). Additional strokes in the character or simple context supplies the clue as to which word is intended in a particular instance.

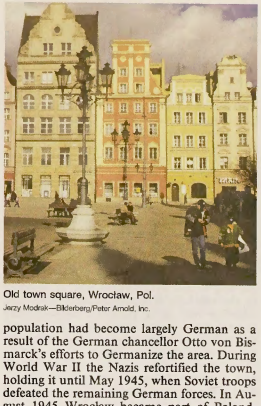
Writings (division of Bible): *see* Ketuvim.

Wrocław, former (1975–98) *województwo* (province), in southwestern Poland, now part of Dolnośląskie (*q.v.*) province.

Wrocław, German BRESLAU, city, capital of Dolnośląskie *województwo* (province), southwestern Poland. It lies along the Oder River at its confluence with the Oława, Ślęza, Bystrzyca, and Widawa rivers. A large industrial centre situated in Dolny Śląsk (Lower Silesia), Wrocław is the fourth largest city in Poland. It contains Poland's largest flour mills, an electronics and data-processing industry, foundries, heavy-machinery plants, textile mills, the "Hutmen" copper plant, and food-processing facilities. It is a major communications centre, having international rail connections, an international airport, and river transport. A cultural and scientific centre, Wrocław contains numerous educational institutions (including the University of Wrocław, founded in 1702 and rebuilt in 1945), museums, theatres and music centres, and a botanical garden and zoo. It is the home of the Polish Laboratory Theatre, which became internationally famous for its innovative approaches to actor training and dramatic production in the 1960s and '70s.

Archaeological findings indicate settlement on the site as early as the Stone Age, several thousand years ago. Wrocław originated in the 10th century AD at the crossroads of the amber trade route between the Roman Empire and the Baltic Sea and the trade route linking the Black Sea to western Europe; it was administered by the Polish Piast kings. In 1000 King Bolesław I the Brave fortified the place and established a bishopric on Ostrów Tumski ("Cathedral Island"). In 1109 a major attack by German forces was repelled at nearby Psie Pole. In 1138 Wrocław became the first capital of all Silesia under the rule of the Piast prince Władysław II the Exile. Much of the city south of the Oder was devastated during the Mongol invasion in 1241. At the invitation of Silesian authorities in the 13th century, many Germans migrated to Wrocław. The city received self-governing rights in 1261, when it adopted the Magdeburg Law (Magdeburger Recht), a civic constitution based on German law. Wrocław again flourished as an economic centre. Nearby to the east a "new town" was developed; it was united with the older city in 1327. In 1335 Wrocław passed to Bohemia with the rest of Silesia, and in 1526 it passed to the Habsburgs. In 1741 it fell to Prussia under the rule of Frederick II the Great and eventually became part of Germany.

The city grew physically with the razing of its fortifications, and by 1910 its inhabitants numbered more than 500,000. By that time its



Old town square, Wrocław, Pol.
Jerzy Modrak—Bilderberg/Peter Arnold, Inc.

population had become largely German as a result of the German chancellor Otto von Bismarck's efforts to Germanize the area. During World War II the Nazis refortified the town, holding it until May 1945, when Soviet troops defeated the remaining German forces. In August 1945 Wrocław became part of Poland. The city's German inhabitants fled westward during 1944–45 or were evacuated in subsequent years, and thenceforth the population was exclusively Polish.

As a direct result of fighting during World War II, 90 percent of the city's industry and 70 percent of its residential area were heavily damaged or entirely destroyed. Reconstruction of the city began immediately, and by 1950 more than 50,000 new houses had been built, with additional 50,000 by 1965. The university and many other fine architectural monuments were reconstructed, and modern industrial districts were built to house the growing population. The modern city prides itself on its numerous parks and restored historical treasures. Pop. (2002) 640,367.

wrought iron, one of the two forms in which iron is obtained by smelting; the other is cast iron (*q.v.*). Wrought iron is a soft, ductile, fibrous variety that is produced from a semifused mass of relatively pure iron globules partially surrounded by slag. It usually contains less than 0.1 percent carbon and 1 or 2 percent slag. It is superior for most purposes to cast iron, which is overly hard and brittle owing to its high carbon content. Dating back to antiquity, the first iron was smelted directly from iron ore by heating the latter in a forge with charcoal, which served both as a fuel and a reducing agent. While still hot, the reduced iron and slag mixture was then removed as a lump and worked (wrought) with a hammer to expel most of the slag and weld the iron into a coherent mass.

In Europe it was found that wrought iron could be produced indirectly from cast iron made in a blast furnace. One of the most widely used such indirect methods, called the puddling process, was developed by Henry Cort of England in 1784. It involved melting cast iron in a hollowed hearth and then agitating it with a bar so that the carbon in the cast metal was removed by the oxidizing gases of the furnace. As the carbon was removed, the proportion of solid decarbonized iron progressively increased, and the resulting thick mixture of metal and slag was then run through a squeezer, which removed much of the excess slag and formed a rough cylinder for subsequent rolling into a more finished product.

Wrought iron began to take the place of bronze in Asia Minor in the 2nd millennium BC; its use for tools and weapons was established in China, India, and the Mediterranean by the 3rd century BC. The chief advantage of iron was simply its far greater availability in nature than that of copper and tin. Wrought iron continued to be used for the proliferating implements of peace and the arms and armour of war for many centuries. In the 19th century it began to appear in building construction, where its strength in tension (resistance to pulling apart) made it superior to cast iron for horizontal beams. The invention of the Bessemer and open-hearth processes led to the supplanting of wrought iron by steel for structural purposes. The use of wrought iron in the 20th century was principally decorative.

Wrought-iron railings, doors, balconies, grilles, and other exterior fittings have been handcrafted since early times; the European Middle Ages were especially rich in handcrafted wrought-iron work. The church screens of the 15th–16th century are especially noteworthy, as is the decorative body armour of the same period.

wrybill, also called WRYBILL PLOVER (*Anarhynchus frontalis*), New Zealand bird of the plover family, Charadriidae (order Charadriiformes), with the bill curved about 20° to the right. This unique bill configuration is present even in the newly hatched chicks. The wrybill feeds by probing under stones and by sweeping its bill like a scythe in shallow, muddy water. It is about 15 cm (6 inches) long, gray above and white below with a black breast band. The wrybill nests along rocky rivers in South Island, laying two eggs. Sizable flocks winter along the coasts of North Island.

wryneck, either of two species of birds that constitute the subfamily Jyngina of the woodpecker family (Picidae) but may be separated as the family Jyngidae. Wrynecks are gray-brown birds of open woods and brushlands, named for their habit of twisting their necks snakily when alarmed. They flick up ants from the ground or insects from trees with their long tongues, and they nest in old woodpecker holes. The Eurasian wryneck (*Jynx torquilla*), 16 cm (6.25 inches) long, breeds from England



Red-breasted wryneck (*Jynx ruficollis*)
Painting by H. Douglas Pratt

to Japan and winters in the tropics. The red-breasted wryneck (*J. ruficollis*) is African.

wryneck (congenital disorder): *see* torticollis.

wu (Buddhism): *see* Satori.

Wu, Chien-shiung (b. May 31, 1912, Liuho, Kiangsu province, China—d. Feb. 16, 1997, New York, N.Y., U.S.), Chinese-born American physicist who provided the first experimental proof that the principle of parity conservation does not hold in weak subatomic interactions.

Wu came to the United States in 1936 to study with Ernest O. Lawrence at the Uni-

versity of California, Berkeley. After receiving the Ph.D. in 1940, she taught at Smith College, Northampton, Mass., and at Princeton University. In 1944 she undertook work on radiation detection in the Division of War Research at Columbia University. Remaining on the university staff after the war, she became Dupin professor of physics in 1957.

In 1956 Tsung-Dao Lee of Columbia and Chen Ning Yang of the Institute for Advanced Study, Princeton, N.J., proposed that parity is not conserved for weak nuclear interactions. With a group of scientists from the National Bureau of Standards, Washington, D.C., Wu tested the proposal in 1957 by observing the beta particles given off by cobalt-60. Wu observed that there is a preferred direction of emission and that, therefore, parity is not conserved for this weak interaction. The success of this and similar additional experiments brought worldwide acclaim not only to Wu but also to Lee and Yang. In 1958 Richard P. Feynman and Murray Gell-Mann proposed the conservation of vector current in nuclear beta decay. This theory was experimentally confirmed in 1963 by Wu in collaboration with two other Columbia University research physicists. She later investigated the structure of hemoglobin.

Wu was a recipient of both the Woman of the Year Award (made by the American Association of Women) and the National Medal of Science (1975). She served as president of the American Physical Society in 1975.

Wu-ch'ang, Pinyin WUCHANG, industrial city and capital of Hupeh *sheng* (province), central China. Located on the south bank of the Yangtze River, it is the oldest city of the Wuhan conurbation (Han-kou, Han-yang, Wu-ch'ang). It is the oldest of the Wu-han cities and served as a capital under the Wu dynasty in the Three Kingdoms period (AD 220–280) and is the administrative and cultural centre of the Wu-han cities. Northeast of the city proper is the huge Wu-han iron and steel complex, built in the 1950s, one of the largest in China. *See* Wu-han.

Wu Chao (empress of China): *see* Wu Hou.

Wu Chen, Pinyin WU ZHEN (b. 1280, Chia-hsing, Chekiang province, China—d. 1354), with landscapes, especially scenes of fishermen.

Wu Ch'eng-en, Pinyin WU CHENGEN (b. *c.* 1500, Shan-yang, Huai-an, now in Kiangsu province, China—d. *c.* 1582, Kiangsu), novelist and poet of the Ming dynasty (1368–1644), generally acknowledged as the author of the Chinese folk novel *Hsi-yu chi* (partial Eng. trans., *Monkey,* 1942).

Wu received a traditional Confucian education and became known for his clever composition of poetry and prose in the classical style. Throughout his life he displayed a marked interest in bizarre stories, such as the set of oral and written folktales that formed the basis of *Hsi-yu chi,* first published in 1592, 10 years after Wu's death. In its 100 chapters *Hsi-yu chi* details the adventures of a cunningly resourceful monkey who accompanies the Buddhist priest Hsüan-tsang on a journey to India. Like all novels of its time, *Hsi-yu chi* was written in the vernacular, as opposed to the officially accepted classical style, and therefore had to be published anonymously to protect the author's reputation. As a result, the identity of the novelist was long unknown outside of Wu's native district.

Only two volumes of Wu's other writings have survived. These two works were discovered in the imperial palaces and were reprinted in 1930.

Wu Chiang (China): *see* Wu River.

Wu ching, Pinyin WU JING (Chinese: "Five Classics"), five ancient Chinese books whose prestige is so great that in the fourfold classification of Chinese writings the *ching* ("classics") are placed before *shih* ("history"), *tzu* ("philosophy"), and *chi* ("literature"). For 2,000 years these classics, all associated in some way with the name of the ancient sage Confucius (551–479 BC), were invoked as norms for Chinese society, law, government, education, literature, and religion. As such, their influence is without parallel in the long history of China. Chinese students, however, do not generally attempt the *Wu ching* without having first studied the shorter—and generally speaking less complicated—Confucian texts called *Ssu shu* ("Four Books").

In 136 BC the Han-dynasty ruler Wu-ti declared Confucianism to be the state ideology of China. Doctoral chairs (*po shih*) were thereupon established for the teaching of the *Wu ching* and continued to exist into the 20th century.

In 124 BC the *Wu ching* were accepted by the national university as its core curriculum. Proficiency in interpreting and expounding the texts of the *Wu ching* became a requirement for all scholars who wanted to obtain posts in the government bureaucracy.

The *Wu ching* collection consists of the *I Ching* ("Classic of Changes"), *Shu Ching* ("Classic of History"), *Shih Ching* ("Classic of Poetry"), *Li chi* ("Collection of Rituals"), and *Ch'un-ch'iu* ("Spring and Autumn" [Annals]).

Wu Ching-tzu, Pinyin WU JINGZI (b. 1701, Ch'üan-chiao, Anhwei province, China—d. Dec. 12, 1754, Yang-chou, Chiang-nan province), author of the first Chinese satirical novel, *Ju-lin wai-shih* (*c.* 1750; *The Scholars*).

Wu Ching-tzu was a member of a scholarly and well-to-do family. He succeeded neither academically nor financially, however, and he was unable or unwilling to pass the higher official examinations. He mismanaged his inheritance and at the age of 32 was forced by poverty to move to Nanking, where he led a life of drinking and carousing.

Probably around 1740, Wu Ching-tzu began work on the semiautobiographical *Ju-lin wai-shih,* completing it about 10 years later. In this picaresque romance, he used sharp and effective satire to attack the corrupt official practices and personalities that he observed throughout his life.

Wu-chou, formerly (1913–46) TS'ANG-WU, Pinyin WUZHOU, or CANGWU, city on the eastern border of the Kwangsi Chuang autonomous *ch'ü* (district), southern China. Wu-chou is situated at the confluence of the Hsi River with its northern tributary, the Kuei River. The city occupies a location of strategic and economic importance because it dominates the principal route between Kwangsi and southwest China as well as the Canton area along the coast.

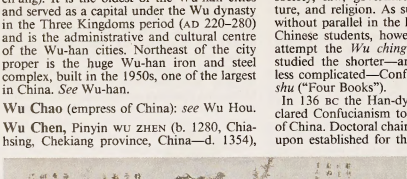
The first *hsien* (county) administration was established there in the 1st century BC under the name of Kuang-hsin. This name was changed to Ts'ang-wu in 589, and the county retained that name until 1946, when it became a municipality under the name of Wu-chow, the name of the prefectural government first set up under the T'ang dynasty (618–907). It continued as a superior prefecture (*fu*), Wu-chou, under the Ming (1368–1644) and Ch'ing (1644–1911/12) dynasties. At this time the county seat of Ts'ang-wu was transferred to Lung-yü on the southern bank of the Hsi River and that town was thereafter called Ts'ang-wu.

Until the 12th century, Wu-chou was primarily a garrison town controlling the non-Han peoples of Kwangsi. Chinese settlement in the area began on a large scale in the late 12th and 13th centuries, and the section of Kwangsi in which Wu-chou is situated is now almost entirely settled by Cantonese-speaking Chinese. Many of the town's large merchant population are from Kwangtung province, a large number of them from Chiang-men, a town with which Wu-chou has always traded by river.

Wu-chou was opened to foreign commerce in 1897, after which a flourishing trade grew up with Germany and the United Kingdom. Industrial growth began in the 1920s and '30s, when chemical plants that manufactured pharmaceuticals and sulfuric acid were established; these plants were, however, almost entirely destroyed during the Sino-Japanese War (1937–45).

Although Wu-chou remains an important commercial centre, it no longer has a monopoly of trade from the western areas of Kwangsi, since these areas have been served by railways connecting to the system in Hunan province since 1939. Since 1957, moreover, those areas have also had an outlet to the port of Chan-chiang. Wu-chou's commercial hinterland now mainly consists of the eastern and northeastern parts of the Kwangsi region that are served by its river. As a port, Wu-chou is accessible by small oceangoing ships of up to about 1,000 tons. Since 1949 industrialization has made further progress. There are various silk-textile factories, chemical works, a large pitch factory, rice mills, sugar refineries, and engineering works (producing agricultural machinery and seamless steel tubes). There is also a ship-repair yard. Wu-chou is the seat of Kwangsi Provincial University. Pop. (1985 est.) 190,300.

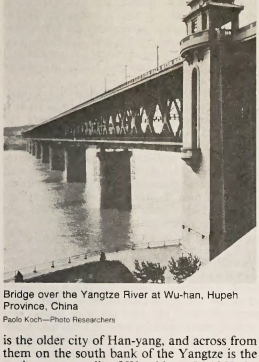
Wu Chu (Chinese emperor): *see* Sun Ch'üan.



"Fishermen," detail of a hand scroll painted in ink by Wu Chen, 1352; in the Freer Gallery of Art, Washington, D.C.

By courtesy of the Smithsonian Institution, Freer Gallery of Art, Washington, D.C.

Wu-han, Pinyin WU HAN, fifth largest city of the People's Republic of China, in Hupeh Province, located at the confluence of the Han and Yangtze rivers. It is a conurbation of three adjacent cities—Han-k'ou (Hankow), Han-yang, and Wu-ch'ang; the last is the capital of Hupeh Province. Han-k'ou lies on the north bank of the Yangtze at the mouth of the Han. Immediately across the Han from it



Bridge over the Yangtze River at Wu-han, Hupeh Province, China
Paolo Koch—Photo Researchers

is the older city of Han-yang, and across from them on the south bank of the Yangtze is the ancient metropolis of Wu-ch'ang. In 1950 the government of the People's Republic of China merged the three cities into a single city called Wu-han.

The triple city of Wu-han has a geographical centrality that gives its site immense commercial significance. It lies in the very heart of China and is crossed by converging transportation routes from almost every point of the compass. Wu-han is roughly equidistant from the cities of Peking and Canton on a north–south axis and is equidistant from Shanghai and Chungking on an east–west axis. The Yangtze, the greatest of China's arterial waterways, is navigable for large ocean-going vessels up to the site of Wu-han, which can therefore be considered the head of ocean navigation on the river, although the city is 600 miles (950 km) from the coast. The main north–south railroad linking Peking and Canton crosses the Yangtze on a bridge (completed 1957) at Wu-han. Another large bridge spans the Han River and connects Han-k'ou with Han-yang. As the meeting point of maritime, river, rail, and road transportation, Wu-han has long been the chief collecting and distribution point for the products of the middle Yangtze River valley and for west and southwest China, particularly for tea, cotton, silk, timber, and tung oil, as well as for a variety of manufactured goods.

The earliest settlement, during the Western Chou period (1111–771 BC), was to the southeast of Wu-ch'ang, which became a capital city of the Wu dynasty during the Three Kingdoms period (AD 220–280). The primarily administrative role of Wu-ch'ang continued throughout the Yüan (1206–1368) and Ming (1368–1644) dynasties, when it served as a district capital.

Han-yang was founded during the Sui dynasty (AD 581–618) but was of minor commercial significance. In contrast, Han-k'ou (then known as Hsia-k'ou) became known during the Sung dynasty (960–1279) as one of China's four major commercial cities. The opening of Han-k'ou to foreign trade under the terms of the treaties of Tientsin (1858) between China, France, and Great Britain gave added impetus to the commercial and industrial development of the three cities. Concessions in Han-k'ou were granted between 1861 and 1896 to British, French, German, Japanese, and Russian interests. A number of foreign commercial, trading, and shipping firms opened offices in Han-k'ou during this period.

The Wu-han cities played a prominent role in the 20th-century history of China. The Chinese Republican Revolution of 1911, which toppled the Ch'ing (Manchu) dynasty, broke out in the barracks at Wu-ch'ang, and the line of heights overlooking the Han River there was the scene of the principal fighting between the Imperial and revolutionary troops, with the main objective being the government arsenal at Han-yang. Han-k'ou's workers were in the forefront of the general strike of 1923, which was the first large-scale industrial strike in China. The capture of Han-k'ou by the Nationalist (Kuomintang) armies marching northward from Kwangtung in December 1926 marked the extension of Nationalist power to the middle Yangtze River valley. It was followed by a serious mob onslaught on the British concession in Han-k'ou, after which an agreement was reached replacing the British municipal council there with one of mixed Chinese and British composition. The Wu-han cities soon afterward became a centre of conflict between the Nationalists and Communists in their short-lived coalition government. After the split between the Nationalists and the Communists in 1927, a left-wing faction of the Nationalists maintained its headquarters in Han-k'ou. Mao Zedong, the future leader of the Chinese Communists, ran a Peasant Movement Institute in Wu-ch'ang, where the Fifth Congress of the Chinese Communist Party was convened in 1927.

After the fall of the Nationalist capital of Nanking to the invading Japanese in 1937, the Chinese government withdrew to Han-k'ou, which temporarily became the base for Chinese resistance. Han-k'ou fell to the Japanese in October 1938 after a defense that lasted more than four months, and the city was occupied by the Japanese until 1945, after which it reverted to Nationalist control. The Wu-han cities were taken by the Chinese Communists in 1949.

Han-k'ou's development as a port in close contact with European commerce brought the three cities early under the influence of Western industrialism, and in the 1890s Han-yang became the site of the first modern steel plant in China. The Wu-han cities' steel industry declined during the Japanese occupation, and in 1938 the Nationalists dismantled the Han-yang steel plant and relocated it at Chungking. Wu-han's steel industry was gradually revived under the Communist government in the 1950s, and by the late 20th century Wu-han was the second most important metallurgical centre of China (after An-shan). It has several large iron- and steel-producing complexes, including a plant on the south bank of the Yangtze about 25 km (15 miles) east of Wu-ch'ang. Iron ore is obtained from the large mine at Ta-yeh, which is about 65 km (40 miles) southeast of Wu-han. Coal is obtained from the major O-nan field, which lies to the south of the city.

The iron and steel base has attracted other industries producing chemicals, fertilizers, electrical equipment, glass, agricultural machinery, railroad cars, and trucks. Wu-han also has one of the largest heavy-machine-tool factories in China. Its consumer industries produce watches, bicycles, and radios and other electronic instruments. Older industries in Wu-han include rice, oil, and flour mills and the production of cotton and woolen fabrics and other textiles. Cement works, paper mills, distilleries, and soap factories are among Wu-han's other light industries. It is also the site of one of China's more important arsenals. The surrounding agricultural area produces wheat, tea, rice, and cotton.

Wu-han is the seat of Wu-han University and the Central China Technical University. The Wu-han Medical School is in Han-k'ou, but most of the other institutions of higher education are located on the eastern outskirts of Wu-ch'ang. Among places of historic interest are the Chang Chun Kuan, a Taoist temple rebuilt at the end of the 19th century east of Wu-ch'ang; the Ku Chin T'ai, an 8th-century pavilion in Han-yang; and the Yüan-dynasty temple and shrine in Wu-ch'ang. Pop. (1999 est.) 3,911,824.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Wu Hou, Pinyin WU HOU (posthumous name, or *shih*), original name (Wade–Giles romanization) WU CHAO, also called WU TSE-T'IEN (b. AD 625—d. Dec. 16, 705), woman who rose from concubinage to become empress of China, ruling effectively for many years, the last 15 (690–705) in her own name. She consolidated the T'ang dynasty and unified the empire.

Wu Hou entered the palace of the T'ang emperor T'ai Tsung as a junior concubine, at the age of 13, in 638. By that time, the T'ang dynasty had recently reunited China, largely through the efforts of the emperor T'ai Tsung. Little is known of Empress Wu's life as a concubine of T'ai Tsung, but, on his death in 649, she is traditionally said to have already entered into intimate relations with his heir, the T'ang emperor Kao Tsung. Relegated to a Buddhist convent on the death of T'ai Tsung, as custom required, the future empress Wu was visited there by the new emperor, who had her brought back to the palace to be his own favourite concubine. She first eliminated her female rivals within the palace, the existing empress and leading concubines, and in 655 gained the position of empress for herself, eventually bearing the emperor Kao Tsung four sons and one daughter.

Wu Hou used her authority to bring about the fall of all the elder statesmen, who had served T'ai Tsung and still exercised great influence over the government. These men opposed her elevation to the rank of empress, mainly because, although she was the daughter of a relatively senior officer, her family was not one of the great aristocratic clans. They also objected to the nature of the relationship between Wu Hou and the emperor Kao Tsung, on the grounds that, as she had been a concubine of T'ai Tsung, it was incestuous. By 660 the empress had triumphed over all opponents, who had been dismissed, exiled, and, in many instances, finally executed. Even the emperor's uncle, the head of the great family of the Chang-sun, of Imperial descent, was hounded to death and his relatives were exiled or ruined.

Virtually supreme power was now exercised by the empress in the name of the sickly emperor, who was often too ill to attend to state affairs for long periods. The emperor, who was weak in character, relied upon her entirely, and, for the last 23 years of his life, the empress Wu was the real ruler of China. She continued to eliminate potential rivals, even when these were her own relations, but she governed the empire with great efficiency, employing able men who clearly felt loyalty to her and stood by her when challenges were made. Her great ability as an administrator, her courage, decisive character, and readiness to use ruthless means against any opponent,

however highly placed, won her the respect, if not the love, of the court. In the years between 655 and 675 the T'ang empire achieved the conquest of Korea, under military leaders who were picked and promoted by the empress Wu. When the emperor Kao Tsung died in 683, he was succeeded by his son (by Wu Chao), the T'ang emperor Chung Tsung. The new emperor had been married to a woman of the Wei family, who now sought to put herself in the same position of authority as that of the empress Wu, for her husband was as weak and incompetent as his father. After one month the empress Wu deposed her son Chung Tsung, exiled him, and installed as emperor her second son, Jui Tsung, whose authority was purely nominal. A revolt was raised by T'ang loyalists and ambitious young officials in the south. It was crushed within weeks with the loyal cooperation of the main armies of the throne. This demonstration of the support she commanded in the public service made the position of the empress unshakable.

Six years later, in 690, at the age of 65, the empress usurped the throne itself. Accepted without revolt, she ruled for 15 years. During this period the question of the succession began to assume great urgency. Her own nephews of the Wu family had hoped that, as she had already changed the name of the dynasty to Chou, she would also displace the T'ang heirs of the Li family and leave the throne to one of the Wu nephews. Neither of them nor their sons was popular or unusually capable; on the other hand, Empress Wu's own sons, the two former emperors Chung Tsung and Jui Tsung, had little support and less ability. But, even among her loyal supporters, there was a growing hope that the T'ang family of Li would not be discarded. In 698 the empress decided to accord with these views; the exiled Chung Tsung was recalled to court and made crown prince. The empress showed her remarkable quality in this decision; she did not place her own family in the line of succession or designate one of her nephews as her heir. She seems to have had no ambition on behalf of her own family, only a determination to retain power for herself to the end.

In the last years of her life, from 699, the empress gave her favour to the Chang brothers, artistic but depraved courtiers who engaged her affection by elaborate entertainments and skillful flattery. They were intensely resented by the court and senior officials, many of whom had the temerity—and courage—to warn the empress of their pernicious activity. She did not heed these warnings and gradually fell into ill health, dependent more than before on the care of the Chang brothers. In February 705 a conspiracy formed among the leading ministers and generals, who seized the palace, executed the Chang brothers, and compelled the empress, old and ill, to yield power to her son Chung Tsung. She retired to another palace and died there in December of the same year.

The empress Wu was a very competent ruler, using men of her own choice, regardless of their social standing. Although her motives were to secure her own authority, the consequences of her policies were to be of great historical importance. The transformation of Chinese society in the T'ang period from one dominated by a military and political aristocracy to one governed by a scholarly bureaucracy drawn from the gentry was promoted by her policy. The significance of this aspect of her rule was long-obscured by the prejudice of Chinese historians against an usurping empress and her many acts of cruelty toward opponents. She established the new unified empire on a lasting basis and brought about needed social changes that stabilized the dynasty and ushered in one of the most fruitful ages of Chinese civilization. (C.P.F.)

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Wu-hsi, Pinyin WUXI, city in southern Kiangsu *sheng* (province), China. Wu-hsi is situated along the Grand Canal at that waterway's junction with the Hsi-ch'eng Canal near the northeastern corner of T'ai Lake.



Fish traps on T'ai Lake, Wu-hsi, Kiangsu Province, China
Emil Schulthess—Black Star/EB Inc

The city is the principal route focus of the dense network of canals and waterways that provides the basic transport system of southern Kiangsu.

Wu-hsi is one of the older cities in the Yangtze River Delta area. It was originally known as a source of tin; but by the time the county was founded under the Former Han dynasty (206 BC–AD 25), the deposits had been exhausted, and the county was named Wu-hsi ("Without Tin"). From the end of the 3rd century the city was subordinated to the commandery (district under the control of a commander) of Pi-ing (or Ch'ang-chou) and remained so except for a brief interval under the rule of the Yüan, or Mongol, dynasty (1206–1368), when it was made an independent prefecture.

Since early times the area around T'ai Lake has been extremely fertile; and after the completion of the Grand Canal in 609, Wu-hsi became a transshipment centre for tax grain destined for the capital. It thus became one of the greatest grain markets in China, handling vast quantities of rice annually, and was the seat of a complex commercial organization of extremely wealthy merchants and middlemen. When the Grand Canal fell into decay after 1850, Wu-hsi retained its importance as a rice market, exporting grain to Shanghai for shipment by sea to Tientsin. The trade in grain increased still further after the completion of the railway link to Shanghai to the east and to Chen-chiang and Nanking to the northwest, in 1908.

Wu-hsi has traditionally been a centre of the textile industry, being engaged in both cotton textiles and silk reeling. Textile mills were established there as long ago as 1894 and silk filatures (establishments for reeling silk) in 1904. This development was largely the work of Shanghai industrialists, many of whom were originally from Wu-hsi merchant families. The two cities have had unusually close links, and Wu-hsi was known colloquially before World War II as "Little Shanghai." The cotton yarn produced is woven not only in the city itself but also in Ch'ang-chou and Su-chou, whereas the silk reeled in the city is mostly woven into cloth in Su-chou and (in recent times) in Shanghai. Modern Wu-hsi is the greatest silk-reeling centre in China. Cotton textile production is also important and is the city's largest single industry.

Other long-established industries are flour milling, rice polishing, and oil extraction. Industrial development has accelerated since the 1950s. The textile and food-processing industries have been modernized and expanded, and the city has become a centre for the engineering industry, particularly for the manufacture of machine tools and diesel engines. It also manufactures electrical equipment and cables and boiler-plant and textile machinery of various types.

Since 1949 the city's importance as a commercial centre has declined, although its role as a distribution and collection centre for the T'ai Lake area remains. Tourism is increasingly important. Wu-hsi's surroundings include many well-known beauty spots, carefully preserved together with city parks and historic sites. Industrial development is closely restricted near the lake, the major scenic attraction. New hotels were built in 1961 and 1978. Pop. (1985 est.) 696,300.

Wu-hsien (China): *see* Su-chou.

Wu-hsing, also called HU-CHOU, Pinyin WU-XING, or HUZHOU, city in northern Chekiang *sheng* (province), China. Wu-hsing is situated close to the southern shore of T'ai Lake, some 40 miles (65 km) north of Hang-chou and 39 miles (63 km) west of Chia-hsing. Situated on the Tung-t'iao River, which flows into the lake, Wu-hsing has excellent waterway communications with the whole northern Chekiang plain.

The city was established as a county, Wu-ch'eng, in the 2nd century BC. In 266 the city became the administrative seat of the commandery (district controlled by a commander) of Wu-hsing. After some temporary changes of name, the city became the seat of Hu-chou (prefecture) in 602, taking its name from T'ai Lake. In 982 the city was divided into two counties, Wu-ch'eng and Kuei-an. By the 11th century it was a major centre of trade, the biggest centre of commerce in the Yangtze River Delta after Hang-chou and Su-chou. In 1225 it was renamed An-chi-chou, but in 1268 the Yüan (Mongol) dynasty (1206–1368) restored the name Hu-chou. Under the Ming (1368–1644) and Ch'ing (1644–1911/12) dynasties, it was the seat of a superior prefecture, Hu-chou, and became a prosperous administrative centre.

In the 1860s, however, the surrounding area was one of the last strongholds of the Taiping Rebellion (1850–64); from 1862 to 1864 the area was under the control of rebel forces, who looted and pillaged the city and its surroundings. After the fall of Nanking to Ch'ing troops in July 1864, the rebel leadership fell back on Hu-chou, which was then occupied by the loyalist armies. During this period the city suffered great damage, and its population was much reduced. After the establishment of the republic in 1911, the superior prefecture was abolished, and the city became the seat of Wu-hsing County. In the 1930s, when the area was badly hit by a depression in the silk handicraft industry, for which Wu-hsing had a world reputation, there was much unrest, several minor uprisings taking place in the district.

Wu-hsing is an important commercial centre. The surrounding area is densely populated and has been intensely farmed since at least the 7th century AD. The area produces rice, oilseeds, mulberries, and silkworms and is also well-known for sheep raising. The chief industries in the city are silk reeling and the

weaving of fine silk fabrics. There are also rice-polishing and oil-extracting works and some minor engineering and chemical industries. A rail line between Ch'ang-hsing and Hang-chou runs about 10 miles (16 km) west of Wu-hsing. Pop. (1985 est.) 184,900.

Wu hsing, Pinyin WU XING (Chinese: Five Elements), in ancient Chinese cosmogony, the five basic components of the physical universe: earth, wood, metal, fire, and water. These elements were believed to destroy and succeed one another in an immutable cycle and were correlated with the cardinal directions, seasons, colours, musical tones, and bodily organs.

The Wu hsing cycle served as a broad explanatory principle in Chinese history, philosophy, and medicine; it was first linked to dynastic history by the sage-alchemist Tsou Yen (3rd century BC). The Neo-Confucian philosophers of the Sung dynasty (AD 960–1279) extended the Wu hsing to encompass the Five Virtues (benevolence, righteousness, reverence, wisdom, and sincerity).

Consult the INDEX *first*

Wu-hu, Pinyin WUHU, city and river port in southeast Anhwei *sheng* (province), China. Wu-hu has long been a communication and strategic centre of some importance, being situated at the junction of the Yangtze River with three tributaries—the Yu-hsi River to the north and the Ch'ing-i and Shui-yang rivers to the south. The city is situated on the southeastern bank of the Yangtze, about 100 miles (160 km) upstream from Nanking in Kiangsu Province. Eastward from Wu-hu the Yangtze Delta consists predominantly of flatland, lakes, and canals.

Wu-hu is located in an area of relatively ancient settlement, which, in the 6th century BC, was the site of the city of Chiu-tzu in the state of Wu. A *hsien* (county) named Wu-hu was founded in the 2nd century BC under the Han dynasty (206 BC–AD 220) at a site some 9 miles (15 km) southwest of the modern town, and it became an administrative centre of some importance in the late 3rd and 4th centuries under the Chin. From the 5th century onward, however, it lost its county status and was merged with neighbouring districts. In the 8th and 9th centuries the area began to develop, and the garrison town of Wu-hu-chen was established on the present site. This became a county in the early 10th century under the rule of the Southern T'ang dynasty (937–975/76). At first subordinated to Sheng-chou (Nanking), it was a part of the superior prefecture of T'ai-p'ing during Ming (1368–1644) and Ch'ing dynasty (1644–1911/12) times. From the 10th century onward, the surrounding area grew rapidly in importance, and its population increased.

Under the Ming, from the 15th century onward, it developed into a major commercial centre and river port and was well-known as a centre of the rice trade. In 1876, as a result of the Chefoo Convention between China and the United Kingdom, it was opened to foreign trade, and a modern town began to develop. Before World War II it ranked third in volume of domestic trade after Shanghai and Nanking. Its foreign trade, however, was less than one-tenth of China's total; almost all of it was with Japan, to which it exported rice, tea, beans, oilseed, and iron ore. After its occupation by the Japanese Army in 1938, great quantities of its iron ore were shipped to the Yawata Iron and Steel Company, at Yawata (now part of Kitakyūshū), Japan.

In the 1930s Wu-hu's inland communications were improved, first by the construction of the highway network in the Nanking area and then by the construction of one rail link running from Nanking to T'ung-ling via the city and of another joining Yü-hsi-k'ou on the opposite bank of the Yangtze with the Huai-nan coalfield in northwest Anhwei. Before World War II, however, there was virtually no industry in the city, apart from the Yu-chung cotton mill and several rice-polishing and oil-extracting plants.

After 1949 the disappearance of the privately organized rice and tea trades considerably reduced Wu-hu's commercial importance, although its role as a communication centre remained. The port facilities both at Wu-hu and at Yü-hsi-k'ou on the opposite bank were rebuilt and improved. The rail line from Wu-hu to Nanking has been double-tracked. Since the early 1950s the existing textile industry has been greatly developed. In the late 1950s and early 1960s, paper mills were also built and a large automobile factory and tractor repair and engineering works begun. Small plants making machine tools and instruments were also established. The developments envisaged under the Second Five-Year Plan (1958–62) laid increasing emphasis on heavy industry. Despite this goal, however, Wu-hu remains primarily a major commercial and collecting centre and its heavy industry is overshadowed by the growth of Ma-an-shan to the north and T'ung-ling to the south. Wu-hu is freely reached by deep-draft shipping carrying out the rice, silk, cotton, tea, wheat, and eggs brought in via the surrounding network of canals and roads. The city is a leading market for rice that is shipped regularly to the lower Yangtze and Canton areas. Pop. (1985 est.) 385,800.

Wu Huang (Chinese emperor): *see* Hsüan Tsung.

Wu Huang-ti (ruler of China): *see* Nurhachi.

Wu-i Mountains, Wade–Giles romanization WU-I SHAN, Pinyin WUYI SHAN, mountain range on the border between Fukien and Kiangsi provinces, China. The Wu-i Mountains originally bore the name of a cluster of peaks in northwestern Fukien, but the name is applied as a general term to the southwest-northeast range forming the northern part of the Fukien–Kiangsi border. The southern range, which has a more nearly south-to-north orientation, is known as the Shan-ling range. The individual peaks of the Wu-i range rise up to about 6,000 feet (1,800 m). Situated in an area with many caves and with some spectacular scenery, the Wu-i Mountains have long been associated with cults of Taoism, a philosophy that has influenced all aspects of Chinese culture for the past 2,000 years. In the 18th and 19th centuries, a well-known academy, known as the Tzu-yang Shu-yuan, was established there. The range is crossed by a number of passes and, since 1957, by the railway at the western end of the range, which replaced the Fen-shui Pass as the main route from Fukien into Kiangsi.

To the northeast the range is continued by the somewhat higher and even more rugged Hsien-hsia Mountains, which extend into Chekiang Province. This range is heavily forested and rather sparsely populated. A famous area for timber and bamboo, it has also long been renowned for its fine tea. From the 13th to the 17th century the government maintained special offices in the area to control tea production.

Wu Jiang (China): *see* Wu River.

Wu Jingzi (Chinese author): *see* Wu Ching-tzu.

Wu-kung Mountains, Wade–Giles romanization WUKUNG SHAN, Pinyin WUGONG SHAN, mountain range, chiefly in west-central Kiangsi Province, China, forming a part of the frontier area between Kiangsi and Hunan provinces. The range is about 80 miles (130 km) long and extends northeastward from Ch'a-ling in Hunan to near I-ch'un in Kiangsi, being divided from the Chiu-ling Mountains farther north by the valley route between Chu-chou and I-ch'un. The western section is the highest part of the range, with average heights of up to 5,000 feet (1,500 m). The chief peaks are Mount T'ai-ho, and Mount T'ai-yang on the provincial border. To the east, the range is lower and divides into three more or less parallel ranges, the Ch'en Mountains, the Wu-kung Mountains proper, and the Yun-hsiao Mountains. The range forms the principal watershed between the Kan River system in Kiangsi, and the Mi River and Lu River tributaries of the Hsiang River in Hunan. The area is heavily forested and produces large quantities of pine and cedar. On its northern flank are the coal mines of P'ing-hsiang; other coal deposits are worked at T'ien-ho, on the southeastern side.

Wu language, variety of Chinese spoken in southeastern Kiangsu Province and in Chekiang Province by more than 8 percent of the population of China. Major cities in which Wu is spoken include T'ai-chou, Shanghai, Soochow, Ning-po, and Wen-chou. The Wu language originally spread from Su-chou, a cultural centre since the 5th century BC, and gained great importance at least as early as the period of the Ming dynasty (1368–1644), when Shanghai became an important metropolitan area. Wu differs from Modern Standard Chinese in preserving the initial voiced stops (sounds formed with complete closure in the vocal tract) and in using seven or eight tones to distinguish meanings between words or word elements that have the same series of consonants and vowels. (Modern standard Chinese uses only four tones for such a purpose.) Like Modern Standard Chinese and the Mandarin language of northern China, the Wu language has lost most of the Ancient Chinese final consonants.

Wu Li, Pinyin WU LI (b. 1632, Ch'ang-shu, Kiangsu Province, China—d. 1718), Chinese painter who, although a convert to Roman Catholicism and later a priest, is remembered as being of the orthodox school of "literati painting" (*wen-jen-hua*) in the early Ch'ing period.

Wu Li became a convert to Catholicism and in 1681 went to Macao Island (on the southeast coast of China), where, without family obligations after the deaths of his mother and wife and the marriage of his two daughters, he entered the Jesuit order. In 1688 he was ordained as a priest under the name Acunha and was posted as a missionary in Kiangsu. While Wu Li saw Western prints and paintings, his own paintings were entirely within the Chinese tradition (and are always signed with his Chinese name). He studied under the great painter Wang Shih-min and was a good friend of the painters Wang Hui and Wang Chien. Wu Li led a rather retiring life and cultivated the proper Confucian virtues in a manner appropriate to the ideal of the cultivated amateur of the literati tradition.

Wu-lieh Ti (Chinese emperor): *see* Li Yüan-hao.

Wu-lu-mu-ch'i (China): *see* Urumchi.

Wu Mountains, Wade–Giles romanization and Pinyin WU SHAN, mountain complex on the borders of Hupeh, Szechwan, and Kweichow provinces, China. They are often referred to by Western writers as the Gorge Mountains, owing to the fact that the Yangtze River cuts its way through the area from the Szechwan Basin into the central Yangtze Basin, below I-ch'ang, through a series of deep and impressive gorges. The area is one of great

complexity, being a zone of contact between the southeastern extremity of the Ta-pa Mountains, which have a predominant northwest to southeast alignment, and the plateau of northeastern Kweichow. The mountains are predominantly formed of ancient limestones, and it is probable that they were folded in more or less their present major structures in Jurassic times (208 to 144 million years ago). They have since been worn down by erosion to a nearly flat plain and then deeply dissected by the river system of the area, which cuts across the main structural lines.

The thinly populated area remained a remote border country occupied by its aboriginal inhabitants until the Sung dynasty (AD 960–1279). Even today cultivation is restricted to a few river valleys. The area is warm and wet and has a heavy forest cover. It produces timber, tung oil, tallowseed oil, lacquer, and other forest products. Communications, however, are very poor, apart from the river traffic. The mountains mostly average about 5,000 ft (1,500 m) in height, but individual peaks, particularly in the highest section to the north of the Yangtze Gorges, are considerably higher—Mount Ying-t'iao reaching 9,700 ft and Mount Chen-chu 9,518 ft. It is the ruggedness of the terrain, however, rather than sheer altitude that makes the Wu Mountains such a formidable barrier to communications, and the only highway through the area, connecting Wan-hsien (Szechwan) with Pa-tung (Hupeh), has to make a lengthy detour south of the main section of the ranges.

Wu P'ei-fu, Pinyin WU PEIFU (b. April 22, 1873, Shantung Province, China—d. Dec. 4, 1939, Peking), Chinese warlord who dominated Peking from 1917 to 1924.

The son of a tradesman, Wu joined the famous Peiyang Army of Yüan Shih-k'ai, the



Wu P'ei-fu
BBC Hulton Picture Library

leading general of the Ch'ing dynasty (1644–1911/12) and the first president of the Republic of China, and rapidly rose to high position. After Yüan's death in 1916, Wu became the chief bulwark of the shaky Peking government. In 1922 Wu came into conflict with Chang Tso-lin, the Manchurian warlord who had begun to extend his control into North China near Peking. Wu secured his position in central China and then in a series of battles drove Chang Tso-lin's army back to its Manchurian base. As a result he became the dominant figure in North China and began to prepare for a campaign to unify all of the country by force. But his stern attitude toward his military associates and his ruthless suppression of a workers' strike on the Hankow–Peking Railroad in 1923 lost Wu much of his popularity, and he was never able again to consolidate his position. In 1924 Chang Tso-lin launched a new attack and defeated Wu in a great battle near Tientsin.

Wu River, Wade–Giles romanization WU CHIANG, Pinyin WU JIANG, tributary of the Yangtze River in southern China. It rises in the hills of western Kweichow Province and flows east through narrow gorges between steep cliffs. It turns north at Ssu-nan, enters Szechwan Province, and flows into the Yangtze at Fu-ling after a total course of 700 mi (1,100 km). Its drainage basin of 31,000 sq mi (80,000 sq km), including most of Kweichow, is a region of rugged terrain and an ethnically diverse population. Until the mid-20th century the river did little to reduce the region's isolation, for reefs and rapids prevented navigation for all but a few short stretches. Since the 1950s, however, blasting and dredging have opened more than 300 mi to motorized boats.

Wu San-kuei, Pinyin WU SANGUI (b. 1612, Liaotung Province, China—d. Oct. 2, 1678, Hen-chou, Hunan), Chinese general who invited the Manchus of Manchuria into China and helped them establish the Ch'ing dynasty in 1644. Later, in southwest China, he led a revolt against the Ch'ing in an attempt to set up his own dynasty.

Wu had been the Ming general in charge of defending the northeast frontier against the Manchus. When the Imperial capital at Peking was attacked by the rebel bandit leader Li Tzu-ch'eng, Wu's forces were summoned to aid in raising the siege, but the city fell (April 1644) before his arrival. Li then advanced against Wu, who appealed to the Manchus for aid. A combined force of Ming and Manchu troops drove Li from Peking, where the Manchus then set up the Ch'ing dynasty. Although loyal Ming officials beseeched Wu for aid in restoring the Ming dynasty, he accepted high rank from the Manchus and for nearly 30 years fought for the Manchu cause.

In 1659 Wu was put in charge of eliminating the remnants of Ming resistance in the southwest, and to this end he was given civil and military control of the southwestern province of Yunnan. With these powers he created an independent satrapy in Yunnan and neighbouring Kweichow Province, collecting taxes and developing trade monopolies in the area. At the same time two other commanders set up similar satrapies in the neighbouring southern provinces of Kwangtung and Fukien, and South China became an independent power that rivalled the Ch'ing government in the north.

In 1673, when the Ch'ing dynasty tried to check these southern kingdoms, Wu led them in a rebellion. Wu chose the name of Chou for the new dynasty he set up and proclaimed himself emperor. In 1674 he advanced into central China but then hesitated, possibly because the Manchus were holding his son as hostage. The Manchus then seized the initiative, and, soon thereafter, with the battle turning against him, Wu died of dysentery. His grandson continued the rebellion until 1681, when it was finally crushed. The incident is known in Chinese history as the Revolt of the Three Feudatories.

Wu Sangui (Chinese general): *see* Wu San-kuei.

Wu school, Pinyin WU, group of Chinese painters of the Ming dynasty active in the second half of the 15th and first half of the 16th centuries. They were scholar-artists who, in their "literati painting" (*wen-jen-hua* [*q.v.*]), perpetuated the personally expressive styles and attitudes of former artists such as the Four Masters of the Yüan dynasty (*q.v.*) in contrast to their contemporaries of the Che school (*q.v.*), who perpetuated more conservative styles.

The Wu school was named after Wu county (*hsien*) in the region of Soochow (Su-chou), in



"Hermitage by Mountain Stream," hanging scroll by Shen Chou, ink and colour on paper, 1464, Wu school, Ming dynasty, in the Ōsaka Municipal Museum of Fine Arts
By courtesy of the Osaka Shiritsu Bijutsukan

Kiangsu Province, where the painters worked. Among the artists included in the group are Shen Chou and his student Wen Cheng-ming (*qq.v.*). Generally, their paintings are quite subtle, but that subtlety veils great variety and imagination—with a sure, light brush to define painterly and structural complexity, learned allusions and poetic inscriptions, and very thin, delicate colouring. Their paintings were done more for their own and their peers' intellectual amusement than for a larger public. Some well-known painters, such as T'ang Yin (*q.v.*) and Ch'in Ying, lived in the area and knew the famous members of the Wu school but cannot easily be grouped with them because of their sometimes differing styles and interests.

Wu Shan (China): *see* Wu Mountains.

Wu-su-li Chiang (Russia–China): *see* Ussuri River.

Wu-t'ai, Mount, Wade–Giles romanization WU-T'AI SHAN, Pinyin WUTAI SHAN, mountain and mountain chain in northeast Shansi Province, China. The mountain chain is a massif with a southwest–northeast axis, separated from the Heng Shan (mountains) to the northwest by the valley of the Hu-t'o Ho (river), which curves around its southern flank to flow into the North China Plain in Hopeh Province. Mt. Wu-t'ai is actually a cluster of flat-topped peaks from which the mountain takes its name (Five Terraces). The highest peak is 10,033 ft (3,058 m) above sea level.

Mt. Wu-t'ai is particularly famous as one of the great holy places of Chinese Buddhism. Great numbers of temples, including some of the oldest wooden buildings surviving in China, are scattered over the mountain; the largest temples—such as the Hsien-t'ung, the Ta-ta-yüan, and the Pu-sa-ting-shen-jung-yüan—are grouped around the town of T'ai-huai-chen.

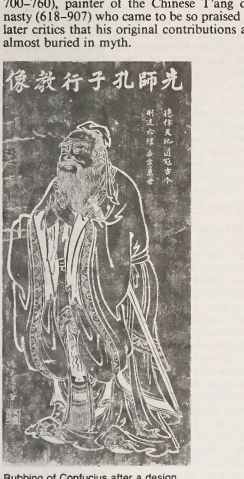
Mt. Wu-t'ai appears first to have become a holy mountain to the Taoist adepts of the later Han dynasty (AD 25–220) but came into prominence in the 5th century under the Northern Wei dynasty (386–534/35) when, as Ch'ing-liang Shan, it became identified as the dwelling place of Mañjuśrī *bodhisattva*

(a heavenly being who voluntarily postpones his Buddhahood in order to work for worldly welfare and understanding). The cult of Mañjuśrī was intensified under the T'ang dynasty (618–907). In early T'ang times Mount Wu-t'ai was closely associated with the patriarchs of the Hua-yen Buddhist school, becoming the principal centre of their teaching. During this period it attracted scholars and pilgrims not only from all parts of China but also from Japan, who continued to visit and study there until the 12th century.

Many of the other monasteries in the region were attached to Ch'an Buddhism, which in the 9th century found patronage in the region from the provincial governors of the neighbouring areas of Hopeh, who were able to protect Mount Wu-t'ai from the worst ravages of the great religious persecution that occurred from 843 to 845. Under Mongol rule in the late 13th century, Tibetan Buddhism (Lamaism) was first introduced to Mount Wu-t'ai. During the Ch'ing dynasty (1644–1911/12), when the Tibetan Buddhist religion was an important element in relations between the Chinese court and their Mongol and Tibetan vassals and when the state gave lavish support to monasteries inhabited by lamas (monks), Mount Wu-t'ai was one of the principal monastic centres.

Few of the present buildings are very old, but the main hall of the Hua-kuang Ssu, dating from 857, is the oldest surviving wooden building in China.

Wu Tao-hsüan, also called WU TAO-TZU, Pinyin WU DAOXUAN, or WU DAOZI (fl. *c.* 700–760), painter of the Chinese T'ang dynasty (618–907) who came to be so praised by later critics that his original contributions are almost buried in myth.



Rubbing of Confucius after a design attributed to Wu Tao-hsüan, Chinese, 19th century

By courtesy of the Museum of Fine Arts, Boston, gift of Robert Treat Paine, Jr.

He is recorded as having painted a wide variety of subjects, perhaps painting large wall compositions of an essentially Buddhist character more than anything else. He is especially noted for his imagination and the expressive vigour of his brush—which is cited even by T'ang critics who lavished a "divine" (*shen*) rating upon him. There are no known extant works that give anything other than the most hazy impression of his skill and accomplishment. Probably, however, his brush created vividly expressive lines of alternately thick and thin tensions—seen then and remembered still as in distinct contrast to the more preciously coloured and evenly controlled delineations of the contemporary courtly style.

Wu Ti (Chinese god): *see* Kuan Ti.

Wu-ti, Pinyin WUDI, original name LIU CH'E (b. 156 BC—d. March 29, 87/86 BC), autocratic Chinese emperor (141/140–87/86 BC), who vastly increased the authority of the Han dynasty and extended Chinese influence abroad. He made Confucianism the state religion of China.

Wu-ti was probably the 11th son of Emperor Ching-ti, the fifth ruler of the Han dynasty. Not being the eldest son, he would normally not have ascended the throne, but relatives of the emperor secured his designation as heir apparent at age seven. From his relatives and his teachers, the future emperor absorbed influences from two basically antagonistic schools: the Taoists, inclined to the legalist philosophy favouring an autocratic ruler guided by the rules of expediency, and the Confucianists, who sought through rituals and other means to check the growing power of the Han monarchs.

Emperor Wu-ti began his reign in 141 or 140 BC. During its early years he was under the moderating influence of relatives and court officials; however, by the late 130s he had decided that the essentially defensive foreign policy of his predecessors was not going to solve his foreign problems. In 133 he launched attacks on the nomadic Hsiung-nu people, who constituted China's principal threat on the northern frontier, and thereafter he committed his realm to the expansion of the empire. By 101 Wu-ti's troops, spurred by an emperor heedless of their hardships and intolerant of defeat, had extended Chinese control in all directions.

Southern China and northern and central Vietnam were incorporated into the empire. Northern and central Korea, which had slipped from Chinese control in 128 BC, were reconquered and again administered by imperial governors. Imperial troops were also sent across the Gobi (Desert) in unsuccessful attempts to eliminate the threat from the nomadic people known as the Hsiung-nu.

Han armies were farthest from home when they marched west to Fergana (now in Uzbekistan). The first expedition, in 104 BC, was a failure, but the emperor refused to accept defeat. His intransigence stemmed from pride and his desire for horses. The horses Wu-ti wanted from Fergana were not principally intended for his war machine (although the Han armies suffered a chronic shortage of horses); rather, they were "blood sweating" horses (infected by a parasite causing skin hemorrhages), which for the emperor had a mystical significance in that possession of them was considered a mark of Heaven's grace. The second expedition returned in 101 BC with some of the famous horses and the head of the ruler of Fergana; furthermore, the small states between China and Fergana had been humbled. Wu-ti had brought to submission all but the most distant parts of the world known to the Chinese.

His wars and other undertakings exhausted the state's reserves and forced him to look for other sources of income. New taxes were decreed and state monopolies on salt, iron, and wine were instituted. Yet, by the latter part of his reign, his regime was in financial difficulties and confronted by popular unrest. The emperor's economic controls were paralleled by his rigid control of the state apparatus. He created institutions for close supervision of the bureaucracy and drew into his personal service men who were outside the normal bureaucratic ranks and who made the bureaucracy more responsive to his will. He usually selected men whose behaviour was much like his own: harsh, demanding, and merciless.

In spite of his aggressive policies, Emperor Wu-ti is also known for making Confucianism the state orthodoxy. Although he was unimpressed with the image of the ideal Confucian ruler as a benevolent father figure, he nevertheless appreciated the literary grace of the Confucianists and particularly the Confucian emphasis on ritual, which complemented his religious interests.

Most of the rituals performed by Emperor Wu-ti had a dual function; although of dynastic political and religious significance, they frequently manifested his ceaseless search for immortality. He richly rewarded men who he believed could introduce him to immortals who would reveal their secrets to him. He sent men in search of the islands of the immortals and constructed elaborate palaces and towers designed to attract the spirits to him. At great expense he had conquered much of the world, and he had indeed heavily in the ardent hope that he would not have to leave it.

The last four years of Emperor Wu-ti's life were a time of retreat and regret. His empire could no longer afford an aggressive foreign policy, and he was forced to begin a period of retrenchment. The deeply suspicious emperor suffered intense personal loss when, in 91 BC, his heir apparent was falsely accused by an imperial confidant of practicing witchcraft against the emperor. In desperation, the son led an uprising in which thousands of people were killed and in which the heir committed suicide. Shortly before Emperor Wu-ti's death, he designated an eight-year-old son as his heir apparent; then, anticipating his own death, he had the youth's mother accused of a crime and imprisoned. Reportedly she "died of grief," but Emperor Wu-ti condoned her death, and perhaps caused it, to avoid having the young emperor dominated by relatives as he himself had been. He died in 87 BC.

Emperor Wu-ti is best remembered for his military conquests; hence, his posthumous title Wu, meaning "martial." His administrative reforms left an enduring mark on the Chinese state, and his exclusive recognition of Confucianism had a permanent effect on subsequent East Asian history. (J.L.D.)

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Wu-ti, Pinyin WUDI (posthumous name, or *shih*), personal name (*hsing-ming*) SSU-MA YEN, temple name (*miao-hao*) (HSI-CHIN) SHIH-TSU (b. 236, China—d. 290, Lo-yang), founder and first emperor of the Western Chin dynasty (265–316/317), which briefly reunited China during the turbulent period following the dissolution of the Han dynasty (206 BC–AD 220).

Ssu-ma Yen was the scion of the great Ssu-ma clan to which the famous Han historian Ssu-ma Ch'ien belonged. He became the most powerful general of the Wei dynasty (220–265/266), the northernmost of the Three Kingdoms into which China had divided at the end of the Han. In 263/264 the Wei kingdom absorbed the second of the Three Kingdoms, the Shu Han. In 265 Ssu-ma usurped the Wei throne, proclaiming the Chin dynasty. In 280 he conquered Wu, the third of the Three Kingdoms, thus reuniting China.

Ssu-ma attempted to reform the government, disbanding his armies to reduce expenses. He tried to regain control of taxation

and to reduce the usurious rent that powerful landowners were extracting from the people. He never really broke the power of the great local families, however, and his reduction of the army left China prey to invasion from foreign tribes. Moreover, he divided his domains into principalities for each of his 25 sons. The son who succeeded him was unable to control his brothers, and Ssu-ma Yen's dynasty came apart in a civil war known as the Revolt of the Eight Kings. Ssu-ma Yen himself was given the posthumous title of Wu-ti ("Martial Emperor").

Wu-ti, Pinyin WUDI (posthumous name, or *shih*), personal name (*hsing-ming*) HSIAO YEN, temple name (*miao-hao*) (SAN-LIANG) KAO-TSU (b. 464, China—d. 549, China), founder and first emperor of the Southern Liang dynasty (502–557), which briefly held sway over South China. A great patron of Buddhism, he helped establish that religion in the south of China.

Wu-ti was a relative of the emperor of the Southern Ch'i dynasty (479–502), one of the numerous dynasties that existed in South China in the turbulent period between the Han (206 BC–AD 220) and T'ang (618–907) dynasties. He led a successful revolt against the Southern Ch'i after his elder brother was put to death by the emperor. He proclaimed himself first emperor of the Liang dynasty in 502, and his reign proved to be longer and more stable than that of any other southern emperor in this period.

A devout believer, Wu-ti diligently promoted Buddhism, preparing the first Chinese *Tripitaka,* or collection of all Buddhist scripts. In 527 and again in 529 he renounced the world and entered a monastery. He was persuaded to reassume office only with great difficulty. In 549 the capital was captured by a "barbarian" general, and Wu-ti died of starvation in a monastery.

Wu-tou-mi (China): *see* Five Pecks of Rice.

Wu Tse-t'ien (Chinese empress): *see* Wu Hou.

Wu-t'ung-ch'iao, Pinyin WUTONGQIAO, town in south-central Szechwan *sheng* (province), China. Situated between Lo-shan and Jung on the Min River, Wu-t'ung-ch'iao was formerly a minor market town and briefly achieved status as a municipality from 1952 to 1958. It is chiefly noted as a major salt-producing area, the salt being drawn as brine from wells of medium depth. Barium and calcium chloride are also produced. Woolens, particularly blankets, are produced, using wool from neighbouring areas. Wu-t'ung-ch'iao's port is Chu-ken-t'an, located on the Min River a few miles to the west. Pop. (mid-1980s est.) 10,000–50,000.

Wu-wang, Pinyin WUWANG (posthumous name, or *shih*), personal name (*hsing-ming*) CHI FA (fl. 12th century BC, China), founder and first ruler (reigned 1111–1104 BC) of the Chou dynasty (1111–255 BC). He was regarded by later Confucians as a wise king.

Wu succeeded his father, the famous Wen-wang, as head of the semibarbaric state of Chou, located on the western border of China. Wen had assumed the title Hsi Po ("King of the West") and had begun to plot against the Chinese Shang dynasty (18th–12th century BC). Wu continued his father's work and formed a coalition with eight other border states, which defeated the evil last ruler of the Shang. The final battles were said to have been extremely bloody, and Shang survivors may well have served as Chinese culture bearers to places as far removed as Korea.

After establishing the Chou dynasty, Wu, assisted by his brother, known as the duke of Chou, consolidated his rule by establishing a feudalistic form of government, which parceled out territory to relatives and vassals willing to acknowledge Chou suzerainty. Even descendants of the defeated Shang were allowed to rule over a portion of their former domain.

Wu-wei, Pinyin WUWEI, city in Kansu *sheng* (province), China. Situated at the eastern end of the Kansu Corridor (through which the Silk Road ran southeast to northwest) to the north of the provincial capital, Lan-chou, Wu-wei became an important defensive area under the Han dynasty (206 BC–AD 220). It has kept the same name ever since, having been since T'ang times (618–907) the seat of a prefecture called Liang-chou, known under the Ch'ing dynasty (1644–1911/12) as Liang-chou prefecture. A traditionally strategic point, it is located where roads from Lan-chou in the south and from Yin-ch'uan (in modern times in the Ningsia Hui autonomous region) to the east joined to form the main Silk Road. An ancient city with many monuments, since the late 1950s Wu-wei has been an important rail junction on the line from Lan-chou to the Sinkiang Uighur autonomous region. A spur line runs east to join the main Lan-chou–Yin-ch'uan–Peking line near the Kansu–Ningsia Hui border. Wu-wei is the chief market and collecting centre not only for the irrigated area surrounding the city itself but also for the products (especially wool) of the pastoral nomads who live in the surrounding grasslands. Pop. (mid-1980s est.) 10,000–50,000.

wu-wei, Pinyin WUWEI (Chinese: "nonaction"), in Chinese Taoism, the principle of yielding to others as the most effective response to the problems of human existence. *Wu-wei* does not mean total passivity. Rather, it is natural, nonaggressive behaviour that compels others (through shame, if for no other reason) to desist voluntarily from violence or overly aggressive conduct. Taoism, therefore, is not indifferent to violence, for it counters violence in its own paradoxical way. Ideally, Taoists do not argue or debate. They rely on proper timing to set forth what they believe to be true, and they speak out against unseemly conduct only when their words are likely to be heeded. Taoists view laws and controls as undesirable repressions of human nature. For them a society with the fewest controls governs itself best. *Wu-wei* is thus regarded as the secret to human happiness, for through "nonaction" all things can be accomplished.

Wu xing (in Chinese cosmogony): *see* Wu hsing.

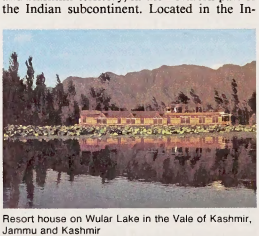
Wu Zhen: *see* Wu Chen.

Wudi (Chinese emperor): *see* Wu-ti.

Wudoumi (China): *see* Five Pecks of Rice.

Wugong Shan (China): *see* Wu-kung Mountains.

Wular Lake, lake, the largest in the Jammu and Kashmir territory, in the northern part of the Indian subcontinent. Located in the Indian-held sector of the territory, the lake is 10 miles (16 km) long and 6 miles (10 km) wide. It lies at the north end of the Vale of Kashmir, 20 miles (32 km) north-northwest of Srinagar. Its area varies from 12 to 100 square miles (30 to 260 square km) according to the season. The lake controls the flow of the Jhelum River, which traverses it. The town of Sopur is on the southwest shore of the lake, and an island to the northeast contains 15th-century ruins.



Resort house on Wular Lake in the Vale of Kashmir, Jammu and Kashmir

D. Chawda—Keystone

wulfenite, lead molybdate, $PbMoO_4$, a minor source of molybdenum and the second most common molybdenum mineral. It occurs in the oxidized zone of lead and molybdenum deposits. Fine crystals have been found at Přibram, Czech Republic; Yuma County, Ariz., U.S.; and Mapimi, Durango, Mex. Other localities include Germany, Austria, Sardinia, and Australia.

Wulfenite ordinarily crystallizes as thin, beveled, square plates that have a resinous to adamantine lustre, and they are yellow to orange in colour. The Mohs hardness is 3; specific gravity, 6.5–7; and crystal system, tetragonal.

Wulfhere (d. 674), king of the Mercians from 657, who made himself overlord of much of England south of the Humber River. He exercised control over Essex, London, Surrey, and the West Saxon lands, or Wessex, north of the Thames.

Wulfhere was a younger son of King Penda and was kept in concealment for some time after his father's defeat and death in 654. In 657, however, the Mercians threw off the supremacy of Oswiu, king of Northumbria, and Wulfhere became their king. He took energetic measures to spread Christianity and was greatly helped by his bishop, Jaruman, and afterward by St. Chad. Outside Mercia he induced the East and the South Saxons to accept Christianity and is said to have founded one or two monasteries. He gained Lindsey from Northumbria in 657 and was successful against Wessex. He extended his borders in all directions and was the founder of the passing greatness of Mercia. His only son Cenred (or Coenred) became king in 704 in succession to his brother Aethelred. His only daughter was St. Werburh, abbess of Ely.

Wulfila (Christian missionary): *see* Ulfilas.

Wulfstan, pseudonym LUPUS (d. May 28, 1023, York, Eng.), bishop of London, 996–1002, archbishop of York, 1002–23, and bishop of Worcester, 1002–16, the author of many Old English homilies, treatises, and law codes. He was a product of the Benedictine revival and probably had some early connection with one of the Fenland abbeys, but nothing is known of him with certainty before he became a bishop.

Wulfstan wrote in a distinctive style, which has enabled the canon of his work to be established. From 1008 he was adviser to the kings Aethelred and Canute and drafted their laws; it was probably he who inspired the latter to reign as a Christian king and thus prevented the Danish conquest from being a disaster to Anglo-Saxon civilization. He was interested in problems of government and the arrangement of society, as is shown by the work known as *Institutes of Polity,* which describes the responsibilities of all classes, from the king down, and defines the relative powers of church and state. He was also deeply concerned with the reform of the church. He studied canonical literature, asked Aelfric to write two pastoral letters for him, and was himself the author of the text known as *The Canons of Edgar.* His most famous work, the *Sermo Lupi ad Anglos* ("Sermon of Wolf to the English"), is an impassioned call to his countrymen to repentance and reform in 1014, after Aethelred had been driven out by the Danish invasions of King Sweyn.

Wulfstan, SAINT, also spelled WULSTAN (b. *c.* 1008, Long Itchington, near Warwick, Eng.—d. Jan. 19/20, 1095, Worcester; canonized 1203; feast day January 19), bishop of Worcester from 1062, the last surviving English holder of a bishopric after the Norman Conquest (1066). He ended the capture and sale of slaves at Bristol, rebuilt the cathedral at Worcester, helped compile Domesday Book (the record of William I the Conqueror's survey of England), and was noted for his preaching and personal asceticism. Educated at Benedictine abbeys, he joined the Benedictine monastery at Worcester. He was respected as bishop for his able administration, and he frequently served as adviser to King William II Rufus of England.

Wundt, Wilhelm (b. Aug. 16, 1832, Neckarau, near Mannheim, Baden [Germany]—d. Aug. 31, 1920, Grossbothen, Ger.), German physiologist and psychologist who is generally acknowledged as the founder of experimental psychology.

Wundt earned a medical degree at the University of Heidelberg in 1856. After studying briefly with Johannes Müller, he was appointed lecturer in physiology at the University of Heidelberg, where in 1858 he became an assistant to the physicist and physiologist Wilhelm von Helmholtz. There he wrote *Beiträge zur Theorie der Sinneswahrnehmung* (1858–62; "Contributions to the Theory of Sense Perception").

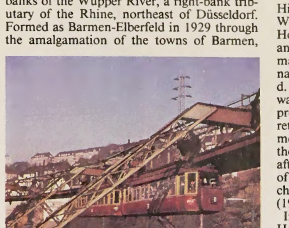
It was during this period, in 1862, that Wundt offered the first course ever taught in scientific psychology. Until then, psychology had been regarded as a branch of philosophy and, hence, to be conducted primarily by rational analysis. Wundt instead stressed the use of experimental methods drawn from the natural sciences. His lectures on psychology were published as *Vorlesungen über die Menschen und Thierseele* (1863; "Lectures on the Mind of Humans and Animals"). He was promoted to assistant professor of physiology in 1864.

Bypassed in 1871 for the appointment to succeed Helmholtz, Wundt then applied himself to writing a work that came to be one of the most important in the history of psychology, *Grundzüge der physiologischen Psychologie*, 2 vol. (1873–74; 3 vol., 6th ed., 1908–11; *Principles of Physiological Psychology*). The *Grundzüge* advanced a system of psychology that sought to investigate the immediate experiences of consciousness, including sensations, feelings, volitions, and ideas; it also contained the concept of apperception, or conscious perception. The methodology prescribed was introspection, or conscious examination of conscious experience.

In 1874 Wundt went to the University of Zürich for a year before embarking on the most productive phase of his career, as professor at the University of Leipzig (1875–1917). There, in 1879, he established the first psychological laboratory in the world, and two years later he founded the first journal of psychology, *Philosophische Studien* ("Philosophical Studies"). Wundt's most important later works include *Grundriss der Psychologie* (1896; "Outline of Psychology") and *Völkerpsychologie*, 10 vol. (1900–20; "Ethnic Psychology").

Wupatki National Monument, national monument in north-central Arizona, U.S. It lies along the Little Colorado River near the San Francisco Mountains, 30 miles (48 km) north-northeast of Flagstaff. Established in 1924, with an area of 55 square miles (142 square km), it comprises more than 800 pre-Columbian red sandstone pueblos. Studies of tree rings in their ancient wooden beams indicate that they were built between the 11th and the 13th century. Their occupants were farming Indians believed to be the ancestors of the Hopi Indians, who came with corn seed and digging sticks to cultivate the cinder soils that covered the region after the eruption (*c.* 1064) of nearby Sunset Crater. The outstanding groups of pueblos are the Wupatki and the Citadel, built near the rim of a sinkhole.

Wuppertal, city, North Rhine-Westphalia *Land* (state), northwestern Germany. The city extends for 10 miles (16 km) along the steep banks of the Wupper River, a right-bank tributary of the Rhine, northeast of Düsseldorf. Formed as Barmen-Elberfeld in 1929 through the amalgamation of the towns of Barmen,



Monorail suspension railway, Wuppertal, Ger.
S. Kuebe—ZEFA/EB Inc.

Elberfeld, Beyenburg, Cronenberg, Ronsdorf, and Vohwinkel, the name was changed to Wuppertal ("Wupper Valley") in 1930. Barmen and Elberfeld, mentioned in the 11th and 12th centuries, jointly received the monopoly for yarn bleaching for the Bergisches Land in 1527. The introduction of ribbon making and linen weaving in the 16th century, lace making (1750), silk weaving (1775), and red dyeing (1785) gave added impetus to these towns' textile industries.

The system of civic poor relief introduced in Elberfeld in 1853 was long regarded as a model throughout the world. A unique monorail suspension railway was built along the Wupper River at the turn of the 20th century in order to serve Barmen, Eberfeld, and the other towns. Wuppertal was severely damaged in World War II but was subsequently rebuilt in parallel terraces on the river valley's slopes, with numerous parks and public gardens and a well-known zoo. Wuppertal is the centre of textile manufacturing in the region. The city also manufactures chemicals, rubber, machinery, vehicles, tools and printing equipment and has breweries, printing works, and publishing houses. Pop. (1989 est.) 371,283.

Wurlitzer FAMILY, American family of musical-instrument makers and dealers.

Rudolph Wurlitzer (b. Jan. 30, 1831, Schöneck, Saxony [Germany]—d. Jan. 14, 1914, Cincinnati, Ohio, U.S.), emigrated to the United States in 1853, settling in Cincinnati. He began dealing in musical instruments, which had been the traditional family business since the time of lute-maker Heinrich Wurlitzer (1595–1656). By 1861 he was no longer able to fill all his orders with instruments imported from Germany, and he established a factory in Cincinnati that primarily produced band instruments for military use.

In 1865 a branch was established in Chicago, and in March 1890 the firm was incorporated as the Rudolph Wurlitzer Company, with its founder serving as president (1890–1912) and chairman of the board (1912–14). Three sons followed.

His eldest son and successor, Howard Eugene (b. Sept. 5, 1871, Cincinnati—d. Oct. 30, 1928, New York City), joined the firm in 1889 and also became president (1912–27) and chairman (1927–28). Chiefly through Howard's efforts, the company expanded in the field of automatic and coin-operated instruments. Rudolph Henry Wurlitzer (b. Dec. 30, 1873, Cincinnati—d. May 27, 1948, Cincinnati), Rudolph's second son, studied violin in Berlin and became interested in violin construction. His training led to the establishment of the Wurlitzer Collection of Rare Violins. Rudolph Henry was active in the company from 1894 and served as president (1927–32) and chairman (1932–42). The third son, Farny Reginald Wurlitzer (b. Dec. 7, 1883, Cincinnati—d. May 6, 1972, North Tonawanda, N.Y.), was educated in the art and technique of producing modern musical instruments. He returned to Cincinnati in 1904 and in 1909 moved to North Tonawanda, N.Y., to head the manufacturing division that was formed after the purchase of DeKleist, manufacturers of barrel organs. He was president (1932–41), chairman (1942–66), and chairman emeritus (1966–72) of the company.

In 1910 the Wurlitzer Company acquired the Hope-Jones Organ Company of Elmira, N.Y., moving its operations to North Tonawanda. It was there that the pipe organ known as the "Unit Orchestra" and later famous as the "Mighty Wurlitzer" was developed.

With the advent of motion pictures the "Mighty Wurlitzer" theatre organ grew in popularity; it soon appeared as part of the elaborate furnishings in the new movie palaces. Equipped with the sound effects of brass trumpets, tubas, clarinets, oboes, chimes, xylophones, drums, and many other tone colours, the instrument proved to be an attraction in itself, and more "Mighty Wurlitzers" were produced than any other model of pipe organ in history.

Würm glacial stage, major division of late Pleistocene deposits and time in Alpine Europe (the Pleistocene epoch began about 1,600,000 years ago and ended about 10,000 years ago). The Würm glacial stage followed the Riss-Würm interglacial and is correlated with the Weichsel glacial stage of northern Europe and the Wisconsin glacial stage of North America. The Alpine glaciations of the Pleistocene were early recognized and formed the basis of modern Pleistocene glacial theory. The Würm glacial stage began about 70,000 years ago and is divided into early, middle, and late phases. The end of the Würm and the retreat of the final glaciers was a complex of minor retreats and advances.

Württemberg, former German state, successively a countship, a duchy, a kingdom, and a republic before its partition after World War II. Its territory approximated the central and eastern areas of present-day Baden-Württemberg (*q.v.*) *Land* (state), of Germany. For the last period of its separate existence, Württemberg was bounded northeast and east by Bavaria, southeast by Bavaria and Lake Constance (Bodensee), and southwest, west, and northwest by Baden, except where Hohenzollern (Prussian from 1849) was enclaved across the frontier in the south. The capital was Stuttgart. Except for the Rhine plain, Württemberg is a mountainous and hilly region that includes the Swabian Jura and the Black Forest and that is drained by the Neckar River.

In the earlier Middle Ages, Württemberg was part of the region known as Swabia (*q.v.*). The Wirtembergs (Württembergs), a local dynasty of counts established by the late 11th century, began from the mid-12th century to extend their control over large sections of Swabia. By the time Württemberg was made a duchy in 1495, the Estates (representative assembly) had come to play an important role in its government. Duke Ulrich, who became a vassal of the house of Habsburg in 1534, introduced Lutheranism into the duchy

and confiscated church lands. His son Duke Christopher (reigned 1550–68) set up a centralized state church and became the leader of German Protestantism; his judicial and civil reforms, which included recognition of the Estates' control over finances, endured for two centuries. Duke Frederick (1593–1608) secured the duchy's release from Habsburg overlordship and was a pillar of the Evangelical Union of Lutheran and Calvinist Princes (1608). Württemberg was devastated in the Thirty Years' War (1618–48) and fell prey to French invasions from 1688 until 1693 during the War of the Grand Alliance. Yet the country enjoyed progressive government. Compulsory education was introduced in 1649. Duke Eberhard Louis (reigned 1693–1733) improved the duchy's defenses and schools, built the celebrated Ludwigsburg Palace, and admitted Waldensian refugees from France, who introduced the textile and other industries into the duchy.

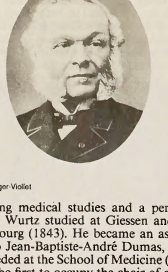
Württemberg was an ally of France from 1802 to 1813 and was rewarded by Napoleon I with large grants of territory, including many Habsburg lands in Swabia and numerous free imperial cities and ecclesiastical territories. These additions doubled Württemberg's size by 1810, and the duchy was successively raised to the status of an electorate (1803) and a kingdom (1806), which it remained after Napoleon's downfall. Political unrest in Württemberg from 1815 until 1819 resulted in the issuance in 1819 of a constitution by King William I (reigned 1816–64), establishing a bicameral legislature. Württemberg was a centre of liberalism in 19th-century Germany. It joined the Zollverein (Customs Union) with Prussia in 1834, but King Charles (1864–91) sided with Austria in the Seven Weeks' War (1866) and was forced to pay an indemnity by the victorious Prussians. Württemberg sided with Prussia in the Franco-German War (1870–71) and then joined the new German Empire.

With Hermann von Mittnacht as chief minister (from 1876 to 1900), Württemberg found a comfortable place in the new Germany, retaining its independence in internal administration, ecclesiastical affairs, and education and also in the management of the postal and railway services. It moreover retained special rights over taxation and the armed forces. Its manufacturing industries were successfully developed—for machinery, motors, precision-engineering, textiles, watches and clocks, musical instruments, and book-production. The previously high rate of emigration declined.

Charles was succeeded in 1891 by his first cousin once removed, William II (reigned 1891–1918), under whom liberal political reforms were inaugurated and arts and drama flourished. Progress, however, was halted by World War I, and the revolution of November 1918 forced William II to abdicate. A republican constitution was promulgated in 1919; but, as a member state of Germany under the Weimar Constitution, Württemberg lost all the special privileges that had been reserved to it under the former system.

Under the Nazi regime a *Reichsstatthalter,* or lieutenant governor, for Württemberg was appointed in 1933, and the state's government was subordinated to that of the Reich in 1934, while the *Landtag,* or State Diet, was abolished. After World War II, Württemberg was divided between the U.S. and French occupation zones. Three of the states created in the birth of the Federal Republic of Germany in 1949 were Baden, Württemberg-Baden, and Württemberg-Hohenzollern. These were merged in 1952 to form Baden-Württemberg.

Wurtz, Charles-Adolphe (b. Nov. 26, 1817, Wolfisheim, near Strasbourg, Fr.—d. May 12, 1884, Paris), French chemist and educator noted for his research on organic nitrogen compounds, hydrocarbons, and glycols.



Wurtz
Boyer—H. Roger-Viollet

Following medical studies and a period of teaching, Wurtz studied at Giessen and then at Strasbourg (1843). He became an assistant (1845) to Jean-Baptiste-André Dumas, whom he succeeded at the School of Medicine (1852). He was the first to occupy the chair of organic chemistry at the Sorbonne (1875).

His work on the acids of phosphorus led him to discover phosphorus oxychloride. In 1849 he synthesized the first organic derivative of ammonia, ethylamine, and six years later devised a method of preparing hydrocarbons from sodium and an alkyl halide, a reaction named for him. Study of glycerol led him into researches of glycols and the synthesis of many important compounds, including choline. In 1867 he and August Kekule prepared phenol. With Marcellin Berthelot he succeeded in making Paris one of Europe's leading centres of chemical education.

wurtzite, a zinc sulfide mineral that occurs typically in Potosí, Bolivia; Butte, Mont.; and Goldfield, Nev. It is a rare and unstable (at temperatures below 1,020° C, [1,870° F]) hexagonally symmetrical modification of sphalerite, to which it inverts crystallographically; it may be made artificially from sphalerite by rapid cooling from 1,020° C. For detailed physical properties, *see* sulfide mineral (table).

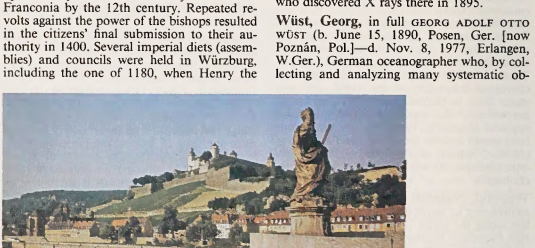
Würzburg, city, northwestern Bavaria *Land* (state), south-central Germany. It lies along the canalized Main River. The site of a Celtic settlement, it was first mentioned as Virteburch in 704. A bishopric was established there by St. Boniface in 741/742, and the bishops had acquired ducal authority over eastern Franconia by the 12th century. Repeated revolts against the power of the bishops resulted in the citizens' final submission to their authority in 1400. Several imperial diets (assemblies) and councils were held in Würzburg, including the one of 1180, when Henry the Lion was placed under the imperial ban and the Bavarian duchy was taken from him and given to Otto, a member of the Wittelsbach family. Würzburg progressed under Bishop Julius (1573–1617), and much building was commissioned by the bishops of the Schönborn family in the 18th century. The bishopric was secularized in 1802, and the city passed to Bavaria in 1802/03. In 1805 it became the seat of the grand duchy of Würzburg in the Confederation of the Rhine, until it was restored to Bavaria in 1814. A new bishopric was created in 1821.

Much of the city was destroyed in World War II, but its postwar reconstruction has been thorough. Although the splendid Baroque episcopal Residenze (built 1719–44 by Balthasar Neumann) was damaged, its grand staircase, with famous frescoes by Giovanni Tiepolo, survived. Other landmarks are the medieval Main Bridge, the Julius Hospital, the town hall, and the Marienberg fortress, originally a Celtic hill fort, which was the residence of the bishops (*c.* 1250–1720). The round church within the courtyard of the fortress is one of the oldest churches extant in Germany (706). Würzburg's Romanesque cathedral, begun in 1034, consecrated in 1189, and restored after World War II, recalls the city's former status as the capital of an ecclesiastical principality. Other notable medieval churches include the Marienkapelle, the Neumünster (with a Baroque facade), and St. Burchard's, and among many fine examples of the Baroque and Rococo styles are the Hauger Stiftskirche and the Käpelle, a pilgrimage church (by Neumann). A university was founded at Würzburg in 1403, but it existed for only a few years. The present University of Würzburg was founded by Bishop Julius in 1582.

Würzburg, once the capital of Franconia, is the capital of the Bavarian administrative district of Lower Franconia and is a centre of grape growing and of rail and river traffic. Würzburg is a centre for the mechanical press industry and the manufacture of steel, paper and printing, electronics, wood, leather, and wine. Pop. (1989 est.) 125,589.

Würzburg, University of, German in full BAYERISCHE JULIUS-MAXIMILIANS-UNIVERSITÄT WÜRZBURG, autonomous, state-supported university in Würzburg, Ger., founded in 1582. Early a famous centre for the study of Roman Catholic theology, it was secularized in 1814 and became best known for its medical school. Among its teachers were the philosopher F.W. Schelling, the pathologist Rudolf Virchow, and the physicist Wilhelm Röntgen, who discovered X rays there in 1895.

Wüst, Georg, in full GEORG ADOLF OTTO WÜST (b. June 15, 1890, Posen, Ger. [now Poznán, Pol.]—d. Nov. 8, 1977, Erlangen, W.Ger.), German oceanographer who, by collecting and analyzing many systematic ob-



Marienberg fortress overlooking Würzburg and the Main River, Germany; in the foreground (right) is a statue of St. Kilian
R. Waldkirch—ZEFA

servations, developed the first essentially complete understanding of the physical structure and deep circulation of the Atlantic Ocean.

Wüst received his doctorate from the University of Berlin in 1919. After the death of his teacher Alfred Merz, Wüst took over as chief oceanographer on the German Atlantic (1925–27) expedition. He was also in charge of the International Gulf Stream (1938) expedition. The Atlantic expedition, conducted from the research vessel "Meteor," was the first study of an entire ocean, and it remains one of the most extensive oceanographic surveys ever undertaken. From the wealth of data amassed, Wüst constructed cross-sectional profiles that revealed the Atlantic's complex temperature and salinity stratification and its deep-current structure.

After World War II Wüst built up again the Institute for Oceanography, at Kiel, so that it flourished as a research centre. He was the institute's director from 1946 until he retired in 1959.

Wutongqiao (China): *see* Wu-t'ung-ch'iao.

Wuxi (China): *see* Wu-hsi.

Wuxing (China): *see* Wu-hsing.

Wuyi Shan (China): *see* Wu-i Mountains.

Wuzhou (China): *see* Wu-chou.

Wyandot (people): *see* Wendat.

Wyandotte, city, Wayne County, southeastern Michigan, U.S., on the Detroit River, just southwest of Detroit. Settled in about 1820, it was laid out in 1854 on the site of the Indian village where Chief Pontiac had planned his attack on Detroit in 1763. Its name recalls the Wyandot (Wendat) Indians, a confederation of the Huron nation. The first commercial Bessemer steel in the United States was produced there in 1864, and Wyandotte was noted for Great Lakes shipbuilding (1872–1920). Diversified manufactures now include steel and allied products, cement, plastic pipes, and industrial diamonds; vast salt beds underlying the city are the basis for important chemical industries. Inc. city, 1867. Pop. (1990) 30,938.

Wyandotte Cave, cave in Crawford County, southern Indiana, U.S., near the village of Wyandotte. With 25 mi (40 km) of passages on five levels, it is the largest of the many such caves dissolved out in the horizontally bedded Mississippian limestones that extend southward into the cave-bearing regions of Kentucky and Tennessee. The entrance is about 200 ft (60 m) above the Blue River. The cave was used by Indians and is believed to have been inhabited in prehistoric times. Outstanding features include Rothrock's Grand Cathedral (an enormous room almost ¼ mi in circumference with a 175-ft-tall rock pile at its centre called Monument Mountain) and the Senate Chamber, an elliptical amphitheatre 145 ft long and 56 ft wide. In the centre of the chamber, a mass of fallen rock supports one of the cave's grandest spectacles, the Pillar of the Constitution—a great fluted column of white calcite, combining a stalactite and a stalagmite and over 70 ft in circumference. The cave also contains many fine examples of helictites (irregular stalactites). The temperature within is a constant 53° F (about 12° C). Little Wyandotte Cave is nearby, and Marengo Cave is 20 mi (32 km) south.

Wyandotte Constitution, in the period immediately preceding the American Civil War, document under which Kansas was admitted to the Union as a free state (Jan. 29, 1861), concluding the struggle known as Bleeding Kansas. Drawn up at Wyandotte (now part of Kansas City) in July 1859, it rejected slavery and suffrage for women and blacks but affirmed property rights for women. The document was approved in a referendum by a vote of about 10,000 to 5,000 (Oct. 4, 1859). Amended many times (including a universal suffrage amendment in 1912), it is still the constitution of Kansas.

Wyat, Sir Thomas, Wyat also spelled WYATT (b. 1503, Allington, near Maidstone, Kent, Eng.—d. Oct. 6, 1542, Sherborne, Dorset), poet who introduced the Italian sonnet and terza rima verse form and the French rondeau into English literature.

Wyat was educated at St. John's, Cambridge, and became a member of the court circle of Henry VIII, where he seems to have been popular and admired for his attractive appearance and skill in music, languages, and arms. During his career, he served a number of diplomatic missions and was knighted in 1537, but his fame rests on his poetic achievements, particularly his songs. His poems are unusual for their time in carrying a strong sense of individuality. They consist of *Certayne Psalmes . . . drawen into Englyshe meter* (1549); three satires, and *Songes and Sonettes*, published in *Tottel's Miscellany* (1557); and songs identified in manuscript, published in 19th- and 20th-century editions.

Wyat, Sir Thomas, THE YOUNGER, Wyat also spelled WYATT (b. *c.* 1521—d. April 11, 1554, London), English soldier and conspirator who led an unsuccessful rebellion against Queen Mary I, probably the most formidable uprising ever faced by a Tudor monarch.



Sir Thomas Wyat the Younger, panel painting by an unknown artist; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

Wyat's father was the renowned poet and diplomat Sir Thomas Wyat. As a young man he acquired a reputation for recklessness, and in 1543 he was briefly imprisoned for taking part in a London street riot. From 1543 to 1549 or 1550, he served in the army abroad—especially in France—achieving recognition as a skillful and daring officer.

Wyat then returned to England and in 1551 served as sheriff in Kent, where he formed his own rudimentary military organization. On King Edward VI's death (July 1553) he supported the accession of Mary, a Roman Catholic, but by the end of the year he turned against the Queen, considering her proposed marriage to the future king Philip II of Spain to be an affront to England's national honour. He accordingly joined several others, including Lady Jane Grey's father, the Duke of Suffolk, in a conspiracy against the crown. The plot was revealed to Mary's lord chancellor, Stephen Gardiner, by the Earl of Devon, one of the conspirators, at the end of January 1554, with the result that of the conspirators only Wyat succeeded in raising an army. At first the government offered to negotiate with him, but it soon decided to suppress the insurgents. A force under the command of Thomas Howard, the aged duke of Norfolk, who was sent to put down the rebellion, largely defected to Wyat.

On Feb. 3, 1554, Wyat entered the outskirts of London with some 3,000 men. He advanced swiftly to the centre of the city, but his troops became disheartened when the populace did not join their cause. Confronted by the royal forces, Wyat surrendered after a brief engagement. He was tried on March 15 and executed less than a month later. To the last, Mary's partisans made strenuous but unsuccessful efforts to persuade him to implicate Princess (afterward Queen) Elizabeth in his conspiracy. After his death he and his followers were widely regarded as patriots and martyrs by a populace that was becoming increasingly repelled by Mary's persecution of Protestants.

Wyatt, James (b. Aug. 3, 1746, Burton Constable, Staffordshire, Eng.—d. Sept. 4, 1813, near Marlborough, Wiltshire), English architect chiefly remembered for his Romantic country houses, especially the extraordinary Gothic Revival Fonthill Abbey.

In 1762 Wyatt went to Italy, where he remained six years. On his return to England, he designed the London Pantheon (opened 1772; later demolished), a Neoclassical building inspired by Hagia Sophia in Istanbul. The Pantheon made Wyatt one of the most fashionable architects in England.

He succeeded Sir William Chambers as surveyor general to the Board of Works (1796) and was engaged in restoring the cathedrals of Durham, Hereford, Lichfield, and Salisbury, as well as Windsor Castle, Westminster Abbey, and Magdalen College, Oxford. These "restorations" later earned him the epithet "the Destroyer" from such medieval revivalists of the 19th century as A.W.N. Pugin, who had a more accurate archaeological approach.

In point of originality, Wyatt's severely elegant works in the classical mode, like Heaton Hall, Lancashire (1772), and Heveningham Hall, Suffolk (*c.* 1788–99), were surpassed by the extravagance of his Gothic Revival buildings, of which the most sensational was Fonthill Abbey (1796–1807), Wiltshire. Initially this was built as a landscape feature and eventually developed into an extraordinary home for the arch-Romantic William Beckford, who supervised its design and construction. The great central tower (270 feet) collapsed in 1807, and after Beckford sold the estate, in 1822, the house further fell into ruin. Today it has mostly disappeared. In John Rutter's *Delineations of Fonthill* (1823), however, one can still experience some of the building's grotesque, spectacular quality that made it architecturally notorious in the Romantic period. Other notable examples of Wyatt's Gothic country houses include Lee Priory, Kent (1783–90), and Ashridge, Hertfordshire, completed (1808–18) by his nephew, Sir Jeffry Wyatville. A biography of the nephew by Derek Linstrum was published in 1972.

Wyatt, John (b. April 1700, Thickbroom?, Staffordshire, Eng.—d. Nov. 29, 1766, Birmingham, Warwickshire), English mechanic who contributed to the development of power spinning.

Wyatt began his career as a carpenter in the village of Thickbroom, near Lichfield, but by 1730, with financial support from the Birmingham inventor Lewis Paul, he was working on machines for boring metal and making files. The spinning machine, first patented in 1738, was almost certainly Paul's idea, with Wyatt providing the technical skill. The principle was to draw the fibres through sets of rollers turning at different speeds. It was successful for a time but was superseded by Richard Arkwright's water frame in the 1770s. Wyatt later worked at Matthew Boulton's Soho foundry.

Wychavon, district, county of Hereford and Worcester, western England, occupying an area of 257 sq mi (666 sq km) in the eastern part of the county. Wychavon district consists mostly of the fertile clay valleys of the Severn

and (Upper) Avon rivers. The Vale of Evesham in the south and centre has the proper soil and climate for the cultivation of plums and various other fruits and vegetables. The steep limestone scarps of the Cotswold Hills cross into Wychavon near the small parish (town) of Broadway in the extreme southeast. Isolated Bredon Hill in the southwest, nearly 1,000 feet (300 m) high, is a spur of the Cotswolds. Evesham, Pershore (the district seat), and Droitwich are historic towns of Wychavon. Droitwich in the northwest has been known since Roman times for its saline springs and baths, said to be 10 times saltier than seawater. Evesham in southeastern Wychavon has a Tudor Round House (a large building with elaborate woodwork) and a town hall (built 1586; remodeled 1885). Pershore, west of Evesham, has a 17th-century bridge across the Avon and a thousand-year-old Norman abbey. Light industries include canneries at Evesham for locally grown fruits and vegetables. Pop. (1991 prelim.) 99,800.

Wycherley, William (b. 1640, Clive, near Shrewsbury, Shropshire, Eng.—d. Jan. 1, 1716, London), English dramatist who attempted to reconcile in his plays a personal conflict between deep-seated puritanism and an ardent physical nature. He perhaps succeeded best in *The Country-Wife* (1675), in which satiric comment on excessive jealousy and complacency was blended with a richly comic presentation, the characters unconsciously revealing themselves in laughter-provoking colloquies.

Wycherley was sent to be educated in France at age 15. There he became a Roman Catholic, but, on returning to England to study at the University of Oxford in 1660, he reverted to Protestantism. Leaving Oxford without a degree, he began to study law, although he seems to have preferred a life of pleasure that included study of the theatre. He had earlier drafted a first play, *Love in a Wood: or, St. James's Park,* and in the autumn of 1671 it was presented in London, bringing its author instant acclaim. Wycherley was taken up by Barbara Villiers, Duchess of Cleveland, whose favours he shared with King Charles II, and he was admitted to the circle of wits at court. His next play, *The Gentleman Dancing-Master,* was presented in 1672 but proved unsuccessful. These early plays—both of which have some good farcical moments—followed tradition in "curing excess" by presenting a satiric portrait of variously pretentious characters—fops, rakes, would-be wits, and the solemn of every kind. *The Plain-Dealer,* presented in 1676, satirizes rapacious greed. The satire is crude and brutal, but pointed and effective. In *The Country-Wife,* acted a year earlier, the criticism of manners and society remains severe, but there is no longer a sense of the author hating his characters.

Wycherley, who had led a fashionably dissolute life during these years, fell ill in 1678. In 1680 he secretly married the Countess of Drogheda, a rigid puritan who kept him on such a short rein that he lost his favour at court. A year later the lady died, leaving her husband a considerable fortune. But the will was contested, and Wycherley ruined himself fighting the case. Cast into a debtor's prison, he was rescued seven years later by King James II, who paid off most of his debts and allowed him a small pension. On his deathbed, Wycherley received the last rites of the Roman Catholic church, to which he had apparently reverted after being rescued from prison.

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Wyckoff, Ralph Walter Graystone (b. Aug. 9, 1897, Geneva, N.Y., U.S.—d. Nov. 3, 1994, Tucson, Ariz.), American research scientist, a pioneer in the application of X-ray methods to determine crystal structure, and one of the first to use these methods for studying biological substances.

Wyckoff was educated at Cornell University and was an instructor in analytical chemistry from 1917 to 1919. He subsequently worked in the Geophysical Laboratory of the Carnegie Institute of Washington (1919–27). From 1927 to 1937 he was associated with the Rockefeller Institute for Medical Research, after which he joined Lederle Laboratories and then Reichel Laboratories. He subsequently worked for the U.S. Public Health Service and during 1952–54 was attached to the U.S. embassy in London. He conducted work of fundamental importance in crystallography, electron microscopy, and medical research. One of the strongest proponents of the Laue method of X-ray crystal analysis (after the German physicist Max von Laue), he devised techniques for deriving the crystal structure from the complicated X-ray diffraction photographs. His attention shifted to the study of organic substances, and attempts to purify and crystallize proteins resulted in the perfection of ultracentrifuges powerful enough to isolate viruses. The first in vitro vaccine against a virus disease was prepared from one of the viruses isolated, a causative agent of sleeping sickness in horses. The subsequent commercial preparation of this vaccine also led to substantial improvements in the technique of growing viruses in chicken embryos; this technique has become standard in the manufacture of other vaccines.

From 1959 to 1981 Wyckoff served as professor of physics at the University of Arizona in Tucson. He compiled *Crystal Structures,* 6 vol. (2nd ed., 1963–71), and was the author of *The Biochemistry of Animal Fossils* (1972).

Wycliffe, John, Wycliffe also spelled WYCLIFF; WYCLIF, WICLIFFE, or WICLIF (b. *c.* 1330, Yorkshire, Eng.—d. Dec. 31, 1384, Lutterworth, Leicestershire), English theologian, philosopher, church reformer, and promoter of the first complete translation of the Bible into English. He was one of the forerunners of the Protestant Reformation. The politico-ecclesiastical theories that he developed required the church to give up its worldly possessions, and in 1378 he began a systematic attack on the beliefs and practices of the church. The Lollards, a heretical group, propagated his controversial views.

Early life and career. Wycliffe was born in the North Riding of Yorkshire and received his formal education at the University of Oxford, where his name has been associated with three colleges, Queen's, Merton, and Balliol, but with some uncertainty. He became a regent master in arts at Balliol in 1360 and was appointed master of the college, but he resigned in 1361 to become vicar of Fillingham, the college's choicest living, or church post. There is some doubt as to whether or not he became also afterward warden of Canterbury Hall, a house for secular (pastoral) and regular (monastic) clergy; but there was a petition from the university to the pope in 1362 to "provide" for him, and he was given a prebend (a stipend) at Aust in the church of Westbury-on-Trym. He drew his prebend while residing elsewhere, a practice he condemned in others. In 1363 and 1368 he was granted permission from the bishop of Lincoln to absent himself from Fillingham in order to study at Oxford, though in 1368 he exchanged Fillingham for Ludgershall, a parish nearer the university. He became a bachelor of divinity about 1369 and a doctor of divinity in 1372.

Political activities and theories. On April 7, 1374, Edward III appointed Wycliffe to the rectory of Lutterworth in place of Ludgershall, and about this time the theologian began to show an interest in politics. He received a royal commission to the deputation sent to discuss with the papal representatives at Bruges the outstanding differences between England and Rome, such as papal taxes and appointments to church posts. In this work, Wycliffe showed himself to be both a patriot and a king's man.

He complemented this activity with his political treatises on divine and civil dominion (*De dominio divino libri tres* and *Tractatus de civili dominio*), in which he argued men exercised "dominion" (the word is used of possession and authority) straight from God and that if they were in a state of mortal sin, then their dominion was in appearance only. The righteous alone could properly have dominion, even if they were not free to assert it. He then proceeded to say that, as the church was in sin, it ought to give up its possessions and return to evangelical poverty. Such disendowment was, in his view, to be carried out by the state, and particularly by the king. These politico-ecclesiastical theories, devised with ingenuity and written up at inordinate length, may be criticized as the work of a theorizer with a limited sense of what was possible in the real world. Exhibiting an ingenuousness and lack of worldly wisdom, he became a tool in the hands of John of Gaunt (1340–99), Duke of Lancaster and a younger son of Edward III, who, from motives less scrupulous than those of Wycliffe, was opposed to the wealth and power of the clergy.

Wycliffe preached acceptably in London in support of moderate disendowment, but the alliance with Gaunt led to the displeasure of his ecclesiastical superiors, and he was summoned to appear before them in February 1377. The proceedings broke up in disorder, and Wycliffe retired unmolested and uncondemned. That year saw Wycliffe at the height of his popularity and influence. Parliament and the king consulted him as to whether or not it was lawful to keep back treasure of the kingdom from Rome, and Wycliffe replied that it was. In May Pope Gregory XI issued five bulls against him, denouncing his theories and calling for his arrest. The call went unanswered, and Oxford refused to condemn its outstanding scholar. Wycliffe's last political appearance was in the autumn of 1378 when, after Gaunt's men killed an insubordinate squire who had taken refuge in Westminster Abbey, he pleaded for the crown before Parliament against the right of sanctuary. Wycliffe defended the action on the ground that the king's servants might lawfully invade sanctuaries to bring criminals to justice.

Wycliffe's attack on the church. He returned to Lutterworth and, from the seclusion of his study, began a systematic attack on the beliefs and practices of the church. Theologically, this was facilitated by a strong predestinarianism that enabled him to believe in the "invisible" church of the elect, constituted of those predestined to be saved, rather than in the "visible" church of Rome—that is, in the organized, institutional church of his day. But his chief target was the doctrine of transubstantiation—that the substance of the bread and wine used in the Eucharist is changed into the body and blood of Christ. As a Realist philosopher—believing that universal concepts have a real existence—he attacked it because, in the annihilation of the substance of bread and wine, the cessation of being was involved. He then proceeded on a broader front and condemned the doctrine as idolatrous and unscriptural. He sought to replace it with a doctrine of remanence (remaining)—"This is very bread after the consecration"—combined with an assertion of the Real Presence in a noncorporeal form.

Meanwhile, he pressed his attack ecclesiastically. The pope, the cardinals, the clergy in remunerative secular employment, the monks, and the friars were all castigated in language

that was bitter even for 14th-century religious controversy. For this exercise, Wycliffe was well equipped. His restless, probing mind was complemented by a quick temper and a sustained capacity for invective. Few writers have damned their opponents' opinions and sometimes, it would appear, the opponents themselves, more comprehensively.

Yet most scholars agree that Wycliffe was a virtuous man. Proud and mistaken as he sometimes was, he gives an overall impression of sincerity. Disappointed as he may have been over his failure to receive desirable church posts, his attack on the church was not simply born of anger. It carried the marks of moral earnestness and a genuine desire for reform. He set himself up against the greatest organization on earth because he sincerely believed that organization was wrong, and if he said so in abusive terms he had the grace to confess it. Neither must his ingenuousness be forgotten. There was nothing calculated about the way in which he published his opinions on the Eucharist, and the fact that he was not calculating cost him—in all probability—the support of John of Gaunt and of not a few friends at Oxford. He could afford to lose neither.

Translation of the Bible. From August 1380 until the summer of 1381, Wycliffe was in his rooms at Queen's College, busy with his plans for a translation of the Bible and an order of Poor Preachers who would take Bible truth to the people. (His mind was too much shaped by Scholasticism, the medieval system of learning, to do the latter himself.) There were two translations made at his instigation, one more idiomatic than the other. The most likely explanation of his considerable toil is that the Bible became a necessity in his theories to replace the discredited authority of the church and to make the law of God available to every man who could read. This, allied to a belief in the effectiveness of preaching, led to the formation of the Lollards. The precise extent to which Wycliffe was involved in the creation of the Lollards is uncertain. What is beyond doubt is that they propagated his controversial views.

In 1381, the year when Wycliffe finally retired to Lutterworth, the discontent of the labouring classes erupted in the Peasants' Revolt. His social teaching was not a significant cause of the uprising because it was known only to the learned, but there is no doubt where his sympathies lay. He had a constant affection for the deserving poor. The archbishop of Canterbury, Simon of Sudbury, was murdered in the revolt, and his successor, William Courtenay (1347–96), a more vigorous man, moved against Wycliffe. Many of his works were condemned at the synod held at Blackfriars, London, in May 1382; and at Oxford his followers capitulated, and all his writings were banned. That year, Wycliffe suffered his first stroke at Lutterworth; but he continued to write prolifically until he died from a further stroke in December 1384.

Assessment. It is no wonder that such a controversial figure produced—and still produces—a wide variety of reactions. The monks of friars retaliated, immediately and fiercely, against his denunciations of them, but such criticism grew less as the Reformation approached. Most of Wycliffe's post-Reformation, Protestant biographers see him as the first Reformer, fighting almost alone the hosts of medieval wickedness. There has now been a reaction to this, and some modern scholars have attacked this view as the delusion of uncritical admirers. The question "Which is the real John Wycliffe?" is almost certainly unanswerable after 600 years.

(Jo.S.)

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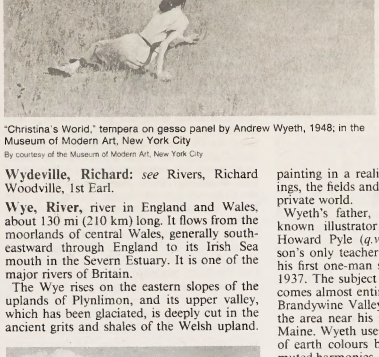
Wycombe, district, county of Buckinghamshire, England, in the southern part of the wooded Chiltern Hills. The River Thames forms its southern boundary. The predominantly rural district has an area of 125 sq mi (324 sq km) and overlaps the designated Chilterns Area of Outstanding Natural Beauty. Prehistoric burial mounds and earthworks are visible. Towns include High Wycombe, Marlow, and Princes Risborough. Pop. (1983 est.) 155,600.

wydah (bird): *see* whydah.

Wydeville, Anthony: *see* Rivers, Anthony Woodville, 2nd Earl.



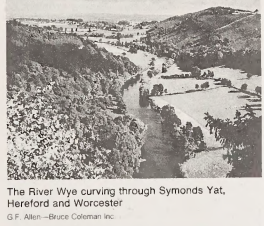
"Christina's World," tempera on gesso panel by Andrew Wyeth, 1948; in the Museum of Modern Art, New York City

By courtesy of the Museum of Modern Art, New York City

Wydeville, Richard: *see* Rivers, Richard Woodville, 1st Earl.

Wye, River, river in England and Wales, about 130 mi (210 km) long. It flows from the moorlands of central Wales, generally southeastward through England to its Irish Sea mouth in the Severn Estuary. It is one of the major rivers of Britain.

The Wye rises on the eastern slopes of the uplands of Plynlimon, and its upper valley, which has been glaciated, is deeply cut in the ancient grits and shales of the Welsh upland.



The River Wye curving through Symonds Yat, Hereford and Worcester

G.F. Allen—Bruce Coleman Inc.

At most points there is only a narrow strip of farmland between peaty moorlands. Near Rhayader the Wye is joined by the Elan, the upper valley of which has been dammed to form reservoirs for supply of water to Birmingham. Passing Builth Wells, it bends to the northeast at Aberllynfi to skirt the Black Mountains and enters England at Hay. At Hereford it is joined from the north by the Lugg and meanders in a mature valley to Ross. Below Ross it repeatedly engages in the Forest of Dean plateau in deeply entrenched meanders that provide impressive scenery and spectacular viewpoints, notably at Symonds Yat (an opening or pass). Passing the ruins of Tintern Abbey, it enters its tidal estuary at Chepstow. Below Monmouth the river forms the historic frontier between England and Wales. The Wye has rich salmon fisheries.

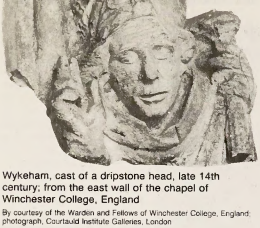
Wyeth, Andrew (Newell) (b. July 12, 1917, Chadds Ford, Pa., U.S.), U.S. watercolourist and worker in tempera noted primarily for painting in a realistic manner the old buildings, the fields and hills, and the people of his private world.

Wyeth's father, N.C. Wyeth, was a well-known illustrator who had studied under Howard Pyle (*q.v.*) and who served as his son's only teacher. Andrew Wyeth presented his first one-man show in New York City in 1937. The subject matter of Wyeth's pictures comes almost entirely from two localities, the Brandywine Valley around Chadds Ford and the area near his summer home in Cushing, Maine. Wyeth uses a restricted palette mostly of earth colours but capable of hundreds of muted harmonies. His technique is precise and detailed, yet he lifts his paintings above photographic naturalism with an unreal, visionary quality. His best known painting, "Christina's World" (1948; Museum of Modern Art, New York City), exemplifies his mastery of unusual angles of perspective and his use of light to pinpoint time. Other works include "The Trodden Weed" (1951), said to have appealed to the former Soviet leader Nikita Kruschev, and "Nicholas" (1955), admired by U.S. Pres. Dwight D. Eisenhower. Wyeth was the first painter to receive the Presidential Freedom Award (1963) conferred by U.S. Pres. John F. Kennedy. In 1977 he became the first American artist since John Singer Sargent to be elected to the French Académie des Beaux-Arts, and in the next year he became an honorary member of the Soviet Academy of the Arts. In 1980 he became the first living American artist to be elected to Britain's Royal Academy. His exhibition at the Whitney Museum in New York City in

1967 established a new attendance record for that institution.

Wyeth's technical resources are remarkable, but more important are his insight into the accretions of living that have left their mark on the people he paints and his ability to convey a sense of generations of living in his paintings of old houses and their interiors.

Wykeham, William of, Wykeham also spelled WICKHAM (b. 1324, Wickham, Hampshire, Eng.—d. Sept. 27, 1404, Bishops Waltham, Hampshire), English prelate and statesman, the founder of Winchester College and of New College, Oxford.



Wykeham, cast of a dripstone head, late 14th century, from the east wall of the chapel of Winchester College, England

By courtesy of the Warden and Fellows of Winchester College, England; photograph, Courtauld Institute Galleries, London

Wykeham evidently came from a very poor family. Wealthy patrons helped him obtain an education, and about 1356 he entered the service of King Edward III. By the mid-1360s he was the king's most trusted assistant. In 1367 he was made chancellor of England and bishop of Winchester, but he lost the former post (1371) in an anticlerical reaction led by the powerful John of Gaunt, Duke of Lancaster. He then became a bitter opponent of Gaunt, who had assumed control of the government of the senile king Edward. Gaunt retaliated by hounding Wykeham with charges of corruption. The bishop received a royal pardon on the accession of King Richard II, whom he served as chancellor from 1389 to 1391.

Meanwhile, Wykeham was working to found his educational institutions. He built New College, beginning in 1380, and in 1382 he founded at Winchester a school (*see* Winchester College) to prepare boys for study at New College.

Wyler, William (b. July 1, 1902, Mulhouse, France—d. July 27, 1981, Beverly Hills, Calif., U.S.), American director of motion pictures that combine a high technical polish with a clear narrative style and sensitive handling of human relationships. Most of his films were based on novels or plays.

The son of a Swiss-born merchant in Alsace, Wyler attended the École Supérieure de Commerce in Lausanne, Switz., and the Paris Conservatory. In New York City he worked in the foreign publicity office of Universal Pictures in 1920–21. He then moved to Hollywood, working as an office boy, property boy, script clerk, assistant casting director, assistant director, and, finally, director of more than 50 westerns between 1925 and 1927.

Counsellor-at-Law (1933) established his reputation as a serious director and initiated a series of box-office successes that included *These Three* (1936), *Dodsworth* (1936), *Dead End* (1937), *Jezebel* (1938), *Wuthering Heights* (1939), *The Westerner* (1940), *The Letter* (1940), and *The Little Foxes* (1941). Wyler developed a characteristic style based on varying the pictorial composition within each frame to create visual variety. *Mrs. Miniver* (1942) won him an Academy Award, as did two later films of equal popularity—*The Best Years of Our Lives* (1946) and *Ben Hur* (1959). During World War II he directed outstanding documentary films such as *The Memphis Belle* (1944) and *Thunderbolt* (1945). In the years following the war, his most highly acclaimed pictures included *Roman Holiday* (1953), *The Big Country* (1958), *The Collector* (1965), and *Funny Girl* (1968).

Wylie, Elinor, *née* ELINOR MORTON HOYT (b. Sept. 7, 1885, Somerville, N.J., U.S.—d. Dec. 16, 1928, New York, N.Y.), American poet and novelist whose work, written from an aristocratic and traditionalist point of view, reflected changing American attitudes in the aftermath of World War I.

Wylie came from a prominent Philadelphia family. In New York literary circles she was noted for her beauty as well as for her writing. Her work included four volumes of poetry and four novels. Her poetry, carefully structured and sensuous in mood, shows the influence of 16th- and 17th-century English poetry. Her novels combine gentle fantasy and classical formality with thoroughly researched historical settings. *The Orphan Angel* (1926) imagines the life of the English poet Percy Bysshe Shelley if he had been rescued from drowning and taken to America. Her third husband, William Rose Benét, edited her *Collected Poems* (1932), *Collected Prose* (1933), and *Last Poems* (1943).

Wyndham, most northerly seaport of Western Australia. It lies at the mouth of the King River, on the West Arm of Cambridge Gulf (an inlet of Joseph Bonaparte Gulf of the Timor Sea). Founded in 1885 as a port for the Kimberley goldfield, it was named after the son of Sir Napier Broome, governor at the time. In 1919 the state government selected Wyndham as the site of a meatworks, which now serves the cattle stations of Wyndham–East Kimberley shire. Some crops are grown on irrigated flats bordering the nearby Ord River. Wyndham is the terminus of the Great Northern Highway from Perth (2,017 miles [3,246 km] southwest) and is linked by a dry-season road to the Stuart (transcontinental) Highway at Katherine (N.Terr.). The population fluctuates seasonally, as a major employer is the seasonal meatworks. Pop. (1986) 1,329.

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Wyndham, George (b. Aug. 29, 1863, London, Eng.—d. June 8, 1913, Paris, France), British Conservative politician and man of letters who, as chief secretary for Ireland, was responsible for the Irish Land Purchase Act of 1903, also known as the Wyndham Land Purchase Act, which alleviated the problem of Irish farm ownership with justice to landlords as well as peasants.

Wyndham was an enthusiast of the British Empire, High Church Anglicanism, and government by a traditional aristocracy. From 1887, when he became the private secretary of Arthur James Balfour, he was a disciple of that future prime minister. Elected to the House of Commons in 1889, he spent much of the next nine years in writing for W.E. Henley's weekly newspapers and in editing (1895–96) Sir Thomas North's translation of Plutarch's *Lives* and a volume (1898) of William Shakespeare's poems.

After serving as undersecretary at the War Office (1898–1900), Wyndham, through Balfour's influence, became chief secretary for Ireland (Nov. 7, 1900). His 1903 statute, by applying British government funds to Irish land transfers, made the sale of smallholdings and even whole estates profitable to landlords while guaranteeing purchase terms that peasant tenants could meet. Two years later (March 6, 1905) Wyndham resigned, either because of ill health or because the Conservatives thought that he approved a plan of Sir Antony (afterward Baron) MacDonnell, permanent undersecretary for Ireland, which called for a kind of Home Rule compromise called devolution—a limited central administration by Irishmen but without an Irish Parliament independent of Westminster.

Wyndham, John, pseudonym of JOHN WYNDHAM PARKES LUCAS BEYNON HARRIS (b. 1903, Birmingham, Warwickshire, Eng.—d. March 11, 1969, London), English science-fiction writer who examined the human struggle for survival when catastrophic natural phenomena suddenly invade a comfortable English setting.

Educated in Derbyshire, Wyndham tried his hand at various jobs, from farming to advertising. During the mid-1920s he wrote short stories for various American pulp magazines, but not until after World War II did he publish his first novel, *The Day of the Triffids* (1951). This book's depiction of lethal, mobile plants that menace the human race quickly established Wyndham as a science-fiction writer.

His work includes *The Kraken Wakes* (1953), *The Chrysalids* (1955), *The Midwich Cuckoos* (1957; filmed as *The Village of the Damned*, 1960), and *The Trouble with Lichen* (1960). His short stories are collected in *Consider Her Ways* (1961) and *The Seeds of Time* (1969).

Wyndham, Sir William, 3RD BARONET (b. 1687, Orchard Wyndham, Somerset, Eng.—d. June 17, 1740, Wells, Somerset), English Tory politician, a close associate of Henry Saint John, 1st Viscount Bolingbroke.

A member of Parliament (1710–40), Wyndham was appointed secretary of war in 1712, chancellor of the Exchequer in 1713, and head of the Treasury in 1714, all at Bolingbroke's behest. He was privy to Bolingbroke's intrigues with James Edward, the Old Pretender, and became head of the English Jacobites. He was eventually arrested (September 1715), and, although he escaped, he then voluntarily surrendered, and no proceedings were taken against him.

Wyndham became Bolingbroke's political mouthpiece and the leader of an opposition to Robert Walpole. From 1726 onward this opposition, composed of Tories and discontented Whigs, made great noise with its propaganda, but its parliamentary performance was generally disappointing, though Wyndham himself was a popular leader. In the 1730s Wyndham and Bolingbroke supported Frederick Louis, Prince of Wales, in his quarrels with his father, King George II. They also attacked Walpole's foreign policy, but when the tide was turning against Walpole, Wyndham's death in 1740 weakened the cohesion of the combined opposition.

Wynfrid, also spelled WYNFRITH: *see* Boniface, Saint.

Wynn, Ed, byname of ISAIAH EDWARD LEOPOLD (b. Nov. 9, 1886, Philadelphia, Pa., U.S.—d. June 19, 1966, Los Angeles, Calif.), American comedian and actor in vaudeville, theatre, and motion pictures and on radio and television. He was also a producer, author, and songwriter.

Wynn made his professional debut with the Thurber-Nasher Repertoire Company in Norwich, Conn., in 1902 and acquired the nickname of the Perfect Fool from a revue of the same name in 1921—a production that he wrote, directed, produced, and starred in. He also toured and finally broadcast this revue (the first complete Broadway show to

be done on radio). Many similarly successful shows followed. During the 1930s he starred in a nationwide radio show, and his voice became familiar to millions of listeners. His style of comedy on stage and in motion pictures, however, was highly visual, often involving the use of bizarre costumes and exaggerated, madcap mannerisms and sight gags. His early films included *Rubber Heels* (1927), *Follow the Leader* (1930), and *The Chief* (1933).

Wynn turned to dramatic acting in the 1950s, playing in *Requiem for a Heavyweight* (winner of television's 1956 Emmy Award) and in the film *The Diary of Anne Frank* (1959), for which he was nominated for an Academy Award. His later motion pictures included *The Greatest Story Ever Told* (1965) and *Mary Poppins* (1964). His son, Keenan Wynn (1916–86), became a well-known actor and his grandson, Tracy Keenan Wynn, a screenwriter.

Wynne (o Lasynys), Ellis (b. March 7, 1671, Y Lasynys, Merioneth, Wales—d. July 13, 1734, Llanfair, Merioneth), clergyman and author whose *Gweledigaetheu y Bardd Cwsc* (1703; "Visions of the Sleeping Bard") is generally considered the greatest Welsh prose classic. An adaptation of Sir Roger L'Estrange's translation of the Spanish satirist Quevedo's *Sueños* (1627; "Visions"), savage pictures of contemporary evils, it followed its original closely. Wynne, however, used colloquial language and transmuted the characters and the scenery of the Spanish work into Welsh characters and scenery of the later 17th century. More than 30 Welsh editions and several English translations of the text exist.

Educated at the University of Oxford, he practiced law before becoming a rector (Llandanwg, 1704, and Llanfair-juxta-Harlech, 1711, both in Merioneth). Other major works include *Rheol Buchedd Sanctaidd* (1701, a translation of *The Rule and Exercises of Holy Living* by Jeremy Taylor) and several hymns and carols.

Wyntoun, Andrew of (b. *c.* 1350—d. *c.* 1423), Scottish chronicler whose *Orygynale Cronykil* is a prime historical source for the later 14th and early 15th centuries and is one of the few long examples of Middle Scots writing.

Wyntoun was a canon of St. Andrews, and, from about 1393 to his retirement because of old age in 1421, he served as prior of St. Serf's, Loch Leven (Kinross, Scotland). Written for Sir John Wemyss of Leuchars, Fife, his chronicle is a long (nine books) and prosaic vernacular compendium in octosyllabic couplets that traces the history of mankind (especially in Scotland) from the creation up to 1420. Wyntoun drew freely on ancient monastic records, Latin chronicles, standard ecclesiastical authorities, and other Scottish chronicles. The *Orygynale Cronykil* is the original source for the encounter between Macbeth and the weird sisters that appears in Shakespeare's *Macbeth*. It is valuable for its account of the death of the Scottish hero Robert Bruce.

Wynyard, town, northern Tasmania, Australia, at the mouth of the River Inglis on Bass Strait. Founded in 1841, it was made a municipality in 1856 and named Table Cape for a high promontory (380 feet [116 m]) to the south. It was gazetted a town in 1861, when its name was changed to honour Major General Edward Wynyard, commander in chief in 1850 of British forces in Van Diemen's Land (now Tasmania). Located on a rail line and the Bass Highway to Launceston (80 miles [130 km] southeast) and near the Waratah Highway link to the west coast, Wynyard is a service centre for a dairy, vegetable, and mixed-farming district. A small fishing fleet operates from its port. In the 1990s it became the municipality of Waratah-Wynyard. Pop. (2001 prelim.) 13,622.

Wyoming, mountain state of the western United States, bounded on the north and northwest by Montana, on the east by South Dakota and Nebraska, on the south by Colorado, southwest by Utah, and west by Idaho. The capital is Cheyenne.

A brief treatment of Wyoming follows. For full treatment, *see* MACROPAEDIA: United States of America: *Wyoming*.

Wyoming was populated chiefly by the Shoshoni and Arapaho Plains Indians in 1743, when white explorers first are known to have entered the area from Canada. The first certain white American explorer strayed from the Lewis and Clark expedition in 1806–07. The historic Oregon and Overland trails (and others) crossed through Wyoming, most of which came under U.S. control first as part of the Louisiana Purchase (smaller portions were acquired from Mexico and Great Britain). Later the territory was divided among the Dakota, Nebraska, and (a small segment) Washington territories, until the first transcontinental-railroad train reached Cheyenne in 1867 and the Wyoming Territory was created in 1868. Wyoming was admitted as a state in 1890 with Cheyenne as its capital. It enfranchised women in 1869 and enshrined the principle in its 1889 constitution, the first state to do so; in 1925 it elected the first woman governor in the United States. Until 1876, when the Plains Indians were decisively defeated, white settlement was confined to southern Wyoming. Subsequently ranching became the principal industry until it was displaced by mining in the mid-20th century.

Eastern Wyoming is the westernmost extension of the Great Plains, with the Black Hills rising in the northeast to dominate the quarter. Northward-trending mountains separated by basins and valleys dominate the western three-fourths of the state and give it the second highest mean elevation in the United States—6,700 feet (2,040 m). The most prominent ranges of the Rocky Mountains are the Big Horn, Wind, Tetons, and the Wind River, culminating in Wyoming's highest point, Gannett Peak, 13,804 feet (4,207 m) in the Wind River Range. The Continental Divide follows the Sierra Madre Range, splits around the Great Divide Basin, then passes over the Wind River Range northward over the Washakie Mountains and Yellowstone National Park into Montana. About three-fourths of Wyoming's rivers drain eastward into the Missouri–Mississippi system, while the rest drain westward into the Snake–Columbia system or southward into the Green–Colorado system. Several of the rivers have been dammed for hydroelectric power. The largest lake is Yellowstone Lake in Yellowstone National Park.

Wyoming has a continental semiarid climate, with substantial temperature and precipitation variation. January mean temperatures range from a low of 10° F (−12° C) in the mountains to 28° F (−2° C) in the southeast. Mean July temperatures range from 50° F (10° C) in the mountains to 75° F (24° C) in the Big Horn Basin in north-central Wyoming. Annual precipitation varies from 4 inches (100 mm) in the desert areas of the southwest to much greater amounts in the mountains, where annual snowfall can surpass 200 inches (5,100 mm).

Wyoming's population density is one of the lowest in the United States. An increase in population of more than 50 percent in the 1970s, largely because of expanding mining activity, reversed in the 1980s in response to a downturn in the oil industry. Since 1950 the urban population has surpassed the rural, with more than half living in the southeastern quarter of the state. The three largest cities, Casper, Cheyenne, and Laramie, contain about one-fourth of the population. Indians now make up less than 2 percent of the population and live mainly on the Wind River reservation. Whites and Hispanics comprise more than 95 percent of the population, and distinct ethnic groups include Mexicans, Scandinavians, Italians, and Germans.

Agriculture is limited by a lack of water and by temperature extremes, although the soils of the plains and mountains are generally fertile. Less than 5 percent of the land is cropped, of which nearly two-thirds is irrigated. Barley, wheat, corn (maize), hay, oats, sugar beets, dry beans, and potatoes are the leading crops. Grassland pastures occupy about 38 percent of the land, and Wyoming ranks high nationwide in sheep rearing, mainly for wool. Beef cattle are raised in quantity, and apiculture is also important. Forests are limited to mountain areas, but they support a developed lumbering industry. Mining has rapidly expanded and has become the leading component of the state's economy. Wyoming is among the nation's leaders in coal, petroleum, natural-gas, uranium, bentonite, and trona (for soda ash), and iron-ore production. Manufacturing is limited to petroleum refining, chemicals, fertilizer, and glass, but the state is a major producer of electrical energy, both hydroelectric and thermal, much of which it exports. Tourism is important, centring on the state's national parks—including Yellowstone, the first in the United States, and the Grand Teton, Flaming Gorge, and Big Horn national parks—and national forests and privately owned dude ranches. Camping, swimming, fishing, hunting, and hiking, as well as skiing and other winter sports attract millions of visitors annually just to the national parks and forests.

Wyoming's highways, railways, and air transport systems are widely used, and there are more than 100 airports throughout the state.

The University of Wyoming, at Laramie, is supplemented by two-year community colleges. Cultural events include the annual state fair at Douglas, Jubilee Days at Laramie, Frontier Days at Cheyenne, county fairs and rodeos, various Indian festivities, and the Grand Teton Music Festival (summer) at Jackson Hole, where there is a resident community of artists, writers, and musicians. Area 97,809 square miles (253,326 square km). Pop. (2000) 493,782.

Wyoming Massacre (July 3, 1778), during the United States War of Independence, killing of 360 American settlers in the Wyoming Valley of Pennsylvania, part of the stepped-up British campaign of frontier attacks in the West. In early June, Colonel John Butler led a force of 1,000 Loyalists and Iroquois allies against the 5,000 inhabitants of the valley—mostly American women and children gathered at Forty Fort. About 300 men and boys left the protection of the fort to meet the attackers. In the massacre that followed, 360 men, women, and children lost their lives, and many others who escaped to the forests died of starvation or exposure. Butler's forces then moved northward to continue the raids along the frontier settlements of New York, eventually leading to a more aggressive American action against the Iroquois.

Wyong, town, eastern New South Wales, Australia, on the Wyong River, immediately west of the Tuggerah Lakes (coastal lagoons). The district was settled in 1823 for the purpose of exploiting its cedar trees. As the forests were removed, agricultural activities increased, with citrus groves being planted after 1887. The town, proclaimed in 1888, derived its name from an Aboriginal word meaning "place of running water." Wyong, a municipality since 1957, serves an area of mixed farming (dairying, fruit and vegetable growing, seed processing, and poultry raising), rutile and zircon mining, and lumbering. Industries include sawmilling,

fruit packing, and brickmaking. Situated on the main northern rail line (from Sydney, 45 mi [72 km] southwest) and on the Pacific Highway, Wyong is the chief town of the Tuggerah Lakes resort region. The locality yields significant catches of fish and prawns. Pop. (1981) 3,902.

Wyre, district (borough), county of Lancashire, northwestern England, with an area of 109 sq mi (283 sq km), bordering on the Irish Sea north and east of the resort borough of Blackpool. The district, named for the River Wyre which rises in the district and drains it, is generally a low coastal plain; formerly occupied by pockets of marshland, much of the plain has been reclaimed and is now intensively cultivated. Extensive sand beaches have formed offshore of the town of Fleetwood at the mouth of the Wyre in the northwest. The eastern limits of the district extend into the moor uplands of the Pennines. Most of the population is concentrated near the Irish Sea at Fleetwood, Thornton Cleveleys, and Poulton-le-Fylde. Fleetwood is the major fishing port on the west coast of England and is an important port for containerized shipping. It has regular seasonal ferry service to the Isle of Man. Fleetwood is also a holiday retreat. Seaside promenades there and at Thornton Cleveleys are favored by retired people. Chemicals, plastics, and leather goods are the principal products manufactured at Fleetwood. Poulton-le-Fylde is both the local agricultural market centre and district seat. Pop. (1983 est.) 98,400.

Wyre Forest, district, county of Hereford and Worcester, western England, occupying an area of 76 sq mi (196 sq km) in the northern part of the county. Wyre Forest district, named after the remnant woodlands extending across its northwestern boundary with the county of Shropshire (formerly Salop), is a pastoral area of parts of the Stour and Severn river valleys. The rivers and the historically important Staffordshire and Worcestershire Canal merge at the parish (town) of Stourport-on-Severn, the district seat, at the southern tip of the district. Stourport-on-Severn and the old town of Bewdley (also on the Severn) were, during different eras, terminal points of navigation between the Bristol Channel and the Birmingham area. Today the extensive river frontage of the towns is used for recreational purposes.

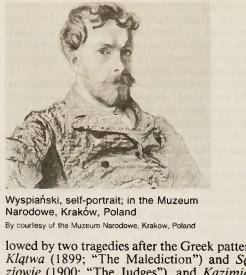
Kidderminster, on the River Stour 3 mi (5 km) north of Stourport-on-Severn, is the birthplace of Sir Rowland Hill, the originator (1840) of Britain's former Penny Post system. It is the principal centre (since 1735) of the British carpet industry; other industries produce electrical equipment, chemicals, and refined sugar.

Stourport, one of England's towns built specifically to accommodate the needs of the canal era, retains many original houses and warehouses dating back to the 18th century; it is occasionally referred to as the "Venice of the Midlands." Pop. (1983 est.) 92,200.

Wyrtgeorn (ancient British king): *see* Vortigern.

Wyspiański, Stanisław (b. Jan. 15, 1869, Kraków, Pol.—d. Nov. 28, 1907, Kraków), dramatist and painter, considered the creator of modern Polish drama. In his plays, themes from Greek mythology and Polish history are blended to produce a new and highly original form of drama.

Wyspiański's early education included classical literature and fine arts. In 1890 he received a grant, enabling him to visit the art cities of western and central Europe; between 1890 and 1894 he paid several visits to Paris. His first published work, *Legenda* ("A Legend"), a dramatic fantasy, appeared in 1897. It was followed by two tragedies after the Greek pattern, *Klątwa* (1899; "The Malediction") and *Sędziowie* (1900; "The Judges"), and *Kazimierz Wielki* (1900), a poem on patriotic themes. *Wesele* ("The Wedding"), his greatest and most popular play, was premiered in 1901. Its story was suggested by the actual marriage of the poet Lucjan Rydel to a beautiful peasant girl in a village near Kraków. The marriage is used symbolically to present a sweeping panorama of Poland's past, present, and future. The great emotional and political impact of *Wesele* shook Kraków at its first performance; the drama was later staged throughout Poland. A successor play, *Wyzwolenie* ("Liberation"), published two years later, contained ideological commentary on *Wesele.*



Wyspiański, self-portrait; in the Muzeum Narodowe, Kraków, Poland

By courtesy of the Muzeum Narodowe, Krakow, Poland

In 1905 Wyspiański was appointed professor at the Kraków Academy of Fine Arts. His paintings, especially his designs for stained-glass windows, reveal his genius for dramatic and visionary composition.

Wyss, Johann Rudolf (b. March 4, 1782, Bern—d. March 21, 1830, Bern), folklorist, editor, and writer, remembered for his collections of Swiss folklore and for his completion and editing of his father's novel *Swiss Family Robinson.*

Wyss became professor of philosophy at the academy at Bern in 1805 and later chief librarian of the municipal library. He was a collector of Swiss tales and folklore, published in *Idyllen, Volkssagen, Legenden und Erzählungen aus der Schweiz* (1815). He also edited the *Alpenrosen* almanac (1811–30), with the collaboration of the best Swiss writers of his time. One of his most important contributions was the completion and editing of *Der schweizerische Robinson* (1812–27), a manuscript originally written by his father, Johann David Wyss, a pastor attached to the minister in Bern, for and with his four sons. Translated into English as *Swiss Family Robinson* in 1814 and into many other languages, the book became one of the most widely popular novels ever written. Wyss was also the author of the Swiss national anthem, "Rufst du, mein Vaterland" (1811).

Wyszyński, Stefan (b. Aug. 3, 1901, Zuzela, Pol., near Łomża, Russian Empire—d. May 28, 1981, Warsaw), Polish archbishop of Gniezno and Warsaw and primate of Poland.

After study at Warsaw, Łomża, and Włocławek, Wyszyński was ordained on his 23rd birthday, Aug. 3, 1924, and was assigned to the basilica at Włocławek. After gaining a doctorate in sociology and ecclesiastical law at the Catholic University of Lublin, he studied further in France, Italy, and Belgium. Back in Poland, he founded the Christian Workers University in 1935 and directed it until 1939, when the Nazi and Soviet forces invaded Poland. Shortly after, his bishop, Msgr. Michał Kozal, ordered him to leave Włocławek, and he thus escaped the fate of 1,811 Polish priests, including his own bishop, who perished in German concentration camps.

He returned to Włocławek as rector of the seminary in March 1945; one year later he was appointed bishop of Lublin, and on Nov. 12, 1948, Pope Pius XII transferred him to the primatial see of Gniezno and, *ad personam,* of Warsaw. On Nov. 29, 1952, he was named cardinal but was unable to go to Rome to receive formal investiture with a cardinal's red hat until 1957. Meanwhile, although he had signed a coexistence agreement with the Communists, he refused to lend the church's authority to the regime's many acts of persecution.

In 1953, during the last repressive spasm of the Stalinist period, he was put under house arrest without trial when the government claimed that he had violated a pledge that the church would punish priests who engaged in anti-government activity. In 1956, shortly after Władysław Gomułka came to power, the Cardinal was released. He concluded an agreement with Gomułka that allowed religious instruction in state schools provided that Communist approval was sought over appointments to higher church offices. Wyszynski's compromise defused a crisis that might have culminated in Soviet invasion and repression, as occurred at that time in Hungary. Gomułka's and Wyszynski's uneasy accord continued even under Gomułka's successor, Edward Gierek, although the Cardinal lent cautious support to such Polish movements as the Workers' Defense Committee, Solidarity, and Rural Solidarity, which sought greater freedom from the late 1970s onward. Doctrinally he was a strong conservative. His last major act was to negotiate with the Polish authorities over the visit of Pope John Paul II to Poland in 1979.

Wythe, George (b. 1726, Elizabeth City County, Va.—d. June 8, 1806, Richmond, Va., U.S.), jurist, one of the first U.S. judges to state the principle that a court can invalidate a law considered to be unconstitutional. He also was probably the first great American law teacher, whose pupils included such well-known figures as Thomas Jefferson, John Marshall, and Henry Clay.

Admitted to the bar in 1746, Wythe was a member (1754–55, 1758–68) and clerk (1769–75) of the Virginia House of Burgesses. In 1764 he drew up a forceful remonstrance from Virginia to the British House of Commons against the Stamp Act. In 1776 Wythe, as a delegate to the Continental Congress, signed the Declaration of Independence. Also in that year he was appointed, with Jefferson, Edmund Pendleton, and George Mason, to revise the laws of Virginia. He was a member of the Constitutional Convention (1787) and of the Virginia convention (1788) that ratified the federal Constitution.

A chancery judge from 1778, Wythe became sole chancellor of Virginia in 1788. As an *ex officio* member of the state supreme court, Wythe, in the case of *Commonwealth* v. *Caton* (1782), asserted the power of courts to refuse to enforce unconstitutional laws.

The future President Jefferson studied law in Wythe's office, at Williamsburg, Va., in the 1760s. Appointed through Jefferson's influence, Wythe held (1779–89), at the College of William and Mary, the first U.S. professorship of law. One of his students there in 1780 was John Marshall, later chief justice of the United States. Wythe's appointment as chancellor of Virginia required him to resign from the college and move to Richmond, where he opened a private school of law. Among his pupils in Richmond, and clerk of his court, was the future U.S. senator Henry Clay.

Wythe died of poisoning. A grandnephew and heir, George Wythe Sweeney, was acquitted of the murder in a trial in which the only witness was, as a Negro, disqualified from testifying.

Wyżyna Małopolska (Poland): *see* Little Poland Uplands.

X-chair: *see* scissors chair.

x-disease: *see* hyperkeratosis.

X ray, any electromagnetic radiation of an extremely short wavelength produced by the deceleration of charged particles or the transitions of electrons in atoms. The wavelengths of X rays range from about 0.05 angstrom to hundreds of angstrom units (an angstrom unit is abbreviated Å and is equal to 10^{-8} centimetre). Like other forms of electromagnetic radiation (gamma rays, ultraviolet, visible light, infrared, and radio waves), X rays have the same speed *in vacuo* (c, equal to 3×10^{10} centimetres per second [about 186,000 miles per second]) and show phenomena associated with its wavelike nature, such as interference, diffraction, and polarization.

X rays were discovered in Würzburg, Ger., on Nov. 8, 1895, by Wilhelm Conrad Röntgen. Röntgen made his discovery while investigating the effects of cathode rays that were produced by electrical discharges through gases at low pressures (cathode rays are electrons that are emitted from the negative electrode, or cathode, of the discharge tube). Although many scientists had studied the properties of cathode rays, Röntgen discovered an effect that had escaped these earlier investigators—namely, that a surface coated with barium platinocyanide placed outside a discharge tube would emit light (fluoresce) even when it was shielded from the direct visible and ultraviolet light of the gaseous discharge. He deduced that an invisible radiation from the tube passed through the air and fluoresced the screen. He named these strange new rays X rays to indicate their unknown nature.

General X-ray phenomena. When a beam of X rays passes through a material, the material becomes a source of secondary X rays and electrons; and, because of these secondary processes, a portion of the primary beam is absorbed. The intensity of the secondary radiations is weak compared with the intensity of the primary X-ray beam, and some of it, too, may not escape from the material.

Two types of secondary X rays are produced when a beam of X rays strikes a material. These are called scattered X rays, which are characterized by an energy that is nearly the same as the primary beam, and fluorescence X rays, which are less energetic than the primary X rays. The scattered X rays are primary X rays that have had their direction (and possibly, to a small extent, their energy) altered by passing through the material. The fluorescence X rays are characteristic of the target material and do not change with change in wavelength of the primary beam as long as the primary-beam wavelength is short enough to excite the fluorescence.

The origin of the scattered X rays can be understood if the primary X rays are thought of as particles. An X-ray particle, called a photon, may be scattered (deflected) when it passes close to an electron. In a small number of these scattering processes the X ray will lose a portion of its energy to the electron.

The fluorescence X rays originate when electrons are ejected from some of the atoms of the target, leaving them in an ionized state—*i.e.,* deficient in electrons. As the atoms regain their normal energy state, energy may be liberated in the form of fluorescence X rays. The two main types of fluorescence X rays that can be excited in most of the elements are known as the *K* and *L* characteristic X rays. Characteristic X rays are emitted from all elements. The energy of these X rays increases in a regular manner in going from one element to the next in atomic number (nuclear charge). The *K* X rays are the most energetic characteristic X rays emitted from an atom and are due to ejection of the most tightly bound electrons from the atom.

In addition to the emission of secondary X rays from a material when it is irradiated with X rays, secondary electrons are also ejected. These are classified as recoil electrons and photoelectrons. The recoil electrons obtain energy from the primary X rays in a way that is given by the particle theory of X-ray scattering, whereas the photoelectrons are emitted by the same process that occurs in the photoelectric effect with light.

When X rays are absorbed in gases, they eject photoelectrons from the gas. These electrons in turn ionize the molecules of the gas, thereby amplifying the effect of the primary X rays. When these processes occur in living tissue, the photoelectrons emitted from the complex organic molecules destroy the cells of the tissue.

Dual nature of X rays. Early experiments with X rays presented evidence that is difficult to explain unless one thinks of X rays as consisting of waves. Other experiments, however, indicated that X rays consist of particles. This dual nature is not restricted to X rays; indeed, it is a general property of all forms of energy and matter. X rays (and the other forms of electromagnetic radiation) should be considered as both particles and waves; that is, as consisting of small packets of electromagnetic waves called quanta, or photons.

X rays as waves. According to classical electromagnetic theory, the deceleration of electrons will produce electromagnetic radiation, in the same way that accelerated electrons in a radio antenna produce radio waves. The failure of magnetic fields to deflect an X-ray beam seems to confirm this classical idea of the origin of X rays. Crucial evidence for the existence of waves is obtained if diffraction and interference phenomena are observed, which depend on the superposition of waves. In addition, if polarization effects are observed, the transverse (vibration at right angles to direction of propagation) nature of the waves is established. In the case of light, these effects were well known in 1895, when X rays were discovered. Röntgen's early experiments failed to observe these effects in the case of X rays.

In 1906 the British physicist, Charles Glover Barkla, demonstrated that when X rays are scattered in certain directions by a block of carbon they are polarized. From these experiments it appeared likely that X rays were transverse electromagnetic waves, perhaps of the same nature as light except for wavelength.

Many scientists attempted to show the wave nature of X rays by passing them through narrow slits and looking for diffraction fringes, and there was some evidence that X-ray wavelengths were about one angstrom. In 1912 a German physicist, Max Theodor Felix von Laue, conceived of a way of measuring the wavelength of X rays. Laue used the idea that, in crystals, atoms are regularly arranged throughout the crystal structure with spacings of about one angstrom (10^{-10} metre) and concluded that the atoms of a single crystal would serve as a grating for the diffraction of X rays. Laue's coworkers directed a narrow beam of X rays at a crystal of zinc sulfide and placed a photographic plate behind it. The resulting photograph consisted of a dark central spot and a complex but symmetrical pattern of dots; the central spot was the result of X rays passing directly through the crystal, whereas the dots were produced by diffraction from the atoms of the zinc sulfide crystal. These experiments established that X rays are waves with wavelengths on the order of one angstrom and confirmed that crystals have their atoms arranged in regular structures, called a lattice.

Shortly after Laue's experiment, an English physicist, William Lawrence Bragg, devised another technique for diffracting X rays. By considering how X rays are scattered from atoms in a crystal lattice, he concluded that, when an X ray of wavelength λ strikes a crystal of interplanar spacing d at an angle θ with respect to the crystal plane, constructive interference would occur when the product of an integer number n (called order of diffraction) times the wavelength is equal to twice the lattice spacing times the diffraction angle: $n\lambda = 2d \sin \theta$. This equation is known as Bragg's law and is the foundation on which X-ray crystal-diffraction spectrometers are based. Using this theory, Bragg obtained a distribution of the intensity of ionization in a detector as a function of angle. This distribution indicated that X rays consist of two types, a line spectrum characteristic of the target material in the tube and a continuous spectrum. From the crystal spacing d, which Bragg obtained from the geometry of the crystal lattice, the density of the crystal, and mass of a single atom, he was able to calculate the wavelengths of the characteristic X-ray lines and to show that these wavelengths varied approximately as the inverse square of the atomic weight of the absorber. These experiments confirmed the earlier results of Barkla, who, by using the fact that short-wavelength X rays are absorbed to a lesser extent than long-wavelength X rays, found two regions of strong maxima. In 1911 Barkla named the long-wavelength maxima the *L* series and the short-wavelength maxima the *K* series.

In 1923 the reflection of X rays from a polished surface of glass was demonstrated by an American physicist, Arthur Holly Compton. He found that, for angles of less than 10 minutes of arc, a strong reflected beam could be observed in the direction predicted by the specular-reflection law. The final proof of the wave nature of X rays, their diffraction by a ruled grating, was observed in 1925. Because the line spacing of a ruled grating is accurately known, this method has been used to determine the absolute value of X-ray wavelengths.

X rays as particles. The particle nature of X rays is graphically demonstrated in the photoelectric effect and the Compton effect. In an attempt to explain blackbody radiation (radiation from a theoretically perfectly nonreflecting, or completely absorbing [*i.e.* "black"] body), Max Planck postulated that energy is radiated in small packets, or quanta, with an energy given by $h\nu$, in which ν is the frequency of the radiation and h is a constant (now called Planck's constant). One of the most important successes of Planck's postulate, in addition to explaining blackbody radiation, was its use by Einstein in explaining the photoelectric effect. In the photoelectric effect, absorbed electromagnetic radiation ejects an electron from the absorber. Einstein's photoelectric equation gives the kinetic energy, E_{kin}, of the emitted electron as the energy of the incident photon, $h\nu$, minus the work required to pull the electron out of the sample, W_0:

$$E_{kin} = h\nu - W_0.$$

Although this equation was first derived for light photons absorbed on metal surfaces, it also holds for X-ray photons if W_0 is the work required to eject the electron from a bound state of the atom.

A second series of experiments that demonstrated the particle nature of X rays was carried out in 1922–23 by Compton. Using an X-ray spectrometer, he measured the wavelength of X rays scattered from light elements. In addition to scattered X rays that had the same wavelength as the primary beam, he found a second, or "modified," peak at a longer wavelength. The intensity and wavelength of this second peak were functions of the scattering angle from the sample. The explanation of this effect (now known as the Compton effect) was given by Compton and independently by a Dutch scientist, Peter Debye. They proposed that a primary X-ray photon could be considered as a small ball that could collide with one of the electrons in the scattering material

in a manner similar to the collision of two smooth elastic balls of different mass. The photon would then lose some of its energy to the recoiling electron and would be of longer wavelength. By assuming that conservation of energy and momentum (mass times velocity) would hold in the collision between a photon and an electron, they were able to derive the shift of the wavelength of the scattered X ray to give the modified peak at higher wavelength.

Detection and measurement of X rays. A beam of X rays is characterized by its intensity and its spectral (energy) distribution, and a number of methods for measuring these properties have been developed.

There are two methods in general use for detecting X rays. The first method relies on the X rays producing a photochemical change in a photographic emulsion. The blackening of the film is related to the exposure, which is defined as the product of the X-ray intensity and the length of the exposure. The position and degree of blackening on film are determined by optical techniques.

The second method for detecting X rays relies on the ability of X rays either to ionize gases or solids or to produce fluorescence in a crystal. Detectors utilizing these phenomena are called electronic detectors. Electronic detectors come in a wide variety of forms, including the ionization chamber, scintillation counter, and solid-state detector (*qq.v.*).

These devices produce a voltage pulse for every absorbed photon. By counting the number of voltage pulses, the number of photons can be determined. In addition, the voltage pulses from all of the devices can be used in conjunction with a pulse-height analyzer, an electronic device that counts pulses and sorts them according to energy, in order to obtain a spectral distribution.

The various counters described here have also been used as the detectors in X-ray diffraction spectrometers. An X-ray spectrometer basically consists of a source of X rays, a diffracting sample, and a detector system. If X rays of known wavelength are used, they can be used to study crystal structures. By using a diffracting crystal of known structure, X-ray spectrometers can be used for measuring X-ray spectra.

Applications of X rays. Because of the many varied properties of X rays, they have been applied to a wide range of medical, industrial, and scientific problems. Some of these are differential absorption, quantitative measurement of absorption, diffraction by crystals, fluorescence of characteristic radiation, and biological effects produced by X rays.

One of the earliest applications of X rays was to medicine, being used in both diagnosis and therapy. Diagnostics include the detection of bone fractures, foreign objects in the body, dental cavities, and diseased conditions such as cancer, whereas, in therapeutic treatment, X rays are used to stop the spread of malignant tumours.

In industry, X-ray radiographs are used to detect flaws nondestructively in castings that are inaccessible to direct observation and to measure the thickness of materials. X rays have been applied to a wide range of quantitative materials characterization problems. By measuring quantitatively the amount of absorption in a sample of known composition, the thickness can be determined. If the thickness of a sample is known, the absorption can be used to measure accurately its composition even if it contains two elements.

The fluorescence of X rays from a sample is used in many instruments for the qualitative and quantitative analysis of materials. The primary beam may be X rays, gamma rays, electrons, or other charged particles. The energy of the fluoresced X rays is characteristic of the materials contained in the sample. By using suitable standards, quantitative determinations can be made. This principle is used in the electron microprobe, in which a narrow electron beam (about 0.0001 centimetre [0.00004 inch] in diameter) is used to determine the constituents of a given area of a sample. X rays are used in scanning electron microscopy to obtain a "picture" of an elemental distribution in a sample. Also, Si(Li) detectors may be combined with a fluorescence source as energy analysis detectors for rapid material identification.

X-ray diffraction, a phenomenon in which the atoms of a crystal, by virtue of their uniform spacing, cause an interference pattern of the waves present in an incident beam of X rays. The atomic planes of the crystal act on the X rays in exactly the same manner as does a uniformly ruled grating on a beam of light. *See also* Bragg law; Laue diffraction pattern.

X-ray source, in astronomy, any of a class of cosmic objects that emit radiation at X-ray wavelength. Because the Earth's atmosphere absorbs X rays very efficiently, X-ray telescopes and detectors must be carried high above it by spacecraft to observe objects that produce such electromagnetic radiation.

A brief treatment of astronomical X-ray sources follows. For full treatment, *see* MACROPAEDIA: Cosmos.

Advances in instrumentation and improved observational techniques have led to the discovery of an increasing number of X-ray sources. By the late 20th century, thousands of these objects had been detected throughout the universe.

The Sun was the first celestial object determined to give off X rays; rocket-borne radiation counters measured X-ray emissions from its corona (outer atmosphere) in 1949. The Sun, however, is an intrinsically weak X-ray source, and it is prominent only because it is so close to the Earth. The unambiguous detection of X rays from other more distant ordinary stars was achieved 30 years later by the orbiting HEAO 2 satellite known as the Einstein Observatory. It detected more than 150 ordinary stars by the X-radiation from their coronas. The stars observed cover almost the entire range of star-types—main sequence, red giants, and white dwarfs. Most stars emit only an extremely small fraction of their energy in the form of X rays. Young, massive stars are the most powerful X-ray emitters. They usually occur in nebulas, and their hot coronal gases can expand to make a nebula itself a detectable X-ray source.

A more powerful type of X-ray source is a supernova remnant, the gaseous shell ejected during the violent explosion of a dying star. The first to be observed was the Crab Nebula, the remnant of a supernova explosion whose radiation reached the Earth in AD 1054. It is, however, a very atypical remnant because its X rays are synchrotron radiation produced by high-speed electrons from a central pulsar (*q.v.*). The X-radiation from most other supernova remnants emanates instead from hot gas. The gases ejected by a supernova explosion are relatively cool, but as they sweep outward at a speed of several thousand kilometres per second they accumulate interstellar gas. The strong shock wave heats this gas to a temperature high enough for X-ray emission—namely, about 10,000,000 K.

The most powerful X-ray sources in the Milky Way Galaxy are certain binary stars. These so-called X-ray binaries have an X-ray output 1,000 times as great as the Sun's output at all wavelengths. X-ray binaries account for most of the sources discovered during the initial years of X-ray astronomy, including Scorpius XR-1 (*q.v.*). A typical X-ray binary source consists of a close double star system in which one member is a very compact object. This object may be a neutron star that contains approximately the mass of two Suns condensed into a sphere only about 20 km (12 mi) across, or alternatively an even more compact black hole, a collapsed star whose gravity is so strong that not even light can escape from it. As gas from the companion star falls toward the compact star, the latter swirls round into an accretion disk. Viscous processes in the disk convert the orbital energy of the gas into heat, and when sufficiently high temperatures are attained large amounts of X rays are emitted.

There are several types of X-ray binaries. In an X-ray pulsar, the gas is channeled to the poles of a neutron star and the radiation is given off as pulses in very regular periods. In objects known as bursters, a neutron star's magnetic field suspends the gas until the accumulated weight crushes the field temporarily and the falling gas emits a sudden burst of X rays. A transient occurs in stellar pairs in which the orbit is elongated and gas is only transferred occasionally (*i.e.* when the component stars are closest together). Astronomers generally classify the compact object in an X-ray binary as a neutron star unless its calculated mass exceeds three solar masses. In such cases, they identify the object as a black hole. Two very strong black hole candidates are Cygnus X-1 (six solar masses) and LMC X-3 (10 solar masses).

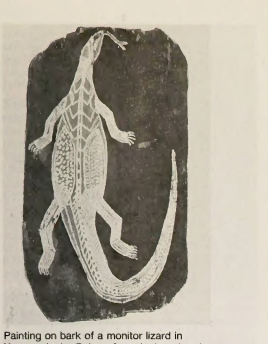
Nearby galaxies (*e.g.*, the Andromeda Galaxy) are detected by the emission from constituent X-ray binaries. They are relatively weak sources compared to active galaxies, which fall into various categories such as radio galaxies, Seyfert galaxies, and quasars. These galactic types are all characterized by violent activity at their cores, usually explained as arising from an accretion disk of hot gases that surrounds a central black hole having a mass of about 1,000,000,000 Suns. The X-ray energy of these galaxies is highly variable. The quasar OX 169, for example, has been observed to vary substantially in X-ray output in less than two hours, implying that the region producing this radiation is less than two "light-hours" across (*i.e.*, smaller than the solar system).

Other powerful extragalactic X-ray sources are galaxy clusters. The X rays from a cluster do not come from its member galaxies but rather from a pool of hot gas between them, which is kept within the cluster by the galaxies' combined gravitational pull. The gas is typically at a temperature of 100,000,000 K, and it may have originated as hot gas ejected by numerous supernovas.

Finally, there is a diffuse background of X-radiation emanating from great distances and from all directions. Although it was discovered in 1962, its nature is still unclear. Such X-radiation could come from very tenuous gas that pervades the entire universe. Currently, however, most astronomers favour the idea that the background consists mainly of X rays from numerous quasars too remote to be observed individually.

X-ray style, manner of depicting animals by drawing or painting the skeletal frame and internal organs, one of the characteristic styles of the art of prehistoric hunting cultures. The origin of the style can be traced to the Mesolithic art of northern Europe, where the earliest examples were found on fragments of bone in southern France dating from the late Magdalenian Period. Animals painted in the X-ray motif have also been discovered in the art of hunting cultures in northern Spain, Siberia, the Arctic Circle, North America, western New Guinea, New Ireland, India, and Malaysia. It is found today primarily in the Aboriginal rock, cave, and bark paintings of eastern Arnhem Land, in northern Australia.

Figures painted in X-ray style vary in size up to 8 feet (2.5 metres) in length and are



Painting on bark of a monitor lizard in X-ray style, by Baboa, from Arnhem Land, Australia; in the State Museum of Folklore, Frankfurt am Main

By courtesy of the Stadtisches Museum fur Volkerkunde, Frankfurt am Main

delicate, polychromed renderings of the interior cavity of the animal. Images are known in which only the outline and skeleton of the bird, fish, or mammal are indicated, and the entire internal system of organs is expressed by a "life line," a single, horizontal line that runs from the animal's mouth to a dot representing the heart or stomach. Whether the depiction of an animal in the X-ray style had particular religious symbolism is not known.

X-ray telescope, instrument designed to detect and resolve X rays from sources outside the Earth's atmosphere. Because of atmospheric absorption, X-ray telescopes must be carried to high altitudes by rockets or balloons or placed in orbit outside the atmosphere. Balloon-borne telescopes are used to detect the more penetrating (harder) X rays, whereas those carried aloft by rockets or in satellites are used to detect softer radiation.

Several types of X-ray detectors have been used, involving Geiger counters, proportional counters, and scintillation counters. These detectors require a large collecting area, because celestial X-ray sources are remote and therefore weak, and a high efficiency for detecting X rays over the cosmic-ray-induced background radiation is needed. Reflecting X-ray telescopes are constructed so that the highly penetrating rays strike the reflective surface at a grazing angle.

X-ray tube, also called ROENTGEN TUBE, vacuum tube that produces X rays by accelerating electrons to a high velocity with a high-voltage field and causing them to collide with a target, the anode. Because X rays can penetrate solid substances to varying degrees, they are applied in medicine and dentistry, in the exploration of the structure of crystalline materials, and in research. The tube consists of a source of electrons, the cathode, which is usually a heated filament, and an anode, usually of tungsten, which is enclosed in an evacuated glass envelope. The X-ray tube functions on the principle that X rays are produced wherever electrons moving at very high speeds strike matter of any kind. The X-ray tube design that became the prototype for subsequent devices was invented by the American engineer William D. Coolidge in 1913.

X-trisomy, sex chromosome disorder of human females, in which three X chromosomes are present, rather than the normal pair. More common than Turner's syndrome, where only one X chromosome is present, X-trisomy usually remains undetected because affected individuals appear normal, experience puberty, and are usually fertile. Statistical studies suggest a slightly increased frequency of mental disturbance, retardation, or both.

Xai-Xai, formerly JOÃO BELO, port town, southern Mozambique. Located on the eastern bank of the Limpopo River near its mouth, the town is a market centre for cashew nuts, rice, corn (maize), cassava, and sorghum raised in the surrounding area, which is irrigated by the lower Limpopo irrigation project; dairy cattle also are raised. A light railway system runs inland and provides access to the port, which has declined in importance since the silting in of its harbour and because of competition from truck transport. Xai-Xai is connected to Maputo, the capital of Mozambique, by the major north-south road along the coast of the Mozambique Channel. Pop. (1991 est.) 93,519.

Xankändi, formerly STEPANAKERT, city, southwestern Azerbaijan. Situated at the foot of the eastern slopes of the Karabakh Range, the city was founded after the October Revolution (1917) on the site of the village of Khankendy and was renamed Stepanakert in 1923 for Stepan Shaumyan, a Baku Communist leader. After Azerbaijan gained independence the name was changed to Xankändi, though Armenians continue to call the city Stepanakert. Xankändi has a varied industrial structure and is especially important for food processing, wine making, and silk weaving; it produces furniture and footwear and has musical and medical schools and a museum of local culture. A branch line of the Baku-Tbilisi-Batumi rail line reaches the city. Pop. (1991 est.) 55,200.

xanthate, any of a class of organic salts formed by treatment of an alcohol with carbon disulfide in the presence of an alkali. The term is derived from the Greek word *xanthos,* for "yellow," in reference to the compound potassium ethyl xanthate ($C_2H_5OCS_2K$), which gives a yellow precipitate when combined with copper sulfate. The most important group of xanthates are the sodium salts produced from cellulose; these materials are processed to form the synthetic fibre rayon or the transparent film cellophane, then reconverted to cellulose. The xanthates of some low-molecular-weight alcohols are used as flotation agents for the concentration of ores.

Xánthi, also spelled XANTHḖ, city and *nomós* (department) in the Thrace (Thráki) region of eastern Greece. The city, which is situated below the Rhodope massif at the head of the narrow Eskejé (Esketzé) Valley, is the seat of a metropolitan bishop of the Greek Orthodox Church.

Though the city's origins are obscure, it grew up beneath the Byzantine fortress of Xanthea and later became a summer colony of the Turks known as Eskije. With the arrival of the Thessaloníki-Adrianople railway in the 1890s, it replaced the nearby Turkish tobacco-trading centre of Yenije in importance. After the Balkan Wars (1912–13) the city passed to Bulgaria and then to Greece after World War I. The city of Xánthi is joined by highway to Stavroúpolis, a town on the Néstos River, and Lágos, a port between the Aegean Sea and a coastal lagoon. Area *nomós,* 692 square miles (1,793 square km). Pop. (1991 prelim.) city, 37,462; *nomós,* 90,450.

xanthinuria, rare inherited disorder of purine metabolism that results from a deficiency in the enzyme xanthine oxidase. Normally this enzyme breaks down the purine base xanthine to uric acid, which is then excreted. In the absence of the enzyme, xanthine is not metabolized by the body and its concentration builds up in the blood and urine. Xanthinuria is not a serious condition, and many individuals are symptomless. Some patients, however, develop xanthine stones in their kidneys. Treatment in these instances includes an increase in fluid intake and a reduction in consumption of foods rich in purines, such as organ meats, asparagus, and mushrooms.

Xanthophyta, division or phylum of algae commonly known as yellow-green algae (*q.v.*).

xanthosis (medicine): *see* carotenemia.

Xanthus, modern KINIK, principal city of ancient Lycia. It is situated on a cliff above the mouth of the Koca (Xanthus) River in what is now western Turkey. The early history of Xanthus is unclear: although it is mentioned in early Lycian inscriptions, no Bronze Age remains have been found within the city. According to the *Iliad,* the Lycians, led by the hero Sarpedon, were the most prominent allies of Troy in the Trojan War. Xanthus reappears in the historical records of the 6th century BC as the principal city of Lycia. About 540 BC it was besieged by Harpagus, general of the Persian king Cyrus. The Lycians, forced within their walls, collected their wives and children and burned them, together with their slaves and treasure, under their acropolis; then, attacking the Persians, they died fighting to the last man.

Soon rebuilt and repopulated, the city flourished from the 5th century BC to 42 BC, when, besieged by the Romans under the command of Brutus, it repeated its heroic defense. The site has well-preserved ruins of a theatre, temples, and other structures. The most remarkable ruins of the city are huge rock-cut pillar tombs; in the 19th century the British archaeologist Sir Charles Fellows sent reliefs and sections of the tombs to the British Museum, where they are exhibited today. Upon one of the remaining pillar tombs is the longest and most important of inscriptions in the Lycian language. Pop. (1990 prelim.) 17,051.

Xauen (Morocco): *see* Chechaouene.

Xauen, Dámaso Berenguer y Fusté, conde de: *see* Berenguer, Dámaso, conde de Xauen.

Xavante (people): *see* Shavante.

Xavier, Saint Francis, Spanish SAN FRANCISCO JAVIER, or XAVIER (b. April 7, 1506, Xavier Castle, near Sangüesa, Navarre [Spain]—d. Dec. 3, 1552, Sancian Island, China; canonized March 12, 1622; feast day December 3), the greatest Roman Catholic missionary of modern times, who was instrumental in the establishment of Christianity in India, the Malay Archipelago, and Japan. In Paris in 1534 he pronounced vows as one of the first seven members of the Society of Jesus, or Jesuits, under the leadership of Ignatius of Loyola.

Early life and education. Francis was born in Navarre (now in northern Spain), at the family castle of Xavier, where Basque was the native language. He was the third son of the president of the council of the king of Navarre, most of whose kingdom was soon to fall to the crown of Castile (1512). Francis grew up at Xavier and received his early education there. As was often the case with younger sons of the nobility, he was destined for an ecclesiastical career, and in 1525 he journeyed to the University of Paris, the theological centre of Europe, to begin his studies.

In 1529, Ignatius Loyola, another Basque student, was assigned to room with Francis. A former soldier 15 years Xavier's senior, he had undergone a profound religious conversion and was then gathering about himself a group of men who shared his ideals. Gradually, Ignatius won over the initially recalcitrant Xavier, and Francis was among the band of seven who, in a chapel on Montmartre in Paris, on Aug. 15, 1534, vowed lives of poverty and celibacy in imitation of Christ

and solemnly promised to undertake a pilgrimage to the Holy Land and subsequently to devote themselves to the salvation of believers and unbelievers alike. Xavier then performed the *Spiritual Exercises,* a series of meditations lasting about 30 days and devised by Ignatius in light of his own experience of conversion to guide the individual toward greater generosity in the service of God and man. They implanted in Francis the motivation that carried him for the rest of his life and prepared the way for his recurrent mystical experiences.

Mission to India. After all the members of the band had completed their studies, they reassembled in Venice, where Xavier was ordained priest on June 24, 1537. Having for more than a year sought passage to the Holy Land in vain, the seven, along with fresh recruits, went to Rome to put themselves at the disposal of the Pope. Meanwhile, as a result of their preaching and care of the sick throughout central Italy, they had become so popular that many Catholic princes sought their services. One of these was King John III of Portugal, who desired diligent priests to minister to the Christians and to evangelize the peoples in his new Asian dominions. When illness prevented one of the two originally chosen for the task from departing, Ignatius designated Xavier as his substitute. The next day, March 15, 1540, Francis left Rome for the Indies, travelling first to Lisbon. In the following fall, Pope Paul III formally recognized the followers of Ignatius as a religious order, the Society of Jesus.

Francis disembarked in Goa, the centre of Portuguese activity in the East, on May 6, 1542; his companion had remained behind to work in Lisbon. Much of the next three years he spent on the southeastern coast of India among the simple, poor pearl fishers, the Paravas. About 20,000 of them had accepted Baptism seven years before, chiefly to secure Portuguese support against their enemies; since then, however, they had been neglected. Using a small catechism he had translated into the native Tamil with the help of interpreters, Francis travelled tirelessly from village to village instructing and confirming them in their faith. His evident goodness and the force of his conviction overcame difficulties of verbal communication. Shortly afterward the primitive Macuans on the southwestern coast indicated their desire for Baptism, and, after brief instructions, in the last months of 1544 Xavier baptized 10,000 of them. He anticipated that the schools he planned and Portuguese pressure would keep them constant.

In the fall of 1545, news of opportunities for Christianity attracted him to the Malay Archipelago. Following several months of evangelization among the mixed population of the Portuguese commercial centre at Malacca, he moved on to found missions among the Malays and the savage headhunters in the Spice Islands (Moluccas). In 1548 he returned to India, where more Jesuits had since arrived to join him. In Goa the College of Holy Faith, founded several years previously, was turned over to the Jesuits, and Francis began to develop it into a centre for the education of native priests and catechists for the diocese of Goa, which stretched from the Cape of Good Hope, at the southern tip of Africa, to China.

Years in Japan. Xavier's eyes, however, were now fixed on a land reached only five years before by Europeans: Japan. His conversations in Malacca with Anjiro, a Japanese deeply interested in Christianity, had shown that this people was cultured and sophisticated, unlike the fishermen he had known in India or the headhunters of the Moluccas. On Aug. 15, 1549, a Portuguese ship bearing Francis, the newly baptized Anjiro, and several companions entered the Japanese port of Kagoshima. Xavier's first letter from Japan, which was to be printed more than 30 times before the end of the century, revealed his enthusiasm for the Japanese, "the best people yet discovered." He grew conscious of the need to adapt his methods. His poverty that had so won the Paravas and Malays often repelled the Japanese, so he abandoned it for studied display when this was called for. In late 1551, having received no mail since his arrival in Japan, Francis decided to return temporarily to India, leaving to the care of his companions about 2,000 Christians in five communities.

Back in India, administrative affairs awaited him as the superior of the newly erected Jesuit Province of the Indies. Meanwhile, he had come to realize that the way to the conversion of Japan lay through China; it was to the Chinese that the Japanese looked for wisdom. He never reached China, however. On Dec. 3, 1552, Francis died of fever on the island of Sancian (now Shang-ch'uan Tao, off the Chinese coast) as he attempted to secure entrance to the country, then closed to foreigners.

Assessment. Twentieth-century scholarship has dispelled many of the legends connected with Xavier and has also defended him against his critics. A modern estimate puts the figure of those baptized by him at about 30,000, as opposed to the 1,000,000 asserted by Baroque exaggeration. In reality he had to struggle with language wherever he worked and did not possess the gift of tongues attributed to him. He is justly credited for his idea that the missionary must adapt to the customs and language of the people he evangelizes, and for his advocation of an educated native clergy—initiatives not always followed by his successors.

Research has shown that he always provided for the continuing pastoral care of the communities he founded and did not abandon them after Baptism as some critics maintained. In fact, many of his own efforts were spent instructing those baptized hastily by others. The areas he evangelized in India have remained Catholic to the present day. Vigorous and prolonged persecution in the 17th century did destroy the missions he founded in the Moluccas and Japan but only after thousands had died as martyrs. Even before his death Francis Xavier was considered a saint, and he has been formally venerated as such by the Catholic Church since 1622. In 1927 he was named patron of all missions. In 1992 a primary source, *The Letters and Instructions of Francis Xavier,* introduced and translated by M. Joseph Costelloe, was published. (R.L.B.)

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Xenacanthus, long-surviving but now extinct genus of freshwater sharks. *Xenacanthus* survived from the end of the Devonian Period, 345,000,000 years ago, to about the end of the Triassic Period, 190,000,000 years ago. *Xenacanthus* had a slim, elongated body with a low dorsal fin that extended down most of it, almost merging with the triangular, pointed tail. From the back of the skull, a long, sharp, movable spine projected.

Xenakis, Iannis (b. May 29, 1922, Brăila, Romania—d. Feb. 4, 2001, Paris, France), Romanian-born French composer, architect, and mathematician who originated *musique stochastique,* music composed with the aid of electronic computers and based upon mathematical probability systems.

Xenakis was born to a wealthy family of Greek ancestry, and he moved to Greece in 1932. He fought in the Greek resistance movement during World War II, losing an eye in the process. After graduation in 1947 from



Xenakis, 1965
Lipnitzki—H. Roger-Viollet

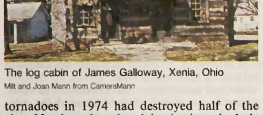
the Athens institute of technology, Xenakis was exiled from Greece owing to his political activities. He moved to Paris, where he was for 12 years associated with the architect Le Corbusier. During this time he designed the Philips Pavilion for the Brussels International Exhibition of 1958. During his 30s he turned seriously to musical composition, receiving training with Darius Milhaud and studying composition under Olivier Messiaen at the Paris Conservatory (1950–62). Following Messiaen's suggestion, he began to use mathematical models in composing his musical pieces. His formal approach was rare among European composers, who had largely embraced serialism (*q.v.*). In 1954 he began his experiments in stochastic music with the composition *Métastasis.* Xenakis' article "La Crise de la musique sérielle" (1955; "The Crisis of Serial Music") elucidated his rigorously logical techniques, wherein the performers—mostly on standard instruments—are directed by a specially devised notation to produce sounds specified by a computer programmed by the composer.

His work *Achorripsis* (1958), for 21 instruments, led Xenakis to formulate his minimal rules of composition. These rules were expanded in the program for *ST/10-1,080262;* the symbols of the title indicate that this is a stochastic work, his first for 10 instruments, computed on Feb. 8, 1962. Several other compositions, including *ST/4-1,080262* for string quartet, *Atrées* (*Hommage à Blaise Pascal*) for 10 instruments, and *Morisma-Amorisma* for 4 instruments, were based on the same program. For this series of works, he used an IBM 7090 computer to control note sequence, instrumentation, pitch, duration, and dynamics. The performers have no freedom to improvise, but the resulting sound is fluid, homogeneous, and natural.

Xenakis' long and fruitful association with the Paris Instrumental Ensemble for Contemporary Music led to frequent performances and recordings of his works for chamber ensemble. He established the School of Mathematical and Automatic Music in 1966. Other works by Xenakis include *Polla ta dhina* for children's chorus and orchestra (1962), *Akrata* (1964–65) for 16 wind instruments, and *Cendrées* (1974) for chorus and orchestra. He also composed works solely for electronic reproduction, such as *Polytope of Cluny* (1972), sound and light space with 7-channel electronic tape, and *Mycenae A* (1978), stereo tape realized with UPIC A computer, as well as works with both human and electronic components, such as *Pour les Paix* (1982), for mixed chorus, electronic tape, and narrators. *Thallein* (1985) for orchestra was his final composition. His published books include *Formalized Music: Thought and Mathematics in Compo-*

sition (1971, partially published in French as *Musiques formelles,* 1963) and a transcription of his 1976 thesis defense, *Arts-Sciences, Alloys* (1985, originally published in French, 1979).

Xenia, city, seat (1804) of Greene County, southwestern Ohio, U.S., near the Little Miami River, 16 mi (26 km) east-southeast of Dayton. It was founded in 1803 by Joseph C. Vance, who gave it a Greek name meaning "hospitality." The arrival of the railroads in the 1840s provided impetus for its growth as a trading centre for farmers and stock raisers. Small manufactures (furniture, cordage, plastics, castings, and aircraft components) supplement its agricultural base. The log cabin (1799) of James Galloway, frontier scout and Revolutionary War soldier, is preserved as a historic monument. Parts of Xenia were rebuilt after



The log cabin of James Galloway, Xenia, Ohio
Mitt and Joan Mann from CameraMann

tornadoes in 1974 had destroyed half of the city. Nearby educational institutions include two historically important black universities at Wilberforce—Central State University (1887) and Wilberforce University (1856, African Methodist Episcopal). Inc. town, 1817; city, 1834. Pop. (1990) 24,664.

Xenicidae, formerly ACANTHISITTIDAE, bird family of the order Passeriformes; its members are commonly known as New Zealand wrens. The three living species are the rock wren (*Xenicus gilviventris*) and the rare bush wren (*X. longipes*) on South Island and, common to both islands, the rifleman (*Acanthisitta chloris*)



Rifleman (*Acanthisitta chloris*)
M.F. Soper—Bruce Coleman Inc./EB Inc.

ris). A fourth species, the Stephen Island wren (*X. lyalli*), was discovered in 1894 by a lighthouse keeper and killed soon afterward by his cat. Nine specimens, brought home by the cat, were sent to the British Museum. This may have been the only flightless passerine bird; certainly its distribution—less than one square mile on an island in Cook Strait—was astonishingly limited.

Xenicids are tiny birds of stout build, with a nuthatch-like bill and an extremely short tail. They vaguely resemble pittas, with which they may share ancestry. The rifleman, only eight centimetres (three inches) long, has brown and yellow plumage suggesting the uniform of an early-day British rifle corps. It is a tree-creeping species found mainly in beech forest. The bush wren is also an arboreal insect eater. The rock wren feeds chiefly in mountains on open slopes. Both wrens bob up and down vigorously on alighting, and the rifleman is a constant wing quiverer.

xenobiology: *see* exobiology.

Xenocrates (d. 314 BC, Athens), Greek philosopher, pupil of Plato, and successor of Speusippus as the head of the Greek Academy, which Plato founded about 387 BC. In the company of Aristotle he left Athens after Plato's death in 348/347, returning in 339 on his election as head of the Academy, where he remained until his death.

Xenocrates' writings are lost except for fragments, but his doctrines appear to resemble Plato's as reported by Aristotle. Among them is the "derivation" of all reality from the interaction of two opposite principles, "the One" and "the indeterminate dyad." It is the dyad that is responsible for multiplicity, or diversity, evil, and motion, whereas the One is responsible for unity, good, and rest. Numbers and geometrical magnitudes are seen as the first products of this derivation. In addition Xenocrates divided all of reality into three realms: (1) the sensibles, or objects of sensation; (2) the intelligibles, or objects of true knowledge, such as Plato's "Ideas"; and (3) the bodies of the heavens, which mediate between the sensibles and the intelligibles and are therefore objects of "opinion." This tripartite division typifies the Academy's tendency to bridge the gap between the two traditional modes of cognition, the mode of sense experience and the mode of intellection.

A second threefold division in Xenocrates' thought separated gods, men, and "demons." The demons represented semihuman, semidivine beings, some good and others evil. To these beings Xenocrates attributed much of what popular religion attributed to gods, and ritual mysteries were instituted to propitiate them, especially the evil ones. Though it is uncertain how literally Xenocrates viewed the demons, his demonology was highly influential, particularly on those early Christian writers who identified pagan deities with evil demons.

The classical distinction differentiating mind, body, and soul has been attributed by some to Xenocrates and by others to the Stoic philosopher Poseidonius. The same is true of the related doctrine that men die twice, the second time occurring on the Moon and consisting in the mind's separation from the soul to make its ascent to the Sun. Sometimes considered an Atomist for his view that matter is composed of indivisible units, he held that Pythagoras, who stressed the importance of numbers in philosophy, was responsible for the Atomist view of acoustics, in which the sound perceived as a single entity actually consists of discrete sounds. The same Pythagorean influence on thinkers of the Academy can be seen in Xenocrates' devotion to tripartite divisions. Yet another such division is found in his general view of philosophy, which he divided into logic, physics, and ethics. The origin of philosophy, he maintained, lies in man's desire to resolve his anxieties. Happiness is defined as the acquisition of the perfection that is peculiar and proper to man; thus, enjoyment consists in being in contact with the things that are natural to him. This doctrine, which suggests the primacy of ethics over speculation in philosophy, foreshadows the Stoic view that ethical norms are to be derived from observation of the natural world. Xenocrates admitted, however, that external items are important for happiness, a notion that the Stoics rejected.

Consult the INDEX *first*

xenolith, rock fragment within an intrusive igneous body that is unrelated to the igneous body itself. Xenoliths, which represent pieces of older rock incorporated into the magma while it was still fluid, may be located near their original positions of detachment or may have settled deep into the intrusion, if their density is greater. Xenoliths can be contrasted with autoliths, or cognate xenoliths, which are pieces of older rock within the intrusion that are genetically related to the intrusion itself. The general term for all such incorporated bodies is inclusions. Xenoliths are usually reconstituted through the processes of contact metamorphism, in which heat and fluids cause mineralogic and chemical changes in the parent rock of the xenolith; a study of these changes can give information on the temperature and composition of the magmatic body.

xenon (Xe), chemical element, heavy and extremely rare gas of Group 0 (noble gases) of the periodic table. It was the first noble gas found to form true chemical compounds. More than $4\frac{1}{2}$ times heavier than air, xenon is colourless, odourless, and tasteless. Solid xenon belongs to the face-centred cubic crystal system, which implies that its molecules, which consist of single atoms, behave as spheres packed together as closely as possible.

Xenon occurs in slight traces in gases within the Earth and is present to an extent of about 0.0000086 percent, or about one part in 10,000,000, by volume of dry air. Xenon is manufactured on a small scale by the fractional distillation of liquid air. The British chemists Sir William Ramsay and Morris W. Travers isolated the element (1898) by repeated fractional distillation of the noble gas krypton, which they had discovered six weeks previously.

The element xenon is used in lamps that produce intense, extremely short flashes of light, such as stroboscopes and lights for high-speed photography. When a charge of electricity is passed through the gas at low pressure, it emits a flash of bluish-white light; at higher pressures white light resembling daylight is emitted. Xenon flash lamps are used to activate ruby lasers.

Natural xenon is a mixture of nine stable isotopes in the following percentages; xenon-124 (0.096); xenon-126 (0.090); xenon-128 (1.92); xenon-129 (26.44); xenon-130 (4.08); xenon-131 (21.18); xenon-132 (26.89); xenon-134 (10.44); and xenon-136 (8.87). The xenon found in some stony meteorites shows a large proportion of xenon-129, believed to be a product of radioactive decay of iodine-129, whose half-life is 17,000,000 years. Study of the xenon-129 content of meteorites casts light on the history of the solar system. More than a dozen radioactive xenon isotopes produced by fission of uranium and other nuclear reactions are known. For example, xenon-135 (9.2-hour half-life) is produced by uranium fission in nuclear reactors, where it is troublesome because it absorbs fission-producing neutrons.

Noble gases were thought to be chemically inert until Neil Bartlett produced (1962) the first noble-gas compound, a red crystalline solid, xenon hexafluoroplatinate(V), that can

best be formulated as $Xe(PtF_6)_x$, in which x varies in value from one to two. Xenon was later observed to combine directly with fluorine to form a series of fluorides, XeF_2, XeF_4, and XeF_6, of which the tetrafluoride (XeF_4) is the easiest to prepare. The oxides XeO_3 and XeO_4, made indirectly in aqueous solution, are explosively unstable when dry. Stable, insoluble xenate(VIII) salts, such as that of sodium, $Na_4XeO_6 \cdot 8H_2O$, and several other stable compounds—for example, the yellow solid cesium octafluoroxenate(VI), Cs_2XeF_8—have been prepared and studied.

atomic number	54
atomic weight	131.30
melting point	−111.9° C (−169.6° F)
boiling point	−107.1° C (−160.6° F)
density (1 atm, 0° C)	5.887 g/litre
valence	0, 2, 4, 6, 8
electronic configuration	2-8-18-18-8 or $(Kr)4d^{10}5s^25p^6$

Xenophanes (b. probably *c.* 560 BC, Colophon, Ionia—d. probably *c.* 478), Greek poet and rhapsode, religious thinker, and reputed precursor of the Eleatic school of philosophy, which stressed unity rather than diversity and viewed the separate existences of material things as apparent rather than real.

Xenophanes was probably exiled from Greece by the Persians who conquered Colophon about 546. After living in Sicily for a time and wandering elsewhere in the Mediterranean, he evidently settled at Elea in southern Italy. In one of his poems, which survive only in fragments, he declared that his travels began 67 years earlier, when he was 25; if this is so, he would have been at least 92 at his death.

Xenophanes' philosophy found expression primarily in the poetry that he recited in the course of his travels. Fragments of his epics reflect his contempt for contemporary anthropomorphism and for popular acceptance of Homeric mythology. Most celebrated are his trenchant attacks on the immorality of the Olympian gods and goddesses. In his elegiac fragments he ridicules the doctrine of the transmigration of souls, condemns the luxuries introduced from the nearby colony of Lydia into Colophon, and advocates wisdom and the reasonable enjoyment of social pleasure in the face of prevalent excess.

Some critics consider Parmenides (fl. *c.* 450 BC) as the founder of the Eleatic school, but Xenophanes' philosophy probably anticipated his views. The tradition that Xenophanes founded the school is based primarily on the testimony of Aristotle, whose views Xenophanes also anticipated. Among the few other Greek writers who subsequently mentioned Xenophanes are Plato, who said that "The Eleatic school, beginning with Xenophanes and even earlier, starts from the principle of the unity of all things," and Theophrastus, who summed up Xenophanes' teaching in the formula "The all is one and the one is God."

Xenophanes was less a philosopher of nature in the manner of Parmenides, who looked for abstract principles underlying natural change, than a poet and religious reformer who applied generally philosophical and scientific notions to popular conceptions. His system and critiques of the works of other thinkers appear primitive in comparison with later Eleaticism, which developed its philosophy of appearance and reality into a sophisticated system.

Xenophon (b. 431 BC, Attica, Greece—d. shortly before 350, Attica), Greek historian, author of the *Anabasis*. Its prose was highly regarded by literary critics in antiquity and had strong influence on Latin literature.

Life. Born of a well-to-do Athenian family, Xenophon grew up during the great war between Athens and Sparta (431–404 BC) and served in the elite force of Athenian cavalry. He and his well-to-do contemporaries sat at the feet of Socrates, were critical of the extreme form of democracy under which they lived, and sympathized with the right-wing revolutionaries who seized power for short spells in 411 BC and 404 BC. When democracy was reestablished in Athens in 401, Xenophon chose to go abroad. His dislike of extreme democracy was deepened by the condemnation and execution of Socrates in 399; a few years later he was himself exiled as a traitor.

The great experience of his life was his service with the Greek mercenaries of the Persian prince Cyrus, first as a soldier of fortune and then, after Cyrus' death, as an elected commander of the Greek force, the "Ten Thousand," composed of men who found themselves 1,000 miles (about 1,500 kilometres) from home and who fought their way through the unknown territories of Kurdistan and Armenia until they reached the Greek city of Trapezus (now Trabzon) on the Black Sea early in 400. This exploit, on which he based his work *Anabasis,* made his name and his fortune at a young age. Service followed under a Thracian prince in Bulgaria and then under Spartan command in Asia Minor, where he met the man whom he was to admire most, the Spartan king Agesilaus II, who commanded large forces against Persia from 396 to 394. Xenophon served on his staff and was present at the Battle of Coronea, when Agesilaus defeated a coalition of Greek states including Athens. After the battle he accompanied Agesilaus to Delphi and placed an offering to Apollo in the treasury of the Athenians. It was probably at this time that he was banished by Athens.

Xenophon was now deeply involved with Sparta and Agesilaus, whom he continued to serve. He was rewarded first with a residence at Sparta and then with an estate at Scillus near Olympia. Happily married and father of two sons, he had ample means and leisure to hunt, entertain the local gentry, and build a chapel to the hunter goddess, Artemis. But the star of Sparta was setting. In 371 Xenophon found a new refuge at Corinth. When Athens and Sparta became allies against Thebes, his banishment was revoked, and he went home *c.* 365. He resumed his old life in Athenian society, remained somewhat critical of democracy, and saw his sons join his old cavalry regiment. Xenophon wrote what was probably his last work, *Ways and Means,* in 355 BC, advocating a policy of peace for Athens and the Greek states. He was reputedly very handsome, and two copies of an original head, sculptured in marble, have survived.

Writings. The most personal of his writings is *Anabasis* (or *Anabasis Kyrou,* "The Expedition of Cyrus"), published probably under a nom de guerre. The narrative excels in graphic details, but the fictitious speeches with which it is adorned have a contrived and artificial air. It is an account by a young man, somewhat romantic, excited by danger and discovery, receptive of impressions, and prompt in action. There are memorable moments. When he rode forward, expecting an enemy, and found the men at the top of the pass shouting "the sea, the sea," and then those behind

> all started running . . . and coming to the top, they embraced one another and their generals and captains, with tears in their eyes, and bringing together a great many stones—by whose order is not known—made a great cairn.

His experience as a horseman prompted two works: *On Horsemanship* (*Peri hippikēs*), which contains all the knowledge of the professional horseman in hunting and war and reveals his own love of horses; and *Cavalry Officer* (*Hipparchikos*), the main interest of which derives from the chapters on the conditions of service in the Athenian cavalry. A short treatise, *On Hunting* (*Kynēgetikos*), regarded by some as spurious, contains a wealth of technical information and seeks to justify hunting as a training for war and for all that requires quick thinking and quick action.

His admiration for Socrates and his dislike for the Sophists led him to write his own justification of Socrates in three works (*Apology, Symposium,* and *Memorabilia*), in which he presented a view of Socrates very different from that of his contemporary Plato; for Xenophon was interested less in philosophical disputation than in personal anecdotes, dinner-party talk, and the more practical aspects of education. Although much of what he had to say was trivial, he appreciated Socrates' concern with goodness. The name of Socrates was used also in a treatise on estate management, *Oeconomicus,* which was cast in the form of a dialogue; but the ideas are entirely Xenophon's, and it is full of horticultural and other details. Of particular charm is the portrayal of the estate owner's wife, who was delightful and dutiful, accepting her husband's rebuke for using makeup and wearing high heels. Xenophon expressed his own ideas about the training of a statesman and the importance of the family in the *Cyropaedia,* a historical novel in which Cyrus, founder of the Persian Empire, undergoes an ideal form of education. In the field of ideas this was his most original and stylish work. A pendant to it is *Hieron,* a fictitious dialogue on kingship between a king and a poet.

Personal admiration led Xenophon to complete the unfinished work of Thucydides, who came from a similar social background. His history of the period 411–403 BC, a patchwork based on personal experience and lacking critical analysis, bears no comparison with the work of Thucydides. Later it formed books I and II of the *Hellenica,* a history of Greek affairs from 411 to 362. For events after 403 Xenophon drew again upon his own experiences and also upon those of his acquaintances, mainly Peloponnesians. He revealed his and their prejudices, sometimes in a disingenuous manner, and left large gaps in his narrative; objectivity, thoroughness, and research were not for him. The speeches that he inserted in imitation of Thucydides were vehicles for anecdotes, aphorisms, and oratorical display rather than for the evaluation of fundamental principles of policy, and divine providence played an increasing part in later events he chronicled. The city and the hero of his prime, Sparta and Agesilaus, received special accolades in two treatises, *The Constitution of Sparta* (*Lakedaimoniōn politeia*) and *Agesilaus,* which are informative as well as laudatory. Late in life, when he was living at Athens, he wrote *Ways and Means,* which provides a most interesting picture of the economic structure of Athens as it was in 355 BC. *The Constitution of Athens,* although transmitted among his works, was not by Xenophon, who died in Attica a year or two before 350.

Assessment. As a writer of prose, Xenophon ranked with his fellow historians Herodotus and Thucydides in the opinion of literary critics of antiquity and had a stronger influence on Latin literature than either. His works were translated into many European languages in the 16th century, and, until comparatively recently, his reputation stood high. He was the first journalist in the sense that he recorded his personal experiences for their own sake and expressed his personal views on leading personalities and popular topics of his time. He wrote fluently in an exceptionally lucid and gracious style, avoided mannerisms or bombast, and gave pleasing expression to a considerable range of ideas, which were all completely undemanding. His life and times were interesting, and he wrote about them with prejudice, enthusiasm, and some insight.

He was not an intellectual force or an educational reformer, but his practicality and orthodoxy made him a popular writer.

(N.G.L.H.)

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xenotime, widely distributed phosphate mineral, yttrium phosphate (YPO_4), though large proportions of erbium commonly replace yttrium), that occurs as brown, glassy crystals, crystal aggregates, or rosettes in igneous rocks and associated pegmatites, in quartzose and micaceous gneiss, and commonly in detrital material. Occurrences include Norway, Sweden, Madagascar, Brazil, and North Carolina. The name is from the Greek word meaning "vain honour," because the yttrium in xenotime was mistakenly thought to be a new element. For detailed physical properties, *see* phosphate mineral (table).

Xerente (people): *see* Sherenté.

xeroderma (skin disease): *see* ichthyosis.

xeroderma pigmentosum, rare, recessively inherited skin condition in which resistance to sunlight and other radiation beyond the violet end of the spectrum is lacking. On exposure to such radiation the skin erupts into numerous pigmented spots, resembling freckles, which tend to develop into multiple carcinomas. The condition may occur in mild or severe forms. Protection from direct sunlight and surgical destruction of precancerous or established malignant lesions are the prescribed treatment.

xerophyte, any plant adapted to life in a dry or physiologically dry habitat (salt marsh, saline soil, or acid bog) by means of mechanisms to prevent water loss or to store available water. Succulents (plants that store water) such as cacti and agaves have thick, fleshy stems or leaves. Other xerophytic adaptations include waxy leaf coatings, the ability to drop leaves during dry periods, the ability to reposition or fold leaves to reduce sunlight absorption, and the development of a dense, hairy leaf covering.

Xerox Corporation, major U.S. corporation and first manufacturer of xerographic, plain-paper copiers. Headquarters are in Stamford, Conn.

The company was founded in 1906 as Haloid Company, changed its name to Haloid Xerox Company in 1958, and to Xerox Corporation in 1961. In 1960 Xerox first marketed the 914 xerographic copier; the process, which made photographic copies onto plain, uncoated paper, had been known for some time, but this was its first commercial application. The product had such success that the company has had to wage a continuing campaign to prevent the trademark Xerox from becoming a generic term.

Since that first copier, the company has expanded into other information products and publishing, while remaining a major reprographics manufacturer. Its primary products are related to the information-processing business, including xerographic copiers and related services, and other business products and supplies. It introduced word-processing machines in 1974, and in 1979 introduced Ethernet, an office communications network. The company also manufactures computer terminals, memory disk drives, and other computer software and offers seminars and management consulting. It manufactures office supplies and optical equipment for the defense and aerospace industries and conducts research in advanced military and aerospace technology.

Xerox owns R.R. Bowker, which publishes *Publishers' Weekly*, *Library Journal*, and *Books in Print*. It also owns several publishers of textbooks and educational materials. Its University Microfilms International stores and rents microfilms of leading periodicals and books. In 1983 the company purchased Crum and Forster, Inc., an insurance holding company. The following year it completed the purchase of Van Kampen Merritt, Inc., an investment banking firm.

Xerxes I, Old Persian KHSHAYARSHA, byname XERXES THE GREAT (b. *c.* 519 BC—d. 465, Persepolis), Persian king (486–465 BC), the son and successor of Darius I. He is best known for his massive invasion of Greece



Xerxes I, detail of a bas-relief of the north courtyard in the treasury at Persepolis, late 6th–early 5th century BC; in the Archaeological Museum, Tehrān

By courtesy of the Oriental Institute, the University of Chicago

from across the Hellespont (480 BC), a campaign marked by the battles of Thermopylae, Salamis, and Plataea. His ultimate defeat spelled the beginning of the decline of the Achaemenid Empire.

Accession to the throne. Xerxes was the son of Darius I and Atossa, daughter of Cyrus; he was the first son born to Darius after his accession to the throne. Xerxes was designated heir apparent by his father in preference to his elder brother Artabazanes. A bas-relief on the southern portico of a courtyard in the treasury of Persepolis, as well as the bas-reliefs on the east door of the tripylon (an ornamental stairway) depict him as the heir apparent, standing behind his father, who is seated on the throne. When his father died, in 486 BC, Xerxes was about 35 years old and had already governed Babylonia for a dozen years.

One of his first concerns upon his accession was to pacify Egypt, where a usurper had been governing for two years. But he was forced to use much stronger methods than had Darius: in 484 BC he ravaged the Delta and chastised the Egyptians. Xerxes then learned of the revolt of Babylon, where two nationalist pretenders had appeared in swift succession. The second, Shamash-eriba, was conquered by Xerxes' son-in-law, and violent repression ensued: Babylon's fortresses were torn down, its temples pillaged, and the statue of Marduk destroyed; this latter act had great political significance: Xerxes was no longer able to "take the hand of" (receive the patronage of) the Babylonian god. Whereas Darius had treated Egypt and Babylonia as kingdoms personally united to the Persian Empire (though administered as satrapies), Xerxes acted with a new intransigence. Having rejected the fiction of personal union, he then abandoned the titles of king of Babylonia and king of Egypt, making himself simply "king of the Persians and the Medes."

It was probably the revolt of Babylon, although some authors say it was troubles in Bactria, to which Xerxes alluded in an inscription that proclaimed:

> And among these countries (in rebellion) there was one where, previously, *daevas* had been worshipped. Afterward, through Ahura Mazda's favour, I destroyed this sanctuary of *daevas* and proclaimed, "Let *daevas* not be worshipped!" There, where *daevas* had been worshipped before, I worshipped Ahura Mazda.

Xerxes thus declared himself the adversary of the daevas, the ancient pre-Zoroastrian gods, and doubtlessly identified the Babylonian gods with these fallen gods of the Aryan religion. The questions arise of whether the destruction of Marduk's statue should be linked with this text proclaiming the destruction of the daeva sanctuaries, of whether Xerxes was a more zealous supporter of Zoroastrianism than was his father, and, indeed, of whether he himself was a Zoroastrian. The problem of the relationship between the Achaemenid religion and Zoroastrianism is a difficult one, and some scholars, such as M. Molé, have even thought that this is an improper posing of the question, that there were, rather, three different states of religion: a religion of strict observance, a royal religion as attested by the Achaemenid inscriptions, and the popular religion as described by the Greek historian Herodotus.

War against the Greeks. With the tranquillity of the empire reestablished, Xerxes would willingly have devoted himself to peaceful activities. But many of those around him were pressing for the renewal of hostilities. His cousin and brother-in-law Mardonius, supported by a strong party of exiled Greeks, incited him to take revenge for the affront that Darius had suffered at the hands of the Greeks at Marathon (490 BC). The impressionable Xerxes gave way to pressure from his entourage and threw himself into patient diplomatic and military preparations for war, which required three years to complete (484–481 BC). Herodotus notes that never before had such an effort been undertaken. Troops were levied in all the satrapies, and a navy, intended to be the army's supply line, was gathered. The care lavished on this enterprise shows that the King did not regard it as a minor operation.

There has been much later speculation on the real causes for the expedition. They could not have been economic, because Greece was not important then. Perhaps it was only the manifestation of a royal absolutism: Xerxes, whose character was later distorted in Greek legend, was neither foolish nor overly optimistic; although sensible and intelligent, he was nevertheless, according to G. Glotz,

> a sovereign by divine right, to whom opposition was as annoying as sacrilege . . . nervous in temperament, fallen from youthful fire into indolence, incited to make a war he didn't like. . . .

At the head of his armies, he left Sardis for the Hellespont and had two boat bridges placed across the strait. A storm destroyed

them, and Xerxes had the sea whipped as punishment. With the bridges remade, for seven days he oversaw the crossing of the army—5,000,000 men according to Herodotus and 360,000 by modern estimate, supported by 700 to 800 ships. Their passage was facilitated by a massive engineering works: a channel was dug across the Isthmus of Actium so that the peaks of Mount Athos might be avoided. Nevertheless, the army's size was of no help, partly because of misinformation about the enemy terrain and partly because of the appearance of a national feeling in Greece. After a few successes (*e.g.,* Thermopylae, mid-August 480 BC), Xerxes occupied Attica and pillaged Athens on September 21, but on September 29, at Salamis, a naval battle that he had initiated turned into a defeat. Without a fleet to bring supplies to the army, he had to retreat; he crossed over into Asia, leaving Mardonius in Thessaly. During an indecisive battle near Plataea, on Aug. 27, 479, Mardonius was killed, and his death obliged the army of occupation to withdraw. Hostilities continued for 13 years, but thenceforth Xerxes involved himself only slightly.

Withdrawal to Persia. Soured by this failure, which modern historians consider the beginning of Achaemenian decline, Xerxes retired to Susa and Persepolis. He then furthered the depletion of the once-enormous resources he had gathered, through multiple taxation, by launching a vast construction program. At the capital city of Persepolis, Darius' architects, working from a unified plan of great scope, had already begun construction on a gigantic terrace of the Apadana (an audience hall), the Tripylon, a palace, and a treasury. When Xerxes became king, he had laid the enameled-brick facing on the exterior of the Apadana and finished his father's palace. Then he erected other monuments: his own palace, southeast of Darius' and similar to it in plan, and a mysterious building called the Harem by archaeologists—a line of small, identical rooms that may have been Xerxes' treasury. He also undertook construction of the Hall of a Hundred Columns, or Throne Room, but he was able to finish only the paving and the base of the walls (the walls themselves and the decoration of this gigantic hypostyle hall were the work of Artaxerxes I). These buildings marked an evolution toward the colossal and toward a style that was perhaps more pretentious than that typical of Darius' reign.

Little is known about the last years of Xerxes' life. After his reversal in Greece, he withdrew into himself and allowed himself to be drawn into harem intrigues in which he was, in fact, only a pawn: thus, he disposed of his brother's entire family at the demand of the queen. But in 465 he himself fell, together with his eldest son, under the blows of murderous members of his court, among them his minister Artabanus. Another son, Artaxerxes I, succeeded in retaining power. (J.-L.Hu.)

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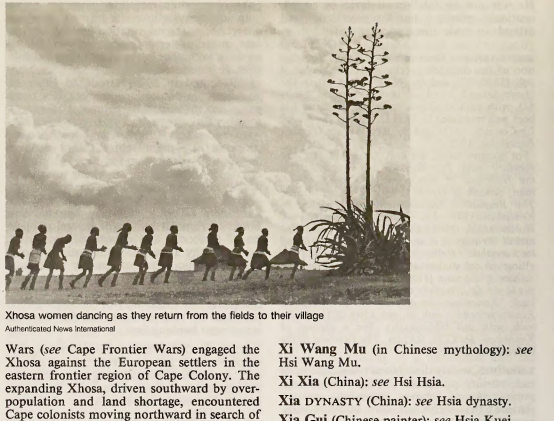
Xhosa, also spelled XOSA, formerly KAFFIR, or KAFIR (Arabic: "Infidel"), a cluster of related tribes living primarily in Eastern Cape province, South Africa, and forming part of the southern Nguni (*q.v.*) group of Bantu-speaking peoples. The main Xhosa groups are the Gcaleka, Ngika, Ndlamba, Dushane, Qayi, Ntinde, and the Gqunkhwebe (the latter being partly of Khoikhoin origin).

In the late 18th and the 19th centuries, a series of conflicts popularly called the Kaffir



Xhosa women dancing as they return from the fields to their village
Authenticated News International

Wars (*see* Cape Frontier Wars) engaged the Xhosa against the European settlers in the eastern frontier region of Cape Colony. The expanding Xhosa, driven southward by overpopulation and land shortage, encountered Cape colonists moving northward in search of good farmland. The struggle lasted for a century, but eventually the Xhosa were defeated by the European settlers and their territories were annexed by the Cape Colony. Europeans attached the name "Transkei" to the Xhosa lands lying beyond the Great Kei River; those between the Great Fish and Great Kei rivers they called "Ciskei."

In 1959 Transkei was administratively created by the South African government as a nonindependent black state (Ciskei followed in 1961) designated for the Xhosa-speaking peoples. Beginning in the 1960s, a high proportion of workers left Transkei as labour migrants, going to Johannesburg and other parts of the country. This migration of workers (for the most part men) seriously disrupted Xhosa family and community life. Many Ciskei residents commuted to work in the industrial areas of East London and King William's Town, just outside the Ciskei borders. With the repeal of the apartheid system of racial separation, Transkei and Ciskei became part of Eastern Cape province in 1994.

Many Xhosa are agriculturists who keep some cattle. They are organized into patrilineal clans, each of which is associated with a tribe or chiefdom, the clan head being the tribal chief, ruling with the aid of a council of the heads of the small subclans and lineages. The Xhosa numbered about 7,300,000 in the late 20th century.

Xhosa-Ciskei (South Africa): *see* Ciskei.

Xhosa language, also spelled XOSA, formerly KAFFIR, or KAFIR, a Bantu language spoken in the Republic of South Africa, especially in Eastern Cape province. Xhosa is a member of the Southeastern, or Nguni, subgroup of the Bantu group of the Benue-Congo branch of the Niger-Congo language family. Other languages of the subgroup are Zulu, Swazi, Basuto (or Sotho), Tswana (or Bechuana), Venda, and Ndebele. Although Xhosa and Zulu are similar enough to be considered dialects of one language, Xhosa and Zulu speakers consider them to be separate languages.

The sound system of Xhosa contains three types of click sounds borrowed from the neighbouring Khoisan languages. Xhosa uses a system of tones to distinguish words that would otherwise sound the same.

Xi Jiang (river, China): *see* Hsi River.

Xi Kang (Taoist philosopher): *see* Hsi K'ang.

Xi Wang Mu (in Chinese mythology): *see* Hsi Wang Mu.

Xi Xia (China): *see* Hsi Hsia.

Xia DYNASTY (China): *see* Hsia dynasty.

Xia Gui (Chinese painter): *see* Hsia Kuei.

Xiaguan (China): *see* Ta-li.

Xian (China): *see* Sian.

xian (Chinese vessel): *see* yen.

Xiang Jiang (China): *see* Hsiang River.

Xiang Yu (Chinese rebel leader): *see* Hsiang Yü.

Xiangfan (China): *see* Hsiang-fan.

Xiangkhoang, also spelled XIENG KHOUANG, town, north-central Laos. Xiangkhoang lies just south of the Plain of Jarres and is situated in the Xiangkhoang Plateau. Corn (maize) and rice are raised by valley Lao north of Xiangkhoang and by Lao-Theung (Mon-Khmer) and Tai Neua groups in scattered upland areas to the north and east of the town; the Hmong (Miao, or Meo), a highland minority, have traditionally grown opium poppies as a cash crop.

The area in which Xiangkhoang is situated also has perhaps the greatest variety of unexploited minerals in Laos, including coal, iron ore, antimony, lead, zinc, silver, and copper. Xiangkhoang is linked to Louangphrabang and Muang Vangviang by highway.

Xiangkhoang Plateau, French PLATEAU DE XIANGKHOANG, formerly PLATEAU DU TRANNINH, English TRAN NINH PLATEAU, dissected upland of complex geologic structure in north-central Laos. The plateau constitutes a western extension of the northern Annamite Chain; it is drained principally by the Ngum and Ngiap (Nhiêp) rivers to the south and the Khan River to the north, all of which are Mekong River tributaries. Once the upland's limestone and sandstone hills were covered with tropical monsoon rain forest, but shifting cultivation practiced by mountain Hmong (Miao, or Meo) and Lao-Theung (Mon-Khmer) peoples have left only scattered remnants of oak and pine, principally along the stream courses. Around Xiangkhoang town are workable deposits of alluvial gold, antimony, copper, lead, zinc, and silver.

Xiangtan (China): *see* Hsiang-t'an.

Xianyang (China): *see* Hsien-yang.

xiao (filial piety): *see* hsiao.

Xiaowen Di (Chinese emperor): *see* Hsiao-wen Ti.

xiaozhuan (script): *see* hsiao-chuan.

Xie He (Chinese painter): *see* Hsieh Ho.

Xin DYNASTY (China): *see* Hsin dynasty.

Xin Jiang (China): *see* Hsin River.

Xin Qiji (Chinese poet): *see* Hsin Ch'i-chi.

xingshu (script): *see* hsing-shu.

Xingtai (China): *see* Hsing-t'ai.

Xingu River, Portuguese RIO XINGU, river in Mato Grosso and Pará states, Brazil. The river rises on the Planalto (plateau) do Mato Grosso, in the drainage basin framed by the Serra do Roncador and the Serra Formosa mountain ranges. Formed by several headstreams, principally the Curiseu, Batovi, and Romuro rivers, the Xingu meanders generally northward for approximately 1,300 mi (2,100 km), emptying into the Amazon River just south of the Ilha (island) Grande de Gurupá. South of Altamira it receives its main tributary, the Iriri (800 mi long).

Although the Xingu's lower course is wide (12½ mi) at its mouth and the channel is deep, the river is navigable only from its mouth to Sousel and Vitória, 125 mi south. Its upper course is marked by innumerable rapids. The Xingu–Araguaia Hydroelectric Project was built along the river during the late 1970s. The Xingu was first explored in 1884–87 by the German ethnologist and explorer Karl von den Steinen. In the 1950s Xingu National Park was designated as a preserve for Brazil's Indians, including the Tchikao, who were threatened by extinction.

Xining (China): *see* Hsi-ning.

Xinxiang (China): *see* Hsin-hsiang.

Xinyang (China): *see* Hsin-yang.

Xiong Foxi, Foxi also spelled FUXI, Wade–Giles romanization HSIUNG FO-HSI (b. 1900, Feng-ch'eng, Kiangsi Province, China—d. Oct. 26, 1965, Shanghai), Chinese playwright who helped to create popular drama intended to entertain and educate the peasantry.

Xiong Foxi began writing, directing, and acting in plays as a youth and, while at Yenching University, helped to establish the Minchung Hsi-chü She (People's Dramatic Society). After graduate work at Columbia University, New York City, he returned to China as a professor of dramatic arts and as the editor of a drama magazine. The high point of Xiong Foxi's career came in 1932, when he was appointed director of experimental rural theatre in Ting-hsien, Hopeh Province. Xiong Foxi lived among the peasants so that he could write plays that they could understand and learn from. His productions, which often used Western dramatic techniques and emphasized the importance of staging, won him wide renown; he described his experiences in the book *An Experiment in Popularizing Drama* (1937).

During the Sino-Japanese War (1937–45), Xiong Foxi served the Nationalist government as a theatre director, president of a dramatic arts college, and founder of two literary magazines. He also continued to write during this time, producing two novels and numerous short stories. After the Communist government was established in 1949, he was a leading member of many of its cultural and educational committees.

Xiong Shili: *see* Hsiung Shih-li.

Xiongnu (people): *see* Hsiung-nu.

Xipe Totec (Nahuatl: "Our Lord the Flayed One"), pre-Columbian Mexican god of spring (the beginning of the rainy season) and of new vegetation; he was also the patron of goldsmiths.

As a symbol of the new vegetation, Xipe Totec wore the skin of a human victim—the "new skin" that covered the Earth in the spring. His statues and stone masks always show him wearing a freshly flayed skin. Described as *anauatl iteouh* ("god of the coast"), Xipe Totec was originally a deity of the Zapotec and Yopi Indians in the present states



Xipe Totec, pottery figure from Monte Albán, Zapotec culture, 8th–11th century AD
Hamlyn Group Picture Library

of Oaxaca and Guerrero, an area believed to be particularly rich in gold. Among the Zapotecs he was considered a vegetation god and was associated with the Feathered Serpent (Quetzalcóatl). Xipe Totec was considered a foreign god, and his temple bore the name Yopico, or the "Yopi Place." Representations of Xipe Totec first appeared at Xolalpan, near Teotihuacán, and at Texcoco, in connection with the Mazapan culture—that is, during the post-Classic Toltec phase (9th–12th century AD). The Aztecs later adopted his cult under the reign of Axayacatl (1469–81). During the second ritual month of the Aztec year, Tlacaxipehualiztli ("Flaying of Men"), the priests killed human victims by removing their hearts. They flayed the bodies and put on the skins, which were dyed yellow and called *teocuitlaquemitl* ("golden clothes"). Other victims were fastened to a frame and put to death with arrows; their blood dripping down was believed to symbolize the fertile spring rains. A hymn sung in honour of Xipe Totec called him Yoalli Tlauana ("Night Drinker") because beneficent rains fell during the night; it thanked him for bringing the Feathered Serpent, symbol of plenty, and for averting drought.

Xipibo (Andean Indians): *see* Shipibo.

Xirgu, Margarita, in full MARGARITA XIRGU I SUBIRÀ (b. June 18, 1888, Molins de Rey, Spain—d. April 25, 1969, Montevideo), Catalan actress and producer whose greatest contribution was her advancement of the plays of Federico García Lorca.

Xirgu made her professional debut in Barcelona in 1906 and five years later joined the Teatro Principal. She made her first appearance in Madrid in 1914, performing exclusively in the Catalan language. Over the next 20 years she applied her depth of feeling and brilliant technique with equal success to comedy and tragedy, including triumphs as Salome, Saint Joan, and Medea. Xirgu became director of the Teatro Español in Barcelona, where she produced and starred in the premiere performances of many of García Lorca's plays, notably *Mariana Pineda* (1927) and *Yerma* (1934). She was on tour in Latin America when the Spanish Civil War broke out in 1936, and she spent the remainder of her life in voluntary exile in Argentina (where she staged the world premiere of García Lorca's *La casa de Bernarda Alba* in 1945) and in Uruguay (where she headed the Montevideo drama school). Her motion pictures include *Violante* (1910) and García Lorca's *Bodas de sangre* (1939; "Blood Wedding").

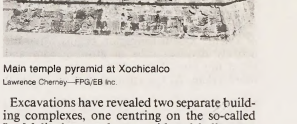
Xiuhtecuhtli (Nahuatl: "Turquoise [Year] Lord"), also called HUEHUETEOTL ("Old God"), Aztec god of fire, thought to be the creator of all life. "Old God" is a reflection of his relative age in the Aztec pantheon. In association with Chantico, his feminine counterpart, Xiuhtecuhtli was believed to be a representation of the divine creator, Ometecuhtli.

One of the important duties of an Aztec priest centred on the maintenance of the sacred fire, making sure that it should burn perpetually. A new fire was ritually kindled during the dedication of new buildings. The two festivals of Xiuhtecuhtli coincide with the two extremes in the climatological cycle, the heat of August and the cold of January. Once every 52 years, at the end of a complete cycle in the calendar of the Aztecs, fire was also ceremonially transferred, first from temple to temple, and then from temples to homes.

The god of fire appears in various representations and guises, one of which depicts him as a toothless old man with a stooped back, carrying an enormous brazier on his head. His insignia was the Xiuhcóatl, or serpent of fire, characterized by a nose of horn, decorated with seven stars.

Xochicalco, ancient Toltec city known for its impressive ruins; it is located on the top of a large hill and parts of surrounding hills near Cuernavaca, in Morelos state, Mexico.

Xochicalco was built primarily during the 8th and 9th centuries AD and soon became an important trading centre. Although it also served for many years as a prominent religious centre, it was apparently turned into a defensive stronghold before the Spanish conquest (*c.* 1520).



Main temple pyramid at Xochicalco
Lawrence Cherney—FPG/EB Inc.

Excavations have revealed two separate building complexes, one centring on the so-called La Malinche temple pyramid and ball court, the other built around the main temple pyramid, the principal monument at Xochicalco. Built on a four-sided base, the main pyramid is especially famous for its lower facing of perfectly fitted and intricately carved stones. The reliefs, which show strong Mayan influence, portray plumed serpents, priests with elaborate headdresses, squatting warriors, glyphs, and fire symbols.

Xochimilco, delegation (administrative subdivision), central Federal District, central Mexico. It lies at 7,461 ft (2,274 m) above sea level in the Valley of Mexico, on Lake Xochimilco. Built on the site of a pre-Columbian town, Xochimilco is famous for its *chinampas,* or floating gardens. Indians constructed rafts on the lake, covered them with soil, and cultivated fruits, vegetables, and flowers, which they shipped to Mexico City via canal. In time the rafts took root and became islands. Tourism is a major source of income. Down-

town Mexico City, 14 mi (23 km) to the north-northwest, can be reached via a link to the peripheral expressway or by several major avenues. A campus of the Autonomous Metropolitan University of Mexico City is located in Xochimilco. Pop. (1990) 271,151.

Xochiquetzal (Nahuatl: "Precious Feather Flower"), Aztec goddess of beauty, sexual love, and household arts. She is also associated with flowers and plants and, in myth, came from Tamoanchán, the verdant paradise of the west.



Xochiquetzal, illustration from the Codex Fejérváry-Mayer
By courtesy of the Liverpool City Museum

Originally wife of Tlaloc, the rain god, she was abducted for her beauty by Tezcatlipoca, the malevolent god of night, who enthroned her as goddess of love. In some areas she was identified with Chalchiuhtlicue, goddess of freshwater.

Xosa: *see under* Xhosa.

Xu (Chinese surname): *see under* Hsü.

Xuan (Chinese surname): *see under* Hsüan.

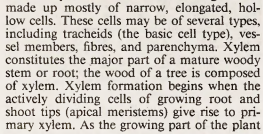
Xuanhua (China): *see* Hsüan-hua.

Xuchang (China): *see* Hsü-ch'ang.

Xun Zi (Chinese philosopher): *see* Hsün-tzu.

Xuzhou (China): *see* Suchow.

xylem, in botany, part of the vascular system that conveys water and dissolved minerals from the roots to the rest of the plant and may also furnish mechanical support. Xylem consists of specialized water-conducting tissues made up mostly of narrow, elongated, hollow cells. These cells may be of several types, including tracheids (the basic cell type), vessel members, fibres, and parenchyma. Xylem constitutes the major part of a mature woody stem or root; the wood of a tree is composed of xylem. Xylem formation begins when the actively dividing cells of growing root and shoot tips (apical meristems) give rise to primary xylem. As the growing part of the plant



Cross section of oak xylem
J.M. Langham

builds past the xylem thus formed, the vascular cambium produces secondary xylem tissues that cover the primary xylem. When this happens the primary xylem cells become dead and empty, losing their conducting function and forming a hard skeleton that serves only to support the plant. Thus, in the trunk and older branches of a large tree only the outer part of the wood (secondary xylem) serves in water conduction, while the inner part (heartwood) is composed of dead but structurally strong primary xylem. *See also* parenchyma; tracheid; vessel.

xylene, any of three isomeric dimethylbenzenes [which have the same chemical formula, $C_6H_4(CH_3)_2$, but different molecular structure], used as solvents, as components of aviation fuel, and as raw materials for the manufacture of dyes, fibres, and films. The three isomers, designated ortho (*o*), meta (*m*), and para (*p*), differ structurally only in the location of the methyl groups. All three are obtained from coal-tar distillate and petroleum as a mixture containing 50–60 percent by volume of *m*-xylene and 20–25 percent of each of the other isomers. Fractional distillation of the mixture removes the meta and para isomers, which have very similar boiling points, from the less volatile ortho isomer. Upon cooling the mixture of meta and para isomers, much of the *p*-xylene crystallizes in nearly pure form. The meta isomer, the principal component of the remaining liquid, then can be purified by taking advantage of its solubility in a mixture of hydrofluoric acid and boron trifluoride. Meta- and para-xylene undergo nitration and reduction to give xylidines, used in making dyes. The meta isomer also is converted to trinitro-*t*-butyl-*m*-xylene, or xylene musk, a component of perfumes. Oxidation of the xylenes gives monocarboxylic acids (toluic acids), and then dicarboxylic acids (phthalic acids).

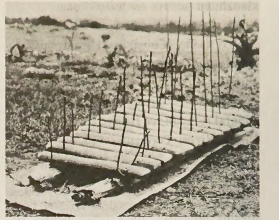
The commercial xylene mixture is a colourless, nonviscous, flammable, toxic liquid that is insoluble in water but miscible with many organic liquids. Xylene is commonly used as a solvent for lacquers and rubber cements.

To make the best use of the Britannica, consult the INDEX *first*

xylophone (from Greek *xylon* and *phonē*: "wood" and "sound"), percussion instrument consisting of a set of graduated, tuned wooden bars supported at nodal (nonvibrating) points and struck with padded mallets. The xylophone possibly originated in Southeast Asia or Oceania and presently exists in forms as simple as two or three logs laid across a player's legs or as wooden slabs set across two supports such as logs; a pit dug in the earth may act as a resonating chamber. In more complex forms the wooden bars are affixed to a frame and often supplied with resonators integral to the instrument. Among the most highly developed types is the Indonesian *gambang*, in which the bars are pinned on the edges of a wooden trough that serves as a resonator. Possessing a range of about 3½ or 4 octaves, the *gambang* is used in the gamelan (Indonesian percussion orchestra). It was known as early as the 8th century and gave rise to similar instruments with metal keys (metallophones) also prominent in Indonesian music. Xylophones were introduced into China from Burma in the late 18th century.

The xylophone is also one of the principal instruments of African music, being found in many forms. The *amadinda* is made of logs. Gourd resonators are often provided for each key, sometimes with a mirliton (vibrating membrane) set in the resonator wall, giving a buzzing edge to the tone. Many African xylophones show similarities to Southeast Asian ones in tuning and construction, and they may have come to Africa through trade or migrating peoples. It is known in Latin America as a marimba (*q.v.*; one of its African names) and was probably taken there by African slaves.

The xylophone is first mentioned in Europe in 1511, known as *hölzernes Gelächter* ("wooden percussion") or *Strohfiedel* ("straw fiddle," because the bars were supported on straw), it was long a Central European folk



African log *amadinda* xylophone; property of the Uganda Museum, Kampala
Hillegist/Kubik

instrument, in which the bars extended away from the player instead of in a line across him. Carillonneurs in Flanders and the Netherlands often used a keyboard version as a practice instrument. About 1830 it became immensely popular through the concerts of the touring Polish virtuoso Michal Jozef Guzikov, who used the then common "four-street" instrument (having four staggered rows, tuned chromatically—*i.e.*, to a 12-note scale). It became a fashionable solo and garden concert instrument.

In its 20th-century form the xylophone's keys are usually arranged in two rows, somewhat like piano keys, on a stand; to improve the tone, a hollow groove is cut along the underside of each plate. Tube resonators are often provided. The compass is normally four octaves upward from middle C. Works using it include *Le Marteau sans maître* (*The Hammer Without a Master,* 1954), by Pierre Boulez, and *The Golden Age* (1930), by Dmitry Shostakovich. Western metallophones related to the xylophone include the glockenspiel and vibraphone.

Xystus (name of popes): *see under* Sixtus.

XYY-trisomy, relatively common human sex chromosome anomaly in which a male has two Y chromosomes rather than one. It occurs in 1 in 500–1,000 live male births, and individuals with the anamoly are often characterized by tallness and severe acne and sometimes by skeletal malformations and mental deficiency. It has been suggested that the presence of an extra Y chromosome in an individual may cause him to be more aggressive and prone to criminal behaviour, a condition called the "supermale" syndrome. Studies of prison populations have tended to confirm this hypothesis; but subsequent studies of the general population, especially those in which affected individuals were observed from early childhood over a long period of time, have cast serious doubt on the validity of linking the chromosomal anomaly directly to behavioral abnormalities.

XYZ Affair, diplomatic incident that, when made public in 1798, nearly involved the United States and France in war. Pres. John Adams dispatched three ministers to France in 1797 to negotiate a commercial agreement to protect U.S. shipping. In Paris the ministers were approached by three French agents who suggested a bribe of $250,000 to Talleyrand, the French foreign minister, and a loan of $10,000,000 to France as a prelude to negotiations. In April 1798 the machinations of the three French agents (called X, Y, and Z in the diplomatic correspondence) were made public in the United States. There was a great outcry over the bribe solicitation, followed by preparations for war. Although a period of undeclared naval warfare ensued between France and the United States formal war was avoided, and the incident was settled by the Convention of 1800.

Ya-an, Pinyin YA'AN, city in west-central Szechwan *sheng* (province), China. Ya-an is situated in the mountainous western border of the Szechwan Basin. It is a communications centre near the crossing of two main routes—one running west to K'ang-ting and to Tibet and another running north–south from Ch'eng-tu to the southwest.

Established as the seat of a county under the Ch'in (221–206 BC) and Han (206 BC–AD 220) dynasties, it was later abandoned to the Mongols. Retaken by the Chinese in the late 5th century, it became in 604 the seat of Ya Prefecture, whence it derived its modern name. It was, however, little more than a frontier garrison protecting the western approaches to Szechwan from Tibet. Known as Ya-chou, or Ya-chou Prefecture, throughout Ming (1368–1644) and Ch'ing (1644–1911) times, it became the county of Ya-an in 1912. In 1939 it was placed in the new province of Hsi-k'ang. Under Communist rule it replaced K'ang-ting in 1950 as capital of Hsi-k'ang, but, when the latter province was abolished in 1955, it again became part of Szechwan.

The city is a traditional market for the tea grown in quantity in the surrounding agricultural area; the tea is cured and prepared in the city. It is also a market for trade in medicinal herbs and animal products. From nearby Tao-fu, iron ore of high quality is shipped to the industrial city of Chungking. Ya-an has small-scale iron manufacture, using local anthracite for fuel. The city also has tanneries, mica and asbos plants, and small engineering works producing farm tools and repairing and maintaining automobiles and machinery. Pop. (1985 est.) 86,000.

Ya-lu-tsang-pu Chiang (Asia): *see* Brahmaputra River.

Ya-lung River, Wade–Giles romanization YA-LUNG CHIANG, Pinyin YALONG JIANG, long secondary tributary of the Yangtze River in central and southern China. The Ya-lung rises in the Pa-yen-k'a-la Mountains in Tsinghai Province at an elevation of nearly 16,500 feet (5,000 m). The upper stream flows southeastward to the south of the Pa-yen-k'a-la Mountains into northwestern Szechwan Province. Below Kan-tzu it swings southward to flow along the western side of the Ta-hsüeh Mountains. After making some wide loops in its course at the southern end of this range, the river flows into the Chin-sha River near Tu-k'ou on the border of Yunnan Province. The Ya-lung is torrential for most of its course and carries a very large volume of water, but it is useless for navigation. Until comparatively recently, its lower course, south of the Ta-hsüeh Mountains, was the limit of effective Chinese penetration to the West; its valley provided the major trade route from Ch'eng-tu in Szechwan to Ta-li in Yunnan and to Southwest China and northern Myanmar (Burma).

Yaabetz: *see* Emden, Jacob Israel.

yab-yum (Tibetan: "father-mother"), in Buddhist art of India, Nepal, and Tibet, the representation of the male deity in sexual embrace with his female consort. The pose is generally understood to represent the mystical union of the active force, or method (*upāya,* conceived of as masculine), with wisdom (prajna, conceived of as feminine)—a fusion necessary to overcome the false duality of the world of appearances in the striving toward spiritual Enlightenment. The use of sexual union as a symbol of mystical union evolved from Indian Tantric thought. It was never fully accepted by the Buddhists of China and Japan. Even in Tibet the *yab-yum* images are not intended for general use but are meant to be viewed only by those who have received proper instruction concerning their esoteric significance. In Tibet, entreaties are considered more efficacious when made to a deity in the company of



Dhyāni-bodhisattva Samantabhadra in the *yab-yum* attitude with his consort, painting on a Tibetan temple banner, *c.* 19th century; in the collection of Fosco Maraini, Florence

By courtesy of Fosco Maraini

his consort, and the tutelary deities (*yi-dam*) adopted by monks and priests are invariably represented in the *yab-yum* attitude.

Yablochkov, Pavel Nikolayevich, also called PAUL JABLOCHKOV (b. Sept. 14 [Sept. 2, Old Style], 1847, Zhadovka, Russia—d. March 31 [March 19], 1894, Saratov), Russian electrical engineer and inventor who developed the Yablochkov candle, the first arc lamp that was put to wide practical use and that greatly accelerated the development of electric lighting.



Yablochkov, lithograph by Lemercier, *c* 1880

H. Roger-Viollet

In 1871 Yablochkov was appointed director of the telegraph lines between Moscow and Kursk, a position he resigned in 1875 to devote himself to research on arc lamps. In 1876 he settled in Paris, and late in that year he completed work on his candles, which consisted of two parallel carbon rods separated by a nonconducting clay partition that gradually vaporized as the carbons burned away. For a few years his system was widely used for street lighting in European cities, but it was gradually superseded by incandescent lighting. Yablochkov contributed various other electrical developments but died in poverty.

Yablonitsky Pass, Russian PEREVAL YABLONITSKY, also spelled PEREVAL JABLONICKIJ, pass in the outer eastern Carpathians of western Ukraine, an important route connecting the rest of the republic with the isolated Zakarpatskaya *oblast* (administrative region) and with northeastern Romania. The southern portion of the pass is formed by the valley of the Tisa River, and the northern section contains the headwaters of the Prut. The head of the pass is 3,054 feet (931 m) above sea level and is crossed by a road and a railway line. The nearby mountains rise to more than 6,600 feet (2,000 m).

Yablonovy Range, Russian YABLONOVY KHREBET, mountain range in the Transbaikalia region of Chita *oblast* (province) and Buryatiya, in far eastern Russia. The range is some 500 miles (800 km) long northeast–southwest and reaches a maximum height of 5,512 feet (1,680 m) in Mount Kusoluy. Formed principally of granites and gneisses, it has been uplifted and much-fractured. The highest peaks are bare, but most of the range is densely forested with larch, spruce, and pine. The Trans-Siberian Railroad crosses the range by a low pass at Yablonovaya.

yacht, a sail- or power-driven vessel, usually light and comparatively small, used for racing or for recreation. In recreation the term applies to very large craft, originally powered by sail and later by steam or internal-combustion engines. It is in this sense that the generality of nonyachting (nonsailing) people usually think of the term. Technically, the word yacht excludes boats propelled by paddles, oars, or outboard motors. Also, recreational powered craft below the largest size are usually called cabin cruisers (*see* motorboat).

The English word *yacht* and the equivalent word in many European languages comes from the Dutch use in the 16th and 17th centuries of the word *jaght,* later *jacht,* which, with the word *schip* added, meant "ship for chasing."

Yachting and yacht clubs. As the Dutch rose to preeminence in sea power during the 17th century, the early yacht became a pleasure craft used first by royalty and later by the burghers on the canals and the protected and unprotected waters of the Low Countries. Racing was incidental, arising as private matches. English yachting began with King Charles II of England during his exile in the Low Countries. On his restoration to the English throne in 1660, the city of Amsterdam presented him with a 20-metre (66-foot) pleasure boat with a beam (maximum width) of 5.6 m (18 feet), which he named *Mary.* Charles and his brother James, the duke of York (James II, reigned 1685–88), built other yachts and in 1662 raced two of them for a £100 wager on the Thames from Greenwich to Gravesend and back. Yachting became fashionable among the wealthy and nobility, but at that time the fashion did not last.

The first yacht club in the British Isles, the Water Club, was formed about 1720 at Cork, Ire., as a cruising and unofficial coast guard organization, with much naval panoply and formality. The closest thing to a race was the "chase," when the "fleet" pursued an imaginary enemy. The club persisted, largely as a social club, until 1765 and in 1828 became, after merging with other groups, the Cork Yacht Club (later the Royal Cork Yacht Club).

Yacht racing began in some organized fashion on the Thames about the mid-18th century. The duke of Cumberland founded the Cumberland Fleet for Thames racing in 1775. When George IV came to the throne in 1820, it came to be called the Fleet to His Majesty's Coronation Sailing Society. The Thames Yacht Club seceded after a racing dispute to become the Royal Thames Yacht Club in 1830. The first English yacht club had been formed at Cowes on the Isle of Wight in 1815, and royal patronage made the Solent, the strait between the mainland and the Isle of Wight, the continuing site of British yachting.

The club at Cowes became the Royal Yachting Club, again at the accession of George IV. All members were required to own boats of at least 20 tons (20,321 kg). Sailing matches for large stakes were held, and the social life was splendid. Ultimately Royal Yachting Club boats increased in size to more than 350 tons.

In North America yachting began with the Dutch in New York in the 17th century and continued when the English gained control. Sailing was mostly for pleasure and reached its apogee in George Crowinshield's *Cleopatra's Barge* (1815), which cruised on the Mediterranean Sea and set a standard of luxury and elegance for the later yachts in those waters from the late 19th century. The first continuing American yacht club, the Detroit Boat Club, was formed in 1839. In 1844 John C. Stevens founded the New York Yacht Club aboard his schooner *Gimcrack*.

Kinds of sailboats. Early sailing yachts followed the lines of such naval craft as brigantines, schooners, and cutters from the 17th century until the second half of the 19th century. The design of large yachts was first greatly affected by the success of *America*, which was designed by George Steers for a syndicate headed by John C. Stevens and was the boat for which the America's Cup (*q.v.*) was named after its victory at Cowes in 1851. Early yachts were not designed and built in the modern sense, only a model being used. Not until the second half of the 19th century did what was called naval architecture come into being. Not until the 1920s did the application of the science of aerodynamics do for the design of sails and rigging what science had earlier done for hulls.

Because nearly all sailboats were individually custom-built, there arose a need for handicapping boats before the one-design class boats were built. Thus, a rating rule came into being, which resulted in the International Rule, adopted in 1906 and revised in 1919. Today, one of the fastest growing areas in the field of sailing is that of one-design class boats. All boats in a one-design class are built to the same specifications in length, beam, sail area, and other elements. Racing between such boats can be held on an even basis with no handicapping necessary. A prime example is the uniform International America's Cup Class adopted for participants in the 1992 America's Cup race.

So long as yachting belonged primarily to the royal and the rich, cost was no object, and the size of boats increased, in both length and weight. The promotion and popularity of smaller craft came in the second half of the 19th century from the sailing of the Englishmen R.T. McMullen, a stockbroker, and E.F. Knight, a barrister and journalist. A voyage around the world (1895–98) sailed singlehandedly by the naturalized American captain Joshua Slocum in the 11.3-metre *Spray* demonstrated the seaworthiness of small craft. Thereafter in the 20th century, notably after World War II, smaller racing and recreational craft became more common, down to the dinghy, a favourite training boat, of 3.7 m. In the late 20th century boats of less than 3 m were sailed single-handedly across the Atlantic Ocean.

Kinds of power yachts. After the decade 1840–50, when steam began to replace sail power in commercial vessels, the steam engine and, later, the internal-combustion engine were increasingly employed in pleasure vessels. Large power yachts were developed to a high degree, and long-distance cruising became a favourite pastime of the rich. The earliest power yachts were paddle-wheel boats; these then gave way to those powered by the completely submerged screw or propeller type of propulsion. As in the case of naval and merchant vessels, auxiliaries carrying both sail and power were the yacht fashion for a number of years. By the second half of the 20th century many yachts were still auxiliaries, but the majority were exclusively power yachts containing gasoline or diesel engines.

During the last decade of the 19th century there was a boom in the construction of large steam yachts. Conspicuous among these was the *Mayflower* (1897) of 2,690 tons, containing triple-expansion engines, twin screws, and a compartmented iron hull and manned by a crew of more than 150. The *Mayflower*, purchased by the United States Navy in 1898, was the official yacht of the president of the United States until 1929 and saw active service during World War II.

As larger and more reliable internal-combustion engines were produced, many large yachts began using them for power. The development of the diesel engine, using heavy oil for fuel, advanced during World War I; and, in the decade that followed, large power-yacht building flourished, reaching a climax in the *Orion* (1930), 3,097 tons. During that period the largest auxiliary yacht built was the four-masted, steel, barque-rigged *Sea Cloud* (1931), 2,323 tons.

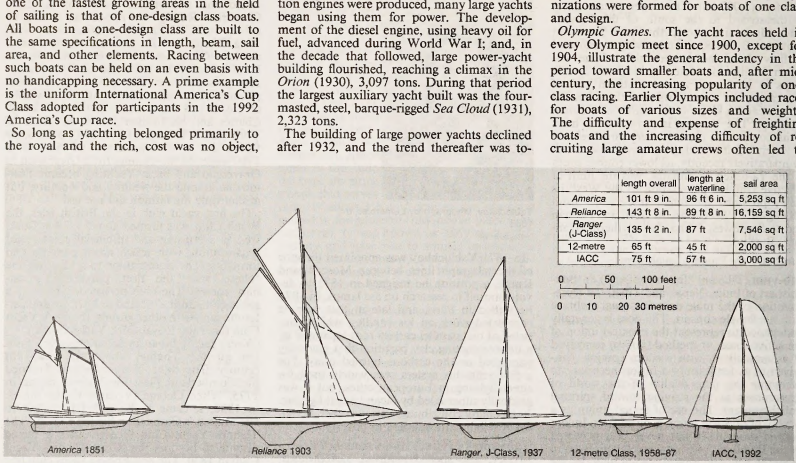
The building of large power yachts declined after 1932, and the trend thereafter was toward smaller, less expensive craft. After World War II, many small naval vessels were sold to private owners for conversion to yachts. By the late 20th century yachting had become a widespread popular sport enjoyed by thousands of yachtsmen personally manning and maintaining their own small pleasure craft. The number of yachts and yachtsmen increased steadily, not only in the traditional areas along the seacoasts but also on inland waterways and lakes.

Racing clubs. In England by 1881 most of the important yacht clubs had become members of the Yacht Racing Association (founded 1875; from 1952 called the Royal Yachting Association). The organization made rules governing regatta sailing and later took on duties as a representative body for all British yachting, including dealing with port, harbour, and other governmental authorities. In the United States, where there is much freshwater sailing, yacht clubs were founded between 1849 and 1880 at New Orleans, La.; Detroit, Mich.; Boston; San Francisco; Marblehead, Mass.; Oyster Bay, N.Y.; Chicago; and Larchmont, N.Y. By the late 20th century there were approximately 1,500 active yacht clubs in the United States. The Royal Canadian Yacht Club was founded in 1852, and the Australian Yacht Squadron (later the Royal Sydney Yacht Squadron) in 1862. Yacht clubs were founded in a number of countries throughout the world. The North American Racing Union was formed in 1925. A need for a body to set international racing rules and classes resulted in the founding of the International Yacht Racing Union (IYRU) in 1907.

Yachting organizations with specialized interests also arose, including the Cruising Club of America (founded 1922) and the Royal Ocean Racing Club (founded 1925), both of which are active in offshore and ocean racing. Many other specialized organizations were formed for preparing charts and offering challenge cups for small sailing craft. During the second half of the 20th century, many organizations were formed for boats of one class and design.

Olympic Games. The yacht races held in every Olympic meet since 1900, except for 1904, illustrate the general tendency in the period toward smaller boats and, after mid-century, the increasing popularity of one-class racing. Earlier Olympics included races for boats of various sizes and weights. The difficulty and expense of freighting boats and the increasing difficulty of recruiting large amateur crews often led to

	length overall	length at waterline	sail area
America	101 ft 9 in.	96 ft 6 in.	5,253 sq ft
Reliance	143 ft 8 in.	89 ft 8 in.	16,159 sq ft
Ranger (J-Class)	135 ft 2 in.	87 ft	7,546 sq ft
12-metre	65 ft	45 ft	2,000 sq ft
IACC	75 ft	57 ft	3,000 sq ft



Evolution of America's Cup racing yacht design (from left): *America*, original winner of the cup; *Reliance*, largest defender; *Ranger*, typical J-Class defender; typical 12-metre Class yacht; and International America's Cup Class (IACC)

From (all except IACC) W.H. De Fontaine and E. Ratsey, *Yacht Sails*, copyright 1948 and © 1957 by Ernest A. Ratsey and W.H. De Fontaine, copyright renewed 1975 by Ernest A. Ratsey and Wade Hampton De Fontaine; (IACC) America's Cup Organizing Committee

host countries winning the most races, sometimes by default. After World War II, the number of classes stabilized and the size of boats shrank. There were usually five classes, with 5.5-metre boats predominating, which included a monotype (one-person crew), a two-person centreboard boat, a two-person keeled boat, a three-person one-design boat, and a development boat. Certain models might not appear in Olympic competition one year but again be used in later games. Classes are named by the International Olympic Committee based on recommendations made by the IYRU.

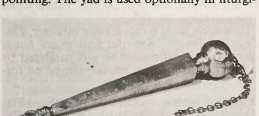
Courses. Sailboat races are held over two kinds of courses: point-to-point and closed. Most ocean racing is point-to-point, as in transoceanic races, global circumnavigation, the Bermuda Race (*q.v.*; first raced in 1906 from Newport to Bermuda), and the Transpacific Race (*q.v.*; first raced in 1906 from California to Hawaii). Such offshore races as the America's Cup and the Fastnet Cup (*qq.v.*) are closed course and point-to-point, respectively. The One Ton Cup (*q.v.*), first raced in 1907, came to include both closed course and point-to-point races. Small boat races, on both inland water and inshore oceanic waters, are usually sailed on closed courses, most commonly triangular.

Transatlantic racing and global circumnavigation. Ocean racing began in 1866 with a match race held under NYYC rules from Sandy Hook, Conn., to Cowes, Isle of Wight, Eng., by three schooners of 32- to 32.6-metre length: *Fleetwing, Vesta,* and *Henrietta. Henrietta,* owned by the American newspaper publisher James Gordon Bennett, won in 13 days of sailing. The first single-sailor transatlantic voyage was made in a 6-metre boat by Alfred Johnson in 1876 to commemorate the centenary of U.S. independence. The first single-handed race in 1891 was won by the American sailor Si Lawlor. A series of single-handed races, sponsored by the London *Observer,* began in 1960 and was held quadrennially thereafter. It was in these races that Francis Chichester (later Sir Francis Chichester, *q.v.*) attracted attention. Interest in sailing around the world was greatly stimulated by his lone voyage around the world in 1966–67. Circumnavigation races included the Golden Globe Race, sponsored by the *Sunday Times* of London in 1968, and races later organized by the Royal Naval Racing Association and held quadrennially from 1973. The introduction of self-steering gear did much to facilitate such racing.

See Sporting Record: *Yachting. See also* Olympic Games.

Yacine Kateb (Algerian author): *see* Kateb, Yacine.

yad (Hebrew: "hand"), plural YADAYIM, in Judaism, a ritual object, usually made of silver but sometimes of wood or other materials, that consists of a shaft affixed to a miniature representation of a hand with its index finger pointing. The yad is used optionally in liturgi-



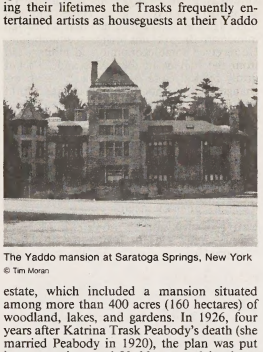
Yad, European, 19th century
By courtesy of the Hebrew Union College Museum, Cincinnati, Ohio

cal services to indicate the place that is being read on a Torah (biblical) scroll, thus eliminating the necessity of touching the sacred manuscript with the hand. Many yadayim are prized as works of art.

Yādava DYNASTY, rulers of a 12th–14th-century Hindu kingdom of central India in what is the modern Indian state of Mahārāshtra. Originally a feudatory of the Eastern Cālukyas of Kalyāni, the dynasty became paramount in the Deccan under Bhillama (*c.* 1187–91), who founded Devagiri (later Daulatābād) as his capital. Under Bhillama's grandson Siṅghana (*c.* 1210–47) the dynasty reached its height at the expense of the Hoysaḷas in the south, the Kākatīyas in the east, and the Paramāras and Cālukyas in the north.

Later rulers continued expansionist wars with varying success. During the reign of the last Yādava king, Rāmacandra (reigned 1271–*c.* 1309), a Muslim army commanded by the Delhi sultan 'Alā'-ud-Dīn Khaljī invaded the kingdom in 1294 and imposed tributary status. A later attempt to throw off the vassalage brought another Delhi army; Rāmacandra was imprisoned but was later released and remained loyal to Delhi until his death. In a further attempt, his son and successor died in battle, and the kingdom was annexed by the Khaljī empire in 1317.

Yaddo, formally THE CORPORATION OF YADDO, a working community of writers, composers, and visual artists, located on the outskirts of Saratoga Springs, New York, U.S. Yaddo is a nonprofit organization founded in 1900 by New York financier Spencer Trask (1844–1909), his wife, the writer Kate, or Katrina, Nichols Trask (1853–1922), and philanthropist George Foster Peabody (1852–1938) for the purpose of providing a place for artists to reside and work in a quiet, secluded atmosphere conducive to creative endeavours. During their lifetimes the Trasks frequently entertained artists as houseguests at their Yaddo



The Yaddo mansion at Saratoga Springs, New York
© Tim Moran

estate, which included a mansion situated among more than 400 acres (160 hectares) of woodland, lakes, and gardens. In 1926, four years after Katrina Trask Peabody's death (she married Peabody in 1920), the plan was put into operation, and Yaddo opened its doors to the first guest-artists.

Typically, guests remain for stays of two to eight weeks, and over the years as many as 177 have been received annually. Applications are reviewed by an advisory committee of artists, and invitations are issued without respect to sex, race, age, or religious persuasion. The quality of one's work is the sole criterion for admission. Among the many notables who have experienced Yaddo's program are Truman Capote, John Cheever, Hermann Broch, James Baldwin, Sylvia Plath, Bernard Malamud, Carson McCullers, Katherine Anne Porter, Clyfford Still, Milton Avery, Raymond Carver, James T. Farrell, William Carlos Williams, Theodore Roethke, Robert Lowell, Langston Hughes, Otto Luening, and Henri Cartier-Bresson.

Yaddo is supported by grants from the New York State Council on the Arts and from the National Endowment for the Arts, as well as by private and corporate funding.

Yadin, Yigael, original name YIGAEL SUKENIK (b. March 21, 1917, Jerusalem—d. June 28, 1984, Ḥadera, Israel), Israeli archaeologist and military leader noted for his work on the Dead Sea Scrolls.

Yadin, the son of an archaeologist, was educated at Hebrew University (M.A., 1945; Ph.D., 1955). He was a member of the Haganah military organization from 1932 to 1948 and served as chief of the general staff of the Israel Defense Forces from 1949 to 1952. He was also deputy prime minister, 1977–81. Yadin, who was a leader of major archaeological expeditions in Israel, including those at Hazor (1955–58; 1968), the Dead Sea Caves (1960–61), and Masada (1963–65), became professor of archaeology at Hebrew University in 1959. He received the laureate of Israel prize (1956) and the Rothschild humanities prize (1964).

Yadin's writings centre upon his archaeological endeavours. They include *The Message of the Scrolls* (1957; new ed. 1962), *Hazor,* 3 vol. (1958–62), and *The Art of Warfare in Biblical Lands in the Light of Archaeological Discovery,* 2 vol. (1963). He is also the author of *Masada: Herod's Fortress and the Zealots' Last Stand* (1966).

Yafo (Israel): *see* Tel Aviv–Yafo.

Yagoda, Genrikh Grigoryevich, Yagoda also spelled JAGODA (b. 1891, Łodz, Pol., Russian Empire—d. March 15, 1938, Moscow), head of the Soviet secret police under Stalin from 1934 to 1936 and a central figure in the purge trials.

Yagoda joined the Bolsheviks in 1907 and became a member of the presidium of the Cheka (Soviet secret police) in 1920. He was a deputy chairman of the Cheka's successor organization, OGPU, from 1924 to 1934 and from 1930 was in charge of the system of forced-labour camps in the Soviet Union. A close, longtime associate of Stalin, Yagoda became in 1934 a member of the Central Committee of the Communist Party and was put in charge of the newly organized Commissariat of Internal Affairs, or NKVD, into which the secret police had been absorbed. There is evidence that Yagoda was instrumental in engineering in 1934 the assassination of Sergey Mironovich Kirov, Leningrad party secretary and a member of the Politburo, whom Stalin perceived as a potential rival. As head of the NKVD, Yagoda prepared the first of the public purge trials (August 1936), in which Zinovyev, L.B. Kamenev, and a number of their associates confessed to a series of astonishing charges and were immediately executed.

One year later Yagoda himself became a victim of the widespread purges that he had helped to carry out on Stalin's orders. He was removed from office in September 1936 and replaced as People's Commissar by N.I. Yezhov, under whose direction the purge trials proceeded. Yagoda was arrested in 1937 and became a defendant at the third public purge trial (March 1938). He was accused of being a member of a "Trotskyite" conspiracy intent on destroying the Soviet Union through sabotage. He was convicted, sentenced to death on March 13, and shot soon afterward.

Yahgan (people): *see* Yámana.

yahrzeit (Yiddish: "year time"), also spelled YORTZEIT, or JAHRZEIT, in Judaism, the anniversary of the death of a parent or close relative, most commonly observed by burning a candle for an entire day. On the anniversary, a male (or female, in Reform and Conservative congregations) usually recites the Qaddish (doxology) in the synagogue at all three services, and males may be called up (*aliyah*) for the public reading of the Torah. If the anniversary falls on a day on which the Torah is

not read, the calling up takes place before the anniversary, as near as possible to the actual date of death. Sephardic (Spanish-rite) Jews attach great importance to the privilege of being called up on the sabbath that precedes the anniversary, for on that day they are allowed to recite the Haftarah (a passage from the prophets).

More learned or more pious Jews may mark the anniversary by studying portions of the Mishna, choosing sections from the sixth division (laws of purity) that begin with letters from the name of the deceased. While some Jews observe a strict fast on *yahrzeit*, others will abstain only from meat and drink. Visiting the grave is no longer quite so common.

Yahrzeit apparently developed from an early Jewish custom of fasting on the anniversaries of the deaths of certain important leaders. During the last centuries of the Second Temple period (*c.* 520 BC–AD 70), Jews are known to have made solemn vows never to partake of meat or wine on the anniversaries of their parents' deaths. As observed today, *yahrzeit* probably began in Germany about the 14th century and gradually spread to other regions.

Yahweh, the God of the Israelites, his name being revealed to Moses as four Hebrew consonants (YHWH) called the tetragrammaton. After the Exile (6th century BC), and especially from the 3rd century BC on, Jews ceased to use the name Yahweh for two reasons. As Judaism became a universal religion through its proselytizing in the Greco-Roman world, the more common noun *'elohim*, meaning "god," tended to replace Yahweh to demonstrate the universal sovereignty of Israel's God over all others. At the same time, the divine name was increasingly regarded as too sacred to be uttered; it was thus replaced vocally in the synagogue ritual by the Hebrew word Adonai ("My Lord"), which was translated as Kyrios ("Lord") in the Septuagint, the Greek version of the Old Testament.

The Masoretes, who from about the 6th to the 10th century worked to reproduce the original text of the Hebrew Bible, replaced the vowels of the name YHWH with the vowel signs of the Hebrew words Adonai or Elohim. Thus, the artificial name Jehovah (YeHoWaH) came into being. Although Christian scholars after the Renaissance and Reformation periods used the term Jehovah for YHWH, in the 19th and 20th centuries biblical scholars again began to use the form Yahweh. Early Christian writers, such as Clement of Alexandria in the 2nd century, had used a form like Yahweh, and this pronunciation of the tetragrammaton was never really lost. Other Greek transcriptions also indicated that YHWH should be pronounced Yahweh.

The meaning of the personal name of the Israelite God has been variously interpreted. Many scholars believe that the most proper meaning may be "He Brings Into Existence Whatever Exists" (Yahweh-Asher-Yahweh). In I Samuel, God is known by the name Yahweh Teva-'ot, or "He Brings the Hosts Into Existence," the hosts possibly referring to the heavenly court or to Israel.

The personal name of God probably was known long before the time of Moses. The name of Moses' mother was Jochebed (Yokheved), a word based on the name Yahweh. Thus, the tribe of Levi, to which Moses belonged, probably knew the name Yahweh, which originally may have been (in its short form Yo, Yah, or Yahu) a religious invocation of no precise meaning evoked by the mysterious and awesome splendour of the manifestation of the holy.

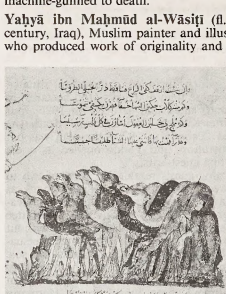
Yaḥyā (Maḥmūd al-Mutawakkil) (b. 1867, Yemen—d. Jan. 17, 1948, Ṣan'ā', Yemen), Zaydī *imām* of Yemen from 1904 to 1948.

When Yaḥyā was a child, Yemen was a province of the Ottoman Empire. His youth was spent in the service of his father's administration, and, when his father died in 1904, Yaḥyā succeeded him as *imām*. The Yemenis had always resented Turkish rule, and Yaḥyā was soon able to assemble a potent military force. Sporadic warfare lasted until 1911, when he was able to force the Turks to recognize the autonomy of his personal rule over the Yemen. He remained loyal to the Turks when World War I broke out but did not take an active part in the hostilities. At the close of the war he was recognized as the independent ruler of the Yemen, but there was no agreement on just which territories composed the country.

Yaḥyā clashed with the British, who had a military base in Aden and who considered many of the neighbouring tribes to be under their protection. He also clashed with his Arab neighbours along the Red Sea coast in the province of Asir. War with the Saudis broke out in 1934, just after the conclusion of the treaty with Great Britain, and Yaḥyā suffered a decisive defeat. Ibn Sa'ūd was generous, forced the *imām* to make no territorial concessions, and permitted a reversion to the prewar status quo. Thereafter foreign affairs ceased to be a dominant concern, and Yaḥyā directed his attention mostly to stabilization at home.

The hallmark of his rule was isolation from the outside world. His military power was based on the support of the Zaydī tribesmen of the interior highlands, while he administered the country through a small class of nobles known as *sayyids*. Yaḥyā himself secured what amounted to a monopoly of Yemen's foreign trade. He was most concerned that no foreign influences disrupt this delicate equilibrium. He received some economic and military aid from the Italians in the 1920s and '30s but firmly refused close contacts, such as an exchange of diplomatic missions. During World War II he remained neutral, but trouble began afterward, when the British strengthened their position in Aden and Yemenis who were discontented with Yaḥyā's isolationist autocracy looked to them for support. Yemenis abroad also supported the domestic dissidents, but opposition did not become active until 1946. Two years later, the aged *imām* was machine-gunned to death.

Yaḥyā ibn Maḥmūd al-Wāsiṭī (fl. 13th century, Iraq), Muslim painter and illustrator who produced work of originality and excellence. He was the outstanding painter of the Baghdad school of illustration, which blended Turkish art and native Christian (probably Jacobite or Syriac Monophysite) painting in a lively Islāmic syncretism.



Leaf from the *Maqāmāt* of al-Ḥarīrī showing camels with their driver, by Yaḥyā ibn Maḥmūd al-Wāsiṭī, Baghdad School, 1237; in the Bibliothèque Nationale, Paris (Ms. Arabe 5847)

By courtesy of the Bibliotheque Nationale, Paris

Yaḥyā was not the first to paint in this style, but he was the best artist whose work has survived. His work shows a synthesis of realism and stylization, and his composition is more elaborate than in earlier Islāmic painting.

He was a native of the town of Wāsiṭ in what is now southern Iraq. Nothing is known of his life, and knowledge of him rests solely on his work.

About 1237 he illustrated the *Maqāmāt* ("Assemblies") of al-Ḥarīrī, a series of anecdotes concerning the picaresque adventures of an eloquent 12th-century Arab rogue, a work that was highly popular at this period. The 96 illustrations are of outstanding quality with fine composition, expressive figures, and vivid but controlled colours. They provide a fascinating series of glimpses into and commentaries on 13th-century Islāmic life and are remarkably satisfying as storybook illustrations.

Yahya Khan, Agha Mohammad (b. Feb. 4, 1917, near Peshāwar, India—d. Aug. 10, 1980, Rāwalpindi, Pak.), president of Pakistan (1969–71), a professional soldier who became commander in chief of the Pakistani armed forces in 1966.

Yahya was born to a family that was descended from the elite soldier class of Nāder Shāh, the Persian ruler who conquered Delhi in the 18th century. He was educated at Punjab University and later graduated first in his class from the Indian Military Academy at Dehra Dun. He served in Italy and the Middle East during World War II and, after the partition of India, organized the Pakistani Staff College in 1947.

After serving in the war with India over Kashmir, he became Pakistan's youngest brigadier general at 34, its youngest general at 40, and commander in chief in 1966. A protégé of Pres. Ayub Khan, Yahya was in command of the military when street riots erupted. Ayub called on him to take over the direction of the government and preserve the integrity of Pakistan. He was appointed chief administrator of martial law, which he declared with the words "I will not tolerate disorder. Let everyone return to his post."

Yahya Khan succeeded Pres. Ayub Khan when the latter resigned his office in March 1969. In 1971 a serious conflict erupted between the central government and the Awami Party of East Pakistan, led by Sheikh Mujibur Rahman. The East Pakistani leader demanded autonomy for his half of the geographically divided nation, and Yahya Khan responded by ordering the Army to suppress the Awami Party. The brutality with which his orders were carried out and the resulting influx of millions of East Pakistani refugees into India led to the Indian invasion of East Pakistan and the rout of its West Pakistani occupiers. East Pakistan became the independent state of Bangladesh, and with its loss Yahya Khan resigned (Dec. 20, 1971).

He was replaced by his foreign minister, Zulfikar Ali Bhutto, who put him under house arrest. Shortly afterward he was paralyzed by a stroke and, after his release, played no further important political role.

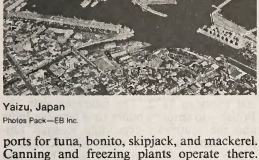
Yaḥyā Ṣobḥ-e Azal, Mīrzā (b. 1831, Tehrān—d. April 29, 1912, Famagusta, Cyprus), half brother of Bahā' Ullāh (the founder of the Bahā'ī faith) and leader of his own Bābist movement in the mid-19th century Ottoman Empire.

Yaḥyā was the designated successor of Sayyid Alī Muḥammad, a Shī'ī sectarian leader known as the Bāb (Arabic: "gate," referring to one who has access to the hidden *imām*). The Bāb was executed in 1850, and by the following year his followers regarded Yaḥyā Mīrzā as

the Báb, in spite of his youth. To avoid persecution by orthodox Shī'ite authorities, he fled Iran in 1853 to Turkish Baghdad where he remained for a decade along with his followers, called Azalis or Bābis. In 1866, in Edirne, a schism erupted between Yaḥyá and Bahá' Ullāh, who now claimed to be divine. In order to stop the sectarian strife which erupted among the followers of each, the Ottoman authorities exiled both, sending Yaḥyá to Cyprus in 1868. When Cyprus came under British rule in 1878 he became a pensioner of the crown and lived out his days in obscurity.

Although reviled by the followers of Bahá' Ullāh, some, particularly in Iran, still regard Yaḥyá as the true spiritual leader.

Yaizu, city, Shizuoka *ken* (prefecture), Honshu, Japan, on the west coast of Suruga Bay. Since the Tokugawa era (1603–1867), Yaizu has been one of the important coastal fishing



Yaizu, Japan
Photos Pack—EB Inc.

ports for tuna, bonito, skipjack, and mackerel. Canning and freezing plants operate there. Deep-sea fishing developed in the early 20th century. Pop. (1989 est.) 111,728.

yajña (Sanskrit: "sacrifice, offering"), in Hinduism, worship based on rites prescribed in the earliest scriptures of ancient India, the Vedas, in contrast to puja (*q.v.*), which may include image worship and devotional practices non-Vedic in origin.

A *yajña* is always purposeful, even though the aim may be as general as sustaining the natural order of the universe. Correct performance of the ritual and recitation of the necessary mantras, or sacred formulas, is considered essential; and the performer and the objects employed must all be in a high state of purity. Such ritual requirements gave rise to the professional class of priests, the modern Brahmans, who are still required to officiate at all important public *yajña*s. Many orthodox Hindu householders continue to perform the *mahāyajña*s, the five daily domestic offerings.

Yājūj and Mājūj, in Islāmic eschatology, two hostile forces who will ravage the Earth before the end of the world. The Qur'ān relates that a certain people terrorized by Yājūj and Mājūj induced Alexander the Great to construct a great wall between them. Yājūj and Mājūj, thus trapped between two mountains until the last days of the world, dig under the wall every night trying to escape, only to find each morning that the wall has been restored by God (Allāh).

Tradition provides several descriptions of Yājūj and Mājūj, who are Muslim counterparts of the biblical Gog and Magog. Some are tall as cedars, and others wide as they are tall; one variety is completely covered with ears. They will appear in large numbers in the northeast of the ancient world as portents of the end, then proceed south toward Israel, drinking up the waters of the Tigris and Euphrates rivers or the Sea of Galilee and killing everyone along the way. When there are no more human targets left for their arrows, Yājūj and Mājūj will



Building a wall against Yājūj and Mājūj, painting by Qāsim, 16th century; in the British Library (MS. Add 5600, folio 372)

Reproduced by permission of the trustees of the British Library; photograph, J.R. Freeman & Co. Ltd.

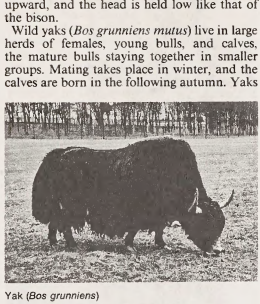
shoot at the sky, but God will either fill their ears and noses and throats with worms and destroy them in a single night or send a flock of birds to drown them in the sea.

Yajurveda, collection of mantras (sacred formulas) and verses that forms part of the ancient sacred literature of India known as the Vedas. *See* Veda.

yak (species *Bos grunniens*), large, massively built ox, family Bovidae (order Artiodactyla), of the Tibetan plateaus 4,300–6,100 m (14,000–20,000 feet) above sea level.

Some large yak bulls attain heights of about 1.8 m (6 feet) at the shoulder hump; cows and domesticated varieties are much smaller. The hair of wild yak is black and short, except on the flanks and tail where it forms a long, shaggy fringe. The horns spread outward and upward, and the head is held low like that of the bison.

Wild yaks (*Bos grunniens mutus*) live in large herds of females, young bulls, and calves, the mature bulls staying together in smaller groups. Mating takes place in winter, and the calves are born in the following autumn. Yaks



Yak (*Bos grunniens*)
Russ Kinne—Photo Researchers/EB Inc.

graze on grass and require much water (they are said to eat snow in winter).

Wild yaks, now reduced in numbers and considered endangered, are found mainly in northern Tibet. Domestic yaks, which breed freely with domestic cattle, are often piebald black and white; they are used as pack, draft, and saddle animals in the plateaus and mountains. The hides of both wild and tame yaks provide leather, and the tails are valued as fly whisks in India. Domesticated yaks are also kept for milk and beef. The hair from the long fringes of the flanks is used in making cords and ropes. The dried dung of the yak is the only obtainable fuel on the treeless Tibetan plateaus.

Yaka, a people inhabiting the wooded plateau and savanna areas between the Kwango and Wamba rivers in southwestern Zaire directly bordering Angola on the west. Their origins are not certain, and Yaka is now a tribal name given to the people of several heritages, including those related to the nearby Suku.

Rural Yaka are subsistence farmers of cassava and corn (maize) as staple crops. Their diet is supplemented when possible by hunting or fishing. Most Yaka men seek work in Kinshasa or other urban centres, and many engage in trade in the greater Kongo area. Yaka material culture (carving, basketry, metalwork, and weaving) is well known. Yaka masks and figures have distinctive bulky forms, globular eyes, and turned up noses; some are polychrome, and many have raffia cloth or fringes attached. Yaka style dominates the expressive forms of neighbouring groups.

Yakima, Sahaptian-speaking Indian tribe that lived along the Columbia, Yakima, and Wenatchee rivers in south-central Washington. They were members of the Plateau culture area and were primarily salmon fishers.

Although culturally much like other Sahaptin Indians of the Plateau, the Yakima acquired historical distinction in the Yakima Indian Wars (1855–58), a failed attempt by the Indians to resist U.S. forces intent upon clearing the Washington Territory for white prospectors and settlers.

The conflict stemmed from a treaty that had been negotiated in 1855, according to which the Yakima and 13 other tribes were to be placed on a reservation and confederated as the Yakima Nation. Before the treaty could be ratified, however, a number of tribes united under the Yakima chief Kamaiakan, who declared his intention to drive all whites from the region. After initial Indian successes, the uprising spread to other tribes in Washington and Oregon. Three years of raids, ambushes, and engagements followed, until September 1858, when the Indians were decisively defeated at the Battle of Four Lakes (on a tributary of the Spokane River).

In 1859 the treaty of 1855 was effected, with the Yakima and most of the other tribes confined to reservations and their fertile ancestral lands opened to white appropriation. Since that time, all of the residents of the Yakima Reservation have been termed Yakima, and the descendants of the original tribe cannot be distinguished.

Yakima, city, seat (1886) of Yakima county, south-central Washington, U.S., on the Yakima River. In 1884 the Northern Pacific Railway selected the site of Yakima City (now Union Gap) as a construction headquarters. This was abandoned and a new settlement (4 miles [6 km] north), known as North Yakima, became a railroad depot and cattle-shipping point. Irrigation, introduced in 1891, turned the Yakima Valley into a highly productive area supporting apples, pears, cherries, sugar beets, mint, hops, livestock, and dairying. Food processing became important. The city, named for the Yakima Indians (whose reservation lies southwest), was incorporated in 1883 as North Yakima (the prefix was dropped in 1918). It is the site of Yakima Valley College (1928) and is a tourist centre and a gateway

to Mount Rainier National Park. Pop. (1990) city, 54,827; Yakima MSA, 188,823.

Yakima River, river, rising in the Cascade Range, near Snoqualmie Pass in south-central Washington, U.S., and flowing southeast about 200 miles (320 km) past Ellensburg and Yakima to join the Columbia River near Kennewick in Benton county. The Yakima and its tributaries irrigate about 460,000 acres (190,000 hectares) in the river valley. The Keechelus Dam, near the river's source, is a major unit of the U.S. Bureau of Reclamation's Yakima project. The Yakima Indian name probably means "runaway," referring to the rushing waters of the river.

Yako, also spelled YAKŌ, or YAKURR, people of the Cross River region of eastern Nigeria; they speak Luko, a language of the Benue-Congo branch of the Niger-Congo family.

The Yako are mainly yam farmers; subsidiary crops include cocoyams (taro), corn (maize), okra, and pumpkin. The main cash crop is palm oil. The Yako occupy compact villages divided into wards, each containing several patrilineal clans. Patrilineal descent governs rights to farmland, house sites, and cooperative labour. Men of the same patrilineal clan live together and cooperate in farming activities. The head of the clan arbitrates disputes, performs clan rituals, and represents the clan in external relations. The Yako also recognize matrilineal descent, which governs the inheritance of transferable wealth, such as livestock and currency. Matrilineal kin are responsible for debts incurred by individuals, have rights and obligations in payment of compensation for injuries, and participate in certain rituals associated with a fertility spirit.

Secular and ritual authority within the village wards is vested in a group of ward leaders, led by a ward head. Secular and ritual authority for the entire village is concentrated in a council of village priests (the *yabot*); the village head is the priest of the paramount fertility spirit.

Traditional Yako ritual is concerned with sacrifice, invocation or control of spiritual beings, and divination. Supernatural beings include a creator god, protective tutelary spirits, malevolent spirits, and the ghosts of the dead. Many Yako are now Christians.

Yakovlev, Aleksandr N(ikolayevich) (b. Dec. 2, 1923, Yaroslavl, Russia, U.S.S.R.), economist, propagandist, and Communist Party official who was a member of the Politburo from 1987 to 1990.

Yakovlev served in the Red Army (1941–43) during World War II, became a member of the Communist Party of the Soviet Union (CPSU) in 1944, and graduated from Yaroslavl Pedagogical Institute in 1946. From that time he held several CPSU positions, first as an editor for a regional party newspaper, then as a lecturer at a CPSU school and as a member of staff on the Central Committee. In the latter capacity, he rose from an instructor in the propaganda department to acting head of the department (1965–73). From 1973 to 1983 he was the Soviet ambassador to Canada. While there he impressed future Soviet president Mikhail Gorbachev, whose trusted aide he later became. He worked for two years as the director of the Academy of Sciences' Institute of World Economics and International Relations. In 1986 he was elected to the Secretariat of the Central Committee, and in June 1987 he became a full member of the Politburo. He is believed to have been instrumental in the development of the policies of *glasnost* ("openness") and *perestroika* ("restructuring"), which were the key concepts of the early years of Gorbachev's administration. In March 1990, as CPSU secretary of foreign policy, Yakovlev was appointed to a 16-member presidential council, a position he held until July of that year. He gave up both his Politburo and Secretariat seats in July.

Yakovlev, Aleksandr Sergeyevich (b. March 19 [April 1, New Style], 1906, Moscow, Russia—d. Aug. 22, 1989, Moscow), aircraft designer noted for his series of Yak aircraft, most of them fighters used by the Soviet Union in World War II.

After graduation from the Air Force Engineering Academy in 1931, Yakovlev immediately began to design aircraft, both piston- and jet-engined. Just before World War II he



Yakovlev
Novosti Press Agency

designed the Yak-1 fighter. His first jet fighter, the Yak-15, was designed in 1945, followed by the Yak-17 and Yak-23. His successful twin-engined "flying wagon" helicopter (the Yak-24) set several world records. In the years after World War II, as the MiG design increased in popularity, Yakovlev began to design civilian aircraft, especially sport planes.

A member of the Communist Party of the Soviet Union from 1938, Yakovlev served from 1940 to 1956 as a deputy minister of the aircraft industry and as chief designer thereafter. He was awarded the Stalin Prize seven times and the Order of Lenin eight times and became a member of the U.S.S.R. Academy of Sciences in 1976.

yaksha, also spelled YAKSA, Sanskrit masculine singular YAKṢA, feminine singular YAKṢĪ, or YAKṢINĪ, in the mythology of India, a class



Yaksha, stone figure from Vidisha, Madhya Pradesh, India, *c.* 1st century BC; in the Vidisha Museum, India
Pramod Chandra

of generally benevolent nature spirits who are the custodians of treasures that are hidden in the earth and in the roots of trees. Principal among the yakshas is Kubera (*q.v.*), who rules in the mythical Himalayan kingdom called Alakā.

Yakshas were often given homage as tutelary deities of a city, district, lake, or well. Their worship, together with popular belief in nagas (serpent deities), feminine fertility deities, and mother goddesses, probably had its origin among the early Dravidian peoples of India. The yaksha cult coexisted with the priest-conducted sacrifices of the Vedic period, and continued to flourish during the Kuṣāna period.

In art, sculptures of yakshas were among the earliest of deities, apparently preceding images of the bodhisattvas and of Brahmanical deities, whose representation they influenced. They were the prototypes also for the attendants of later Hindu, Buddhist, and Jaina art.

Yakub Beg (b. 1820, Pskente, Kokand [now in Uzbekistan]—d. May 16, 1877, Kashgaria [now in Sinkiang province, China]), Tajik adventurer who entered northwest China in 1864 and through a series of military and political maneuvers took advantage of the anti-Chinese uprisings of its Muslim inhabitants to establish himself as head of the kingdom of Kashgaria. Expanding northward in the area of modern Sinkiang province, he attracted the attention of the Ottoman sultan, who made Yakub the emir of Kashgaria.

During the turmoil, the Russians occupied parts of Chinese Turkistan and Sinkiang and then encouraged Yakub to sign a commercial treaty in 1872. The following year, the British—to ensure a buffer zone between India and the southward-expanding Russian Empire—signed a similar treaty with Kashgaria. Those two treaties, in effect, gave Kashgaria international recognition.

But the Chinese, who had been occupied with rebellions and invasions in other parts of their empire, then decided to take decisive action against Yakub. An army under the noted Chinese scholar-general Tso Tsung-t'ang (1812–85) advanced rapidly westward toward Kashgaria. On May 16, 1877, with the fall of Yakub's capital city of Turfan, the kingdom of Kashgaria came to an end, and Yakub committed suicide.

Yakuba (African people): *see* Dan.

Yakurr (people): *see* Yako.

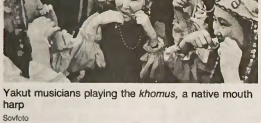
Yakushi-ji, temple complex dedicated to Yakushi, the Healing Buddha, in Nara, Japan. It was established about 690 outside



The three-storied eastern pagoda of Yakushi-ji, Nara period, Nara, Japan
Mitt and Joan Mann—CAMERAMANN INTERNATIONAL

Nara, and in 718 it was refounded within the city. The only one of the original buildings to have survived is the three-storied eastern pagoda, which is one of the finest examples of religious architecture of the Nara period (AD 710–784). Yakushi-ji has many treasures of Japanese art, the most famous being the Nara-period sculpture group known as the Yakushi triad (statues of Buddha, Nikko, and Gakko).

Yakut, also called SAKHA, one of the major peoples of eastern Siberia, numbering some 380,000 in the late 20th century. In the 17th century they inhabited a limited area on the



Yakut musicians playing the *khomus,* a native mouth harp
Sovfoto

middle Lena River, but in modern times they have expanded throughout Sakha republic (Yakutia) in far northeastern Russia. They speak a Turkic language and, in their own language, are known as the Sakha. The Yakut are thought to be an admixture of migrants from the Lake Baikal region with the aborigines of the Lena—probably mostly Evenk, who have contributed much to their culture. Other evidence, however, points to a southern ancestry related to the Turkic-speaking tribes of the steppe and the Altai Mountains.

The early history of the Yakut is little known, though epic tales date from the 10th century. In the 17th century they had peacefully assimilated with other northern peoples and consisted of 80 independent tribes, subdivided into clans. The nuclear family was the primary Yakut social unit. The position of women in family and public life was generally inferior. Supernatural power was attributed to blacksmiths, since their art was considered a divine gift. The old Yakut religion had many supernatural spirits, good and evil.

The majority of the Yakut were formerly seminomadic, with winter settlements of earth-covered log huts and summer camps of conical birch-bark tents sited near pasturage and sources of hay for winter fodder. Through the process of assimilation many of the southern Yakut turned to farming, while the more northerly adopted reindeer breeding from the Evenk. Much noted for their ironwork, the Yakut also made pottery, a unique occupation among the historical Siberian tribes.

Despite the Arctic climate, the Yakut have clung to an economy based on the raising of cattle, reindeer, and horses, though their livestock must be sheltered and fed a large part of the year. Dairy products occupy a prominent place in their diet, with meat reserved for special occasions. Fishing in rivers and lakes is the second most important economic activity. Many traditional arts, such as ivory and wood carving and jewelry making, are still practiced, though such relatively modern arts as filmmaking are also popular. Playing of the *khomus,* or mouth harp, once an accompaniment to shamanic ritual, has also experienced a resurgence.

Yakut language, Yakut SAKHA-TYLA, member of the Turkic language family (possibly of a larger Altaic family), spoken in northeastern Siberia (Sakha republic [Yakutia]), in northeastern Russia. Because its speakers have been geographically isolated from other Turkic languages for centuries, Yakut has developed deviant features; it demonstrates closest affinity to the northeastern Turkic languages.

Almost all the 380,000 ethnic Yakut speak the Yakut language as their mother tongue. Most also speak Russian. Yakut is sometimes used as a lingua franca among other northern peoples. *See also* Turkic languages.

Yakut-Sakha, also called YAKUTIA: *see* Sakha.

Yakutsk, city and capital of Sakha republic (Yakutia), in far northeastern Russia, on the Lena River. A fort was founded on the Lena's low right bank in 1632 and transferred 43 miles (70 km) upstream to the present site of Yakutsk in 1642. Long a small provincial centre of wooden houses where, beginning in the 19th century, dissidents were exiled, Yakutsk has grown in size and acquired light industries, up-to-date housing, and paved streets, but its functions remain primarily those of administration and of a river port. It has a university (founded 1956). Pop. (1994 est.) 194,400.

yakuza, in Japan, gangster, a member of a *bōryokudan* (*q.v.*), or gang of racketeers. The word *yakuza,* which has come to mean "good for nothing," is derived from a worthless hand in a Japanese card game similar to blackjack: the cards *ya-ku-za* ("eight-nine-three"), when added up, exceed the winning number of 19.

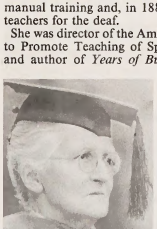
Yala, town, extreme southern Thailand. Yala is a modern commercial centre on the Pattani River, which flows north into the Gulf of Thailand. The town is also located on the Bangkok-Singapore railway and the Pattani–George Town (Penang [Malaysia]) highway. The population includes Thai Muslims, Malay Muslims, and Chinese. The region is heavily planted in rubber. Nearby caves contain murals and a reclining Buddha sculpture in the Śrivijaya style. Pop. (1992 est.) town, 73,363.

Yalag: *see* Gordon, Judah Leib.

Yale, Caroline Ardelia (b. Sept. 29, 1848, Charlotte, Vt., U.S.—d. July 2, 1933, Northampton, Mass.), American educator of the deaf and long-time principal of the Clarke School for the Deaf.

After studying for two years at Mount Holyoke College, South Hadley, Mass., and teaching briefly in academies at Williston and Brandon, Vt., Yale joined the teaching staff of the Clarke Institution for Deaf Mutes (which in 1896 became the Clarke School for the Deaf) at Northampton. Its principal, Harriet Burbank Rogers, rejecting the finger alphabet, introduced the German oral method to teach deaf children to speak and to read lips. After a trial month on the staff in 1870, Yale remained for 63 years. She became associate principal in 1873 and principal in 1886. Under her direction the school added athletic and manual training and, in 1889, classes to train teachers for the deaf.

She was director of the American Association to Promote Teaching of Speech to the Deaf and author of *Years of Building, Memories of a Pioneer in a Special Field of Education* (1931).



Caroline Yale, 1927
By courtesy of the Clarke School for the Deaf, Northampton, Mass.

Yale, Elihu (b. April 5, 1649, Boston, Mass. [U.S.]—d. July 8, 1721, London, Eng.), English merchant, official of the East India Company, and benefactor of Yale University. Although born in Massachusetts, Yale was taken to England by his family at the age of three, and he never returned to America. He was educated at a private school in London.

In 1671 Yale began working for the East India Company and was sent the following year to Madras. From a fairly low-ranking position he worked his way up by 1687 to become governor of Fort Saint George, the East India Company's installation at Madras. Five years later the company removed him from office, charging him with self-aggrandizement at company expense. He was kept in Madras until 1699 and forced to pay a fine, but Yale was still able to take a sizable fortune with him to England. In London he entered the diamond trade, but he devoted a good deal of his time and money to philanthropy.

Connecticut's London agent, Jeremiah Dummer, approached Yale with the suggestion that the Collegiate School at Saybrook in the colony would welcome a contribution. Yale responded with a gift of books. Later, in 1718, Cotton Mather wrote to Yale, hinting broadly that the Saybrook school—which had recently moved to New Haven—could be renamed in Yale's honour in gratitude for another sizable gift. Thereupon, Yale sent more books, a portrait of George I, and a variety of goods from the East Indies. The gifts were sold in Boston for some £800, and the money was used to construct a building called Yale College in New Haven. By its charter of 1745, the entire institution was named Yale University. Yale was buried at Wrexham in North Wales.

Yale, Frankie, byname of FRANK UALE (b. 1885, Brooklyn, N.Y., U.S.—d. July 1, 1927, Brooklyn), American gangster and national president, during its heyday (1918–28), of the Unione Siciliane, a Sicilian fraternal organization that by World War I had become a crime cartel operating in several U.S. cities and active in robbery, prostitution, labour-union extortion, and other rackets.

Yale graduated from youth gangs to bootlegging and rum-running during Prohibition and took on murder contracts as a sideline; he was reputedly the imported gunman who held Dion O'Bannion's hand while cohorts shot the Chicago mobster. Yale himself was finally killed driving his car on a Brooklyn street as another car drew alongside, machine guns firing. Al Capone allegedly ordered the execution, suspecting Yale of a liquor hijacking. Yale's funeral was grandly enacted, with a $12,000 casket and 28 trucks of flowers.

Yale, Linus (b. April 4, 1821, Salisbury, N.Y., U.S.—d. Dec. 25, 1868, New York, N.Y.), American inventor and designer of the compact cylinder pin-tumbler lock that bears his name.

At first Yale tried portrait painting, but he became interested in locks after his father began to manufacture bank locks in Newport, N.Y., about 1840. His first achievement was the Yale Infallible Bank Lock in 1851. Later he opened his own shop in Shelburne Falls, Mass., where he produced the Yale Magic Bank Lock and the Yale Double Treasury Bank Lock. By about 1862 he had introduced the combination lock.

His most important invention was the cylinder lock, based on the pin-tumbler mechanism of the ancient Egyptians. The serrations on the edge of the key raise pin tumblers to exactly the correct height, allowing the cylinder of the lock to revolve and withdraw the bolt.

In 1868 Yale, in partnership with John Henry Towne and his son, Henry Robinson Towne, founded the Yale Lock Manufacturing Company at Stamford, Conn.

Yale school, group of literary critics at Yale University, who became known in the 1970s and '80s for their deconstructionist theories. The Yale school's skeptical, relativistic brand of criticism drew inspiration from the work of French philosopher Jacques Derrida. Its most prominent members were Paul de Man and J. Hillis Miller. De Man, a professor of comparative literature, was closely allied with Derrida and based his theories on a system of rhetorical figures. The writings of English professors Geoffrey H. Hartman and Harold Bloom (both of whom were also at Yale) were frequently critical of the Yale school, while Miller, whose work focused on textual opposites and differences, often defended charges that deconstruction was nihilistic. The Yale school helped popularize deconstruction in America, but de Man's death in 1983 and Miller's departure in 1986 marked its eclipse. The revelation (in the late 1980s) that de Man published anti-Semitic articles during World War II further affected the school's reputation. *See also* deconstruction.

Yale University, private university in New Haven, Conn., that was founded in 1701 and is the third oldest university in the United States. It was originally chartered by the colonial legislature of Connecticut as the Collegiate School and was held at Killingworth and other locations. In 1717 the school was moved to New Haven, and the following year it was renamed Yale College in honour of a wealthy British merchant and philanthropist, Elihu Yale, who had made a series of donations to the school. Yale's initial curriculum emphasized classical studies and strict adherence to orthodox Puritanism.

Yale's medical school was organized in 1810. The divinity school arose from a department of theology created in 1822, while a law department became affiliated with the college in 1824. The geologist Benjamin Silliman, who taught at Yale between 1802 and 1853, did much to make the experimental and applied sciences a respectable field of study in the United States. While at Yale he founded the *American Journal of Science and Arts,* which was one of the great scientific journals of the world in the 19th century. Yale's Sheffield Scientific School, begun in the 1850s, was one of the leading scientific and engineering centres in the nation until the 20th century.

Graduate instruction was begun at Yale in 1846, and a graduate school was organized the following year. A school of art was created in 1865, and schools of music, forestry, nursing, drama, management, and architecture were subsequently established. The college was renamed Yale University in 1886. Women were first admitted to the graduate school in 1892, but the university did not become fully coeducational until 1969. Yale is highly selective in its admissions and is among the nation's most highly rated schools in terms of academic and social prestige.

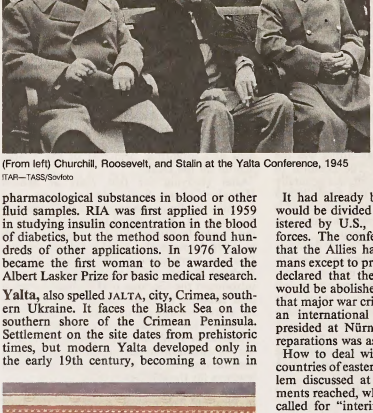
The Yale University Library, with more than 10 million volumes, is one of the largest in the United States. Yale's extensive art galleries, the first in a U.S. college, were established in 1832 when Colonel John Trumbull donated a gallery to house his paintings of the American Revolution. Yale's Peabody Museum of Natural History houses important collections of paleontology, archaeology, and ethnology.

Yale's graduates have included the U.S. presidents William Howard Taft, Gerald Ford, George Bush, and William J. Clinton; the politician John C. Calhoun; the theologian Jonathan Edwards; the inventors Eli Whitney and Samuel F.B. Morse; and the lexicographer Noah Webster.

Yalow, Rosalyn S., in full ROSALYN SUSSMAN YALOW (b. July 19, 1921, New York, N.Y., U.S.), American medical physicist, joint recipient (with Andrew V. Schally and Roger Guillemin) of the 1977 Nobel Prize for Physiology or Medicine for her development of the technique of radioimmunoassay (RIA).

Yalow graduated from Hunter College in New York City in 1941 and four years later received her Ph.D. in physics from the University of Illinois. From 1946 to 1950 she lectured on physics at Hunter. In 1947 she became a consultant in nuclear physics to the Bronx Veterans Administration Hospital, where from 1950 to 1970 she was physicist and assistant chief of the radioisotope service. With a colleague, Solomon A. Berson, she began investigating various medical applications of radioactive isotopes. By combining techniques from radioisotope tracing and immunology, Yalow developed RIA, which proved to be a very sensitive and simple means for measuring minute concentrations of biological and pharmacological substances in blood or other fluid samples. RIA was first applied in 1959 in studying insulin concentration in the blood of diabetics, but the method soon found hundreds of other applications. In 1976 Yalow became the first woman to be awarded the Albert Lasker Prize for basic medical research.

Yalta, also spelled JALTA, city, Crimea, southern Ukraine. It faces the Black Sea on the southern shore of the Crimean Peninsula. Settlement on the site dates from prehistoric times, but modern Yalta developed only in the early 19th century, becoming a town in 1838. Its favourable climate with mild winters and its scenic location between sea and mountains make Yalta one of the most popular holiday and health resorts of Ukraine, with many hotels and sanatoriums, including one established in 1900 at the instigation of the writer-physician Anton Chekhov. There are fruit-canning and tobacco-processing industries, and wine is produced at the nearby Massandra winery. Yalta is a regular port of call for passenger ships from other Black Sea ports. The city has road links to Simferopol and Sevastopol. In February 1945, during World War II, the three chief Allied leaders met at Yalta in the Livadiya Palace in what became known as the Yalta Conference. Pop. (1991 est.) 89,300.



(From left) Churchill, Roosevelt, and Stalin at the Yalta Conference, 1945
ITAR—TASS/Sovfoto



Garden facade of Livadiya Palace, Yalta, Ukraine
John Massey Stewart

Yalta Conference (Feb. 4–11, 1945), major World War II conference of the three chief Allied leaders, President Franklin D. Roosevelt of the United States, Prime Minister Winston Churchill of Great Britain, and Premier Joseph Stalin of the Soviet Union, which met at Yalta in the Crimea to plan the final defeat and occupation of Nazi Germany.

It had already been decided that Germany would be divided into occupied zones administered by U.S., British, French, and Soviet forces. The conferees accepted the principle that the Allies had no duty toward the Germans except to provide minimum subsistence, declared that the German military industry would be abolished or confiscated, and agreed that major war criminals would be tried before an international court, which subsequently presided at Nürnberg. The determination of reparations was assigned to a commission.

How to deal with the defeated or liberated countries of eastern Europe was the main problem discussed at the conference. The agreements reached, which were accepted by Stalin, called for "interim governmental authorities broadly representative of all democratic elements in the population . . . and the earliest possible establishment through free elections of governments responsive to the will of the people." Britain and the United States supported a Polish government-in-exile in London, while the Soviets supported a communist-dominated Polish committee of national liberation in Lublin. Neither the Western Allies nor the Soviet Union would change its allegience, so they could only agree that the Lublin committee would be broadened to include representatives of other Polish political groups, upon which the Allies would recognize it as a provisional government of national unity that would hold free elections to choose a successor government. Poland's future frontiers were also discussed but not decided.

Regarding the Far East, a secret protocol stip-

ulated that, in return for the Soviet Union's entering the war against Japan within "two or three months" after Germany's surrender, the U.S.S.R. would regain the territory lost to Japan in the Russo-Japanese War of 1904–05, and the status quo in pro-Soviet Outer Mongolia would be maintained. Stalin agreed to sign a pact of alliance and friendship with China.

The United Nations organization charter had already been drafted, and the conferees worked out a compromise formula for voting in the Security Council. The Soviets withdrew their claim that all 16 Soviet republics should have membership in the General Assembly.

After the agreements reached at Yalta were made public in 1946, they were harshly criticized in the United States. This was because, as events turned out, Stalin failed to keep his promise that free elections would be held in Poland, Czechoslovakia, Hungary, Romania, and Bulgaria. Instead, communist governments were established in all those countries, noncommunist political parties were suppressed, and genuinely democratic elections were never held. At the time of the Yalta Conference, both Roosevelt and Churchill had trusted Stalin and believed that he would keep his word. Neither leader had suspected that Stalin intended that all the Popular Front governments in Europe would be taken over by communists. Roosevelt and Churchill were further inclined to assent to the Yalta agreements because they assumed, mistakenly as it turned out, that Soviet assistance would be sorely needed to defeat the Japanese in the Pacific and Manchuria. In any case, the Soviet Union was the military occupier of eastern Europe at the war's end, and so there was little the Western democracies could do to enforce the promises made by Stalin at Yalta.

Yalu River, Wade-Giles romanization YA-LÜ CHIANG, Pinyin YALU JIANG, Korean AMNOK-KANG, river that forms the northwestern boundary between North Korea and the Northeast Region (Manchuria) of China. The Chinese provinces of Kirin and Liaoning are bordered by the river. Its length is estimated to be 491 miles (790 km), and it drains an area of some 12,259 square miles (31,751 square km). From a mountainous source in the Ch'ang-pai Mountains, the river flows southwestward to drain into the Yellow Sea. The river is an important source of hydroelectric power, is used for transportation (especially of lumber from the rich forests on its banks), and provides fish for the riverine populations.

In addition to serving as a political boundary, the Yalu River constitutes a dividing line between Chinese and Korean cultures. It is generally known abroad by its Chinese name, Ya-lü (Pinyin Ya-lu), instead of by its Korean name, Amnok. According to ancient writing, the Chinese name, which is derived from the words *ya* ("duck") and *lü* ("greenish blue"), is a comparison of the blueness of the river's waters and the greenish blue of a particular species of domestic duck that inhabits it. The Yalu did not become a political boundary until the Korean–Chinese border was established toward the end of the Korean Koryŏ dynasty in the 14th century. The river played an important political role in the Korean War of 1950–53.

The Yalu rises in T'ien Lake (known in Korean as Ch'ŏn Lake), a body of water of indeterminate depth on top of Pai-t'ou Mountain on the Chinese–North Korean border, at a height of 9,000 feet (2,700 m) above sea level. Winding southward as far as Hyesan, North Korea, and then meandering northwestward for 80 miles (130 km), the river reaches Linchiang, Kirin province, from which it flows southwestward for 200 miles (320 km) before emptying into Korea Bay.

Except for small areas of basaltic lava along the easternmost part of the river's course, the Yalu flows over Precambrian rock (more than 570 million years old) before its alluvium begins to spread out as it approaches its estuary. Throughout much of its course it flows through deep, gorgelike valleys, with mountains ranging in height from 1,900 to 3,800 feet (600 to 1,200 m) above sea level rising on either bank. The principal tributaries are the Herchun, Changjin, and Tokro rivers.

The upper part of the Yalu as far as Linchiang has very rapid currents, many waterfalls, and sunken rocks. The middle part, which extends as far as Ch'osan, contains considerable deposits of alluvium that make the riverbed so shallow in places that it prevents even timber rafts from passing downstream during the dry season. The lower part of the river's course has a very slow current in which deposits of alluvium are even greater and form a vast delta containing many islands. The silting of the river has increased so much in the past several decades that, whereas in 1910 ships of 1,000 tons could easily sail upstream to the port of Sinŭiju, today 500-ton ships can hardly manage to do so.

The climate along the river's course is typically continental and characterized by cold winters and warm summers. The river is frozen and thus closed to navigation during the four winter months (November through February). Because it is situated in mountain ranges and is not far from oceans, the river's basin receives fairly heavy rainfall, much of which occurs during the months of June, July, August, and September. The abundant rainfall waters rich forests of conifers as well as deciduous trees. The forests provide a sanctuary for wildlife, which includes wild boars, wolves, tigers, jaguars, bears, foxes, and such birds as ptarmigan and pheasant. The river abounds in carp and eels.

It is notable that fish in two of the tributaries of the Yalu—the Herchun and Changjin—are like those in the upper stream of the Amur River in China and not like those in the Yalu. It is supposed that these tributaries once were connected with the Sungari River, a tributary to the Amur, only to be separated from it and connected with the Yalu when an eruption of Pai-t'ou Mountain produced a flow of basaltic lava during the Quaternary Period (within the last 1.6 million years).

Ever since a tribe called the Yojin was driven into Manchuria in the 16th century, the Korean side of the river has been inhabited only by Koreans. The northwestern (Chinese) bank is inhabited by Manchurians and Chinese. The arable land along the river amounts to no more than 220,000 acres (89,000 hectares). Rice is the main crop grown along the river's lower course; corn (maize), millet, soybeans, barley, and sweet potatoes are raised further upstream in the mountainous middle and upper reaches of the river.

The river measures about 460 feet (140 m) in width and 3 feet (one metre) in depth at Hyesan and is 640 to 800 feet (200 to 250 m) wide and 4.5 feet (1.4 m) deep at Chunggang. It reaches 1,280 feet (390 m) in width at Sinđojang, the location of an immense reservoir of the Sup'ung Lake hydroelectric station. In its estuary the river is 3 miles (5 km) wide and 8 feet (2.5 m) deep.

The river is primarily important as a source for hydroelectricity. The largest dam on the river is located at Sup'ung-nodongjagu, North Korea, situated 35 miles (56 km) upstream from Sinŭiju. The height of the dam is 320 feet (100 m) and its length 2,880 feet (880 m); the surface area of the reservoir is 133 square miles (345 square km), and its potential generating capacity amounts to about 7,000,000 kilowatts. One of the largest hydroelectric plants in eastern Asia, it supplies electricity for a large area of the northern part of North Korea as well as the southern part of the Manchurian region, both for industrial development and for electric railroads. Its importance to the Chinese economy was a major reason for the entry of the People's Republic of China into the Korean War in 1950, when United Nations troops were advancing northward toward the Yalu.

Yam (god): *see* Yamm.

yam, any of several plant species of the genus *Dioscorea* (family Dioscoreaceae), native to warmer regions of both hemispheres. A number of species are cultivated for food in the tropics; in certain tropical cultures, notably of West Africa and New Guinea, the yam is the primary agricultural commodity and the focal point of elaborate ritual.

True yams are botanically distinct from the sweet potato (*q.v.*), but moist-fleshed varieties of sweet potato are often called yams in the United States. *D. bulbifera,* the air-potato yam, is one of the few true yams cultivated for food in the United States. Yams have thick tubers (generally a development of the base of the stem) from which protrude long, slender, annual, climbing stems bearing leaves, which are either alternate or opposite and either entire or lobed and unisexual flowers in long clusters. The flowers are generally small and individually inconspicuous, though collectively showy. Each consists of a greenish, bell-shaped or flat perianth of six pieces, enclosing six or fewer stamens in the male flowers and surmounting a three-celled, three-winged ovary in the female flowers. The ovary ripens into a membranous capsule, bursting by three valves to liberate numerous flattish or globose seeds.

Most yams contain an acrid principle that is dissipated in cooking. *D. trifida* and *D. alata* are the edible species most widely diffused in tropical and subtropical countries. The tubers of *D. alata* sometimes weigh 45 kg (100 pounds). *D rotundata* and *D. cayenensis* are the main yam species grown in West Africa. *D. esculenta,* grown on the subcontinent of India, in southern Vietnam, and in the South Pacific islands, is one of the tastiest yams. *D. batatas,* the Chinese yam, or cinnamon vine, is widely cultivated in East Asia.

Hundreds of species of yams are known, and they vary widely in taste and appearance. Yams' flesh ranges in colour from white to yellow, pink, or purple. They vary in taste from sweet to bitter to tasteless. Yams are consumed as cooked starchy vegetables. They are often boiled and then mashed into a sticky paste or dough, but they may also be fried, roasted, or baked in the manner of potatoes.

yam bean: *see* jícama.

Yama, in Tibetan Buddhism, one of the eight fierce protective deities. *See* dharmapāla.

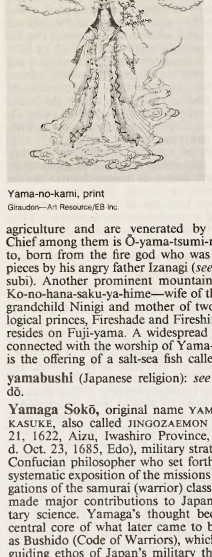
Yama, in the mythology of India, the lord of death. The Vedas describe him as the first man who died, blazing the path of mortality down which all men have since followed. He is the guardian of the south (the region of death) and presides over the resting place of the dead, which is located in the south under the earth. In the Vedas Yama was represented as a cheerful king of the departed ancestors, not as a punisher of sins, but in later mythology he became known as the just judge (Dharmarāja) who weighs the good and evil deeds of the dead and determines their retribution. He is described as majestic in appearance, green, with red eyes and red garments. He carries a mace, which may be ornamented with a skull, and a noose and rides a buffalo. His two four-eyed dogs guard the entrance to his kingdom, and the crow and the pigeon act as his messengers. Yama has also passed over into Buddhist mythology in Tibet, China, and Japan, where he occupies a similar but minor role as the guardian of the abode of the dead.

yama (Sanskrit: "restraint"), in the Yoga system of Indian philosophy, first of the eight stages intended to lead the aspirant to *samādhi*, or state of perfect concentration. An ethical preparation, meant to purify the individual, *yama* involves the abstinence from injury to others and from lying, stealing, sex, and avarice.

The second stage, *niyama* (Sanskrit: "discipline"), in its ethical intent similar to *yama,* comprises five categories of observance: cleanliness, contentment with one's material condition, asceticism, study of the metaphysics relating to salvation, and devotion to God.

Neither *yama* nor *niyama* is a specifically Yogic state; they are preliminaries necessary for any type of asceticism. They prepare the yogic practitioner for the more difficult stages.

Yama-no-kami, in Japanese popular religion, any of numerous gods of the mountains. These *kami* are of two kinds: (1) gods who rule over mountains and are venerated by hunters, woodcutters, and charcoal burners and (2) gods who rule over



Yama-no-kami, print
Giraudon—Art Resource/EB Inc.

agriculture and are venerated by farmers. Chief among them is Ō-yama-tsumi-no-mikoto, born from the fire god who was cut into pieces by his angry father Izanagi (*see* Ho-musubi). Another prominent mountain deity is Ko-no-hana-saku-ya-hime—wife of the divine grandchild Ninigi and mother of two mythological princes, Fireshade and Fireshine—who resides on Fuji-yama. A widespread tradition connected with the worship of Yama-no-kami is the offering of a salt-sea fish called *okoze.*

yamabushi (Japanese religion): *see* Shugendō.

Yamaga Sokō, original name YAMAGA TAKASUKE, also called JINGOZAEMON (b. Sept. 21, 1622, Aizu, Iwashiro Province, Japan—d. Oct. 23, 1685, Edo), military strategist and Confucian philosopher who set forth the first systematic exposition of the missions and obligations of the samurai (warrior) class and who made major contributions to Japanese military science. Yamaga's thought became the central core of what later came to be known as Bushido (Code of Warriors), which was the guiding ethos of Japan's military throughout the Tokugawa period (1603–1867) and down to the end of World War II.

A *rōnin,* or masterless samurai, Yamaga early showed great promise, and he journeyed to Edo (now Tokyo), the capital, where he soon became the favourite student of the Neo-Confucian scholar Hayashi Razan. Yamaga soon moved beyond his teacher, however, studying Buddhism, Shintō, and military science as well as Confucianism. Within a short time he became one of the most popular teachers of his time, attracting thousands of disciples. As a result of his fame, in 1652 he was appointed military instructor to the lord of the great *han* (fief) of Akō.

Yamaga made important innovations in the study of strategy and tactics, weapons, and military intelligence. His work as a military teacher became one of his most important legacies; 19th-century students of Yamaga, though fiercely nationalistic and antiforeign, were among the first to advocate learning more about Western nations so that Japan would be better able to oppose them.

Meanwhile, Yamaga began his attempts to develop a suitable ethic for the samurai class and turned to the Chinese "Ancient Learning" school of Confucianism, which advocated a return to the original 7th/6th-century BC teachings of Confucius. Yamaga felt that those teachings were more appropriate to the samurai class than the watered-down Neo-Confucianist philosophy of Tokugawa Japan. Accordingly, Yamaga equated the samurai with the Confucian "superior man" and taught that his essential function was not only to keep himself fit for possible military service, but to justify the stipend his lord provided him with by becoming an exemplar of virtue for the lower classes. Without disregarding the basic Confucian virtue, benevolence, Yamaga emphasized the second virtue, righteousness, which he interpreted as obligation or duty.

Yamaga's critique of Neo-Confucianism first appeared in 1665 in his *Yamaga gorui* ("Yamaga's Sayings"), the summary of which was also published in three volumes under the title *Seiyōyōroku* ("Summary of Holy Teachings"). His views were seen as a potential challenge to Tokugawa authority, and he was banished from the capital in the custody of the Lord of Akō and exiled to one of the remote corners of Japan.

Yamaga became the teacher and chief inspiration for the future leader of the "47 *rōnin.*" Following Yamaga's code, that group of samurai in 1702 defied shogunate law and risked their own lives to avenge the death of their lord. That incident still is one of the most famous in Japanese history and brought increased (if posthumous) fame to Yamaga and his ideas. Another of his ideas was that Japanese civilization was superior even to that of China. In his *Chūchō jijitsu* ("The True Facts Concerning the Middle Kingdom"), Yamaga maintained that since its founding Japan had remained loyal to its divine Imperial line, whereas China's dynasties had come and gone. Furthermore, he argued, Confucian philosophy had been corrupted by metaphysical speculation, but Japan had remained true to the Confucian conception of duty. In the 19th century these thoughts helped inspire the militant Japanese nationalists, who in 1868 overthrew the Tokugawa shogunate and restored direct Imperial rule to Japan.

Yamagata, prefecture (*ken*), northern Honshu, Japan, on the Sea of Japan. Much of its 3,601 sq mi (9,327 sq km) is mountainous. Bandai-Asahi National Park, stretching from north to south, includes the Dewa Sangan (Three Mountains of Dewa [Gassan, Yudono-san, Haguro-san]), which are sacred to the Shugen-dō sect of Buddhism; the granite mountains associated with Asahi-dake (6,135 ft [1,870 m]); and Iide-san (6,906 ft). In the northwest, Chōkai Quasi-national Park is crowned by Chōkai-zan, which rises to 7,316 ft on the border with Akita Prefecture. The extinct volcano of Zaō-san (6,040 ft) is the central feature of Zaō Quasi-national Park in the southeast.



Kokubun-ji (Kokubun Temple), Yamagata city, Japan
Photos Pack—EB Inc.

The prefecture is drained by the Mogami-gawa (Mogami River). Its valley is followed by a main highway and railway and contains the major interior towns. The short coastal plain is largely composed of the Mogami-gawa delta.

Yamagata's agriculture is based on rice production, sericulture, and fruit orchards. Forestry and fishing are locally important, and deposits of petroleum, zinc, natural gas, and feldspar are worked. Industries produce electrical machinery, precision instruments, and paper.

The prefectural capital, Yamagata, is the largest city. Located in an interior mountain basin, it developed as the castle town of the Mizuno daimyo family. A commercial centre and seat of Yamagata University (1949), its industry produces various consumer goods and cast metal.

Yonezawa is another important interior town. The coastal district is dominated by the industrial centres of Tsuruoka and Sakata, the main port. Pop. (1983 est.) city, 242,015; prefecture, 1,256,000.

Yamagata Aritomo, KŌSHAKU (Duke, or Prince) (b. Aug. 3, 1838, Hagi, Japan—d. Feb. 1, 1922, Tokyo), Japanese soldier and states-



Yamagata Aritomo
By courtesy of the International Society for Educational Information, Tokyo, Inc.

man who exerted a strong influence in Japan's emergence as a formidable military power at the beginning of the 20th century. He was the first prime minister under the parliamentary regime, serving 1889–91 and 1898–1900.

Early career. Yamagata was from a family of the lowest samurai rank in Chōshū, a feudal domain strongly opposed to the military dictatorship that ruled Japan from the 17th century until the restoration of Imperial rule under the emperor Meiji in 1868. He began his career as an errand boy of the treasury office and an informer in the police administration. Educated from *c.* 1858 at Shōka-Sonjuku, a private school, he became a promising member of revolutionary loyalists who were incensed by the growth of foreign influence under the shogunate and raised the cry "Sonnō jōi" ("Revere the emperor! Drive out the barbarians!"). In 1863 Yamagata was chosen

commanding officer of the Kiheitai, the most famous of the irregular troop units formed by the revolutionaries in Chōshū. Serving in the Shimonoseki Incident in 1864—the bombardment of Chōshū by an allied fleet of Western powers that resulted in the defeat of the rebels—he was wounded. The defeat opened Yamagata's eyes to the superiority of the Western military system and convinced the leaders of the Sonnō Jōi Movement that their "antiforeign" policy was doomed to failure unless Japan acquired efficient modern armament equal to that of the Western powers.

In 1867 the Tokugawa shogunate was overthrown and in 1868 the Meiji government established. When adherents of the shogunate in the north rose against the Meiji emperor, Yamagata headed a military expedition to suppress the revolt. The incident convinced him that the popular troops he led were superior to the regular army of the northern domains and that the nation's security would best be safeguarded by a system of universal obligatory military service.

After studying military institutions as a step toward the modernization of the Japanese Army, Yamagata returned to Japan in 1870. Soon after that, he became secretary to the vice minister of military affairs. Intending to abolish the system of the feudal domains and to centralize political power, he proposed the formation of an Imperial Force (Goshimpei). In early 1871, when a force of about 10,000 men drawn from the feudal armies was organized, Yamagata was promoted to vice minister of military affairs. This Imperial Force was later renamed Imperial Guard (Konoe), and Yamagata became its commander.

With the help of the restoration hero Saigō Takamori, who wielded great influence in the army, Yamagata succeeded in introducing conscription. When the government reorganized the military system into an army and a navy, he became minister of the army. After Saigō's resignation from the government in protest against its restrained policy toward Korea, Yamagata assumed greater influence over the government.

Yet the right to determine government policies lay largely in the hands of the councillor (*sangi*) to the Executive Council. Thus, in 1874 when a punitive expedition to Formosa was discussed, Yamagata, though minister of the army, had no voice in the decision. This fact determined him to work to separate military policies from civilian control. Because the Japanese Army was not yet ready for war against China, he had opposed the Formosa expedition; and, in order to allay his opposition, the government reluctantly promoted him to *sangi* in August 1874.

In 1877 Saigō Takamori and his adherents in Satsuma rose against the government, and Yamagata headed the expeditionary forces that put down the revolt. His victory proved once again the superiority of the conscript army over the former samurai troops. It also helped to establish his leadership in the army.

In 1878 Yamagata issued the "Admonition to the Military," emphasizing the old virtues of bravery, loyalty, and obedience to the emperor, to counteract democratic and liberal trends. After separating the Operations Department from the Army Ministry and reorganizing the General Staff Office, he resigned as army minister and assumed the position of chief of the general staff. He also took the important step of refashioning the Japanese military system according to the Prussian example.

In 1882 Yamagata induced the Emperor to promulgate the "Imperial Precept for the Military"—in essence a recapitulation of Yamagata's "Admonition to the Military"—which was to become the spiritual guidepost of the Imperial army until the surrender of Japan in World War II. In anticipation of the Sino-Japanese War, he reorganized the army to adapt it for field operations. While still chief of the general staff he entered politics in 1882 and became president of the Legislative Board (Sangiin), a group of elders who advised the government concerning the establishment of the basic principles of the Meiji constitution. As home minister from 1883 to 1889, he established local government bodies, modernized the police system, and perfected controls over both institutions. As always, he was intent on creating a strong executive in anticipation of a future challenge from the parties. He was created a count in 1884 and resigned as chief of the general staff.

Rise to political power. In 1889, after surveying systems of local government in Europe for a year, he returned to Japan to become the first prime minister under the newly established parliamentary system. More conservative than Itō Hirobumi, who drafted the Japanese constitution, Yamagata proposed to the first Diet that Japan should expand its dominion over part of the Asian continent. When he was promoted to full general, he became the virtual head of the army. He induced the Emperor to proclaim the Imperial Rescript on Education, the guideline under the Meiji regime. In 1891 Yamagata, exhausted by party strife, resigned as prime minister. He served, however, as minister of justice (1892–93) and president of the Privy Council (1893–94) and remained a *genrō* (elder statesman) of an informal body of confidential advisers to the Emperor.

When the Sino-Japanese War broke out in 1894, Yamagata became commander of the 1st Army, in Korea, but sickness forced him to return home in the middle of the war. Confronted with the Russian–German–French diplomatic intervention in May 1895 after Japan's victory over China, he urged a compromise with Russia by dividing the Korean peninsula, which he effected as special ambassador to Moscow in 1896. His promotion to field marshal in 1898 affirmed his preeminent position in Japan's military and political life.

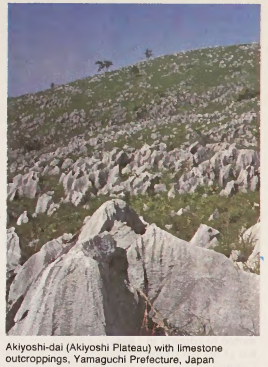
His second Cabinet was organized in November 1898. Half of its members were generals and admirals, and with their help Yamagata succeeded in accelerating his expansionist policy in Asia. When the Boxer Rebellion broke out in China in response to foreign encroachment, Yamagata, at Great Britain's request, dispatched the largest of the foreign contingents that were sent to put down the rebellion. This force played a major role in suppressing the Chinese nationalist movement and boosted Japan's international position. Domestically, Yamagata did his best to suppress the social-labour movement in its incipient stage, while strengthening the autonomy of the armed service and the bureaucracy. He also issued a governmental regulation which permitted only officers on active service to be appointed army and navy ministers, thus virtually freeing the military from civilian control.

In October 1900, when it found that it could deal neither with the nation's financial crisis brought on by military expansion nor with the problem of the division of China by the powers after the Boxer Rebellion, the Yamagata Cabinet resigned. From 1903 until 1909 he and Itō Hirobumi alternately occupied the office of president of the Privy Council. During the Russo-Japanese War of 1904–05 he was chief of the general staff. For his distinguished service he was awarded the title of prince. In anticipation of a recurrence of war between Japan and Russia, he prepared a contingency plan for war with the United States and Russia. Called the plan of national defense for the empire, it played a substantial part in the entry of Japan into World War II.

Without a rival after Itō Hirobumi's assassination in 1909, Yamagata led Japan as a virtual dictator, backed by the military and the bureaucracy under his influence. He consistently opposed the creation of a genuine Cabinet. When the Chinese revolution broke out in 1911, he endeavoured to help sustain the Ch'ing dynasty, and soon after the outbreak of World War I he succeeded in transforming the agreement with tsarist Russia into the military pact. In 1921, however, he meddled in the Crown Prince's marriage and was publicly censured. Yamagata died in disgrace the following year. (Fu.M.)

BIBLIOGRAPHY. The three biographies of Yamagata, in Japanese—by Fujimura Michio (1961), by Oka Yoshitake (1958), and by Tokutomi Iichiro (1933, reprinted 1969)—are all excellent. A publication in English, Roger F. Hackett, *Yamagata Aritomo in the Rise of Modern Japan, 1838–1922* (1971), gives a full account of his life.

Yamaguchi, prefecture (*ken*), extreme western Honshu, Japan, bordered by the Sea of Japan (north), the Shimonoseki-kaikyō (Shimonoseki Strait; southwest), and the Inland Sea (south). Most of its 2,355-sq-mi (6,100-sq-km) area is composed of plateaus and hills,



Akiyoshi-dai (Akiyoshi Plateau) with limestone outcroppings, Yamaguchi Prefecture, Japan
Orion Press—FPG

and there are no extensive plains. The limestone caves and outcroppings of the Akiyoshi-dai (plateau) in the west present a typical karst formation and are widely known tourist attractions. Rice and mandarin oranges are grown, and there is a large deep-sea fishery catch. Coal is mined at Ōmine and limestone and marble at Akiyoshi. Industries produce iron and steel, chemicals, and lumber.

Yamaguchi, the prefectural capital, dates from the 14th century. The castle town was planned to resemble Kyōto; it prospered as a cultural and commercial centre under the Ōuchi feudal lords. Yamaguchi was the home of the 15th-century landscape painter Sesshū. Following the traditions of the Chinese school, Sesshū is noted for his strong personal style.

Shimonoseki is the largest city in the prefecture and a leading industrial and educational centre and port. Iwakuni, on the Inland Sea, is known for its castle and arched Kintai-kyō (Kintai Bridge). On the Sea of Japan, Hagi is an ancient pottery centre that retains the charm of the feudal period. Pop. (1990) city, 129,467; prefecture, 1,572,645.

Yamal Peninsula, Russian POLUOSTROV YAMAL, lowland region in northwestern Siberia, west-central Russia, bounded on the west by

the Kara Sea and Baydarata Bay, on the east and southeast by the Gulf of Ob, and on the north by the Malygina Strait. The peninsula has a total length of 435 miles (700 km), a maximum width of 150 miles (240 km), and an area of 47,100 square miles (122,000 square km). The coasts of Yamal are mainly low-lying and sandy, whereas the inland region, rising in the south to a maximum height of 300 feet (90 m), has an irregular surface much affected by marine and glacial deposition. Drainage is exceedingly poor. Large natural-gas deposits have been discovered on the west coast of the peninsula and exploited at Kharasavey. Yamal in the Nenets language means "land's end."

Yamalo-Nenets, autonomous *okrug* (district), Tyumen *oblast* (province), in western Siberia, north-central Russia. It was established in 1930 as an autonomous *okrug* for the Nenets, or Samoyed, people, although by 1979 they constituted only 11 percent of the population. The *okrug* covers the northern part of the West Siberian Plain. Apart from the narrow chain of the northern Urals in the west, it is a huge, level plain, covered by extensive swamps and barren tundra; in the south is stunted forest. The climate is extremely severe. Reindeer herding and fishing were the only occupations until the early 1970s, when exploitation of natural-gas deposits began. The natural-gas fields in the *okrug* are some of the world's largest. Among the many deposits, the Urengoy and Medveshye fields are large producers. Salekhard (*q.v.*) is the administrative centre. Area 289,700 square miles (750,300 square km). Pop. (1993 est.) 464,800.

Yamamoto Eizō: *see* Ryōkan.

Yamamoto Gonnohyōe, COUNT (Hakushaku), Gonnohyōe also spelled GOMBEE (b. Nov. 26, 1852, Kagoshima, Japan—d. Dec. 8, 1933, Tokyo), Japanese naval officer who served two terms as prime minister of his country (1913–14; 1923–24).

Yamamoto's well-placed political contacts aided his rapid rise in the navy. During the Sino-Japanese War he served as aide-de-camp to general headquarters and in 1898 was appointed minister of the navy in the Japanese cabinet with the rank of vice admiral. Promoted to admiral in 1904, he became a member of the government's high-ranking Military Council.

In 1913 popular discontent with the oligarchic nature of Japanese politics caused the fall of the newly formed cabinet of the former army general Katsura Tarō. The old oligarchs who still controlled the government refused to allow Hara Takashi (Hara Kei), head of the dominant political party, to assume the prime ministership, and Yamamoto was chosen as a compromise candidate. Under Yamamoto, legislation to further the influence of the political parties was passed and reform of the civil-service appointment system carried out. His government also began Japanese involvement on the Chinese mainland, demanding and receiving new railway rights in Manchuria.

In 1914 Yamamoto was forced to retire after Japanese naval officers were found to have received bribes to ensure that the German firm of Siemens and the British firm of Vickers, Ltd., received naval armament contracts. In 1923 he again assumed the prime ministership, after the great Tokyo earthquake in which more than 100,000 people died. In the wake of the widespread anarchy and destruction resulting from the earthquake, Yamamoto attempted to restore law and order and continue government services. Four months later, however, he resigned when his cabinet assumed "responsibility" for an attempt to assassinate the Prince Regent (later the emperor Hirohito).

Yamamoto Isoroku (b. April 4, 1884, Nagaoka, Japan—d. April 18, 1943, Solomon Islands), Japanese naval officer who conceived of the surprise attack on the U.S. naval base at Pearl Harbor on Dec. 7, 1941.

Yamamoto graduated from the naval academy in 1904 and fought as an ensign in the Russo-Japanese War. He was naval attaché at the Japanese embassy in Washington, D.C., during 1926–27. He became vice minister of the Japanese navy in 1936, commander of the First Fleet in 1938, and commander in chief of Japan's Combined Fleet in August 1941.

Yamamoto opposed war with the United States because he feared Japan would lose a protracted struggle with such a powerful opponent. Once the decision to go to war was made, however, Yamamoto asserted that Japan's only chance for victory lay in a surprise attack that would cripple the American naval forces in the Pacific, after which Japan could seize the rich lands of Southeast Asia and move eastward across the Pacific unopposed. Yamamoto's plan for a carrier-based air strike on Pearl Harbor was adopted by the naval general staff, but meanwhile he was predicting that, if the war with the United States lasted more than one year, Japan would eventually be defeated.

After the success of the attack on Pearl Harbor, Yamamoto sought a decisive battle with what remained of the United States' Pacific forces, namely, its aircraft carriers. But the resulting battle, at Midway Island (June 1942), was won by the Americans. Yamamoto's ensuing campaign in the Solomon Islands was also less than successful. His death resulted when U.S. forces, having broken the Japanese communication codes, knew his whereabouts and ambushed and shot down his plane over Bougainville Island in the Solomons.

Yamamoto was Japan's greatest naval strategist during World War II. His contribution to naval strategy lies in his early recognition of the effectiveness of carrier-based aircraft in long-range naval attacks.

Yámana, also called YAHGAN, South American Indian people, very few in number, who were the traditional occupants of the south coast of Tierra del Fuego and the neighbouring islands south to Cape Horn. In the 19th century they numbered between 2,500 and 3,000. The Yámana language forms a distinct linguistic group made up of five mutually intelligible dialects that correspond to five regionally defined subdivisions.

Archaeologists have discovered extensive remains of Yámana camping places. Like their neighbours the Alacaluf and the Chono (*q.v.*), the Yámana hunted and gathered shellfish, seals, whales, and birds; a few berries and several varieties of fungi rounded out their diet. Despite the cold, rainy climate they had only a single garment of animal skin, worn like a cape over the shoulders. Their canoes had distinctive raised, pointed ends and a fireplace amidships.

The Yámana had no organized tribal life or recognized leaders. The family, usually monogamous, formed the basic social, political, and economic unit. They followed no clear pattern of migration and rarely camped in one place for more than a few days.

Their aesthetic activities were simple and few. They believed in a benevolent deity who was the giver of life and who punished wrongdoers. There were lesser spirits also, who could be approached through a shaman.

Yamana Mochitoyo, also called SŌZEN (b. June 26, 1404, Japan—d. April 15, 1473, Kyōto), head of the most powerful warrior clan in western Japan in the 15th century.

Yamana's attempts to increase his family's rank and influence brought him into conflict with a rival clan in eastern Japan and resulted in the Ōnin War (1467–77), which was followed by a century of internecine strife. As a Buddhist monk, he took the name Sōzen, and, because of his quick temper and scarlet complexion, he was sometimes called Akanyūdō, the Red Monk.

Yamana's rival for power within the central government, or shogunate, was Hosokawa Katsumoto, head of an important coalition of warriors from eastern Japan, and the *kanrei,* or shogunal prime minister. The conflict between the two contenders for power erupted into warfare in 1467, when the shogun, Ashikaga Yoshimasa (ruled 1449–73), attempted to name his infant son, rather than his younger brother, as his heir.

Although both Yamana and Hosokawa died in 1473, the fighting dragged on for four more years, when it ended in a stalemate. By that time the last vestiges of the central government's control over the outlying regions of Japan had been eliminated, and local warrior families had begun to quarrel among themselves. Within the central government the Yamana family lost out to the Hosokawa.

Yamanashi, landlocked *ken* (prefecture), central Honshu, Japan. Much of its area is mountainous, including the peaks of Mount Shirane (10,472 feet [3,192 m]) in the northwest and Mount Fuji (12,388 feet) on the southern border. The prefecture is drained by the Fuji River and its tributaries. The five lakes associated with Mount Fuji—Yamanaka, Kawaguchi, Sai, Shōji, and Motosu—are located in the south.

Yamanashi is basically agricultural, with extensive mulberry fields and orchards of



Waterfall in the Nishizawa valley near Nanatsugama, Yamanashi prefecture, Japan
Cosio—Shostal

peaches, apples, and cherries. Kōshū grapes are also grown. Small-scale factories manufacture textiles and processed foods. The prefectural capital, Kōfu (*q.v.*), is a major industrial and educational centre. Area 1,723 square miles (4,463 square km). Pop. (1993 est.) 865,000.

Yamanouchi FAMILY, Yamanouchi also spelled YAMAUCHI, family of Japanese feudal lords who from 1600 to 1868 dominated the important fief of Tosa on the island of Shikoku.

The rise in the Yamanouchi family's fortunes began with Yamanouchi Kazutoyo (1546–1605). For his successes on the battlefield in the service of Toyotomi Hideyoshi, then the most powerful general in Japan, Kazutoyo was rewarded with a small fief. After Hideyoshi's death, Kazutoyo switched his loyalty to Tokugawa Ieyasu (1543–1616), whom he aided at the Battle of Sekigahara (1600) by benevolent neutrality. Ieyasu became the dominant power in Japan, and he rewarded Kazutoyo with the large fief of Tosa.

Throughout the Tokugawa shogunate (1603–1867), the Yamanouchi, unlike many of the other great lords, remained loyal to the Tokugawa. When agitation against the Tokugawa family began in the mid-19th century, the head of the Yamanouchi family, Yamanouchi Toyoshige (1827–72), tried to negotiate a favourable settlement for the Tokugawas with the dissident lords. But, when his efforts failed, he joined the rebels in overthrowing the Tokugawa rule in order to prevent warriors of rival fiefs from obtaining too much influence in the new imperial government. Under this imperial government, formed in 1868, Tosa was made into Kōchi prefecture, and Toyoshige was given the hereditary title of prince, though his feudal prerogatives were eliminated.

Yamanoue Okura (b. *c.* 660—d. *c.* 733), one of the most individualistic, even eccentric, of Japan's classical poets, who lived and wrote in an age of bold experimentation when native Japanese poetry was developing rapidly under the stimulus of Chinese literature. His poems are characterized by a Confucian-inspired moral emphasis unique in Japanese poetry. The stern logic of Confucian morality, however, is often tempered with a Buddhist resignation.

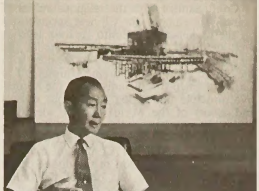
Relatively little is known of Okura's early life. From 726 to 732 he was governor of the province of Chikuzen, in Kyushu. There he was responsible to the governor-general of the island, Ōtomo Tabito, himself a major poet and patron of letters, and the two formed a close literary relationship. All of Okura's extant work is contained in the 8th-century anthology *Man'yō-shū*. The most famous of his poems is the "Hinkyū mondō" ("Dialogue on Poverty"), which treats the sufferings of poverty in the form of an exchange between a poor man and a destitute man. Also outstanding are poems expressing love for his children and laments on the death of his son, on the instability of human life, and on his own sickness and old age.

Yamāntaka, in northern Buddhism, one of the eight protective deities. *See* dharmapāla.

Yamasaki, Minoru (b. Dec. 1, 1912, Seattle, Wash., U.S.—d. Feb. 6, 1986, Detroit, Mich.), American architect whose buildings, notable for their appeal to the senses, departed from the austerity often associated with post-World War II modern architecture.

Following his graduation from the University of Washington, Seattle, Yamasaki went in 1934 to New York City, where he held a number of design positions and from 1943 to 1945 was an instructor in architectural design at Columbia University. In 1945 he moved to Detroit, becoming chief designer for the large architectural firm of Smith, Hinchman and Grylls; one of his projects was a modern addition for the Neoclassic Federal Reserve Bank. He resigned in 1949 to become a partner with George Hellmuth and Joseph Leinweber. He designed the Lambert-St. Louis Municipal Airport terminal, notable for its impressive use of concrete vaults and a strong influence on subsequent American air-terminal design. In 1955, the year in which Hellmuth left the partnership, Yamasaki was commissioned to design the American consulate in Kōbe, Japan.

The McGregor Memorial Conference Community Center, Wayne State University, Detroit, completed in 1958, is a widely admired example of his interior and exterior design used to convey serenity. Another outstanding structure, the Reynolds Metals Company Building, also in Detroit, made use of skylights, plants, and pools. His design of the U.S. science pavilion for the Seattle World's Fair of 1962 was impressive, but some critics found its use of tall Gothic arches lacking in architectural logic. Similar criticisms were aroused by his unconventional design for North Shore Congregation Israel (1964), a Jewish temple in Glencoe, Ill. Yamasaki is perhaps best known for the World Trade Center, a complex of several buildings on a 16-acre (6.5-hectare) site in New York City. The complex was notable for its 110-story twin towers (1970–72), which, until their destruction by terrorists in 2001, were among the world's tallest structures. Yamasaki is the author of *A Life in Architecture* (1979).



Minoru Yamasaki, 1972
Michael A. Vaccaro

Yamasee War (1715–16), in British-American colonial history, conflict between Indians, mainly Yamasee, and British colonists in the southeastern area of South Carolina, resulting in the collapse of Indian power in that area. Embittered by settlers' encroachment upon their land and by unresolved grievances arising from the fur trade, a group of Yamasees rose and killed 90 white traders and their families (April 15, 1715). All the surrounding Indian tribes except the Cherokee and the Lower Creek eventually allied themselves with Yamasee bands that continued to raid trading posts and plantations. The conspiracy disintegrated, however, when South Carolinian military resistance was strengthened by additional troops from neighbouring colonies and war supplies from New England. Many of the defeated Indians escaped to Florida, joining runaway black slaves and other Indians to form what later were called the Seminole.



"Nozame monogatari emaki," detail of a Yamato-e hand scroll (*emakimono*), colour on paper, second half of the 12th century, Late Heian period, in the Yamato Bunka Museum, Nara, Japan
By courtesy of the Yamato Bunka Museum

Yamashita Tomoyuki, also called YAMASHITA HŌBUN, byname TIGER OF MALAYA (b. Nov. 8, 1885, Kōchi, Japan—d. Feb. 23, 1946, Manila, Phil.), Japanese general known for his successful attacks on Malaya and Singapore during World War II.

After graduating from the Army Academy (1905) and the Army War College (1916), Yamashita was an officer for the Army General Staff Office. He rose rapidly through the ranks of the Imperial Army, eventually becoming the highest-ranking general of its air force.

An able strategist, he trained Japanese soldiers in the technique of jungle warfare and helped conceive the military plan for the Japanese invasion of the Thai and Malay peninsulas in 1941–42. In the course of a 10-week campaign, Yamashita's 25th Army overran all of Malaya and obtained the surrender of the huge British naval base at Singapore on Feb. 15, 1942. Soon afterward Yamashita was retired by Prime Minister Tojo Hideki to an army training command in Manchuria, and he did not see active service again until after Tojo's fall in 1944, when he was sent to command the defense of the Philippines. His forces were badly defeated in both the Leyte and the Luzon campaigns, but he held out until after the general surrender was announced from Tokyo in August 1945. More than a year later he was tried for war crimes, and, though he denied knowing of atrocities committed under his command, he was convicted and eventually hanged.

Articles are alphabetized word by word, not letter by letter

Yamato, city, Kanagawa *ken* (prefecture), Honshu, Japan, in the eastern part of the Sagamihara Plateau. During the Tokugawa period (1603–1867) it was a trade centre for the surrounding sericultural region. An air base of the imperial Japanese army, established in the city in 1942, was taken over by U.S. occupation forces after World War II. The city has rapidly industrialized since 1955. It is connected by rail to the Tokyo-Yokohama metropolitan area. Pop. (1988 est.) 188,351.

Yamato-e (Japanese: "Japanese painting"), style of painting important in Japan during the 12th and early 13th centuries. It is a Late Heian style, secular and decorative with a tradition of strong colour. The Yamato-e style was partly native in inspiration and partly derived from one of the styles of decorative wall and scroll painting of T'ang dynasty China.

Yamato-e is a calculated decorative style and is essentially an art of illustration, at its best unequaled in its vigorous, flowing compositions. Scroll paintings of the 12th and 13th centuries show a close relation between painting and prose. The *Genji* scrolls, probably the oldest examples of the style, achieve an intimate quality through the use of an aerial perspective over roofless Japanese architecture. They are notable for the variety, harmony, and richness of their colour schemes.

Yamato-Kōriyama, also called KŌRIYAMA-KINGYO (Kōriyama-Goldfish), city, Nara *ken* (prefecture), western Honshu, Japan. It is located 3 miles (5 km) southwest of Nara city. A prehistoric settlement, it became a castle town during the last decade of the 15th century.

With the opening of a trunk line of the National Railway, a modern textile factory was established there in 1893. The most important industry of the city has been goldfish breeding, which produces about 60 percent of the goldfish in Japan and has established overseas markets. The city also attracts many tourists to Jiko Temple, which has a ceremonial teahouse and garden. Pop. (2000 prelim.) 94,208.

yamato koto (musical instrument): *see* wagon.

Yamato Takeru, in full YAMATO TAKERU NO MIKOTO (Japanese: "Prince Brave of Yamato"), Japanese folk hero, noted for his courage and ingenuity, who may have lived in the 2nd century AD. His tomb at Ise is known as the Mausoleum of the White Plover.

The legendary son of the legendary 12th emperor Keikō, Yamato Takeru was supposedly responsible for expanding the territory of the Yamato court. His story appears in the chronicles *Kojiki* (completed in 712) and *Nihon Shoki* ("Japanese Chronicles"; completed in 720). In the stories, he subdued two uncouth Kumaso warriors by cleverly disguising himself as a woman and, at a banquet in his honour, killing them while they were drunk. He cut away the burning grass of a fire set by the Ainu tribesmen with the miraculous sword Kusanagi and escaped. His adventures ended on the plains of Tagi, where he was stricken with illness and, according to legend, changed into a white plover and disappeared from the world.

Yamazaki Ansai (b. Jan. 24, 1619, Kyōto, Japan—d. Oct. 16, 1682, Kyōto), propagator in Japan of the philosophy of the Chinese neo-Confucian philosopher Chu Hsi (1130–1200). Ansai reduced neo-Confucianism to a simple moral code, which he then blended with the native Shintō religious doctrines. This amalgamation was known as Suika Shintō.

A Buddhist monk early in life, Ansai began to study Confucianism and gradually turned



Yamazaki Ansai, ink drawing by an unknown artist

By courtesy of the International Society for Educational Information Tokyo, Inc

against Buddhism. By the time he was 29, he had become a Confucian teacher, gathering thousands of students, among whom were some of the greatest scholars of the day.

From the complex philosophic system of Chu Hsi, Ansai extracted the simple formula "Devotion within, righteousness without." By the former he meant the neo-Confucian emphasis on sincerity and seriousness. But in Ansai's hands, these concepts took on religious connotations. Indeed, as Ansai grew older, he began to combine the ethical doctrines of Confucianism with the religious values of Shintō. He equated the Chinese speculations on the universe with Shintō creation legends and identified the various elements of the neo-Confucian metaphysical principles with the Shintō gods. The Supreme Ultimate (T'ai Chi) of the neo-Confucianists (*i.e.*, the normative principle underlying the various objects and affairs of the world) became identified in Ansai's system with the first two divinities mentioned in the Shintō religious chronicles.

His amalgamation of Confucian morality with the Shintō tradition of the divine origin of the imperial line was one of the philosophical roots of the later extreme Japanese nationalism and emperor worship. Ansai was himself intensely nationalistic: he instructed his disciples that if Confucius and his great disciple Mencius were to come to Japan at the head of an invading army, the students would be obliged to don their armour and attempt to capture both sages.

Yamazaki Sōkan (b. *c.* 1465, Ōmi province, Japan—d. *c.* 1552, Shikoku?), Japanese *renga* ("linked-verse") poet of the late Muromachi period (1338–1573) who is best known as the compiler of *Inu tsukuba shū* (*c.* 1615; "Mongrel Renga Collection"), the first published anthology of haikai (comic *renga*).

Little is known of Sōkan's life. According to tradition he served as a retainer to the shogun Ashikaga Yoshihisa and became a monk after Yoshihisa's death in 1489. Numerous other legendary tales exist concerning his unconventional lifestyle, which usually characterize him as being destitute and mad, but historical evidence indicates that he earned a comfortable income from teaching poetry and from his calligraphy.

The *Inu tsukuba shū*, containing haikai by Sōkan and others, was probably written over a period of several years but was not published until some 100 years after its completion. The delay in publication may have been because Sōkan compiled the book for the use of his students and did not intend for it to be published. A more likely reason, however, is the coarse and profane nature of many of its poems. Despite their earthiness, the poems contained a wit and freshness that appealed to the aspiring haikai poets of the 17th century, especially those of the Danrin school, who often tried to imitate their style.

Yambol, also spelled JAMBOL, town, east-central Bulgaria, on the Tundzha (Tundja) River. North of the present town are the ruins of Kabyle (or Cabyle), which originated as a Bronze Age settlement in the 2nd millennium BC and was conquered by the Macedonians under Philip II in 342–341 BC. Taken by Rome in 72 BC, Kabyle became a city in the Roman province of Thrace, governing the middle reaches of the Tundzha (ancient Tonsus) and serving as a rest stop on the road to Adrianople (now Edirne). It was the seat of a bishopric in the 4th century AD and disappeared in the 6th century. Finds from excavations at Kabyle are in the Regional Museum of Yambol.

Between the 11th and the 14th century, the present site was called Diampolis; from the 15th to the 19th century, under the Turks, it was referred to as Yambolı. The town has ruins of a notable stone mosque. Yambol's industries produce textiles, machinery for footwear manufacture, ceramics, furniture, processed foods, wines, and beverages. Pop. (2001) 82,924.

Yamethin, town, central-northern Myanmar (Burma), occupying a high point on the central plain. For centuries it was an important junction on the caravan trade route between the Shan region to the east and Myingyan, 90 miles (145 km) northwest, on the Irrawaddy River. Modern Yamethin, a municipality since 1888, has railway workshops and is irrigated by the Kyeni Tank (reservoir), built in the 11th century, to the southeast. It is linked by road and railway to Yangôn (Rangoon) and Mandalay. The surrounding area produces rice, sugarcane, corn (maize), and millet. Pop. (1993) 36,400.

yamim nora'im (Hebrew: "days of awe"), English HIGH HOLY DAYS, in Judaism, the High Holy Days of Rosh Hashana (on Tishri 1 and 2) and Yom Kippur (on Tishri 10), in September or October. Though the Bible does not link these two major festivals, the Talmud does. Consequently, *yamim nora'im* is sometimes used to designate the first 10 days of the religious year: the three High Holy Days, properly so-called, and also the days between. The entire 10-day period is more accurately called Aseret Yeme Teshuva ("Ten Days of Penitence").

Yamm, also spelled YAM (Hebrew: "Sea"), ancient West Semitic deity who ruled the oceans, rivers, lakes, and underground springs. He also played an important role in the Baal myths recorded on tablets uncovered at Ugarit, which say that at the beginning of time Yamm was awarded the divine kingship by the god El, the president of the pantheon. One day, Yamm's messengers requested that the gods surrender Baal to be a bond servant to Yamm. El finally agreed, but Baal refused to go and instead engaged Yamm in battle. After a furious fight, in which the craftsman Kothar supplied Baal with two special weapons, Yamm was finally slain and the kingship given to Baal. According to some scholars, Yamm was the same deity as Lotan (Hebrew: Leviathan), who was represented as a hydralike dragon or serpent.

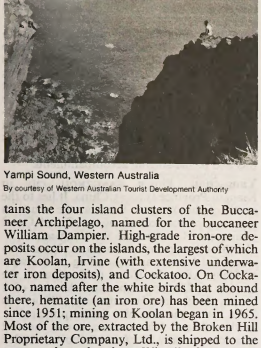
Yamoussoukro, town and capital designate, south-central Côte d'Ivoire (Ivory Coast), located about 170 miles (274 km) northwest of the national capital, Abidjan. For more than three decades after Côte d'Ivoire achieved independence in 1960, Yamoussoukro served as the country's "second capital" because it was the birthplace, home, and unofficial headquarters of President Félix Houphouët-Boigny, Côte d'Ivoire's head of state from 1960 to 1993. The town housed the assembly hall of the nation's only political party, the Democratic Party of Côte d'Ivoire (Parti Démocratique de la Côte d'Ivoire). Yamoussoukro became a major urban centre largely because of Houphouët-Boigny's influence, with a dense infrastructure of roads and public utilities. The fishing, forestry, and perfume industries play important roles in the town's economy. Sites of cultural importance in Yamoussoukro include the Yamoussoukro Basilica, a large mosque, other churches, and secondary schools. Pop. (1995 est.) 110,000.

Yamoussoukro Basilica, in full OUR LADY OF PEACE OF YAMOUSSOUKRO BASILICA, Roman Catholic basilica in Yamoussoukro, Côte d'Ivoire, that is the largest Christian church in the world. The basilica's rapid construction in 1986–89 was paid for by Côte d'Ivoire's president, Félix Houphouët-Boigny, and the building is situated in his birthplace, the city of Yamoussoukro. The basilica's form is roughly based on that of Saint Peter's in Rome, with a dome surmounting a colonnade that is in the form of a Latin cross. The basilica is fronted by a large plaza encircled by two more colonnades. The 272 Doric columns that support the colonnades are made of cement and rise as high as 101 feet (31 m). The basilica's gigantic dome dwarfs that of Saint Peter's and rises to a height of 489 feet (149 m). The basilica has the capacity to hold 18,000 worshipers, while the esplanade can accommodate a crowd of 300,000.

Yampa River, river, in the western United States, rising in the White River National Forest of northwestern Colorado, in the Rocky

Mountains. It flows north past Steamboat Springs, then turns west to flow through Yampa Canyon (about 1,600 feet [490 m] deep) in Dinosaur National Monument and joins the Green River near the Utah border after a course of about 250 miles (400 km). Its chief tributary, the Little Snake, joins it from the north immediately east of the monument. The river's name probably derives from an Indian tribe.

Yampi Sound, portion of the Indian Ocean off the north coast of Western Australia, between King Sound and Collier Bay. It con-



Yampi Sound, Western Australia
By courtesy of Western Australian Tourist Development Authority

tains the four island clusters of the Buccaneer Archipelago, named for the buccaneer William Dampier. High-grade iron-ore deposits occur on the islands, the largest of which are Koolan, Irvine (with extensive underwater iron deposits), and Cockatoo. On Cockatoo, named after the white birds that abound there, hematite (an iron ore) has been mined since 1951; mining on Koolan began in 1965. Most of the ore, extracted by the Broken Hill Proprietary Company, Ltd., is shipped to the company's steelworks at Whyalla, S.Aus., and at Port Kembla, N.S.W. Extreme tides on Yampi Sound make navigation difficult. The sound was named in 1838 by Lieutenant John Lort Stokes (who surveyed the coast aboard HMS *Beagle*) and derives from an Aboriginal word meaning "freshwater."

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Yamuna River, also called JUMNA, river in Uttar Pradesh state, northern India, rising in the Himalayas near Jamnotri. It flows in a southerly direction through the Himalayan foothills and onto the northern Indian plain, along the Uttar Pradesh–Haryāna state border. The Eastern and Western Yamuna canals are fed from the river at that point.

The Yamuna then passes Delhi, where it feeds the Āgra Canal. Near Mathura it turns southeastward and passes Āgra, Firozābād, and Etāwah. Below Etāwah it receives a number of southern tributaries, the largest of which are the Chambal, the Sindh, the Betwa, and the Ken. Near Allahābād, after a course of about 855 miles (1,376 km), the Yamuna joins the Ganges River; their confluence is a sacred place to Hindus.

Traffic on the Yamuna is light. Above Āgra it shrinks to a small stream in summer, partly because of the amount of water removed by the canals.

Yan Fu (Chinese scholar): *see* Yen Fu.

Yan Liben: *see* Yen Li-pen.

Yan Ruoju (Chinese scholar): *see* Yen Jo-chü.

Yan Yuan (Confucianist philosopher): *see* Yen Yüan.

Yana, Hokan-speaking California Indians formerly living along the eastern tributaries of the upper Sacramento River, from the Pit River to southwest of Lassen Peak. Yana territory comprised a myriad of foothills and narrow, rugged canyons, partly wooded but mostly brush-covered and rocky.

There were four Yana divisions—Northern, Central, and Southern Yana, as well as Yahi—speaking mutually intelligible dialects. A significant characteristic of Yana speech was its use of separate forms for men and women. The differences were small; but females used their word forms exclusively, whereas men used the male forms among themselves and the female forms when addressing women.

Life generally was very poor in the harsh, barren environment. The Yana lived in earth-covered winter lodges and thatch-covered summer dwellings, hunted various game, and fished for salmon. Little is known of their social organization, except that it probably comprised small bands and contained classes or rankings. The Yana were relatively warlike, a common trait among northern hill dwellers of California.

In the 1860s the Yahi group were the victims of particularly brutal attacks by nearby white settlers. The settlers launched an extermination campaign, killing most of them and driving off a few survivors, who hid themselves in isolated canyons for more than 40 years. The last known Yahi survivor (Ishi), discovered in 1911, died in 1916. Other Yana, if they survive, are intermixed with other Indians.

Yanam, town, Pondicherry union territory, an enclave within northeastern Andhra Pradesh state, southern India, on the main mouth of the Godāvari River.

Formerly part of the Cōḷa empire, the area came under Muslim occupation in the 16th century. In the 17th and 18th centuries it was the scene of constant warfare between Muslim, British, and French troops. When much of the coastal plain was incorporated into the Madras Presidency in 1765, Yanam remained a French enclave. It joined the union territory in 1954. Pop. (1981) 11,631.

Yan'an (China): *see* Yen-an.

Yanbu', also spelled YENBO, town, western Saudi Arabia, on the Red Sea north of Jidda. It serves as the country's second Red Sea port, after Jidda, and is the main port for Medina, 100 miles (160 km) to the east. The economy of Yanbu' was traditionally based on the pilgrim trade and the export of agricultural products, especially dates. Its harbour is being enlarged and improved to ease the pressure on Jidda, and the city is one terminus of three pipelines built in the 1980s for the delivery of petroleum and petroleum products to a major petrochemical complex at Yanbu'. The town has a small airfield and roads extending along the coast and eastward to Medina. Pop. (latest est.) 30,000.

Yancey, Jimmy, byname of JAMES EDWARD YANCEY (b. Feb. 20, 1898, Chicago—d. Sept. 17, 1951, Chicago), American blues pianist who established the boogie-woogie style with slow, steady, simple left-hand bass patterns. These became more rapid in the work of his students Albert Ammons and Meade "Lux" Lewis, who popularized the "Yancey Special."

Yancey was largely a self-taught pianist, with some instruction from his brother Alonzo. He had a childhood career as a singer and dancer, touring American vaudeville circuits and European music halls, giving a command performance for King George V of England in 1913. Returning to Chicago, Yancey performed at small taverns and informal gatherings. He played baseball in the Negro leagues until 1919, the year he married Estella Harris (Mama Yancey), who sang with him at house parties throughout the 1920s, '30s, and '40s. They had three recording sessions together and performed on network radio in 1939 and at Carnegie Hall in New York City in 1948. From 1925 until his death, Yancey worked as a groundskeeper at the Chicago White Sox baseball stadium.

Yancey's influence on other musicians was profound, but his music was known to only a small coterie during his lifetime. Mama Yancey continued to perform and record, working with pianists Little Brother Montgomery and Erwin Helfer. She sang at Carnegie Hall again in 1981.

Yancey, William Lowndes (b. Aug. 10, 1814, Warren County, Ga., U.S.—d. July 27, 1863, Montgomery, Ala.), American southern political leader and "fire-eater" who, in his later years, consistently urged the South to secede in response to Northern antislavery agitation.

Though born in Georgia, Yancey in 1822 moved with his mother and stepfather, an antislavery Presbyterian minister, to Troy, N.Y. Yancey attended Williams College from 1830 to 1833 and then studied law in Greenville, S.C. In 1834 he was admitted to the bar. As editor of the *Greenville Mountaineer* during the nullification crisis, he took a firm Unionist stand.

In 1836 Yancey moved to Alabama, where he rented a plantation and purchased two local newspapers. It was as a lawyer, however, that he became prominent, and in 1841 he was elected to the Alabama legislature; he became a state senator in 1843. He urged many progressive reforms as an Alabama legislator, and there is no evidence that he was a proponent of secession prior to the Mexican War.

In 1844 Yancey was elected to the U.S. Congress. He was reelected the following year but resigned in September 1846 to devote himself to fostering a grassroots movement in the South to counter Northern antislavery agitation. In 1848 he drafted the Alabama Platform, the foundation of his political creed until the outbreak of the American Civil War. Drawn up in response to the Wilmot Proviso—a proposed ban on slavery in the territories newly acquired from Mexico—the Alabama Platform insisted that slaveowners had the right to take their chattel property with them into the territories, that Congress had the duty to protect the rights of slaveholders everywhere, that a territorial legislature could not ban slavery, and that the Democratic Party should endorse only proslavery candidates for national office.

Although it was endorsed by the Alabama legislature, Yancey's Alabama Platform was overwhelmingly rejected when he presented it at the 1848 Democratic National Convention. Yancey, however, was resolute, and, after the Compromise of 1850, he added secession to his creed. For the next decade he sought to arouse Southerners to the peril of remaining in the Union. He organized Southern-rights associations and in 1858 assisted in the creation of the League of United Southerners. He delivered hundreds of speeches, trying to draw Southerners of all parties and persuasions into a movement backing his uncompromising proslavery states' rights position.

By 1860 the Alabama Platform had won substantial support throughout the South. At the Democratic National Convention in Charleston, a slightly revised version won only qualified acceptance, prompting the Southern delegates to withdraw and nominate a rival ticket. In essence, therefore, Yancey was responsible for the dissolution of the last national institution of the antebellum era.

Yancey then campaigned for John C. Breck-

inridge, nominee of the Southern wing of the party, the Constitutional Democrats. Following Lincoln's election, it was Yancey who drafted Alabama's secession ordinance. Early in 1861, he went to England and France in quest of official recognition of the new Confederate government, but his mission proved unsuccessful. He returned in 1862 and was elected to the Confederate Senate, where he served until his death.

Yancheng (China): *see* Yen-ch'eng.

Yáñez, Agustín (b. May 4, 1904, Guadalajara, Mex.—d. Jan. 17, 1980, Mexico City), Mexican novelist and short-story writer and active political figure who held several government posts.

Yáñez was a member of the Generation of 1924 group of writers and was active in the Banderas de Provincias group, which translated Franz Kafka and James Joyce. A lawyer by profession, he began to publish novels in the 1940s.

The novel *Al filo del agua* (1947; "To the Edge of the Water"; Eng. trans. *The Edge of the Storm*), his masterpiece, presents life in a typical Mexican village just before the Mexican Revolution. Its use of stream of consciousness, interior monologue, and complex structure anticipates many traits of the Latin-American new novel of the 1950s and '60s. *La creación* (1959; "The Creation"), a novel that has some of the same characters as *Al filo del agua*, is an attempt to define the new cultural climate that resulted from the revolution. *La tierra pródiga* ("The Lavish Land") appeared in 1960.

Las tierras flacas (1962; *The Lean Lands*) shows the effect of industrialization on a peasant society. *Tres cuentos* (1964; "Three Stories") and *Los sentidos del aire* (1964; "The Ways the Wind Blows"), short-story collections, deal with man's attempt to come to grips with time and space. His *Obras escogidas* ("Selected Works") were published in 1968.

Yáñez was governor of the state of Jalisco (1953–59), subsecretary to the president of Mexico (1962–64), and secretary of education (1964–70). Most of his works are set in his native state, Jalisco. *Genio y figuras de Guadalajara* (1941; "The Character and Personages of Guadalajara") recalls the men who developed the city. The essay collections *Mitos indígenas* (1942; "Native Myths"), *El alma espiritual de Jalisco* (1945; "The Spiritual Climate of Jalisco"), and *Don Justo Sierra* (1950) reveal a critical and sensitive mind.

Yáñez Pinzón, Vicente: *see* Pinzón, Martín Alonso; and Pinzón, Vicente Yáñez.

Yang, Chen Ning, byname FRANK YANG (b. Sept. 22, 1922, Hofei, Anhwei, China), Chinese-born American theoretical physicist



Chen Ning Yang
By courtesy of the State University of New York at Stony Brook

whose research with Tsung-Dao Lee showed that parity—the symmetry between physical phenomena occurring in right-handed and left-handed coordinate systems—is violated when elementary particles decay. Until this discovery it had been assumed by physicists that parity symmetry is as universal a law as the conservation of energy or electric charge. This and other studies in particle physics earned Yang and Lee the Nobel Prize for Physics for 1957.

Life. Yang's father, Yang Ko-chuen (also known as Yang Wu-chih), was a professor of mathematics at Tsinghua University, near Peking. While still young, Yang read the autobiogphy of Benjamin Franklin and adopted "Franklin" as his first name. After graduation from the Southwest Associated University, in K'unming, he took his B.Sc. in 1942 and his M.S. in 1944. On a fellowship, he studied in the United States, enrolling at the University of Chicago in 1946. He took his Ph.D. in nuclear physics with Edward Teller and then remained in Chicago for a year as an assistant to Enrico Fermi, the physicist who was probably the most influential in Yang's scientific development. Lee had also come to Chicago on a fellowship, and the two men began the collaboration that led eventually to their Nobel Prize work on parity. In 1949 Yang went to the Institute for Advanced Study in Princeton, N.J., and became a professor there in 1955. He became a U.S. citizen in 1964.

Work. Almost from his earliest days as a physicist, Yang had made significant contributions to the theory of the weak interactions—the forces long thought to cause elementary particles to disintegrate. (The strong forces that hold nuclei together and the electromagnetic forces that are responsible for chemical reactions are parity-conserving. Since these are the dominant forces in most physical processes, parity conservation appeared to be a valid physical law, and few physicists before 1955 questioned it.) By 1953 it was recognized that there was a fundamental paradox in this field since one of the newly discovered mesons—the so-called K-meson—seemed to exhibit decay modes into configurations of differing parity. Since it was believed that parity had to be conserved, this led to a severe paradox. After exploring every conceivable alternative, Lee and Yang were forced to examine the experimental foundations of parity conservation itself. They discovered, in early 1956, that, contrary to what had been assumed, there was no experimental evidence against parity nonconservation in weak interactions. Those experiments that had been done, it turned out, simply had no bearing on the question. They suggested a set of experiments that would settle the matter, and, when these were carried out by several groups over the next year, large parity-violating effects were discovered. In addition, the experiments also showed that the symmetry between particle and antiparticle, known as charge conjugation symmetry, is also broken by the weak decays.

In addition to his work on weak interactions, Yang, in collaboration with Lee and others, carried out important work in statistical mechanics—the study of systems with large numbers of particles—and later investigated the nature of elementary particle reactions at extremely high energies. From 1965 Yang was Albert Einstein professor at the Institute of Science, State University of New York at Stony Brook, Long Island. During the 1970s he was a member of the board of Rockefeller University and the American Association for the Advancement of Science and, from 1978, of the Salk Institute for Biological Studies, San Diego. He was also on the board of Ben-Gurion University, Beersheba, Israel. He received the Einstein Award in 1957 and the Rumford Prize in 1980; in 1986 he received the Liberty Award and the National Medal of Science. (J.Be.)

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Yang Chien (Chinese emperor): *see* Wen-ti (541–604).

yang-ch'in, Pinyin YANGQIN, Chinese dulcimer in which tone is produced by striking the strings with bamboo beaters covered with rubber or leather. The vibration of the strings is transmitted to a trapezoidal wooden soundboard by bridges, over which the strings are stretched.

The *yang-ch'in* has four or five bridges with sets of strings on each bridge pitched whole steps apart and neighbouring sets of strings on adjacent bridges pitched a fifth apart, thus allowing a chromatic scale to be played in all keys. The range of this instrument covers one octave below middle C and two and a half octaves above it. The *yang-ch'in* was introduced to East Asia from the West about 1800 and is now an important feature in Chinese orchestras and ballad-singing accompaniments.

Yang-chou, Pinyin YANGZHOU, city in Kiangsu Province (*sheng*), China. It lies to the north of the Yangtze River at the southern terminus of the section of the Grand Canal joining the Huai River to the Yangtze.

In the 4th and 3rd centuries BC Yang-chou was a fief known as Kuang-ling in the state of Ch'u. After the Ch'in unification of the empire in 221 BC, it became the seat of a county. Under the Han dynasty (206 BC–AD 220), it was the seat of a feudal principality. In the 5th and 6th centuries it was the seat of a commandery, or *chün* (district controlled by a commander), called either Kuang-ling or Nan-yen. During this early period, Yang-chou was the traditional name for Southeast China—one of the nine traditional divisions of China.

The identification of the old city of Kuang-ling with Yang-chou began in 590. Yang-chou became the southern capital of the Sui dynasty (581–618) in 605. In 606–607 it became the southern terminus of the canal system built to link the Yangtze and Huai valleys with the capital cities of Lo-yang and Ch'ang-an. Yang-chou became a major port and transshipment point, as well as the chief commercial city of the Yangtze valley. After 763, under the T'ang dynasty (618–907), Yang-chou became the administrative centre for the state's financial apparatus in southern China and the headquarters of the salt administration. It was also an important seaport.

Yang-chou continued to be a flourishing trading centre through the Sung (960–1279) and Yüan (1206–1368) periods. According to some scholars, Marco Polo, the 13th-century Venetian traveler (who knew the city as Yonju), was employed as an official there; he speaks of its flourishing trade and large garrison forces.

During the Ming dynasty (1368–1644), its importance as a port diminished with the decline of Chinese sea-borne trade. The city, previously located near modern Chiang-tu some distance to the east, had been moved to its present site during the Southern Sung dynasty (1127–1279). Under the Ming the present city was constructed on a part of the Sung site, and the whole surrounded by 5.5 miles (9 km) of walls.

Yang-chou remained a regional administrative centre from Ming to Ch'ing times (1368–1911/12), forming a superior prefecture (*fu*)

of the same name. During this period it was of national importance as the base for the Lianghuai Salt Administration. The salt merchants of Yang-chou grew immensely wealthy, and from the 16th to the 18th centuries were patrons of the arts and letters, making Yangchou an important centre of culture. Its decline dates from the Taiping Rebellion (1850–64). The city was taken by the rebels in 1853, and in 1855 it was the site of a major battle in which the Imperial (Manchu) forces were disastrously defeated. During these years Yang-chou was seriously damaged, its temples and public buildings being destroyed. Its recovery was hampered by the fact that from 1855 onward the Grand Canal was flooded and its northern reaches damaged, so that grain shipments to Peking and Tientsin were increasingly sent north by sea from Shanghai. At the same time the changes in the salt administration also struck at the other base of Yang-chou's traditional prosperity. In 1913 it ceased to be a superior prefecture and reverted to a county municipality.

In the early part of the 20th century, it remained relatively prosperous, and was still a centre of the salt administration, although no longer the home of its merchant princes. It also remained a centre of such traditional handicrafts as silk textiles, lacquer ware, carving, and embroidery. It was a regional market, especially for rice, and a centre of food processing.

Since 1949 Yang-chou has experienced a revival, especially since the restoration of the southern reaches of the Grand Canal and improvements made in the canal system to the north. It is primarily a transportation and market city and is the focus of an extensive road network. Industry, chiefly cotton spinning and textiles, is less important. In the 1970s a pumping station was constructed to pump Yangtze River water to the northern part of the country. The city has many ancient buildings and sites of historic interest. Pop. (1998 est.) 395,000.

Yang Chu, Pinyin YANG ZHU (b. 440 BC, China—d. 360? BC, China), one of the early Taoist philosophers. Yang has been infamous in Chinese history for what was thought to be his extreme hedonism. This characterization of Yang was fostered by the great Confucian philosopher Mencius (*c.* 371–289 BC), the second Sage (after Confucius) of China, who condemned Yang Chu for upholding the principle of "each for himself." According to Mencius, "Though he [Yang] might have benefitted the world by plucking out a single hair, he would not have done it." The few fragments of Yang's writing that have survived, however, make it doubtful that this is an accurate interpretation of his ideas.

Yang Chu was an advocate not of license and debauchery but of naturalism. He said, "The only way to treat life is to let it have its own way, neither hindering it nor obstructing it." He felt that man owes it to himself to live pleasurably and that to live pleasurably means to live naturally. Overindulgence is as much against nature as rigid self-restraint. Interference with others, whether in the form of assistance or encroachment, is out of the question.

Yang-ch'üan, Pinyin YANGQUAN, city, eastern Shansi Province (*sheng*), China. It is a prefecture-level municipality (*shih*) entirely surrounded by Chin-chung Prefecture (*ti-ch'ü*). Yang-ch'üan is located in the mountains of Shansi, west of the main range of the T'aihang Shan (mountains), at the eastern end of the route through the mountains via Niangtzu Kuan (pass). Its site was of major strategic importance throughout history, commanding one of the main routes from the North China Plain to Shansi and the Northwest.

Yang-ch'üan itself, however, was only an insignificant mountain village, subordinate to the nearby town of P'ing-ting until the 20th century. It was first opened up by the construction of the railway from Shih-chia-chuang in Hopeh Province to T'ai-yüan, the provincial capital of Shansi. Yang-ch'üan then became a railway centre, as well as a key road junction on the east–west highway via the Niang-tzu Kuan, being also linked to the north–south route to the valleys of southeastern Shansi.

With the coming of the railway, Yang-ch'üan, located in the heart of the rich Shansi coalfield, also became an important mining centre, producing both coking coal and anthracite. Much of the coal is used for generating power, both locally and in T'ai-yüan. It also supplied the Lung-yen steelworks at Hsüan-hua, northwest of Peking in Hopeh. Yen Hsi-shan, provincial warlord of Shansi in the first half of the 20th century, established an ironworks at Yang-ch'üan. This formed the base of a local munitions industry and was one of the few ironworks that continued in production through the depressed years of the late 1920s and '30s.

Geological surveys have also revealed rich deposits of iron ore, pyrite, bauxite, plaster stone, and other minerals in the vicinity. The city has developed various other industries, including metallurgy, chemicals, machinery, and construction equipment. Its position as a transportation hub of eastern Shansi was strengthened with the electrification and expansion of the railway and the construction of an express highway between Shih-chia-chuang and T'ai-yüan. Pop. (1998 est.) 447,200.

Yang Di (Chinese emperor): *see* Yang Ti.

Yang Hsiu-ch'ing, Pinyin YANG XIUQING (d. Sept. 2/3, 1856, Nanking), organizer and commander in chief of the Taiping Rebellion, one political–religious uprising that occupied most of South China between 1850 and 1864.

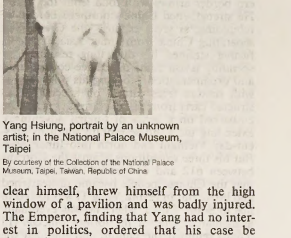
A dealer in firewood, Yang joined the Taiping band shortly before the rebellion broke out and quickly rose to a high position. In 1851, when the supreme Taiping leader, Hung Hsiu-ch'üan (1814–64), proclaimed his own dynasty and gave himself the title of T'ien-wang, or Heavenly King, he made Yang commander in chief of the armed forces with the title of Tung-wang, or Eastern King. Yang organized the Taiping army and also developed a massive system to spy on the Taiping followers. Hung Hsiu-ch'üan had formed the Taipings after a series of visions in which it was revealed to him that he was the younger son of God, sent down to earth to save China. Yang proceeded to buttress his own position by imitating Hung. He went into a series of trances, in which he claimed to speak as the mouthpiece of the Lord, an accomplishment confirmed by his seeming ability to reveal traitors to the Taiping cause and confront them with the details of their treason.

Under Yang's direction, the Taipings advanced northward until in 1853 they took the large east central city of Nanking and made it their capital. Taiping armies continued north in an effort to take the Imperial capital at Peking. Meanwhile, Hung turned his attention increasingly to his harem and to religious affairs. He made Yang his prime minister, with authority to organize the Taiping administration.

Gradually, Yang also usurped Hung's prerogatives as Heavenly King, and the resentful Hung ordered Yang's execution. Not only was Yang put to death, but his entire family and thousands of his adherents were destroyed. After this coup d'etat Taiping leaders grew increasingly suspicious of one another, and the Taiping cause began to collapse.

Yang Hsiung, Pinyin YANG XIONG (b. *c.* 53 BC, near Ch'eng-tu, Szechwan Province, China—d. AD 18, Ch'ang-an, now Sian, Shensi Province), Chinese poet and philosopher best known for his poetry written in the form known as *fu* (*q.v.*).

As a quiet and studious young man he came to admire and practice the *fu* form. When he was over 40 years of age he went to live in the Imperial capital, Ch'ang-an (Sian), where his reputation as a poet won him a position at court. In AD 9 when Wang Mang usurped the Imperial throne and executed or imprisoned many prominent persons, Yang Hsiung, about to be arrested and fearful that he could not



Yang Hsiung, portrait by an unknown artist, in the National Palace Museum, Taipei

By courtesy of the Collection of the National Palace Museum, Taipei, Taiwan, Republic of China

clear himself, threw himself from the high window of a pavilion and was badly injured. The Emperor, finding that Yang had no interest in politics, ordered that his case be dropped.

In later life Yang Hsiung turned from poetry to philosophy, in which he was influenced by both Confucianism and Taoism. The doctrine for which he is remembered reflects the perennial Chinese interest in human nature, which Yang regarded as a mixture of good and evil, avoiding the extreme positions taken by Mencius (original goodness) and Hsün-tzu (original evil). His chief works in philosophy were the *Fa-yen,* in 13 chapters, devoted to ethics, history, etc., and the *T'ai-hsüan ching,* 15 essays imitating the Confucian Classic *I Ching* in form.

Yang Kuei-fei, Pinyin YANG GUIFEI (d. 756, Ma-wei, China), notorious beauty and concubine of the great T'ang emperor Hsüan Tsung (reigned 712–756). Because of her the Emperor is said to have neglected his duties, and the T'ang dynasty (618–907) was greatly weakened by a rebellion that ensued. Her story has been the subject of many outstanding Chinese poems and dramas. The daughter of a high official, she was one of the few obese women in Chinese history to have been considered beautiful. She became a concubine to Hsüan Tsung's son, but the 60-year-old emperor found the girl so desirable that he forced his son to divorce her. Soon her two sisters were admitted into the Imperial harem, and her brother Yang Kuo-chung became the first minister of the empire.

Through Yang's influence, An Lu-shan, a cunning young general of Turkish origin, rose to great prominence. Yang adopted him as her legal son and is said to have made him her lover. With such powerful patronage, An Lu-shan came to control an army of 200,000. Jealous of the power of Yang's brother, An Lu-shan soon turned against the Emperor and led a great rebellion against him. When the capital was captured in 756, Hsüan Tsung and his court were forced to flee to the south. On the road the Imperial soldiers became enraged with members of the Yang family, whom they thought responsible for the debacle, and executed both Yang and her brother.

Yang Ti, Pinyin YANG DI (posthumous name, or *shih*), personal name (Wade–Giles

romanization) YANG KUANG, or YANG YING, temple name (SUI) KAO TSU (b. 569, China—d. 618, China), the second and penultimate emperor of the Sui dynasty (581–618). Under Yang Ti canals were built and great palaces erected.

He acceded to the throne in 604, and it is generally agreed that he did so after assassinating his father and his elder brother. Embarking on a costly program of construction and conquest, in 608 he built a great canal between the rice-producing areas in the south and the Peking area in the north. Yang Ti extended this transportation system in 610, beginning the Grand Canal network that was later used to supply the capital and northern border armies with food from the south. He strengthened China's northern border by rebuilding, at great expense, the Great Wall separating China from Inner Asia. Yang Ti further strained his dwindling resources by spending lavish sums on palace construction and ornamentation, stocking his private park with mature trees carried on specially constructed carts from distant forests. Finally, he embarked on a series of foreign adventures, extending the Chinese empire south to present-day Vietnam and north into Inner Asia. But his three expeditions against the Koreans between 612 and 614 ended so disastrously that the Chinese people became disheartened and broke out in revolt. Yang Ti was forced to flee to South China, where he was eventually assassinated. One of his former officials (Li Yüan) reunited the empire and founded the T'ang dynasty (618–907).

Yang Xiong (Chinese poet): *see* Yang Hsiung.

Yang Xiuqing (Chinese rebel leader): *see* Yang Hsiu-ch'ing.

Yang Yen, Pinyin YANG YAN (b. 727, China—d. 781, China), minister to the T'ang emperor Te Tsung (reigned 779/780–805).

Yang introduced a new system of taxation into China that helped reduce the power of the aristocratic classes and eliminate their large tax-free estates. Yang abolished the various land, labour, produce, and other taxes to which the Chinese peasantry had been subject and the upper classes immune. In their place he created the double tax. Levied twice a year on land in the 6th and 11th months, regardless of ownership, it persisted in its basic form until the Communist revolution in 1949. Yang himself committed suicide when a jealous co-minister accused him of bribery and corruption.

Yang Zhu (Chinese philosopher): *see* Yang Chu.

yangban (Korean: "two groups"), the highest social class of the Yi dynasty (1392–1910) of Korea. It consisted of both *munban,* or civilian officials, and *muban,* or military officials. The term *yangban* originated in the Koryŏ dynasty (935–1392), when civil service examinations were held under the two categories of *munkwa* (civilian) and *mukwa* (military). By the Yi dynasty, the term came to designate the entire landholding class. The Yi dynasty had a rigidly hierarchical class system composed broadly of four classes: *yangban, chungin* (intermediate class), *sangmin* (common people), and *ch'ŏnmin* (lowborn people).

The *yangban* were granted many privileges by the state, including land and stipends, according to their official grade and status. They alone were entitled to take civil service examinations and were exempt from military duty and corvée labour. They were even permitted to have their slaves serve their own terms of punishment.

The rules to which the *yangban* were subjected were severe. Unless at least one of their family members within three successive generations was admitted to the officialdom, they were deprived of their *yangban* status. They were expected always to exhibit courtesy and righteousness and to be prepared to sacrifice their lives for a greater cause. No matter how poor, they were not supposed to show a shred of meanness in their behaviour.

The *yangban* system, corrupted and deemed pernicious to social development, was discarded in 1894, when a series of modern reforms were effected.

Yangiyul, also spelled IANGIIUL, or JANGIJUL', city, Tashkent *oblast* (province), Uzbekistan. The city lies in the middle of the Tashkent oasis. Formerly a village on the site of the ancient settlement of Kaunchi-Tepe, it developed between World Wars I and II because of its proximity to Tashkent and its situation on the Tashkent–Samarkand railway and Great Uzbek Highway. It is now a thriving centre of food and other light industries. Pop. (1991 est.) 56,900.

Yangôn, also called RANGOON, city and capital of Myanmar (Burma). It is located in the southern part of the country on the eastern (left) bank of the Yangôn, or Hlaing, River (eastern mouth of the Irrawaddy River), 25 miles (40 km) north of the Gulf of Martaban of the Andaman Sea. Yangôn is the largest city in Myanmar and is the country's industrial and commercial centre. It was known abroad as Rangoon until 1989, when the government of Myanmar requested that Yangôn, a transliteration reflecting the Burmese pronunciation of the city's name, be used by other countries.

The site of the city is a low ridge surrounded by delta alluvium. The original settlements were located on the ridge, but the modern town was built on alluvium. Subsequent expansion has taken place both on the ridge and on diked land. The local climate is warm and humid, with much rainfall.

The centre of the city, called the Cantonment, was planned by the British in 1852 and is laid out on a system of blocks, each 800 by 860 feet (245 by 262 m), intersected regularly by streets running north–south and east–west. As Yangôn's population increased in the 20th century, new settlements were built in the north, east, and west that greatly expanded the city's area.

The most notable building in Yangôn is the Shwe Dagon Pagoda, a great Buddhist temple complex that crowns a hill about one mile north of the Cantonment. The pagoda itself is a solid brick stupa (Buddhist reliquary) that is completely covered with gold. It rises 326 feet (99 m) on a hill 168 feet (51 m) above the city. Yangôn is the site of several other major religious edifices, including the World Peace Pagoda (1952) and the Sule and Botataung pagodas.

Most of the city's centre is made up of brick buildings, which are generally three to four stories high, while traditional wooden structures are common in the outlying areas. Among the old colonial structures of red brick are the Office of Ministers (formerly the Old Secretariat), the Law Courts, Yangôn General Hospital, and the customhouse. Modern architecture includes the Secretariat Building, the department stores in the Cantonment, the Polytechnic School, the Institute of Medicine I, and the Yangôn Institute of Technology at Insein.

Yangôn's rice mills and sawmills located along the river are the largest in the country. The city's major industries—which produce textiles, soap, rubber, aluminum, and iron and steel sheet—are state-owned, while most of its small industries (food-processing and clothing-manufacturing establishments) are owned privately or cooperatively. The central area of the city contains the commercial district of banks, trading corporations, and offices, as well as shops, brokerage houses, and bazaars.

North of the city's centre is Royal Lake (Kandawgyi), surrounded by a wooded park; nearby are the city's zoological and botanical gardens. Yangôn's several museums include the Bogyoke Aung San Museum and the National Museum of Art and Archaeology. There are several stadiums for sports and athletic events. The University of Rangoon, established in 1920, was reconstituted into the Arts and Science University in 1964.

Yangôn is Myanmar's main centre for trade and handles more than 80 percent of the country's foreign commerce. Rice, teak, and metal ores are the principal exports. The city is also the centre of national rail, river, road, and air transportation; an international airport is located at Mingaladon, north of Yangôn.

The Shwe Dagon Pagoda had been a place of pilgrimage for many centuries, and Yangôn grew out of a settlement around the temple that eventually became known as Dagon. Its status was raised to that of a town by the Mon kings in the early 15th century. When King Alaungpaya (who founded the last dynasty of Myanmar kings) conquered southern Myanmar in the mid-1750s, he developed Dagon as a port and renamed it Yangôn ("The End of Strife"), a name that was later transliterated as Rangoon by Arakanese interpreters accompanying the British. By the early 19th century the town had a thriving shipbuilding industry, as well as a British trading station. Rangoon was taken by the British at the outbreak of the First Anglo-Burmese War in 1824 but was restored to Burmese control two years later. The city was taken again in 1852 by the British, who made it the administrative capital of Lower Burma (*i.e.,* the southern part of the country). After the British annexation of all of Burma in 1886, Rangoon became the capital city and grew in importance.

In 1930 Rangoon was struck by a massive earthquake and tidal wave, and during World War II it was the scene of major fighting between the Allies and the Japanese. The city was subsequently rebuilt, though as the capital of independent Myanmar (since 1948) it never regained the commercial importance it had under the British as one of the great ports of southern Asia. By the late 20th century, the city's economic vitality had declined, largely owing to the isolationist policies pursued by the Myanmar government. Area city, 77 square miles (199 square km). Pop. (1993 est.) 3,361,700.

Yangôn River, also called RANGOON RIVER, marine estuary in southern Myanmar (Burma), formed at the city of Yangôn (Rangoon) by the confluence of the Pegu and Myitmaka rivers. It empties into the Gulf of Martaban of the Andaman Sea, 25 miles (40 km) southeast. Linked west to the Irrawaddy River by the Twante Canal (first dug in 1883), it is the main access channel to Yangôn and can accommodate oceangoing vessels.

yangqin (musical instrument): *see* yang-ch'in.

Yangquan (China): *see* Yang-ch'üan.

Yangtze Plain, Wade-Giles romanization CH'ANG CHIANG P'ING-YÜAN, Pinyin CHANG JIANG PINGYUAN, series of alluvial plains of uneven width along the Yangtze River and its major tributaries, beginning east of I-ch'ang (Hupeh province), China. The Middle Yangtze Plain comprises parts of northeastern Hunan, southeastern Hupeh, and north-central Kiangsi provinces, including Tung-t'ing, P'o-yang, and Hung lakes. The Lower Yangtze Plain includes the Yangtze River delta and T'ai Lake and the area along the Yangtze in south-central Anhwei province. There are a few isolated hills, but mostly the plains are level and lie below 150 feet (45 m) above sea level. The slopes of the valleys bordering the plains have been converted into a system of flat terraces. The rivers, canals, and lakes form a network of navigable waterways. Flood di-

version projects built after 1949 have helped control flooding. Rice, cotton, wheat, rapeseed, mulberries, bamboo, hemp, and fish are raised; the major cities are Shanghai, Nanking, Hang-chou, and Wu-han.

Yangtze River, Chinese (Wade-Giles) CH'ANG CHIANG, or (Pinyin) CHANG JIANG, longest river of Asia and the third longest river in the world, having a length of 3,915 miles (6,300 km).

A brief treatment of the Yangtze River follows. For full treatment, *see* MACROPAEDIA: Asia.

The Yangtze rises on the Plateau of Tibet in western China and flows in a generally northeasterly direction across 12 Chinese provinces and regions to its delta on the East China Sea. More than three-quarters of the river's course runs through mountains; the lower course, however, is situated at the southern edge of the extensive North China Plain in the lowlands of eastern China.

The drainage basin of the Yangtze covers an area of 698,265 square miles (1,808,500 square km), encompassing eight principal tributaries: the Ya-lung, Min, Chia-ling, and Han rivers join the Yangtze on its left (north) bank, and the Wu, Yüan, Hsiang, and Kan rivers on its right bank. The Yangtze carries a tremendous volume of water and is ranked fourth in volume among the rivers of the world. During the period of monsoon rains in the summer months, the Yangtze and its tributaries spill over, creating extensive floods. If the floods in the main channel coincide with flooding in one or more of the major tributaries, powerful, destructive flood waves can result—an occurrence that has struck repeatedly in the history of China.

Population distribution in the Yangtze River basin is uneven; it is greatest in the plains that adjoin the banks of the river and its tributaries in central and eastern China and is most sparse in the highlands to the west. Such large cities as Shanghai, Nanking, Wu-han, Chungking, and Ch'eng-tu, all of which have urban area populations of more than 2,000,000, are located in the Yangtze River basin. The basin is considered the granary of China and contributes nearly half of the country's agricultural output, including nearly three-fourths of its total volume of rice. Other chief crops include wheat, barley, corn (maize), beans, and hemp. The rivers and large lakes of the basin—most notably Lakes Tung-t'ing, P'o-yang, and T'ai—abound with fish of commercial value. The fishing trade is widely developed and is a major livelihood for much of the population of the region. The Yangtze River is China's principal inland waterway and binds the country's inland and sea ports together with other major cities into a transportation network in which Nanking, Wu-han, and Chungking play leading roles. Intensive cargo and passenger traffic travels along 1,700 miles (2,700 km) of the river's course, with large ships reaching as far as Wu-han, 700 miles (1,100 km) upriver from the coast.

Yangzhou (China): *see* Yang-chou.

Yanji (China): *see* Yen-chi.

Yankari National Park, park in Bauchi state, east-central Nigeria, southeast of Bauchi town. It was established as a game reserve in 1956 and became a national park in 1991. It covers 870 square miles (2,254 square km). The park, at an elevation of about 1,600 feet (500 m), has characteristic savanna vegetation, including swamps in river floodplains, grasslands, and thick bush. Yankari is rich in animal life, with antelopes (roan, waterbuck, bushbuck, and hartebeest), elephants, hippopotamuses, giraffes, baboons, hyenas, lions, leopards, and crocodiles. Special features of the park include ancient sandstone cisterns, carved by former inhabitants for water storage, and the Wikki Warm Springs.

Yankee, a native or citizen of the United States or, more narrowly, of the New England states of the United States (Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut). The term Yankee is often associated with such characteristics as shrewdness, thrift, ingenuity, and conservatism. It was applied to Federal soldiers and other Northerners by Southerners during the American Civil War (1861–65) and afterward.

The origin of the term is unknown. *The Oxford English Dictionary* says that "perhaps the most plausible conjecture" is that it comes from the Dutch *Janke,* the diminutive of Jan (John). British soldiers are recorded using it as a term of derision in 1775. Mitford Mathews (*A Dictionary of Americanisms on Historical Principles* [1951]) traced its rise, pointing out that no evidence of use of the word by New Englanders before the Battle of Lexington (1775) has been found.

Many fanciful derivations have been advanced. A mythical tribe of Massachusetts Indians, the Yankos ("Invincibles"), were said to have been defeated by brave New Englanders who then somehow assumed their name. Virginians countered with the story that the word means coward or slave and is derived from the Cherokee word *eankke;* no such word exists in the Cherokee language. These and many other theories about the origin of Yankee and of Yankee Doodle are reviewed and are all rejected in a comprehensive study conducted for the Librarian of Congress by Oscar G. Sonneck (1873–1928): *Report on "The Star-Spangled Banner," "Hail Columbia," "America," "Yankee Doodle"* (1909).

Yankton, a major division of the Sioux (*q.v.*), or Dakota, confederation of American Indians.

Yankton, city, seat (1862) of Yankton county, southeastern South Dakota, U.S. The city lies along the Missouri River near its confluence with the James River. Yankton is just east of Gavins Point Dam and National Fish Hatchery and Lewis and Clark Lake. Settled in 1858 and named for the Yankton Indians, it served as the first capital of Dakota Territory (1861–83). The old Territorial Legislative Building now houses a museum. After the arrival of the Dakota Southern Railway in 1872, it became a river port and an outfitting point for gold prospectors. It is the seat of Mount Marty College (1936). The city's primary industries are based on processing the agricultural products of the surrounding area. Inc. 1869. Pop. (1992 est.) 13,207.

Yannina (Greece): *see* Ioánnina.

Yanofsky, Charles (b. April 17, 1925, New York, N.Y., U.S.), American geneticist who demonstrated the colinearity of gene and protein structures.

Yanofsky was educated at the City College of New York and at Yale University (Ph.D., 1951), where he studied chemistry and microbiology. While at Yale he showed that a suppressor mutation (change in a gene that reverses the visible effects of mutation in a second gene) results in the reappearance of an enzyme that was missing in a mutant organism. He was also part of the research team that first demonstrated that certain mutant genes produce inactive proteins, detectable with the techniques of immunology.

From 1954 to 1958 Yanofsky was at Western Reserve University Medical School in Cleveland, Ohio, and he then moved to Stanford University, Palo Alto, Calif. There, working with the bacterium *Escherichia coli,* he showed that the sequence of the nitrogen-containing bases forming part of the structure of the genetic material has a linear correspondence to the amino acid sequence of proteins. In his investigations of the biochemical actions of suppressor mutations, Yanofsky and his research group studied mutants of the mold *Neurospora crassa* and found that suppression resulted in the restoration of the ability to form an active enzyme in a mutant that had previously produced an inactive protein. He was elected president of the Genetics Society of America in 1969 and received the National Academy of Sciences Award in Microbiology for 1972.

Yanomami, also spelled YANOMAMÖ, or YANOAMÖ, South American Indians, speakers of a Xirianá language, who live in the remote forest of the Orinoco River basin in southern Venezuela and the northernmost reaches of the Amazon River basin in northern Brazil. In the late 20th century the Yanomami probably numbered about 10,000 individuals throughout their range.

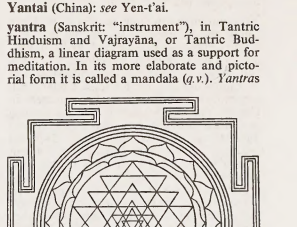
The Yanomami practice slash-and-burn agriculture and live in small, scattered semipermanent villages. They supplement their crop of plantains, cassava, tubers, corn (maize), and other vegetables with gathered fruits, nuts, seeds, grubs, and honey. They hunt monkeys, deer, tapir, fowl, and armadillos. They grow tobacco, a great favourite of Yanomami of all ages, and cotton, an important trade and domestic item used in the manufacture of string and cord for hammocks, nets, containers, and clothing. They keep dogs, both for village security and for hunting.

The Yanomami live in vine-and-leaf-thatched houses in palisaded villages surrounded by garden plots. They relocate their villages when the soil wears out or when a village has become too susceptible to attack by other Yanomami.

Traditional Yanomami culture, such as is still practiced in remote parts of Venezuela, places a high premium on aggressive behaviour. Yanomami are constantly at war with one another, and much of Yanomami social life centres on forming alliances through trade and sharing food with other friendly groups, while waging war against hostile villages. The role of continuous, nonterritorial war in Yanomami society has attracted the attention of anthropologists who have studied the Yanomami since the middle of the 20th century. By the 1990s the way of life and even the continued survival of the Yanomami were threatened by the incursions of Brazilian miners into their territory in the Roraima state of Brazil. In 1991 Brazil's government set aside an area of some 36,000 square miles (93,240 square km) as a homeland for the Yanomami.

Yantai (China): *see* Yen-t'ai.

yantra (Sanskrit: "instrument"), in Tantric Hinduism and Vajrayāna, or Tantric Buddhism, a linear diagram used as a support for meditation. In its more elaborate and pictorial form it is called a mandala (*q.v.*). *Yantras*



Śriyantra

range from those traced on the ground or on paper and disposed of after the rite, to those etched in stone and metal, such as are found in temples. When used along with yogic practices, the component parts of the *yantra* diagram take the believer along the different steps leading to Enlightenment.

One characteristic *yantra* employed in the ritual worship of the goddess Śakti is the *śrīyantra* (also called *śrīcakra,* "wheel of Śrī"). It is composed of nine triangles: five pointing downward, said to represent the yoni, or vulva, and four pointing upward, said to represent the lingam, or phallus. The dynamic interplay is understood to be an expression of all the cosmic manifestations, beginning and ending with union at the centre, visualized as a dot (*bindu*).

Yao, various Bantu-speaking peoples inhabiting southernmost Tanzania, the region between the Rovuma and Lugenda rivers in Mozambique, and the southern part of Malawi.

By 1800 the Yao had become known as traders plying between the inland tribes and the Arabs on the east coast. Much of this trade was in slaves, which led eventually to clashes with European powers who were establishing control over former Yao territory in the late 18th and 19th centuries. The Yao were never united but lived as small groups ruled by chiefs who were predominantly military and commercial leaders; by 1900 all Yao chiefdoms had come under German, Portuguese, or British rule.

The Yao are an agricultural people using slash-and-burn techniques to cultivate their staples, corn (maize) and sorghum. Fish provide protein in areas near lakes or larger rivers. In Malawi they cultivate tobacco as an important cash crop.

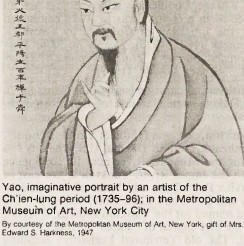
The Yao live in compact villages of 75 to 100 persons under traditional headmen. These headmen, like the chiefs, succeed matrilineally, the office usually going to the eldest sister's firstborn son. On marriage the man leaves his village to live in that of his wife, so that villages are composed basically of groups of women related through the female line, together with their spouses. Yao social life features annual initiation ceremonies involving circumcision for boys. Originally, these ceremonies were closely connected with the worship of ancestor spirits, but through Arab contact most Yao are Muslims, and the rites incorporate Islāmic elements.

Yao, mountain-dwelling peoples of southern China and Southeast Asia. In the late 20th century there were estimated to be 1,400,000 in China, 360,000 in Vietnam and Laos, and 30,000 in northern Thailand. Most Yao in China live in the Kwangsi Chuang autonomous region, with smaller numbers in Hunan, Yunnan, Kweichow, and Kwangtung provinces. Although they speak closely related Sino-Tibetan dialects, the widely dispersed groups of the Yao have developed in different directions, adjusting their ways to the environments in which they live. In the Chinese province of Kwangtung, some Yao are wet-rice cultivators in the lowlands, but elsewhere they have kept to the mountains, where they engage in a migratory slash-and-burn agriculture.

The Yao groups are animists who believe in various classes of spirits. Those of the Ling-nan area of China (Kwangtung-Kiangsi Chuang) revere their ancestors in Chinese fashion and also believe in ghosts and spirits who must be placated. An important cult is that of the dog-god P'an Ku; according to legend he delivered the head of an enemy to a monarch and was awarded a princess for a wife, and the Yao descended from this union. The Yao of Indochina, who are called Man by the Vietnamese, revere their ancestors, believe in spirits associated with natural elements (*e.g.,* thunder, clouds, rivers, and mountains), and practice a form of witchcraft directed at their enemies.

The Yao are village peoples, and their indigenous political structure does not extend above the village chief. Some villages in Kwangtung have several clans, and the clan chiefs act jointly in matters that concern the entire village. The Yao carry on trade with the peoples of the lowland, obtaining manufactured goods and some food in exchange for the products of the hills.

Yao, formally (Wade-Giles romanization) T'ANG TI YAO, in Chinese mythology, a legendary emperor (*c.* 24th century BC) of the golden age of antiquity, exalted by Confucius as an inspiration and perennial model of virtue, righteousness, and unselfish devotion.



Yao, imaginative portrait by an artist of the Ch'ien-lung period (1735–96); in the Metropolitan Museum of Art, New York City

By courtesy of the Metropolitan Museum of Art, New York, gift of Mrs. Edward S. Harkness, 1947

His name is inseparable from that of Shun, his successor, to whom Yao gave his two daughters in marriage.

Legends recount that after 70 years of Yao's rule, the sun and moon were as resplendent as jewels, the five planets shone like strung pearls, phoenixes nested in the palace courtyards, crystal springs flowed from the hills, pearl grass covered the countryside, rice crops were plentiful, two unicorns (omens of prosperity) appeared in the capital at P'ing-yang, and the wondrous calendar bean made its appearance, producing one pod each day for half a month before the 15 pods withered one by one on successive days.

Two remarkable events marked Yao's reign: a rampaging flood was controlled by Ta Yü; and Hou I, the Lord Archer, saved the world from destruction by shooting down 9 of the 10 suns burning up the Earth.

Like Fu Hsi, Shen Nung, and Huang Ti before him, Yao had special temples dedicated in his honour. He is said to have offered sacrifices and to have practiced divination. In choosing a successor, Yao bypassed his own less worthy son in favour of Shun and served as counselor to the new emperor.

Yao, city, Ōsaka *fu* (urban prefecture), Honshu, Japan, on the Nagase River. The city is situated on mountain slopes and a plain in Kongō-Ikoma Quasi-national Park. The central part of the city was a commercial centre during the Tokugawa period (1603–1867). Yao is now an industrial and residential suburb of the Ōsaka–Kōbe Metropolitan Area, with large-scale machinery, chemical, and textile plants along the river. The railway to Ōsaka was opened in 1925. Pop. (2000 prelim.) 274,779.

Yao-shih-fo (Buddha): *see* Bhaisajya-guru.

Yaounde (people): *see* Yaunde.

Yaoundé, also spelled YAUNDE, city and capital of the Republic of Cameroon. It is situated on a hilly, forested plateau between the Nyong and Sanaga rivers in the south-central part of the country. Founded in 1888 during the period of the German protectorate, Yaoundé was occupied by Belgian troops in 1915 and was declared the capital of French Cameroun in 1922. From 1940 to 1946 it was replaced as the capital by Douala, but after independence it became the seat of government of Cameroun in 1960, of the federal government in 1961, and of the united republic in 1972.

The city has grown as an administrative, service, and commercial centre and a communications hub for road, rail, and air transport. Yaoundé contains several small manufacturing and processing industries (a cigarette factory, a brewery, sawmills, and printing presses) and is also the market for one of the richest agricultural areas in the country.

The University of Yaoundé was founded in 1962; the city also has schools of education, agriculture, health, engineering, journalism, administration, and international relations. The Pasteur Institute of Cameroun for biomedical research is among Yaoundé's many research institutes, and the national library and archives are located in the city. Natural features in the vicinity include Nachtigal Falls and a chain of grottoes known as Akok-Bekoe (Grottoes of the Pygmies). Pop. (1992 est.) 800,000.

Yap, formerly GUAP, island and archipelago of the western Caroline Islands, part of the Federated States of Micronesia. The archipelago, with a total land area of 45.9 square miles (118.9 square km), comprises the islands of Gagal-Tomil, Map, Rumung, and Yap (also called Rull, Ruul, Uap, Yappu). Yap, the largest island (38.7 square miles [100.2 square km]), has a central range of hills rising to Mount Tabiwol, 568 feet (173 m), and is thickly wooded. Temperatures are fairly constant throughout the year. The mean monthly temperature is 82° F (28° C), and the average annual rainfall is 122 inches (3,100 mm).

In pre-European times Yap was the centre of a cultural area stretching from Palau in the west to near Truk in the east. Extensive ruins and the islanders' renowned use of stone-disk money date from this period. Probably sighted (1526) by the Portuguese, Yap was nominally controlled by Spain after being discovered anew by the Spanish galleon captain Francisco Lazeano in 1686. It passed to Germany in 1899. During this period, David Cook, an American, founded a trading empire based upon his supplying the Yapese with traditional stone money in return for copra. The German authorities made Yap a centre for underwater cable communication and divided the archipelago into 10 administrative units that still function as such, each unit electing a magistrate who is a member of the district administrator's advisory council. Under Japanese control from 1919, Yap became a point of conflict until the United States and Japan reached agreement (1921) concerning the use of the cable facilities. Yap was a Japanese air and naval base during World War II. Yap became part of the United Nations Trust Territory of the Pacific Islands in 1947 and part of the newly established Federated States of Micronesia in 1986.

Copra is the chief export, and some surplus bananas, coconuts, and taros are sold to nearby atolls. Yams, sweet potatoes, pepper, cloves, and tobacco are also grown, and there is some fishing. Agricultural labour is divided between the sexes, each tending separate taro patches. A caste system with economic sig-

nificance ranks Gatchapar, Teeb, and Ngolog as the most important villages. By the 1970s there were more than 20 public and mission elementary schools in the state. The Yapese, physically and linguistically, are more closely related to Melanesians than to the other people of the Carolines. Pop. (1985 est.) island, 6,951; (1980) archipelago, 5,196.

Yap Ah Loy (b. March 14, 1837, Kwangtung Province, China—d. April 15, 1885, Kuala Lumpur, Malay Peninsula), leader of the Chinese community of Kuala Lumpur, who was largely responsible for the development of that city as a commercial and mining centre.

Yap Ah Loy arrived in the Malay state of Selangor in 1856 at the age of 19. He spent his first years in the peninsula as a miner and petty trader, but in 1862 his fortunes improved when his friend Liu Ngim Kong became Capitan China of Kuala Lumpur, a position not only of leadership within the Chinese community but also of liaison with the Malay political system and, after British intervention in 1874, with British officials as well. He served as Liu's trusted lieutenant and became the new Capitan China after Liu's death in 1869, upon which he began to put together a sound administration and a strong fighting force.

When civil war broke out in Selangor in 1870, Yap Ah Loy was faced with internecine fighting among dissident Chinese groups as well as attacks from Malay factions. His decisive victory at Kuala Lumpur in 1873 proved to be the turning point of the war and left him in a strong political position. Until 1879 he was almost supreme in the interior of the state. As the acknowledged leader of the Chinese community he had been given the powers of a Malay ruling chief by the British except for the right to tax, a restriction he easily evaded. He achieved a striking position of monopoly in the mining industry and established Kuala Lumpur as the economic centre of the peninsula. Through his control of the tin market, his ownership of local "farms" (monopolies on the sale of items such as opium and exclusive control of activities such as gambling), and his diverse business interests, he amassed a considerable personal fortune.

When in 1879 the first British resident (government adviser) was assigned to Kuala Lumpur, the power of the Capitan China began to be undermined. None of Yap Ah Loy's successors approached his power and independence of action. The city that he had largely developed retained its preeminent position and became the capital of Malaysia.

Yap Trench, also called WEST CAROLINE TRENCH, deep submarine trench in the western Pacific Ocean located east of the Yap Ridge and the Yap island group. The Yap Trench is about 400 miles (650 km) long from north to south and reaches a maximum depth of 27,976 feet (8,527 m) some 300 miles (480 km) northeast of the Palau Islands. It is a part of the chain of trenches that begins at the southwestern edge of the Bering Sea and runs southward toward the southern tip of the Philippine Trench (Mindanao Trench). Besides the Yap Trench, the chain includes the Kuril, Japan, Izu, and Mariana trenches. The greatest known depth of the Pacific Ocean, the Trieste Depth (36,201 feet [11,034 m]), occurs near the intersection of the Mariana and Yap trenches.

Yapen Island, Indonesian PULAU YAPEN, Dutch JAPPEN EILANDEN, island comprising most of Yapen Waropen *kabupaten* (regency), in Sarera Bay off the northern coast of Irian Jaya province, Indonesia. Its area of 936 square miles (2,424 square km) has an elevated central ridge that rises to 4,907 feet (1,496 m). The chief settlement is Serui on the central southern coast. Pop. (1990) regency, 64,206.

yapok, also spelled YAPOCK, marsupial mammal, a species of opossum (*q.v.*).

Yapurá River (South America): *see* Japurá River.

Ya'qūb ibn Laith aṣ-Ṣaffār (b. 840—d. 879), founder of the Ṣaffārid Empire, who rose from obscurity to rule much of present Iran as well as portions of Afghanistan and Pakistan; at one point he came close to capturing Baghdad, the seat of the caliph (the religious leader of all Islām).

After Laith's apprenticeship as a coppersmith (*ṣaffār,* whence the name of the dynasty), he became a bandit and assembled an independent army. He won a measure of respect from the caliph by conquering non-Muslim areas in what is now Afghanistan. He then began to act as an independent ruler, minting his own coinage and driving out the Ṭāhirid dynasty from control of Khorāsān, in eastern Iran. Laith next seized control of the Iranian foodproducing provinces of Fars and Ahwaz. Finally in 878 he marched on Baghdad itself but was stopped when its defenders cut irrigation dikes.

Laith is a popular folk hero in Iranian history, and it was at his court that the revitalization of the Persian language began after two centuries of eclipse by Arabic.

Ya'qūbī, al-, in full AḤMAD IBN ABŪ YA'QŪB IBN JA'FAR IBN WAHB IBN WĀḌIḤ AL-YA'QŪBĪ (d. 897, Egypt), Arab historian and geographer, author of a history of the world, *Tārīkh ibn Wāḍiḥ* ("Chronicle of Ibn Wāḍiḥ"), and a general geography, *Kitāb al-buldān* ("Book of the Countries").

Until 873 al-Ya'qūbī lived in Armenia and Khorāsān, under the patronage of the Iranian dynasty of the Ṭāhirids, and wrote his history there. After the fall of the Ṭāhirids he traveled to India and the Maghrib (North Africa) and died in Egypt.

The *Tārīkh ibn Wāḍiḥ* is divided into two parts. The first is a comprehensive account of pre-Islāmic and non-Islāmic peoples, especially of their religion and literature; it includes extracts from the Greek philosophers and accounts from stories and fables. The second part covers Islāmic history up to 872. The author's Shī'ite bias pervades the work.

In the *Kitāb al-buldān,* a large part of which is lost, al-Ya'qūbī analyzes statistics, topography, and taxation in describing the larger cities of Iraq, Iran, Arabia, Syria, Egypt, the Maghrib, India, China, and the Byzantine Empire.

Yaque del Norte River, river in central and northwestern Dominican Republic. The largest river in the nation, its headstreams rise on the northern slopes of the Cordillera Central, uniting to descend northward into the Cibao Valley, which lies between the Cordillera Central and the Cordillera Septentrional. The river then flows generally westnorthwestward through the agricultural Cibao Valley before emptying into Manzanillo Bay, off the Atlantic Ocean, just downstream from Montecristi. The stream is 240 miles (386 km) long and, although generally shallow and therefore navigable only by small craft, it is subject to flooding during the rainy season. Its waters are used extensively for irrigating rice, sugarcane, plantain, and tobacco in the Cibao Valley; Tavera hydroelectric dam at Tavera, south of Santiago de los Caballeros, was completed in 1972.

Yaque del Sur River, river in southwestern Dominican Republic, one of the nation's three most important river systems. Its headstreams arise on the southern slopes of the Cordillera Central, uniting near Duarte Peak. The river is 80 miles (130 km) long and descends into the eastern San Juan valley, crosses into the Neiba valley, and then turns abruptly eastward to empty into Neiba Bay, off the Caribbean Sea, just north of Barahona. Although the river is not navigable except by small craft, it is economically important because its waters are used extensively for irrigating rice, plantain, sugarcane, beans, bananas, and peanuts (groundnuts).

Yaqui, Indian people centred in southern Sonora state, on the west coast of Mexico. They speak the Yaqui dialect of the language called Cahita, which belongs to the Uto-Aztecan language family. (The only other surviving speakers of the Cahita language group are the related Mayo people.)

The Yaqui were, and in part remain, settled agriculturists, but they offered a stubborn resistance to the first Spanish invaders in the 16th and 17th centuries. They gradually came under mission influence and settled in church-centred communities, but in the 19th century Mexican encroachments on the fertile lands of their tribal territory led to a series of Yaqui uprisings that were finally quelled with difficulty by the Mexican Army in 1887. Thousands of Yaqui were deported, and the remainder were left greatly reduced in numbers by warfare and emigration. Much of the Yaqui's tribal lands were restored to them by the Mexican government in the 1930s, however. Since the 1940s, large irrigation projects using the waters of the Yaqui River have shifted the emphasis in Yaqui agriculture from subsistence crops of corn, beans, and squash to the growing of cash crops such as wheat and cotton, and the production of vegetable oils. The Yaqui are Roman Catholic, but the form of their worship is clearly influenced by aboriginal practices. The Yaqui numbered about 25,000 in the late 20th century, with several thousand also living in Arizona in the United States.

Yaqui River, Spanish RÍO YAQUI, river in Sonora state, northwestern Mexico. Formed in the Sierra Madre Occidental by the junction of the Bavispe and Papigochic rivers, the Yaqui flows generally southward and westward through Sonora for approximately 200 miles (320 km), crossing the coastal plain to empty into the Gulf of California 28 miles (45 km) southeast of Guaymas. The Yaqui is Sonora's largest river system. Retained by the Álvaro Obregón Dam above Ciudad Obregón and by the Novillo Dam above Soyopa, the river is used extensively for irrigation. Wheat, corn (maize), rice, and fruits are the principal crops cultivated along its lower course. The Yaqui is not navigable.

Yaracuy, state, northwestern Venezuela. It is bounded by the states of Falcón (north), Carabobo (east), Cojedes (south), and Lara (west). It lies within a tropical zone and has an area of 2,741 square miles (7,100 square km). The state embraces the fertile and economically important valley of the Yaracuy River, which separates the Segovia Highlands on the west and northwest from the central highlands on the east. Yaracuy is extremely productive agriculturally. The principal crops grown in the state include peanuts (groundnuts), sugarcane, bananas, citrus fruits, coffee, cotton, and tobacco. There are deposits of coal, copper, lead, and platinum. The state, which lies in the nation's most densely populated region, is part of the important commercial area centred at Barquisimeto. The Pan-American Highway traverses the heart of Yaracuy, linking San Felipe (*q.v.*), the state capital, with the neighbouring cities of Puerto Cabello to the northeast and Barquisimeto to the southwest. Pop. (2000 est.) 518,902.

Yarborough, Cale, byname of WILLIAM CALEB YARBOROUGH (b. March 27, 1939, Timmonsville, S.C., U.S.), U.S. stock-car racing driver who was the first to win the National

Association for Stock Car Auto Racing (NASCAR) championship three consecutive years.

Yarborough began driving stock cars in the early 1960s, and in 1968 he won four NASCAR races, including the Daytona 500-mile race and the Atlanta 500, the former of which he also won in 1977 and 1983 and the latter of which he also won in 1967, 1974, and 1981. After unsuccessfully driving United States Automobile Club (USAC) championship cars (1971–72), he won his first NASCAR championship in 1976, repeating in 1977 and 1978. In 1977 he was the first NASCAR driver to start and finish 30 of 30 races.

yard-of-ale glass, tall, extremely narrow drinking glass that was known in England from the 17th century. It is approximately 1 yard (90 cm) long and holds about 1 pint (0.5 litre). The glass has a trumpet-shaped opening at one end and either a foot at the other or a trick bulb, which makes drinking more difficult, for when air gets into it the ale is forced out in a rush. Impractical for ordinary use, it appears to have been reserved for demonstration of drinking feats or for special toasts and the like.

yardang, large area of soft, poorly consolidated rock and bedrock surfaces that have been extensively grooved, fluted, and pitted by wind erosion. The rock is eroded into alternating ridges and furrows essentially parallel to the dominant wind direction. The relief may range from one to several metres, and there may be unconnected hollows and other irregular shapes. Yardangs occur in various deserts of the world including the Turkistan and the Mojave deserts.

Yarden, ha- (Israel-Jordan): *see* Jordan River.

Yardley, Herbert Osborne (b. April 13, 1889, Worthington, Ind., U.S.—d. Aug. 7, 1958, Washington, D.C.), American cryptographer who organized and directed the U.S. government's first formal code-breaking efforts during and after World War I.

As a young man Yardley displayed a marked talent for mathematics and began a lifelong fascination with the game of poker. At 23 he entered the U.S. State Department as a coding clerk and, discovering a remarkable aptitude for cryptology, was soon making recommendations to improve and protect government codes. In 1917 he was put in charge of MI8, the code-breaking section of the Military Intelligence Division (MID). After World War I he proposed that a permanent organization be created "for code and cipher investigation and attack." In 1919 a joint body, funded by the State Department and the military, was established in New York City with Yardley in charge. He was assisted in this and later cryptographic activities by Edna Ramsaier (1903/04–90), whom he married in 1944. In 1921 this group broke the Japanese diplomatic code and provided information that the State Department used to advantage during the Washington Naval Disarmament Conference. Over the next several years the group suffered from the indifference and even hostility of public officials, culminating in Secretary of State Henry Stimson's dictum that "Gentlemen do not read each other's mail." The group was disbanded, and Yardley, unable to find employment, published in 1931 a best-seller entitled *The American Black Chamber,* describing in detail the workings of the code group. As a result 19 nations changed their diplomatic codes. In 1938 the Chinese Nationalist leader Chiang Kai-shek engaged Yardley to break the codes of the Japanese armies, which were then invading China. He remained there until 1940, when he went to Canada to set up a cryptology service. Yardley also wrote *The Education of a Poker Player* (1957).

Yardley, Kathleen: *see* Lonsdale, Dame Kathleen.

Yare, River, stream in the county of Norfolk, Eng., which enters the North Sea 25 miles (40 km) east of Norwich. It flows sluggishly across Norfolk to Norwich, where it is joined by the Wensum from the north. In its lower course it traverses the flat, alluvial tract of the Broads to its estuary, Breydon Water. The Rivers Bure (from the north) and Waveney (from the south) also enter this estuary, the mouth of which is deflected south for 3 miles (4.8 km) by the spit on which the resort of Great Yarmouth stands.

Yareaḥ, ha- (rabbi): *see* Astruc of Lunel.

Yarikh, also spelled YAREAH, ancient West Semitic moon god whose marriage to the moon goddess Nikkal (Sumerian: Ningal, "Queen") was the subject of a poem from ancient Ugarit. The first part of the poem recorded the courtship and payment of the bride-price, while the second half was concerned with the feminine aspects of the marriage. Fertility, symbolized by the birth of offspring, was believed to be the principal result of the marriage; thus, the Canaanites believed that fruitfulness in heaven would also result in terrestrial abundance for human beings.

Yarīm, town, southwestern Yemen. It lies in the heart of the Yemen Highlands, on an upland plateau dominated by the massif of nearby Mount Sumārah, which rises to about 10,000 feet (3,000 m) above sea level. In antiquity the Yarīm area was the core of the state of Ḥimyar, which ruled over much of southern Arabia from about 115 BC to about AD 575; the Ḥimyarite capital of Ẓafār (*q.v.*) was about 9 miles (15 km) south of Yarīm. The town is now a stopping-place on the all-weather highway from Ṣan'ā' to the city of Ta'izz, in the south; it is also a local trade centre for the farmers and shepherds of the surrounding highland area. The ruins of ancient Ẓafār, off the highway in rugged, mountainous terrain, are still visible. Pop. (1977 est.) 8,038.

Yarkand, Chinese (Pinyin) YARKANT, oasis city in the Uygur Autonomous Region of Sinkiang, northwestern China. The city comprises several separate walled units, one of which is named Sha-ch'e, and another Yarkand; both names have at times been used as general terms for the city as a whole and for the oasis. Yarkand is situated in an oasis watered by the Yarkand, or Yeh-erh-ch'iang, River at the western end of the Tarim River basin, southeast of Kashgar (Kashi), at the junction of roads to A-k'o-su (Aksu) to the northwest and to Ho-t'ien (Hotan, or Khotan) to the southeast. The roads form parts of the ancient northern and southern branches of the Silk Road through the Tarim basin.

Yarkand first came to the notice of the Chinese in the latter part of the 2nd century BC, when it was known as the kingdom of Sah-ch'e, commanding the route over the Pamir Mountains. At the end of the 1st century AD, weakened by warfare with its neighbours, Yarkand was taken by Chinese armies under Pan Ch'ao. During the T'ang period (618–907) it again began to emerge as an important place, after having been overshadowed by Karghalik to the south and by Kashgar to the northwest. It became still more important in the 12th and 13th centuries, becoming the chief base of the khanate of Chagatai (part of the Mongol empire). At the end of the 16th century it was riven by factional dissension and was eventually incorporated into the khanate of Kashgar. It was finally brought under Chinese control in the mid-18th century.

The oasis covers some 1,240 square miles (3,210 square km) and is very fertile. It produces a variety of grain crops, as well as cotton, hemp, beans, fruit, and mulberries for the local silk industry. Around the oasis there is extensive stock rearing, primarily of camels, horses, and sheep. The towns have many handicrafts, producing fine cotton and silk textiles, carpets, and leather goods. The population of the oasis area includes a wide variety of peoples, among them Chinese, Uighur (Uygur), Iranians, and some Indians. Pop. (1987 est.) 68,960.

Yarkand River, Yarkand also spelled YARKANT, Chinese (Wade-Giles) YEH-ERH-CH'IANG, or (Pinyin) YE'ERQIANG, a headstream of the Tarim River in the Uygur Autonomous Region of Sinkiang, in extreme western China. The Yarkand, which is 600 miles (970 km) long, rises in the Karakoram Pass of the Karakoram Range of northern Kashmir. In its upper course it forms a small part of the border between Kashmir and Sinkiang as it cuts a deeply incised valley through the mountain ranges of the Kunlun system. Upon emerging from the Kunlun Gorges, the northeastward-flowing Yarkand loses the character of a raging mountain torrent and spreads out in many branches over an alluvial fan to irrigate the Yarkand oasis. The oasis is one of the largest in Sinkiang and contains the town of Yarkand. Upon leaving the oasis, the river flows northeastward around the eastern margins of the Takla Makan Desert. South of A-k'o-su (Aksu) oasis it joins the Kashgar (Kashi), A-k'o-su, and Ho-t'ien (Khotan) rivers to form the Tarim River.

Unlike other headstreams of the Tarim River, the Yarkand carries water year-round and is regarded as the main source stream of the Tarim. The Yarkand derives most of its water from melting snow and glaciers in the Karakoram and Kunlun mountain systems. Its volume is therefore greatest in the summer and lowest in the winter. Most of its water is used for irrigation or is absorbed by desert sands.

Yarkon River (Israel): *see* Yarqon River.

Yarmouth, town, seat of Yarmouth county, southwestern Nova Scotia, Can. It lies at the Atlantic entrance to the Bay of Fundy, 210 miles (339 km) by road west of Halifax. The site may well have been visited by Leif Eriksson and his Norsemen in 1007; the Runic Stone (found at nearby Overton in 1812), said to be carved by Eriksson, is in the Yarmouth County Historical Society Museum. The community was founded in 1761 by New England settlers. Some Acadians (banished about 1755) returned in 1767, and the population was increased in 1785 by the arrival of Loyalists. The town, once a noted shipbuilding centre, was probably named for Yarmouth, Mass. It is now a port and car-ferry terminal for services to Bar Harbor and Portland, Maine, U.S. Yarmouth Light, at the mouth of its harbour, is a familiar landmark. The town's economic activities focus on industrial fabrics, cotton duck, and dairy and fish products; pulpwood, fish, lumber, fruit, and cattle are exported. Inc. 1890. Pop. (1991) 7,781.

Yarmouth, Great (Norfolk, Eng.): *see* Great Yarmouth.

Yarmouth Interglacial Stage, major division of Pleistocene deposits and time (1,600,000 to 10,000 years ago) in North America. The Yarmouth Interglacial was named for deposits that were studied in the region of Yarmouth, Iowa, and is equivalent to the Mindel-Riss Interglacial Stage of Alpine Europe.

The Yarmouth Interglacial is represented by the remains of ancient soil horizons developed on Kansan glacial deposits as well as by deposits of peat. In some localities fossil vertebrates are especially well represented; the composition of these faunas indicates that

Yarmouth climates were at least as warm as modern climates. In some regions, the development of distinctive deposits seems to indicate that Yarmouth climates may have been semiarid.

Yarmük River, Hebrew NAHAR HA-YARMUK, Arabic NAHR AL-YARMŪK, river, a tributary of the Jordan River, in southwest Asia. For most of its course, the Yarmük forms the boundary between Syria to the north and Jordan to the south. Since the Six-Day War of June 1967, the lower 14 miles (23 km) of the river have been under Israeli control.

The Yarmük rises on a lava plain in southwest Syria, near the Jordan frontier, and flows roughly southwestward until its confluence with the Jordan River. The Yarmük is only 20 miles (32 km) long in a straight line, but because of the many convolutions in its course, the total length of the stream is about 50 miles (80 km). The river has cut through the resistant lava of the plateau to soft, chalky limestone beneath, creating a steep-walled gorge.

The Yarmük was the site of the Battle of the Yarmük River, one of the decisive battles in the history of Palestine. The Arabs, who under Khālid ibn al-Walid had conquered Damascus in 635, were forced to leave the city when they were threatened by a large Byzantine army under Theodorus. Khālid concentrated his forces south of the Yarmük River, and on Aug. 20, 636, he took advantage of a rebellion among the Byzantine forces to attack and destroy them. The battle marked the beginning of Muslim suzerainty in Palestine, which was broken only by the period of the Crusades (1099–1291) and lasted until World War I.

The Yarmük River formerly provided hydroelectric power for Jordan, and its valley was the site of a branch railway, but successive Arab–Israeli wars and the accompanying territorial disputes in the area have largely erased these economic developments.

After the Six-Day War of 1967, the government of Israel opened the lower Yarmük river valley, with its fine scenery, hot springs, and interesting ruins of Roman times, to tourist traffic. The Gawr irrigation canal, begun in 1958 and completed in 1966, diverts water from the Yarmük to irrigate land in the northern Ghar region in Jordan.

yarn, continuous strand of fibres grouped or twisted together and used to construct textile fabrics.

A brief treatment of yarn follows. For full treatment, *see* MACROPAEDIA: Industries, Textile.

Yarns are made from both natural and synthetic fibre, in filament or staple form. Filament is fibre of great length, including the natural fibre silk and the synthetic fibres. Most fibres that occur in nature are of fairly short length, or staple, and synthetic fibres may be cut into short, uniform lengths to form staple.

Spinning is the process of drawing out and imparting twist to a mass of fibres. Filament yarns generally require less twist than staple. A fairly high degree of twist produces strong yarn; low twist produces softer, more lustrous yarn; and tight twist produces crepe yarns. Two or more single strands of yarn may be twisted together, forming ply yarn.

Novelty yarns, used to produce special effects, include bouclé, characterized by projecting loops; nub yarn, with enlarged places, or nubs, produced by twisting one end of a yarn around another many times at one point; and chenille, a soft, lofty yarn with pile protruding on all sides. Textured yarns are synthetic filament yarns that are made bulky or stretchy by heating or other techniques.

In yarns used for weaving, the warp, or lengthwise, yarns are usually made stronger, more tightly twisted, smoother, and more even than the filling, or crosswise, yarns. Knitting yarns have less twist than weaving yarns. Yarns used for machine knitting may be single or ply types; ply yarns are generally used for hand knitting. Thread, used for sewing, is a tightly twisted ply yarn having a circular cross section.

Yaroslav I, byname YAROSLAV THE WISE, Russian YAROSLAV MUDRY (b. 980—d. Feb. 2, 1054), grand prince of Kiev from 1019 to 1054.

A son of the grand prince Vladimir, he was vice-regent of Novgorod at the time of his father's death in 1015. Then his eldest surviving brother, Svyatopolk the Accursed, killed three of his other brothers and seized power in Kiev. Yaroslav, with the active support of the Novgorodians and the help of Varangian (Viking) mercenaries, defeated Svyatopolk and became the grand prince of Kiev in 1019.

Yaroslav began consolidating the Kievan state through both cultural and administrative improvements and through military campaigns. He promoted the spread of Christianity in the Kievan state, gathered a large collection of books, and employed many scribes to translate Greek religious texts into the Slavic language. He founded churches and monasteries and issued statutes regulating the legal position of the Christian Church and the rights of the clergy. With the help of Byzantine architects and craftsmen, Yaroslav fortified and beautified Kiev along Byzantine lines. He built the majestic Cathedral of St. Sophia and the famous Golden Gate of the Kievan fortress. Under Yaroslav the codification of legal customs and princely enactments was begun, and this work served as the basis for a law code called the Russkaya Pravda ("Russian Justice").

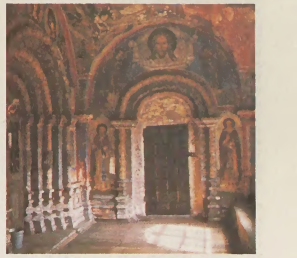
Yaroslav pursued an active foreign policy, and his forces won several notable military victories. He regained Galicia from the Poles, decisively defeated the nomadic Pechenegs on the Kievan state's southern frontier, and expanded Kievan possessions in the Baltic region, suppressing the Lithuanians, Estonians, and Finnish tribes. His military campaign against Constantinople in 1043 was a failure, however.

Trade with the East and West played an important role in Kievan Rus in the 11th century, and Yaroslav maintained diplomatic relations with the European states. His daughters Elizabeth, Anna, and Anastasia were married respectively to Harald III of Norway, Henry I of France, and Andrew I of Hungary.

In his testament, Yaroslav sought to prevent a power struggle among his five sons by dividing his empire among them and enjoining the younger four sons to obey the eldest, Izyaslav, who was to succeed his father as grand prince of Kiev. This advice had no lasting effect, and civil war ensued after Yaroslav's death.

Yaroslavl, *oblast* (province), western Russia. It has an area of 14,100 square miles (36,400 square km) and lies in the upper Volga River basin. Most of the *oblast* is a low plain traversed by the Volga River and broken only by the low, morainic Danilov and Uglich uplands, which run northeast–southwest across it. In the northwest is the 1,768-square-mile (4,579-square-kilometre) Rybinsk Reservoir on the Volga; most of the reservoir lies within the *oblast.* The *oblast*'s natural vegetation is forest of spruce, pine, oak, maple, and ash, with many patches of swamp and with floodplain meadows along the rivers. Agriculture is dominated by dairying, and the region is noted for its cheeses; flax, oats, fodder crops, and vegetables are also grown. Textile manufacture, timber working, and food processing are widespread in the towns, with engineering and chemical industries in the two main centres, Yaroslavl city (*oblast* headquarters) and Rybinsk. Power is supplied by the Rybinsk hydroelectric station. Pop. (1991 est.) 1,475,700.

Yaroslavl, city and administrative centre of Yaroslavl *oblast* (province), western Russia. It lies on the right bank of the Volga River, 175 miles (282 km) northeast of Moscow. Yaroslavl is believed to have been founded in 1010 by Prince Yaroslav the Wise, and it served as the capital of an independent principality from 1218 until 1471, when it came under the rule of Moscow. Yaroslavl was sacked by the Tatars in 1238 and by Ivan I



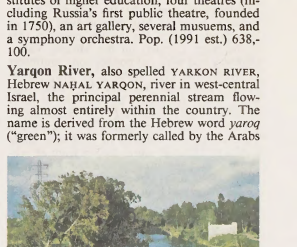
Church of Nikola Nadein, Yaroslavl city, Russia
Shostal

Kalita in 1332 and was captured by Novgorod in 1371, but on each occasion its recovery was swift. The opening of trade with the West during the 16th century brought prosperity to the town, which lay at the intersection of the great Volga River and Moscow–Archangel trade routes. The Yaroslavl Great Manufactory, one of the earliest and largest textile mills in Russia, was established in 1722, and by the late 18th century Yaroslavl had become an important industrial centre.

Yaroslavl's industries now produce heavy machinery (particularly diesel engines and electrical equipment), refined petroleum products, textiles, and synthetic rubber and tires. Power is produced by coal-burning electric plants and by the Rybinsk and Uglich hydroelectric stations, located upstream on the Volga.

Many fine churches survive in Yaroslavl, including the Transfiguration Cathedral (1505–16) of the Saviour Monastery. The churches of Elijah the Prophet, Nikola Nadein, and St. John the Baptist all date from the 17th century. Yaroslavl has a university, several institutes of higher education, four theatres (including Russia's first public theatre, founded in 1750), an art gallery, several musuems, and a symphony orchestra. Pop. (1991 est.) 638,-100.

Yarqon River, also spelled YARKON RIVER, Hebrew NAḤAL YARQON, river in west-central Israel, the principal perennial stream flowing almost entirely within the country. The name is derived from the Hebrew word *yaroq* ("green"); it was formerly called by the Arabs



Yarqon River above Tel Aviv–Yafo, Israel
Maynard Williams—Shostal

Nahr el-'Auja ("The Tortuous River"). The Yarqon rises in springs near Rosh ha-'Ayin and flows westward for about 16 miles (26 km) to the Mediterranean in northern Tel Aviv–Yafo. It marks the boundary between the Plain of Sharon (north) and the coastal lowlands (south). The seasonal watercourses west of Rosh ha-'Ayin, which form part of the drainage system, extend eastward into the West Bank. They include the Wadi Shillo (Dayr Ballūṭ) in the east, usually considered by geographers to mark the boundary between historic Judaea and Samaria, and the Wadi Ayyalon (Aijalon) in the southeast. In the valley of the latter, according to the Bible, the moon stood still during Joshua's conquest of the Amorites (Joshua 10).

Until the 1950s the Yarqon was a pleasant stream frequented by boaters; since the construction and expansion of the Yarqon-Negev Project, part of the National Water Plan (1955 and following), the water level has gone down and pollution has increased.

The Yarqon basin was the centre of several 19th and early 20th-century Jewish settlements, including Petaḥ Tiqwa, Bene Beraq, Ramat Gan, and Tel Aviv, that have grown into cities. It was also the site of several important British victories over the Turks in their conquest of Palestine during World War I. At the mouth of the river, in Tel Aviv, a shallow-draft port was built during the prolonged strike of the Arab port workers of Jaffa (1936); after World War II, however, it was abandoned.

Near the river's mouth, adjacent to the campus of Tel Aviv University, are the important archaeological excavations of Tell Qasile.

Yarra River, river, south-central Victoria, Australia. It rises near Mount Matlock in the Eastern Highlands and flows westward for 153 miles (246 km) through the Upper Yarra Dam, past the towns of Warburton, Yarra Junction, and Warrandyte, to Melbourne. The river's upper course traverses timber and dairy country; its mouth at Hobson's Bay (at the head of Port Phillip Bay), formerly a swamp, was dredged to create the port of Melbourne. Development of the upper Yarra River basin is controlled by the New Yarra Valley Authority, created in 1977. The river was seen in 1803 by Charles Grimes during his survey of Port Phillip Bay, and its first settlement (1835) grew to become the city of Melbourne. The Yarra was once called Great, or Freshwater, River, and its present Aboriginal name means "running water."

Yarrawonga, town on the Murray River, Victoria, Australia. Mulwala, its twin town in New South Wales, lies on the opposite side of the river. Located on the Murray Valley Highway and with rail connections southwest to Melbourne (135 miles [217 km] southwest), Yarrawonga lies near the Yarrawonga Weir, which impounds the Murray to form Lake Mulwala, a reservoir (15,000 acres [6,070 hectares]) used for irrigation and recreation. Yarrawonga was founded in 1868 and made a shire in 1891; its name derives from an Aboriginal term meaning "where the cormorant builds." The town serves an area of livestock raising, dairy and fruit farming, and wheat and grape cultivation. The town's other economic activities include stock selling, flour milling, and shoe manufacture. Pop. (1991 prelim.) including Mulwala, 5,522.

yarrow, any of about 80 species of perennial herbs constituting the genus *Achillea* in the family Asteraceae, and native primarily to the North Temperate Zone. They have toothed, often finely cut leaves that are sometimes aromatic. The many small white, yellow, or pink flowers often are grouped into flat-topped clusters.



Yarrow (*Achillea millefolium* variety *lanulosa*)
Dennis E. Anderson

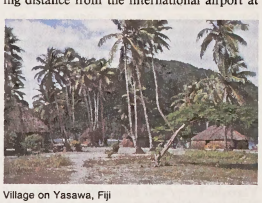
Some species are cultivated as garden ornamentals. The dried leaves of sneezewort (*A. ptarmica*) are used to make a sneezing powder, and parts of yarrow or milfoil (*A. millefolium*) have been used for snuff and tea.

Yaruro, South American Indian people inhabiting the tributaries of the Orinoco River in Venezuela. Their language, also called Yaruro, is a member of the Macro-Chibchan linguistic group.

The Yaruro differ from the typical agriculturists and hunters of the savannas of the region in that their life centres on the river. Crocodiles, manatees, turtles, and the eggs of these animals provide their basic foods. Fish are hunted in canoes and killed with bow and arrow. The Yaruro do not hunt the caiman, the tonina, or the howling monkey because they believe that these creatures are relatives of mankind. They make pottery, basketry, and netting.

The basic social unit of the Yaruro is the extended family consisting of the headman, his sons, their wives, and unmarried children. There are also two matrilineal groups or moieties; the members of each group take spouses from the other. The Yaruro believe in a moon goddess, who created the world, and other gods and spirits. Communication with gods and ancestors is through shamans, who may be either male or female and whose main function is to treat sickness.

Yasawa Group, chain of about 20 volcanic islands in the western division of Fiji, in the South Pacific. The islands lie northwest of Viti Levu, the principal Fijian island. They were sighted in 1789 by Captain William Bligh of the British navy and cover a total land area of 52 square miles (135 square km). The principal islands are Naviti and Yasawa. By the 1970s the group, only a short cruising distance from the international airport at Nadi on Viti Levu, was beginning to develop a tourist business. The population is almost entirely Melanesian. Pop. (1986) 5,333.



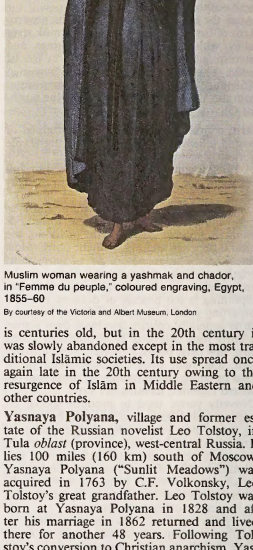
Village on Yasawa, Fiji
Photo Research International

Yashin, Lev Ivanovich (b. Oct. 22, 1929, Moscow, Russia, U.S.S.R.—d. March 21, 1990, Moscow), Soviet association football (soccer) player renowned for his acrobatic skills as goalkeeper.

From 1949 to 1971 Yashin was a member of the Moscow Dynamo Club, and in 1954 he joined the Soviet national team. After helping win the Olympic gold medal (soccer) in 1956, Yashin played for the Soviet Union until retiring in 1970, including participation in the World Cup tournaments of 1958, 1962, and 1966. He became a coach after his retirement.

yashmak, also spelled YAŞMAK, long, narrow face screen or veil traditionally worn in public by Muslim women. The yashmak can consist of a piece of black horsehair attached near the temples and sloping down like an awning to cover the face, or it can be a veil covered with pieces of lace, with slits for the eyes, tied behind the head by strings and sometimes supported over the nose by a small piece of gold, ivory, or silver.

The yashmak is usually worn with an enveloping garment most frequently called a chador. The custom of wearing the costume



Muslim woman wearing a yashmak and chador, in "Femme du peuple," coloured engraving, Egypt, 1855–60
By courtesy of the Victoria and Albert Museum, London

is centuries old, but in the 20th century it was slowly abandoned except in the most traditional Islāmic societies. Its use spread once again late in the 20th century owing to the resurgence of Islām in Middle Eastern and other countries.

Yasnaya Polyana, village and former estate of the Russian novelist Leo Tolstoy, in Tula *oblast* (province), west-central Russia. It lies 100 miles (160 km) south of Moscow. Yasnaya Polyana ("Sunlit Meadows") was acquired in 1763 by C.F. Volkonsky, Leo Tolstoy's great grandfather. Leo Tolstoy was born at Yasnaya Polyana in 1828 and after his marriage in 1862 returned and lived there for another 48 years. Following Tolstoy's conversion to Christian anarchism, Yasnaya Polyana became a pilgrimage centre for his followers. Upon his death in 1910, Tolstoy was buried in a grave marked only by

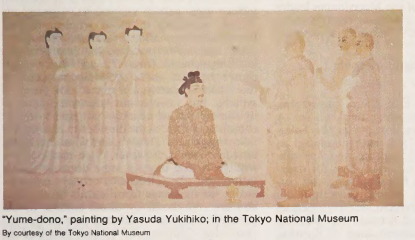
nine oaks on Stary Zakaz (Old Wood) Hill, a few hundred yards from his simply furnished home. Looted during the German occupation in 1941, Tolstoy's home and the remaining portion of the original estate were preserved under the auspices of the Ministry of Culture of the U.S.S.R. The Tolstoy Memorial Museum complex includes the Volkonsky mansion built in the Neoclassical style, a servants' house, coach houses, a park extending to the Voronka River, and Tolstoy's home, with his library of some 22,000 books. The building where Tolstoy organized a school for peasants in the late 1850s has become a literary museum. An Order of Lenin (an award for special services, ratified by the Presidium of the Supreme Soviet of the U.S.S.R.) was bestowed upon the Yasnaya Polyana museum complex in 1978. Pop. (early 1980s) less than 10,000.

Yass, town, southeastern New South Wales, Australia. It lies along the Yass River, which is a tributary of the Murrumbidgee. The Yass Plains, on the Western Slopes of the Eastern Highlands, were explored in 1824 by Hamilton Hume and William Hovell. The town, established in 1837, serves a district producing merino wool, wheat, oats, orchard fruits, silver, lead, and bismuth. Yass lies on the Hume Highway near its junction with the Barton and has rail connections to Sydney (144 miles [232 km] northeast) and Melbourne. Burrinjuk River is 20 miles (32 km) to the northeast. Pop. (1981) 4,283.

Yass-Canberra (Australia): *see* Australian Capital Territory.

Yasuda Yukihiko, original name YASUDA SHINZABURŌ (b. Feb. 16, 1884, Nihonbashi, Tokyo—d. April 29, 1978, Ōiso, Kanagawa Prefecture), painter who excelled in depicting historical personages in the tradition of Japanese painting but augmented them with a psychological dimension.

Yasuda studied briefly under Kobori Tomone at the Tokyo Art Academy but left before graduation to establish a study group called Kōjikai in 1901, with the cooperation of several young artists. He contracted tuberculosis while still young, but this did not prevent him from continued involvement. In 1914 he joined the Japan Fine Arts Academy upon its revival and became one of its most important members. His technique was based on that of the *Yamato-e* (traditional Japanese painting), and he painted with graceful lines and warm and gentle colouring. His historical paintings were enriched by his erudition and profound knowledge of Japanese history. Among his best-known works are "The Hall of Dreams"



"Yume-dono," painting by Yasuda Yukihiko; in the Tokyo National Museum
By courtesy of the Tokyo National Museum

(1912), "Praying for Her Majesty's Safe Delivery" (1914), and "The Camp at Kise River" (1941). Yasuda also taught at the University of Tokyo from 1944 to 1951. He received the Order of Cultural Merit in 1948, becoming in that year a member of the Japan Art Academy.

Yasuda Zenjirō (b. Nov. 25, 1838, Toyama, Etchū Province, Japan—d. Sept. 28, 1921, Ōiso), entrepreneur who founded the Yasuda *zaibatsu* ("financial clique"), the fourth largest of the industrial and financial combines that dominated the Japanese economy until the end of World War II.

Of humble origin, Yasuda ran away from home to go to Tokyo, where he started work as a shop assistant and eventually began his own exchange brokerage. He prospered, becoming a major lender to the new Meiji government (1868–1912) and the founder of a giant banking empire. He soon branched out into industrial enterprises, buying up railways, shipping companies, and other businesses.

In his old age, he became one of Japan's major philanthropists, endowing many fine arts and educational projects. He was assassinated by a young rightist who saw Yasuda as a symbol of the corrupting influence of business on government.

Yasui Sōtarō (b. May 17, 1888, Kyōto—d. Dec. 10, 1959, Tokyo), Japanese painter who excelled in drawing in the Western style. He was particularly famous for his portraits.

The son of a wholesale cotton-goods merchant, Yasui began to study painting in 1904 at the Shōgoin Institute of Western Art (which later became the Kansai Bijutsuin [Fine Arts Academy of Western Japan]) under its founder, Asai Chū. In 1907 he went to France, where he remained until 1914, except for occasional trips to Holland, Italy, Spain, and other European countries. In France he continued his study of painting, at first formally and later on his own. He was particularly influenced by the work of Gustave Courbet and Paul Cézanne. Upon his return to Japan he held a successful exhibition of 40-odd paintings and drawings. He gradually loosened himself from the overwhelming influence of the French masters and developed a more individual style based on painstaking sketches and with a frequently decorative composition, especially in portrait paintings. Among his representative works are "Nude Washing Her Feet" (1913), "Paulownia Blossoms" (1924), "Woman With a Fan" (1929), "Seoul" (1938), and "At the Studio" (1951).

Yāsūj (Iran): *see* Yesuj.

Yates, Edmund Hodgson (b. July 3, 1831, Edinburgh—d. May 20, 1894, London), English journalist and novelist who made respectable both the gossip column and the society paper.

The son of the actor Frederick Henry Yates and the actress Elizabeth Yates, Edmund Hodgson Yates began working at age 16 in the London general post office and rose to become head of the missing-letters department before retiring in 1872. In the early 1850s he began writing criticism and poetry for various popular journals and then began working as an editor while collaborating in the writing of theatrical farces. He also became a familiar figure in literary and artistic circles. It was as a columnist for the *Illustrated Times,* in 1855, that Yates first introduced a steadily appearing column of gossip about public personalities. Entitled "The Lounger at the Clubs," it proved a great success.

In the 1860s and '70s Yates edited various popular journals, including *Temple Bar, Tinsley's Magazine,* and *Time.* In 1874 he founded, with Grenville Murray, the first relatively respectable society paper, *The World.* This was a journal reporting the activities and associations of socially prominent persons. As editor, Yates strove to elevate *The World* above the level usual for this type of publication—*i.e.,* that of a scurrilous and scandalous journal used by the editors for making libelous personal attacks in the course of satisfying their own and their friends' vendettas. *The World* proved to be quite successful, although Yates was briefly imprisoned at one point for a libel he made in it.

Yates also wrote a number of novels, many of which were published serially in popular journals. The best of these books are *Broken to Harness* (1864) and *Black Sheep* (1867). His most lasting work, however, is his autobiography, *Edmund Yates: His Recollections and Experiences* (1884).

Yathrib (Saudi Arabia): *see* Medina.

Yatsushiro, city, Kumamoto *ken* (prefecture), Kyushu, Japan. It is situated along the delta of the Kuma River, facing Yatsushiro Bay. The city developed around a Shintō shrine that was built during the Heian era (794–1185). It was a castle town and began the production of Yatsushiro pottery in the 16th century.

The city rapidly industrialized in the early 20th century. Factories producing cement, paper, rayon, and distilled beverages utilize the area's rich natural resources, which include water, timber, clay, and limestone. Yatsushiro has a fishing and commercial port that was enlarged in 1956 and is located at the junction of the Kagoshima and Hisatsu railway lines. Pop. (1985) 108,790.

Yaunde, also spelled YAOUNDE, or JAUNDE, also called ÉWONDO, a Bantu-speaking people of the hilly area of south-central Cameroon who live in and around the capital city of Yaoundé. The Yaunde and a closely related people, the Eton, comprise the two main subgroups of the Beti, which in turn constitute one of the three major subdivisions of the cluster of peoples in southern Cameroon, mainland Equatorial Guinea, and northern Gabon known as the Fang (*q.v.*). The other two main subdivisions are those of the Bulu and of the Fang proper, who live mostly in Gabon and in Equatorial Guinea.

Yaunde is a dialect of the Yaunde-Fang group of Bantu languages; people may speak a maternal dialect, such as Eton, but they learn to read and write in Yaunde. Yaunde is also used for commerce and politics in rural areas inhabited by other groups and is especially useful in Yaoundé city, where immigrants from throughout Cameroon and neighbouring countries employ it as a lingua franca. Vocabulary from these other dialects, other nearby languages, and English and French is assimilated into everyday speech.

The Yaunde share a common culture and history with other Beti, and it is often difficult to distinguish them from their neighbours. Beti are said to be the last of several great waves of Fang immigrants who came from somewhere to the northeast perhaps because of pressure from the jihad of the Fulani under Usman dan Fodio. While the Fang proper drove into what is now Gabon, and the Bulu subgroup swept toward the sea, the Beti followed these powerful precursors and occupied lands adjacent to theirs.

The Yaunde live in a region of equatorial

forest. They raise staple crops of cassava and corn (maize), which are supplemented with a wide variety of vegetable leaves, palm oil, wild mushrooms, insects, and other gathered products. Yams, plantains, and peanuts (groundnuts) are also important to the Yaunde economy, the latter so much so that the name Ewondo is derived from peanut. Goats and pigs are kept but are used more for ritual feasts than everyday eating. Cacao is an important cash crop, but its cultivation is not as profitable as it is in other areas, because poorer soil and higher population density reduce the land area available for plantations. Rural Yaunde, as a consequence, are less wealthy than some of their neighbours. In general, Yaunde are more often labourers in urban centres than are individuals from the richer, cacao-producing regions.

The Yaunde, like the Bulu and other Fang, had only a loose political organization prior to European conquest, and their society remains essentially egalitarian. The essential units of Yaunde society are genealogically related clans determined through patrilineal descent; lineage groups within those clans; and the larger entities of the tribes, which are loosely cohering clusters of clans. The age groups into which Yaunde society was also divided have decreased in importance in recent years. Most rural Yaunde continue to live in small clusters of adjacent homesteads (with populations rarely exceeding 300 or 400 people) rather than in real villages.

A list of the abbreviations used in the MICROPAEDIA *will be found at the end of this volume*

Yauri, historic kingdom and traditional emirate, Kebbi state, northwestern Nigeria. The kingdom was probably founded by the Reshe (Gungawa) people. The date of its founding is unknown, but by the mid-14th century it was considered one of the most important of the *banza bakwai* (the "seven unsanctioned states" of the Hausa-speaking peoples). A political power struggle took place between Yauri and Zaria (emirate), both Hausa-speaking groups, over the governmental control of the Seven Hausa States. Yauri lost the struggle and Zaria was then recognized as comprising the Seven True Hausa States. Yauri, however, became known as the "seven illegitimate states" of the Hausa peoples. The walls of its first capital, Bin Yauri (Birnin Yawari, Ireshe Bino, Ireshe)—traditionally said to date from the 10th century—have long been in ruins. Yauri's 5th and 11th kings (Yauri and Jerebana II, respectively) are both credited with establishing Islām as the state religion.

Muhammadu Kanta, founder of the Kebbi kingdom to the north, conquered Yauri in the mid-16th century; and Yauri, although essentially independent after Kanta's death (*c.* 1561), paid tribute to Kebbi until the mid-18th century. About 1810 King Albishir (Mohammadu dan Ayi), the Hausa ruler of Yauri, pledged allegiance to the emir of Gwandu, the Fulani empire's overlord of the western emirates, and became the first emir of Yauri.

The expulsion in 1844 of Emir Jibrilu Gajere by the peoples of Yauri led to civil war. In 1859 Emir Suleimanu dan Addo moved the Yauri capital from Bin Yauri to the island of Ikum in the Niger River. Fears of conquest by Kontagora, the adjoining emirate to the south and east, led the Yauri rulers to retain the island capital until 1888, when agreement was reached with Kontagora's emir, Ibrahim Nagwamatse, and the Yauri capital was moved to Yelwa (*q.v.*).

Since that time—through British rule (1901–60) and Nigerian independence (since 1960)—Yelwa has remained the traditional seat of the emirate and the chief trade centre. Crops are grown for export on the fertile Niger River flood plain. Most of the population of the emirate is composed of members of the Yauri, Dakarki (Dakarawa), Kamberi, Reshe, Dukawa, Hausa, and Fulani groups.

Yavana, in early Indian literature, either a Greek or another foreigner. The word appears in Achaemenian (Persian) inscriptions in the forms *Yauna* and *Ia-ma-nu* and referred to the Ionian Greeks of Asia Minor, who were conquered by the Achaemenid king Cyrus the Great in 545 BC. The word was probably adopted by the Indians of the northwestern provinces from this source, and its earliest attested use in India is by the grammarian Pāṇini (*c.* 5th century BC) in the form *Yavanānī*, which is taken by commentators to mean Greek script. At that date the name probably referred to communities of Greeks settled in the eastern Achaemenian provinces.

From the time of Alexander the Great (*c.* 334 BC) Yavana came to be applied more specifically to the Greek kingdom of Bactria, and, even more specifically, after about 175 BC, to the Indo-Greek kingdom in the Punjab. Indian sources of that time regarded the Yavanas as a barbarian people of the northwest. From the beginning of the Christian era the word was often used loosely to refer to any foreigner; and at a much later date it frequently applied to the Muslim invaders of India.

Yavarí River (South America): *see* Javari River.

Yavorov, Peyo, pseudonym of PEYO KRACHOLOV (b. Jan. 13, 1878, Chirpan, Bulg.—d. Oct. 16/29, 1914, Sofia), Bulgarian poet and dramatist, the founder of the Symbolist movement in Bulgarian poetry.

Yavorov took part in the preparation of the ill-fated Macedonian uprising against Ottoman hegemony in August 1903, edited revolutionary papers, and crossed twice into Macedonia with partisan bands. He committed suicide at the age of 36.

Until 1900 Yavorov mainly wrote poetry of a sociopolitical character, inspired by compassion for the peasantry, the struggles of the Macedonians, and the suffering of the Armenian exiles. Disillusionment with radicalism led him then to abandon realism for introspection and Symbolism. Besides several collections of poems—*Stikhotvoreniya* (1901); *Bezsunitsi* (1907); *Podir Senkite na Oblatsite* (1910)—his works include the plays *V Polite na Vitosha* (1911) and *Kogato Gram Udari* (1912); a biography of the Macedonian leader Gotse Delchev; and a book of reminiscences of his fighting days, *Haidushki Kopneniya* (1908).

Yavuz (Ottoman sultan): *see* Selim I.

yawara (martial art): *see* jujitsu.

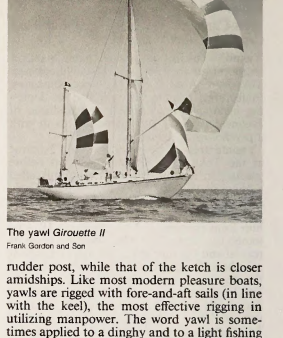
Yawatahama, city, Ehime *ken* (prefecture), Shikoku, Japan. It lies along the Uwa Sea. A castle town and fishing port during the Tokugawa era (1603–1867), it later developed as a trade centre for silk cocoons and raw silk. The city is now an important base for deep-sea trawling and has fish-processing and cotton textile industries. Mandarin oranges are cultivated in the hinterland. A ferry operates across the Bungo Strait between Yawatahama and Usuki, on the eastern coast of Kyushu. Pop. (1990) 38,550.

Yawkey, Tom, byname of THOMAS AUSTIN YAWKEY, original name THOMAS AUSTIN (b. Feb. 21, 1903, Detroit, Mich., U.S.—d. July 9, 1976, Boston, Mass.), American professional baseball executive, sportsman, and owner of the American League Boston Red Sox (1933–76), who was the last of the patriarchal owners.

Austin was taken into the home of his maternal uncle William Yawkey and received a B.S. degree (in mining engineering and chemistry) from Yale University in 1925. After his mother's death he took his uncle's name and at the age of 16 became heir to his uncle's fortune. Yawkey had a lifelong passion for baseball, and he bought the Red Sox in 1933. He signed such stars as Jimmy Foxx, Lefty Grove, Joe Cronin, Ted Williams, and Carl Yastrzemski. The Red Sox won the American League pennant three times but lost the World Series to the National League St. Louis Cardinals (1946, 1967) and to the Cincinnati Reds (1975).

Yawkey was also an avid fisherman and hunter. His 40,000-acre (16,000-hectare) wildlife preserve at South Island, S.C., provided feeding and stopover sites for migrating birds and habitat for other wildlife. He willed 15,000 acres (6,070 hectares) of it to the state of South Carolina with a trust fund of $10,000,000 for its maintenance.

yawl, two-masted sailboat, usually rigged with one or more jibsails, a mainsail, and a mizzen. In common with the ketch, the forward (main) mast is higher than the mizzenmast, but the mizzenmast of a yawl is placed astern of the



The yawl *Girouette II*
Frank Gordon and Son

rudder post, while that of the ketch is closer amidships. Like most modern pleasure boats, yawls are rigged with fore-and-aft sails (in line with the keel), the most effective rigging in utilizing manpower. The word yawl is sometimes applied to a dinghy and to a light fishing vessel rigged with lugsails.

yaws, also called FRAMBESIA, contagious disease occurring in moist tropical regions throughout the world. It is caused by a spirochete, *Treponema pertenue,* that is structurally indistinguishable from *T. pallidum,* which causes syphilis. Some syphilologists contend that yaws is merely a tropical rural form of syphilis, but yaws is not contracted primarily through sexual activity, and later systemic complications from the disease are much rarer than in syphilis. The Wassermann and Kahn tests for syphilis, however, often read positive with yaws, and there is some degree of cross-immunity. The spirochetes of yaws are present in the discharge from lesions on the skin and are transferred by direct contact to the abraded skin of an uninfected person; by contaminated clothing; and by flies that feed on the sores. The disease is most frequently contracted in early childhood, and considerable immunity to subsequent infection is acquired.

Yaws has three stages. The symptoms are an initial papule on the skin at the site of inoculation, followed by multiple cauliflower eruptions, and later, in some cases, by mutilating destruction of the skin, mucous membranes, and bones. The primary yaws sore is characterized by a wartlike thickening of the epi-

dermis, which becomes fibrous, cracks open, bleeds easily, and discharges a serous fluid.

A month or more later, when the first lesion may have disappeared except for a scar, multiple eruptions of the same type characteristically develop, often at junctions of the skin and mucous membranes, as around the mouth, nose, and anus, or on the skin of the crotch, neck, arms, legs, and buttocks. These lesions, whether initial or secondary, are yellowish-red and look somewhat like a raspberry (hence the name frambesia, latinized from the French *framboise:* "raspberry"). Later, the disease may subside, leaving only superficial scarring, but in some instances there may be deforming tertiary yaws involving the nose, long bones ("boomerang leg" of Australia), and, rarely, the spleen, brain, and great blood vessels.

Penicillin is rapidly effective in killing the spirochete and in curing yaws except in the tertiary stage, when oxophenarsine with bismuth subsalicylate is used. Prevention centres on isolating and promptly treating cases to reduce exposure and on maintaining personal and group hygiene. All abrasions and sores of the skin and mucous membranes should be treated with appropriate antiseptics and covered with clean dressings, and all clothing in contact with yaws lesions should be sterilized or destroyed.

Yayoi culture (*c.* 250 BC–*c.* AD 250), prehistoric culture of Japan, subsequent to the Jōmon culture. Named after the district in Tokyo where its artifacts were first found in 1884, the culture arose on the southern Japanese island of Kyushu and spread northeastward toward the Kantō Plain. The Yayoi people mastered bronze and iron casting. They wove hemp and lived in village communities of thatched-roofed, raised-floor houses. They employed a method of wet paddy rice cultivation, of Chinese origin, and continued the hunting and shell-gathering economy of the Jōmon culture.

Yayoi pottery, like earlier Jōmon ware, was unglazed. Pottery of the Early Yayoi period (250–100 BC) was characterized by knife-incised surface decoration. During the Middle Yayoi period (100 BC–AD 100), pottery objects with comb-mark decorations appeared. Forms of this warm, russet-coloured ware included tall footed vessels, large and small jars, bowls, and spouted vessels. Yayoi ware appears wheel-thrown but was made by the coiling method—that is, by preparing the clay in the shape of a rope and coiling it spirally upward. Surfaces were smoothed with a paddle or edging tool, then painted in red and polished to a high finish. Pieces produced in the last stage of the period were often undecorated.

Yayoi sites have yielded bronze mirrors and coins bearing similarities to Chinese Handynasty bronzes; ceremonial bronze weapons, swords, spears, and halberds; and bronze bells (*dōtaku*) decorated with incised geometric designs and matchstick drawings.

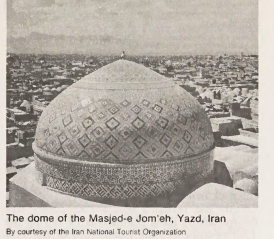
Yayoi pottery seems to be of two types, western and eastern, these being roughly geographically divided by the Inland Sea. Comparison of the bronzes, on the other hand, suggests the division of Yayoi culture into a western section around northern Kyushu, a central section around the Kinki area, and an eastern section around the Kantō Plain.

yazata, in Zoroastrianism, member of an order of angels created by Ahura Mazdā to help him maintain the flow of the world order and quell the forces of Ahriman and his demons. They gather the light of the Sun and pour it on the Earth. Their help is indispensable in aiding man to purify and elevate himself. They teach him to dispel demons and free himself of the future torments of hell. Persons who remember the yazata through ritual offerings receive their favour and prosper. Zoroaster prayed to them to grant him strength for his mission.

The principal *yazatas* are mostly ancient Iranian deities reduced to auxiliary status: Ātar (Fire), Mithra, Anahita, Rashnu (The Righteous), Sraosha, and Verethraghna.

Yazd, also called YEZD, city, central Iran. The city dates from the 5th century AD and was described as the "noble city of Yazd" by Marco Polo. It stands on a mostly barren, sand-ridden plain about 4,000 feet (1,200 m) above sea level. The climate is completely desertic. A network of *qanats* (tunnels dug to carry water) links Yazd with the edge of the nearby mountain Shīr Khū. Historically, Yazd has been the link between Fārs and Khorāsān and between Persian Iraq and Kermān, and it was situated at the intersection of the trade routes from central Asia and India. It served as a provincial capital and earned the title of *Dār al-ibada* (Home of Piety), owing to its many religious buildings. Some of the city's inhabitants are Zoroastrians whose ancestors had fled toward Yazd and Kermān when the Muslim Arabs conquered Iran. Yazd is now the last centre of Zoroastrianism in Iran.

Since Sāsānian times Yazd has been famous for beautiful silk textiles that were rivaled in later periods only by those of Kāshān and Esfahān. The city is still a major centre of silk weaving. It has spinning and weaving mills, a plant for the manufacture of water purification and filtration equipment, and considerable mining and quarrying activity; copper deposits nearby are processed at the Sar Cheshmeh facilities. Almonds, fruit, and some grain are grown near the city.



The dome of the Masjed-e Jom'eh, Yazd, Iran
By courtesy of the Iran National Tourist Organization

Besides a few remains of the imposing medieval city wall, the city has many important mosques and mausoleums dating from the 12th imam (head of Islām; 1035). The Masjed-e Jom'eh (Friday Mosque) is distinguished by the highest minarets in Iran, mosaic faience (earthenware ceramics), a superb mihrab (pulpit) dated 1375, and two oratories that are Gothic in appearance. Some of the other mosques and mausoleums in the city are decorated with delicate and rich stucco relief or are polychromed with tones of pale blue, rose, and yellow. The skyline is picturesque with minarets and many tall towers that were designed to bring cool air from underground into the buildings' chambers. Yazd city is linked with Kermān, Qom, Esfahān, and Tehrān by road and railway; it also has an airport.

The economy of the area in which Yazd is situated is dominated by agriculture that was modernized through the establishment of farm corporations and processing centres for agricultural products. The chief crops grown include wheat, barley, cotton, oilseeds, indigo plants, fruits, and vegetables. Pop. (1985 est.) city, 223,300.

Yazdegerd, also spelled YEZDEGERD, or YEZDEGIRD, Middle Persian YZDKRT, name of Iranian rulers of the Sāsānian dynasty grouped below chronologically and indicated by the symbol •.

• **Yazdegerd I** (fl. 5th century), king of the Sāsānian Empire (reigned 399–420).

Yazdegerd was a highly intelligent ruler who tried to emancipate himself from the domination of the magnates and of the Magi (a priestly caste serving a number of religions); thus, his reign is viewed differently by Christian and Magian sources. Because he stopped the persecution of the Christians, the Christian writers praise his clemency, but the sources dependent on Magian tradition refer to him as "Yazdegerd the Sinner." He also tried to limit the power of the nobles, but their resistance finally was answered with severity. He lived in peace and friendship with the Roman Empire and was therefore praised by Byzantine authors. He appears to have been murdered in Khorāsān and was succeeded by one of his sons, Bahrām V.

• **Yazdegerd II** (fl. 5th century), king of the Sāsānian dynasty (reigned 438–457), the son and successor of Bahrām V.

Although Yazdegerd was at first tolerant of the Christians, he remained a zealous Zoroastrian and later persecuted both Christians and Jews. He was engaged in a short war with Rome in 442 and also fought against the Kushans (Kuṣāṇas) and Kidarites in the east. Little else is known of Yazdegerd's reign; he was succeeded in turn by two of his sons, Hormizd III and Fīrūz.

• **Yazdegerd III** (d. 651, Merv, Sāsānian Empire), the last king of the Sāsānian dynasty (reigned 632–651), the son of Shahryār and a grandson of Khosrow II.

A mere child when he was placed on the throne, Yazdegerd never actually exercised power. In his first year the Arab invasion began, and in 636/637 the Battle of al-Qādisiyah on one of the Euphrates canals decided the fate of the empire. His capital, Ctesiphon, was occupied by the Arabs, and Yazdegerd fled into Media, where his generals unsuccessfully attempted to organize resistance. After the Battle of Nahāvand (642), in which Sāsānian forces were badly defeated, Yazdegerd sought refuge in one district after another, until at last he was slain at Merv. The Parsis—Zoroastrians who immigrated to western India on the advent of Islām—still use the old Persian calendar and continue to count the years from Yazdegerd's accession.

Yazīd I, in full YAZĪD IBN MUʿĀWIYAH IBN ABĪ SUFYĀN (b. *c.* 645, Arabia—d. 683, Damascus), second Umayyad caliph (680–683), particularly noted for his suppression of a rebellion led by Ḥusayn, the son of ʿAlī. The death of Ḥusayn at the Battle of Karbalāʾ (680) made him a martyr and made permanent a division in Islām between the party of ʿAlī (the Shīʿah) and the majority Sunnah.

As a young man Yazid commanded the Arab army that his father, Muʿāwiyah, sent to lay siege to Constantinople. Soon afterward he became caliph, but many of those whom his father had kept in check rebelled against him.

Although presented in many sources as a dissolute ruler, Yazid energetically tried to continue the policies of Muʿāwiyah and kept many of the men who had been in his father's service. He strengthened the administrative structure of the empire and improved the military defenses of Syria. The financial system was reformed. He lightened the taxation of some Christian groups and abolished the tax concessions granted to the Samaritans as a reward for aid they had rendered in the days of the Arab conquests. He concerned himself

with agricultural matters and improved the irrigation system of the Damascus oasis.

Yazīd ibn al-Muhallab (b. 672—d. 720, Wāsit, Iraq), provincial governor in the service of several caliphs of the Umayyad dynasty.

In the first years of the 8th century Yazīd became governor of Khorāsān. He soon came into conflict with the powerful governor of Iraq, al-Ḥajjāj, at whose instigation the caliph, al-Walīd, had Yazīd jailed. In 708 Yazīd managed to escape, fleeing to the protection of Sulaymān, al-Walīd's brother. When in 715 Sulaymān himself became caliph, Yazīd was named governor of Iraq and embarked on a persecution of the followers of al-Ḥajjāj, who had died in 714. Later he was also named governor of Khorāsān, while retaining supreme command in Iraq. Cruelty and extortion characterized his administration. In 717 he was again jailed when he was unable to transmit the appropriate tribute to Damascus. Once more he escaped, this time to lead a rebellion that resulted in his death.

Yazīdī, also spelled YEZĪDĪ, AZĪDĪ, ZEDĪ, or IZDĪ, religious sect, found primarily in the districts of Mosul, Iraq; Diyarbakır, Tur.; Aleppo, Syria; Armenia and the Caucasus region; and in parts of Iran. The Yazīdī religion is a syncretic combination of Zoroastrian, Manichaean, Jewish, Nestorian Christian, and Islāmic elements. The Yazīdī themselves are thought to be descended from supporters of the Umayyad caliph Yazid I. They believe that they were created quite separately from the rest of mankind, not even being descended from Adam, and they have kept themselves strictly segregated from the people among whom they live. Although scattered and probably numbering fewer than 100,000, they have a well-organized society, with a chief sheikh as the supreme religious head and an emir, or prince, as the secular head.

The chief divine figure of the Yazīdī is Malak Ṭā'ūs ("Peacock Angel"), who is worshiped in the form of a peacock. He rules the universe with six other angels, but all seven are subordinate to the supreme God, who has had no direct interest in the universe since he created it. The seven angels are worshiped by the Yazīdī in the form of seven bronze or iron peacock figures called *sanjaq,* the largest of which weighs nearly 700 pounds (320 kg).

Yazīdī are antidualists; they deny the existence of evil and therefore also reject sin, the devil, and hell. The breaking of divine laws is expiated by way of metempsychosis, or transmigration of souls, which allows for the progressive purification of the spirit. The Yazīdī relate that, when the devil repented of his sin of pride before God, he was pardoned and replaced in his previous position as chief of the angels; this myth has earned the Yazīdī an undeserved reputation as devil worshipers. Shaykh 'Adī, the chief Yazīdī saint, was a 12th-century Muslim mystic whom the Yazīdī believe to have achieved divinity through metempsychosis.

The Yazīdī religious centre and object of the annual pilgrimage is the tomb of Shaykh 'Adī, located at a former Christian monastery in the town of ash-Shaykh 'Adī, north of Mosul. Two short books written in Arabic, *Kitāb al-jilwah* ("Book of Revelation") and *Maṣḥaf rash* ("Black Writing"), form the sacred scriptures of the Yazīdī, and an Arabic hymn in praise of Shaykh 'Adī is held in great esteem.

Yāzijī, Nāṣīf (b. March 25, 1800, Kafr Shīmā, Lebanon—d. Feb. 8, 1871, Beirut), Lebanese scholar who played a significant role in the revitalization of Arabic literary traditions.

Until 1840 Yāzijī was employed in the service of Bashīr Shihāb II, the emir of Lebanon. He then moved to Beirut, where he continued his literary work. He was a Christian, and for a while he helped some American missionaries prepare Arabic textbooks for use in local mission schools. He had a deep love for the Arabic language and a deep appreciation for the beauty of classical Arabic literature. He was also a purist in that he sought to eliminate "corruptions" that through the centuries had been absorbed into language and to return to the practices of the classical scholars. In previous centuries the classic literature had fallen into neglect, but the writings of Yāzijī and of other Christian Arabs helped to revive it as an active element in contemporary Arabic culture.

Yazılıkaya (Turkish: "Inscribed Rock"), Hittite monument about a mile northeast of Boğazköy; it was the site of the Hittite capital



Yazılıkaya
From K. Bittel, R. Naumann, and H. Otto, *Yazilikaya: Architektur, Felsbilder, Inschriften, und Kleinfunde*

Hattusa in eastern Turkey. Two recesses in the rock, one to the northeast and the other to the east, form natural open-air galleries. In a northeastern recess is carved a long procession of mostly male figures to the west and female to the east, meeting on the far northeastern wall. The east gallery contains a relief of a procession of warriors; on the opposite wall is a large relief showing a king in the embrace of his patron god, with a long dagger thrust into the rock before him.

Study has revealed that the sanctuary was completed by King Tudhaliyas IV during the 13th century BC, the last period of the Hittite empire, when Hurrian religious and cultural influence had become predominant. The shrine, therefore, canonized the official Hurrianized cult of the Hittite capital city.

Yazoo City, city, seat (1849) of Yazoo county, west-central Mississippi, U.S. It lies along the Yazoo River, 38 miles (61 km) northwest of Jackson. Founded as Hanan's Bluff in 1824, it was incorporated in 1830 and called Manchester; it was renamed for the Yazoo Indians in 1839. Its riverfront was the scene of several Civil War battles; the hull of the *Baron DeKalb,* sunk by Federal forces, is still visible at low water. Yazoo City was almost completely destroyed by fire in 1904 and was afterward rebuilt. An oil refinery was built in the city after the state's first oil well began production (1939) nearby. Yazoo City is an agricultural-trade centre (cattle, soybeans, corn [maize], cotton) and has some manufactures (nitrogen chemicals, fertilizer, machinery, textiles). Delta National Forest is a few miles west. Pop. (1990) 12,427.

Yazoo River, river formed by the confluence of the Tallahatchie and Yalobusha rivers north of Greenwood, Mississippi, U.S. It meanders 189 miles (304 km) generally south and southwest, much of the way paralleling the Mississippi River, which it joins at Vicksburg. The Yazoo flows with a fall of only 7½ inches (19 cm) per mile. Prior to the completion of a system of levees in 1886, the Yazoo Basin was subject to headwater flooding by the larger streams; after that it became a major cotton-growing region. The basin, or floodplain, between the Mississippi on the west and the Yazoo on the east is now protected from the Mississippi's overflow by 270 miles (435 km) of levees extending from south of Memphis to the mouth of the Yazoo at Vicksburg. The basin is variously called the Delta, the Yazoo Delta, and the Yazoo Basin. Chief cities along the Yazoo River are Greenwood and Yazoo City.

The name Yazoo (that of an Indian tribe) is also applied to a tributary that flows parallel to the main stream for some distance before their confluence farther downstream.

Ye Jianying, Wade–Giles romanization YEH CHIEN-YING (b. May 14, 1897, Mei-hsien, Kwangtung Province, China—d. Oct. 22, 1986, Peking), Chinese Communist military officer, administrator, and statesman who held high posts in the Chinese government during the 1970s and '80s.

Born of a middle-class family, Ye graduated from the Yunnan Military Academy in 1919 and joined Sun Yat-sen's Nationalist movement shortly thereafter. He established a lifelong friendship with Zhou Enlai when the two were on the faculty of the Whampoa Military Academy during the mid-1920s. He joined the Chinese Communist Party (CCP) in 1927 and studied in Moscow from 1928 to 1931, subsequently joining Mao Zedong's Kiangsi Soviet. Ye helped plan the Long March (1934–35), and by the late 1930s he had earned a reputation as an outstanding strategic planner. He was chief of staff of the (Communist) Eighth Route Army during much of World War II. He became a member of the Central Committee of the CCP in 1945. During the civil war between the Communists and Nationalists (1945–49), he was deputy chief of the general staff of the Communist armed forces.

Ye was the chief political commissar in Kwangtung Province in the early 1950s and was also mayor of Canton at this time. In 1955 he was made a marshal of the People's Liberation Army, and in 1966 he was made a member of the ruling Politburo of the CCP. He became a member of the powerful Standing Committee of the Politburo in 1973. After Mao's death in 1976, Ye opposed the Gang of Four and supported Hua Guofeng. Ye served as defense minister from 1975 to 1978 but, having grown feeble from old age, was in the latter year made chairman of the Standing Committee of the National People's Congress, thereby becoming nominal chief of state. He generally opposed Deng Xiaoping's reforms, and in 1985 he retired from his principal posts, including his membership in the Politburo.

Yeager, Charles E(lwood), byname CHUCK YEAGER (b. Feb. 13, 1923, Myra, W.Va., U.S.), American test pilot and U.S. Air Force officer who was the first man to exceed the speed of sound in flight.

Yeager enlisted in the U.S. Army in September 1941, shortly after graduating from high school, and was assigned to the Army Air Corps. He was commissioned a reserve flight officer in 1943 and became a pilot in the fighter command of the Eighth Air Force stationed in England. He flew 64 missions over Europe during World War II, shot down 13 German aircraft, and was himself shot down over France (he escaped capture with the help of the French underground). After the war he became a flight instructor and then a test pilot, securing a regular commission as a captain in 1947.

Yeager was chosen from several volunteers to test-fly the secret experimental X-1 aircraft, built by the Bell Aircraft Company to test the capabilities of the human pilot and fixed-wing aircraft against the severe aerodynamic stresses of sonic flight. On Oct. 14, 1947, over Rogers Dry Lake in southern California, he rode the X-1, attached to a B-29 mother ship, to an altitude of 25,000 feet (7,600 m). The X-1 then rocketed separately to 40,000 feet (12,000 m), and Yeager became the first man to break the sound barrier, which was approximately 662 miles per hour (1.066 kilometres per hour) at that altitude. The feat was not announced publicly until June 1948. Yeager continued to make test flights, and, on Dec. 12, 1953, he established a world speed record of 1,650 miles per hour (2,660 km/h) in an X-1A rocket plane.

In 1954 Yeager left his post as assistant chief of test-flight operations at Edwards Air Force Base in California to join the staff of the Twelfth Air Force in West Germany. Following other routine assignments, he returned to Edwards in 1962 as commandant of the Aerospace Research Pilot School with the rank of colonel. In 1968 he took command of the 4th Tactical Fighter Wing. He retired from the Air Force with the rank of brigadier general in 1975. His autobiography, *Yeager,* was published in 1985.

Consult the INDEX *first*

year, time required for the Earth to travel once around the Sun, about 365¼ days. This fractional number makes necessary the periodic intercalation of days in any calendar that is to be kept in step with the seasons. In the Gregorian calendar a common year contains 365 days, and every fourth year (with a few exceptions) is a leap year of 366 days.

In astronomy, several kinds of year are distinguished, having slightly different lengths. The solar year (365 days 5 hours 48 minutes 46 seconds), also called tropical year, or year of the seasons, is the time between two successive occurrences of the vernal equinox (the moment when the Sun apparently crosses the celestial equator moving north). Because of the precession of the equinoxes (an effect of a slow wobble in the Earth's rotation), the solar year is shorter than the sidereal year (365 days 6 hours 9 minutes 10 seconds), which is the time taken by the Sun to return to the same place in its annual apparent journey against the background of the stars. The anomalistic year (365 days 6 hours 13 minutes 53 seconds) is the time between two passages of the Earth through perihelion, the point in its orbit nearest the Sun. A lunar year (used in some calendars) of 12 synodic months (12 cycles of lunar phases) is about 354 days long. A cosmic year is the time (about 225 million years) needed for the solar system to revolve once around the centre of the Milky Way Galaxy.

yeast, any of certain economically important single-celled fungi, most of which are in the class Ascomycetes, only a few being Basidiomycetes. Yeasts are found worldwide in soils and on plant surfaces and are especially abundant in sugary mediums such as flower nectar and fruits. There are hundreds of varieties of ascomycetan yeasts; the types commonly used in the production of bread, beer, and wine are selected strains of *Saccharomyces cerevisiae.* The small cakes and packets of yeast used in food- and beverage-processing contain billions of individual yeast cells, each about 0.003 inch (0.075 mm) in diameter.

Yeasts reproduce asexually by budding: a small bump protrudes from a parent cell, enlarges, matures, and detaches. A few yeasts reproduce by fission, the parent cell dividing into two equal cells. Some yeasts are mild to dangerous pathogens of humans and other animals (*e.g., Candida albicans, Histoplasma, Blastomyces*). *Torula* is a genus of wild yeasts that are imperfect, never forming sexual spores.

In food manufacture, yeast is used to cause fermentation and leavening. The fungi feed on sugars, producing alcohol (ethanol) and carbon dioxide; in beer and wine manufacture the former is the desired product, in baking, the latter. In sparkling wines and beer some of the carbon dioxide is retained in the finished beverage. The alcohol produced in bread making is driven off when the dough is baked. The fermentation of wine is initiated by naturally occurring yeasts present in the vineyards. One yeast cell can ferment approximately its own weight of glucose per hour.

Yeast is 50 percent protein and is a rich source of vitamins B_1, B_2, niacin, and folic acid. Brewer's yeast is sometimes eaten as a vitamin supplement.

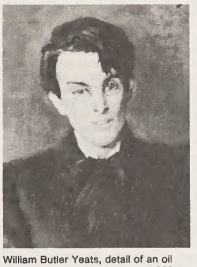
In commercial production, selected strains of yeast are fed a solution of molasses, mineral salts, and ammonia. When growth ceases, the yeast is separated from the nutrient solution, washed, and packaged. Yeast for baking is sold in compressed cakes containing starch or in a dry granular form mixed with cornmeal.

Yeats, Jack Butler (b. Aug. 23, 1871, London, Eng.—d. March 28, 1957, Dublin, Ire.), leading Irish painter of the 20th century, whose scenes of Irish daily life and Celtic mythology contributed to the surge of nationalism in the Irish arts after Irish independence was won.

He was the younger son of John Butler Yeats, a well-known portrait painter, and was the brother of the poet William Butler Yeats. He was privately educated in Sligo, Ire., and his early work was mainly confined to illustrations for books and broadsheets produced by his sisters at the Dun Emer, later the Cuala Press of Dundrum near Dublin. About 1915 he began to paint in oil, and it was during the years of the Irish struggle for independence that his style matured and he began to acquire fame. His approach to the Irish scene is romantic and emotional, yet never out of touch with reality. Yeats was also a writer, whose literary works are characterized by the same qualities of fantasy and of colourful and haphazard expression that are apparent in his paintings.

Yeats, William Butler (b. June 13, 1865, Sandymount, Dublin, Ire.—d. Jan. 28, 1939, Roquebrune-Cap-Martin, Fr.), Irish poet, dramatist, and prose writer, one of the greatest English-language poets of the 20th century. He received the Nobel Prize for Literature in 1923.

Yeats's father, John Butler Yeats, was a barrister who eventually became a portrait painter. His mother, formerly Susan Pollexfen, was the daughter of a prosperous merchant in Sligo, Ire. Through both parents Yeats claimed kinship with various Anglo-Irish Protestant families who are mentioned in his work. Normally, Yeats would have been expected to identify with his Protestant tradition—which represented a powerful minority among Ireland's predominantly Roman Catholic population—but he did not. Indeed, he was separated from both historical traditions available to him in Ireland—from the Roman Catholics, because he could not share their faith, and from the Protestants, because he felt repelled by their concern for material success. Yeats's best hope, he felt, was to cultivate a tradition more profound than either the Catholic or the Protestant—the tradition of a hidden Ireland that existed largely in the anthropological evidence of its surviving customs, beliefs, and holy places, more pagan than Christian.



William Butler Yeats, detail of an oil painting by John Butler Yeats, 1900; in the National Gallery of Ireland, Dublin

By courtesy of the National Gallery of Ireland, Dublin

In 1867, when Yeats was only two, his family moved to London, but he spent much of his boyhood and school holidays in Sligo with his grandparents. This country—its scenery, folklore, and supernatural legend—would colour Yeats's work and form the setting of many of his poems. In 1880 his family moved back to Dublin, where he attended the high school. In 1883 he attended the Metropolitan School of Art in Dublin, where the most important part of his education was in meeting other poets and artists.

Meanwhile, Yeats was beginning to write: his first publication, two brief lyrics, appeared in the *Dublin University Review* in 1885. When the family moved back to London in 1887, Yeats took up the life of a professional writer. He joined the Theosophical Society, whose mysticism appealed to him because it was a form of imaginative life far removed from the workaday world. The age of science was repellent to Yeats; he was a visionary, and he insisted upon surrounding himself with poetic images. He began a study of the prophetic books of William Blake, and this enterprise brought him into contact with other visionary traditions, such as the Platonic, the Neoplatonic, the Swedenborgian, and the alchemical.

Yeats was already a proud young man, and his pride required him to rely on his own taste and his sense of artistic style. He was not boastful, but spiritual arrogance came easily to him. His early poems, collected in *The Wanderings of Oisin, and Other Poems* (1889), are the work of an aesthete, often beautiful but always rarefied, a soul's cry for release from circumstance.

Yeats quickly became involved in the literary life of London. He became friends with William Morris and W.E. Henley, and he was a cofounder of the Rhymers' Club, whose members included his friends Lionel Johnson and Arthur Symons. In 1889 Yeats met Maud Gonne, an Irish beauty, ardent and brilliant. From that moment, as he wrote, "the troubling of my life began." He fell in love with her, but his love was hopeless. Maud Gonne liked and admired him, but she was not in love with him. Her passion was lavished upon Ireland; she was an Irish patriot, a rebel, and a rhetorician, commanding in voice and in person. When Yeats joined in the Irish nationalist cause, he did so partly from conviction, but mostly for love of Maud. When Yeats's play *Cathleen ni Houlihan* was first performed in Dublin in 1902, she played the title role.

After the rapid decline and death of the controversial Irish leader Charles Stewart Parnell in 1891, Yeats felt that Irish political life lost its significance. The vacuum left by politics might be filled, he felt, by literature, art, poetry, drama, and legend. *The Celtic Twilight* (1893), a volume of essays, was Yeats's first

effort toward this end, but progress was slow until 1898, when he met Augusta Lady Gregory, an aristocrat who was to become a playwright and his close friend. She was already collecting old stories, the lore of the west of Ireland. Yeats found that this lore chimed with his feeling for ancient ritual, for pagan beliefs never entirely destroyed by Christianity. He felt that if he could treat it in a strict and high style, he would create a genuine poetry while, in personal terms, moving toward his own identity. From 1898, Yeats spent his summers at Lady Gregory's home, Coole Park, County Galway, and he eventually purchased a ruined Norman castle called Thoor Ballylee in the neighbourhood. Under the name of the Tower, this structure would become a dominant symbol in many of his latest and best poems.

In 1899 Yeats asked Maud Gonne to marry him, but she declined. Four years later she married Major John MacBride, an Irish soldier who shared her feeling for Ireland and her hatred of English oppression: he was one of the rebels later executed by the British government for their part in the Easter Rising of 1916. Meanwhile, Yeats devoted himself to literature and drama, believing that poems and plays would engender a national unity capable of transfiguring the Irish nation. He (along with Lady Gregory and others) was one of the originators of the Irish Literary Theatre, which gave its first performance in Dublin in 1899 with Yeats's play *The Countess Cathleen*. To the end of his life Yeats remained a director of this theatre, which became the Abbey Theatre in 1904. In the crucial period from 1899 to 1907, he managed the theatre's affairs, encouraged its playwrights (notably John Millington Synge), and contributed many of his own plays. Among the latter that became part of the Abbey Theatre's repertoire are *The Land of Heart's Desire* (1894), *Cathleen ni Houlihan* (1902), *The Hour Glass* (1903), *The King's Threshold* (1904), *On Baile's Strand* (1905), and *Deirdre* (1907).

Yeats published several volumes of poetry during this period, notably *Poems* (1895) and *The Wind Among the Reeds* (1899), which are typical of his early verse in their dream-like atmosphere and their use of Irish folklore and legend. But in the collections *In the Seven Woods* (1903) and *The Green Helmet* (1910), Yeats slowly discarded the Pre-Raphaelite colours and rhythms of his early verse and purged it of certain Celtic and esoteric influences. The years from 1909 to 1914 mark a decisive change in his poetry. The otherworldly, ecstatic atmosphere of the early lyrics has cleared, and the poems in *Responsibilities: Poems and a Play* (1914) show a tightening and hardening of his verse line, a more sparse and resonant imagery, and a new directness with which Yeats confronts reality and its imperfections.

In 1917 Yeats published *The Wild Swans at Coole*. From then onward he reached and maintained the height of his achievement—a renewal of inspiration and a perfecting of technique that are almost without parallel in the history of English poetry. *The Tower* (1928), named after the castle he owned and had restored, is the work of a fully accomplished artist; in it, the experience of a lifetime is brought to perfection of form. Still, some of Yeats's greatest verse was written subsequently, appearing in *The Winding Stair* (1929). The poems in both of these works use, as their dominant subjects and symbols, the Easter Rising and the Irish civil war; Yeats's own tower; the Byzantine Empire and its mosaics; Plato, Plotinus, and Porphyry; and the author's interest in the philosophy of G.E. Moore and in contemporary psychical research. Yeats explained his own philosophy in the prose work *A Vision* (1925, revised version 1937); this meditation upon the relation between imagination, history, and the occult remains indispensable to serious students of Yeats despite its obscurities.

In 1913 Yeats spent some months at Stone Cottage, Sussex, with the American poet Ezra Pound acting as his secretary. Pound was then editing translations of the nō plays of Japan, and Yeats was greatly excited by them. The nō drama provided a framework of drama designed for a small audience of initiates, a stylized, intimate drama capable of fully using the resources offered by masks, mime, dance, and song and conveying—in contrast to the public theatre—Yeats's own recondite symbolism. Yeats devised what he considered an equivalent of the nō drama in such plays as *Four Plays for Dancers* (1921), *At the Hawk's Well* (first performed 1916), and several others.

In 1917 Yeats asked Iseult Gonne, Maud Gonne's daughter, to marry him. She refused. Some weeks later he proposed to Miss George Hyde-Lees and was accepted; they were married in 1917. A daughter, Anne Butler Yeats, was born in 1919, and a son, William Michael Yeats, in 1921.

In 1922, on the foundation of the Irish Free State, Yeats accepted an invitation to become a member of the new Irish Senate: he served for six years. In 1923 he was awarded the Nobel Prize for Literature. Now a celebrated figure, he was indisputably one of the most significant modern poets. In 1936 his *Oxford Book of Modern Verse, 1892–1935*, a gathering of the poems he loved, was published. Still working on his last plays, he completed *The Herne's Egg*, his most raucous work, in 1938. Yeats's last two verse collections, *New Poems* and *Last Poems and Two Plays*, appeared in 1938 and 1939 respectively. In these books many of his previous themes are gathered up and rehandled, with an immense technical range; the aged poet was using ballad rhythms and dialogue structure with undiminished energy as he approached his 75th year.

Yeats died in January 1939 while abroad. Final arrangements for his burial in Ireland could not be made, so he was buried at Roquebrune, France. The intention of having his body buried in Sligo was thwarted when World War II began in the autumn of 1939. In 1948 his body was finally taken back to Sligo and buried in a little Protestant churchyard at Drumcliffe, as he specified in "Under Ben Bulben," in his *Last Poems*, under his own epitaph: "Cast a cold eye On life, on death. Horseman, pass by!"

Had Yeats ceased to write at age 40, he would probably now be valued as a minor poet writing in a dying Pre-Raphaelite tradition that had drawn renewed beauty and poignancy at a time from the Celtic revival. There is no precedent in literary history for a poet who produces his greatest work between the ages of 50 and 75. Yeats's work of this period takes its strength from his long and dedicated apprenticeship to poetry; from his experiments in a wide range of forms of poetry, drama, and prose; and from his spiritual growth and his gradual acquisition of personal wisdom, which he incorporated into the framework of his own mythology.

Yeats's mythology, from which arises the distilled symbolism of his great period, is not always easy to understand, nor did Yeats intend its full meaning to be immediately apparent to those unfamiliar with his thought and the tradition in which he worked. His own cyclic view of history suggested to him a recurrence and convergence of images, so that they become multiplied and enriched; and this progressive enrichment may be traced throughout his work. Among Yeats's dominant images are Leda and the Swan; Helen and the burning of Troy; the Tower in its many forms; the sun and moon; the burning house; cave, thorn tree, and well; eagle, heron, sea gull, and hawk; blind man, lame man, and beggar; unicorn and phoenix; and horse, hound, and boar. Yet these traditional images are continually validated by their alignment with Yeats's own personal experience, and it is this that gives them their peculiarly vital quality. In Yeats's verse they are often shaped into a strong and proud rhetoric and into the many poetic tones of which he was the master. All are informed by the two qualities which Yeats valued and which he retained into old age—passion and joy.

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Yecla, city, Murcia *provincia* and *comunidad autónoma* ("autonomous community"), southeastern Spain. It lies north of the city of Murcia, on the Arroyo del Jua (a tributary of the Segura River) at the slopes of the Cerro del Castillo. The Stone Age remains of Monte Arabí are to the northwest. The city received its coat of arms from King Charles II in 1687. It has castle ruins and two prominent churches: the 17th-century Gothic-style Church of the Saviour and the Romanesque-style Basilica of the Immaculate Conception, completed in 1868. The writer Azorín used the latter as a setting for his novel *La voluntad* (1902; "Volition"). Yecla is an agricultural trade centre dealing in wine, olives, cattle, and cereals. Its light industries include furniture making and distilling. Pop. (1991 prelim.) 27,362.

Articles are alphabetized word by word, not letter by letter

Yegorov, Boris Borisovich (b. Nov. 26, 1937, Moscow, Russia, U.S.S.R.—d. Sept. 12, 1994, Moscow), Soviet physician who, with cosmonauts Vladimir M. Komarov and Konstantin P. Feoktistov, was a participant in the first multimanned spaceflight, that of Voskhod ("Sunrise") 1, on Oct. 12–13, 1964, and was also the first practicing physician in space.

Upon graduating in 1961 from the First Medical Institute, Moscow, Yegorov joined the team of physicians who studied medical telemetry data from Soviet spaceflights. An expert on the sense-of-balance mechanism in the inner ear, he began training for the Voskhod 1 flight during the summer of 1964. During the flight (which, with an apogee of 254 miles [409 km], was then the highest attained by a manned capsule), Yegorov tested the effects of radiation, confinement, weightlessness, and various other conditions of spaceflight on himself and the other cosmonauts. The flight was the first undertaken in woolen clothes rather than the usual space suits. It was suggested at the time that a longer flight had been planned, which was why a doctor

was included. Yegorov was not a trained long-term professional cosmonaut and returned to medical practice. The medical information gained from the Voskhod 1 flight and subsequent research enabled Soviet scientists to make advances in adapting humans to long spaceflights.

Yegoryevsk, also spelled JEGORJEVSK, or EGOREVSK, city, Moscow *oblast* (province), western Russia. It lies along the Glushitsy River southeast of the capital. The city of Yegoryevsk was formed in 1778 from the village of Vysokoye and became an important trading centre, especially for grain and cattle from Ryazan province. In the 19th century it became a textile centre and now manufactures textile machinery, clothing, and footwear. It also produces phosphates from local phosphorite deposits. There are medical and teacher-training schools and a museum of local history and culture. Pop. (1993 est.) 74,000.

Yeh Chien-ying (Chinese official): *see* Ye Jianying.

Yeh-lü Ta-shih, Pinyin YELÜ DASHI, temple name (Wade-Giles romanization) (HSI-LIAO) TE-TSUNG (b. 1087, China—d. 1143, Central Asia), founder of the Hsi (Western) Liao dynasty of Central Asia.

Yeh-lü was a member of the imperial family of the Liao dynasty (907–1125), which had been established by the Khitan tribes and ruled much of Mongolia, Manchuria, and Northeast China. When the Liao dynasty was overthrown by the Juchen, who established the Chin dynasty, Yeh-lü fled west to Turkestan, where he imposed his suzerainty over the Central Asian oases east and west of the Pamir mountains. His empire was finally conquered in 1211 by the Mongols, who called it the Karakitai, or "Black Khitan," empire.

Yeh T'ing, Pinyin YE TING, also called YEH HSI-P'ING (b. 1897, near Hong Kong—d. 1946), outstanding Chinese military leader.

Yeh is thought to have been of peasant origin, but he was educated at the Pao-ting Military Academy, from which he graduated in 1919. He joined the Chinese Communist Party (CCP) in 1925 and within a year was commander of a vanguard unit on the Northern Expedition. He was a key figure in the Nan-ch'ang Uprising of Aug. 1, 1927, and commanded Communist units during the Canton Commune, after the coup of Dec. 11, 1927, in that city. Both of these attempts by the CCP to seize power were quickly nullified by the Nationalists (Kuomintang). In 1928 Yeh went to the Soviet Union and in 1929 to western Europe, where he remained for five years. In October 1937, after the outbreak of the Sino-Japanese War, Yeh was appointed commander of the (Communist) New 4th Army. The cooperation that had been initiated between the Communists and the Nationalists soon deteriorated, however, and in January 1941 Yeh (while at Nationalist headquarters) was arrested and his troops were ambushed. At the time of what became known as the New 4th Army Incident, the army had about 100,000 men, 9,000 of whom were killed, wounded, or captured. Yeh himself was held prisoner for five years by the Nationalists and soon after his release was killed in an airplane accident.

Yehezqel (Jewish prophet): *see* Ezekiel.

Yehoram (Old Testament king): *see* Jehoram.

Yehoshaphat (king of Judah): *see* Jehoshaphat.

Yehoshua' (biblical Jewish leader): *see* Joshua.

Yehu (king of Israel): *see* Jehu.

Yehuda THE HASID: *see* Judah ben Samuel.

Yehuda ben Shemuel ha-Levi (Hebrew poet): *see* Judah ha-Levi.

Yehudi, ha-, also called HA-YEHUDI HA-KADOSH (Hasidic leader): *see* Przysucha, Jacob Isaac ben Asher.

Yekaterina (Russian personal name): *see under* Catherine.

Yekaterinburg (*oblast,* Russia): *see* Sverdlovsk.

Yekaterinburg, also spelled EKATERINBURG, formerly (1924–91) SVERDLOVSK, city and administrative centre of Sverdlovsk *oblast* (province), west-central Russia. It lies along the Iset River, which is a tributary of the Tobol River, and on the eastern slope of the Ural Mountains. Yekaterinburg is situated 1,036 miles (1,667 km) east of Moscow.

Near the village of Shartash, which was founded in 1672 by members of the Russian sect of Old Believers, an ironworks was established in 1721 and a fortress in 1722. In 1723 the new settlement was named Yekaterinburg in honour of Catherine I, the wife of Peter I the Great. The town grew as the administrative centre for all the ironworks of the Urals region, and its importance increased after 1783, when the Great Siberian Highway was built through it. After 1878 the Trans-Siberian Railroad linked the city with Siberia. After the Russian Revolution of 1917 (October), Yekaterinburg achieved notoriety as the scene of the execution of the last tsar, Nicholas II, and his family in July 1918. In 1924 it was renamed Sverdlovsk in honour of the Bolshevik leader Yakov M. Sverdlov, but the city reverted to its original name in 1991.

Modern Yekaterinburg is one of the major industrial centres of Russia, especially for heavy engineering. Metallurgical and chemical machinery, turbines, diesels, and ball bearings head a long list of engineering products manufactured there. Some steel is also made in the city. The chemical and rubber-tire industries are well developed, and there is a range of light industries, including a traditional one of gem cutting. The city, laid out on a regular gridiron pattern, sprawls across the valley of the Iset—there dammed to form a series of small lakes—and the low, surrounding hills.

Yekaterinburg is an important railway junction, with lines radiating from it to all parts of the Urals and the rest of Russia. The city is the leading cultural centre of the Urals and has numerous institutions of higher education, including the Urals A.M. Gorky State University (founded 1920), a conservatory, and polytechnic, mining, forestry, agricultural, law, medical, and teacher-training institutes. The Urals branch of the Academy of Sciences and many scientific-research establishments are also located there. Pop. (1993 est.) 1,358,000.

Yekaterinodar (city, Russia): *see* Krasnodar.

Yekaterinoslav (city, Ukraine): *see* Dnipropetrovsk.

Yelets, also spelled YELEC, OR ELETS, city, Lipetsk *oblast* (province), western Russia, on the Sosna River. First mentioned in 1146 and the seat of a minor princedom in the 13th century, Yelets long served as a southern frontier fortress. It was captured by Timur in 1395 and by the Mongols in 1414; in 1483 it passed to Moscow. Although long noted for its handmade lace, Yelets today is an industrial city, with flour milling and engineering, and is also a railway junction. Pop. (1993 est.) 119,900.

Yelizaveta (Russian personal name): *see under* Elizabeth, or Elisabeth.

Yelizavetgrad (Ukraine): *see* Kirovohrad.

Yelizavetpol (Azerbaijan): *see* Gyandzha.

yellow birch, also called SILVER BIRCH, or SWAMP BIRCH (*Betula alleghaniensis,* or *B. lutea*), ornamental and timber tree of the family Betulaceae, native to the northeastern part of North America.

Among the largest of birches, yellow birch grows to 30 m (100 feet) on cool, moist bottomlands and on drier soils to elevations of 1,950 m. On limbs and young trunks the silvery yellow bark peels in paper-thin curls; on old trunks it is red-brown, deeply grooved, and broken into irregular plates. The pale green twigs are slightly aromatic.

The hard, pale red-brown wood usually is not separated from that of sweet birch commercially, both woods being sold for furniture, woodenware, veneer, and flooring.

Yellow Book, The, short-lived but influential illustrated quarterly magazine devoted to aesthetics, literature, and art. It was published in London from 1894 to 1897.



"The Reflected Faun," drawing by Laurence Housman for *The Yellow Book*

From its initial visually arresting issue, for which Aubrey Beardsley was art editor and for which Max Beerbohm wrote an essay, "In Defense of Cosmetics," *The Yellow Book* attained immediate notoriety. Published by John Lane and edited by Henry Harland, *The Yellow Book* attracted many outstanding writers and artists of the era, such as Arnold Bennett, Charlotte Mew, Henry James, Edmund Gosse, Richard Le Gallienne, and Walter Sickert.

yellow bunting (bird): *see* yellowhammer.

yellow cress: *see* marsh cress.

yellow-dog contract, agreement between an employer and an employee in which the employee agrees, as a condition of employment, not to join a union during the course of his employment. Such contracts, used most widely in the United States in the 1920s, enabled employers to take legal action against union organizers for encouraging workers to break these contracts. A federal law prohibiting the use of yellow-dog contracts on the railroads (Erdman Act of 1898) was struck down by the Supreme Court as an unconstitutional infringement upon the freedom of contract (*Adair* v. *The United States,* 1908). In 1932, in accordance with the new philosophy that the government should not interfere with workers' right to organize, the Norris-LaGuardia Act made yellow-dog contracts unenforceable in the federal courts.

yellow fever, acute infectious tropical and subtropical disease, sometimes occurring in the temperate zones. The disease, caused by

a virus, infects humans, all species of monkeys, and certain other small mammals. The virus is transmitted among susceptible hosts by several species of mosquitoes.

There is considerable uncertainty over the origin of yellow fever. Western Africa has long been regarded as the home of the virus, but the first recorded outbreaks of the disease were in central and coastal South America after the Spanish conquest in the 16th century. For the next 300 years, yellow fever was one of the great plagues of the world. The tropical and subtropical regions of the Americas were subjected to devastating epidemics, and serious outbreaks occurred as far north as Boston and as far away from the endemic centres as Spain, France, England, and Italy.

By the late 19th century there were several theories about the cause and transmission of yellow fever, and in 1881 Carlos Juan Finlay of Havana, Cuba, suggested that the infectious agent was transmitted by the mosquito now known as *Aedes aegypti*. In his investigation of Finlay's theory, Major Walter Reed of the U.S. Army demonstrated in 1900 the transmission of yellow fever from one human to another through the bite of *A. aegypti*. Reed was further able to show that mosquitoes (rather than bodily contagion, as had previously been thought) were the only vector of the disease. Reed's discoveries were quickly taken up by the American surgeon William Crawford Gorgas, who was able to practically eliminate yellow fever from Havana through the control of the *Aedes* mosquito. Gorgas' success was repeated in Rio de Janeiro and then in Panama during the building of the Panama Canal. The last outbreak of yellow fever in the United States occurred in 1905, when New Orleans and other ports of the South were invaded.

There are two substantially different patterns of transmission of the virus: (1) urban, or classical, yellow fever, in which the transmission is from person to person by the *Aedes aegypti* mosquito, and (2) jungle yellow fever, in which the transmission is from a mammalian host (usually a monkey) to any one of a number of forest-living species of mosquito to humans. In South America, jungle yellow fever is transmitted by mosquitoes belonging to the genus *Haemagogus,* while in Africa it is transmitted by the mosquito *A. africanus*. The distinct transmission cycle involved in jungle yellow fever was first recognized in 1933, after which it became clear that the virus was endemic in huge areas of the Amazon and Orinoco river basins in South America and in the forests of tropical central and western Africa.

The course of yellow fever is rapid. After the bite of the infecting mosquito, there is an incubation period of several days while the virus multiplies within the body. The onset of symptoms is then abrupt, with headache, backache, rapidly rising fever, nausea, and vomiting. This stage lasts two or three days, after which the patient either begins to recover or proceeds to a deeper febrile state marked by high fever, slow pulse rate, and the vomiting of dark, altered blood. Death may occur six or seven days after the onset of symptoms. Because the virus destroys liver cells, jaundice (yellowing of the skin and eyes by deposition of bile pigment) is a common symptom in persons with yellow fever and is in fact responsible for the name of the disease.

The yellow-fever patient's convalescence is prolonged, but, when recovery does occur, it is complete and is accompanied by a lifelong immunity. The mortality rate of yellow fever varies greatly, depending upon the strain of virus and, to a certain extent, upon the race of the patient. Many persons may experience only a mild infection that lasts a few days.

There is no specific treatment for those with yellow fever. Good nursing and supportive care, particularly reduction of fever, are important both in maintaining comfort and in reducing mortality.

Yellow fever is an outstanding example of a completely preventable disease. Originally, the control of *Aedes aegypti* mosquitoes was the only preventive procedure available, as, for example, the campaign against them that made the construction of the Panama Canal possible. Live-virus vaccines, which produce active immunity without clinical illness, are the second great preventive measure.

Eradication of the *Aedes aegypti* mosquito gives effective protection to the populace of cities. Where people must travel or live in regions where the forest cycle of the virus is maintained through host animals, individual immunization is necessary. In these jungle-yellow-fever regions, human cases will continue as long as there remain unimmunized persons, for there is no known practical way of eliminating the virus of yellow fever from the animal and mosquito populations of the vast tropical forests in South America and Africa.

yellow-green algae, members of the division Xanthophyta (about 6,000 species), once classified with the green algae on the basis of similarity of body organization. The Xanthophyta are distinguished by their food reserve (oil), the quantity of B-carotene in their plastids, and motile bodies with unequal flagella. Frequently their cell walls are two overlapping halves. The usual method of asexual reproduction is by motile zoospores and nonmotile resting aplanospores. Sexual reproduction is rare; the genus *Vaucheria* (*q.v.*) is an important exception.

Yellow Hat sect (Tibetan Buddhism): *see* Dge-lugs-pa.

yellow journalism, the use of lurid features and sensationalized news in newspaper publishing to attract readers and increase circulation. The phrase was coined in the 1890s to describe the tactics employed in furious competition between two New York City newspapers, the *World* and the *Journal.*

Joseph Pulitzer had purchased the New York *World* in 1883 and, using colourful, sensational reporting and crusades against political corruption and social injustice, had won the largest newspaper circulation in the country. His supremacy was challenged in 1895, when William Randolph Hearst, the son of a California mining tycoon, moved into New York City and bought the rival *Journal.* Hearst, who had already built the San Francisco *Examiner* into a hugely successful, mass-circulation paper, soon made it plain that he intended to do the same in New York City by outdoing his competitors in sensationalism, crusades, and Sunday features. He brought some of his staff from San Francisco and hired some away from Pulitzer's paper, including Richard F. Outcault, a cartoonist who had drawn an immensely popular comic picture series, "The Yellow Kid," for the *Sunday World.* After Outcault's defection, the comic was drawn for the *World* by George B. Luks, and the two rival picture series excited so much attention that the competition between the two newspapers came to be described as "yellow journalism." This all-out rivalry and its accompanying promotion developed large circulations for both papers and affected American journalism in many cities.

The era of yellow journalism may be said to have ended shortly after the turn of the century, with the *World*'s gradual retirement from the competition in sensationalism. Some techniques of the yellow-journalism period, however, became more or less permanent and widespread, such as banner headlines, coloured comics, and copious illustration.

yellow mombin (tree): *see* hog plum.

Yellow Plain (China): *see* North China Plain.

yellow poplar: *see* tulip tree.

Yellow River (China): see Huang Ho.

yellow scales, also called SHORE LICHEN (*Xanthoria parietina*), lichen species characterized by lobed margins and a wrinkled centre. It is usually found where the air is filled with mineral salts, especially near the sea and on rocks and walls. It was once considered a valuable medication for jaundice because of its yellow or orange colour.

Consult the INDEX *first*

Yellow Sea, Wade-Giles romanization and Pinyin HUANG HAI, Korean HWANGHAE, marginal sea of the western Pacific Ocean lying between mainland China to the north and west and the Korean peninsula to the east.

A brief treatment of the Yellow Sea follows. For full treatment, *see* MACROPAEDIA: Pacific Ocean.

On the south the Yellow Sea is separated from the East China Sea by an east-west line connecting Cheju Island, off South Korea, with the mainland of China. The sea's major inlets are Korea Bay in the north and the Po Hai (Gulf of Chihli) in the northwest. The Strait of Chihli, between the Liaotung Peninsula to the north and the Shantung Peninsula to the south, links the Yellow Sea proper with the Po Hai.

The area of the Yellow Sea (excluding the Po Hai) is 161,000 square miles (417,000 square km), its mean depth is 131 feet (40 m), and its maximum depth is 338 feet (103 m). It derives its name from the colour of the silt-laden water discharged by the Huang Ho (Yellow River) and other major Chinese rivers including the Yangtze, Huai, Liao, and Yalu. Generally, the climatic conditions of the region are characterized by very cold, dry winters and warm, wet summers.

The Yellow Sea is famous for its fishing grounds. Chinese, North and South Korean, and Japanese trawlers exploit rich demersal (bottom-dwelling) fish resources. The leading port cities are Tsingtao, Shanghai, Tientsin, Lü-ta, and Ch'in-huang-tao in China, Inch'ŏn in South Korea, and Namp'o in North Korea.

Yellow Springs, village, Greene county, southwestern Ohio, U.S. It lies 23 miles (37 km) east-northeast of Dayton. Founded in 1804, it was named for a local mineral spring, which later (1820–80) was the site of a health resort. The village's manufactures include aluminum castings, bronze art castings, rubber and plastic components, scientific instruments, stained glass, and bookplates. Yellow Springs is the seat of Antioch University, founded in 1852 with Horace Mann as its first president, now with several campuses elsewhere in the United States. Fels Longitudinal Study, of the Wright State University School of Medicine, is also located there. John Bryan State Park is a few miles southeast. Inc. 1856. Pop. (1994 est.) 4,084.

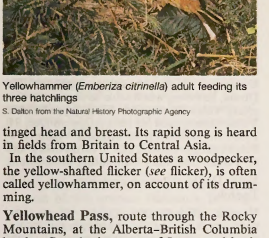
Yellow Tiger (Chinese rebel leader): *see* Chang Hsien-chung.

Yellow Turbans, Chinese secret society whose members' uprising, the Yellow Turban Rebellion (AD 184–*c.* 204), contributed to the fall of the Han dynasty (AD 220). Led by Chang Chüeh, a Taoist faith healer who gained numerous adherents during a widespread pestilence, the rebellion was directed against the tyrannical eunuchs who dominated the emperor. The rebels wore yellow headdresses to signify their association with the "earth" element, which they believed would succeed the

red "fire" element that represented Han rule. To suppress the uprising, which erupted in east China, the Han conscripted huge armies at great cost, but their efforts were hampered by inefficiency and corruption in the imperial government. Chang Chüeh was killed in AD 184, but the rebellion was a continuing menace to the government for the subsequent two decades.

yellowberry: *see* cloudberry.

yellowhammer, also called YELLOW BUNTING (*Emberiza citrinella*), Eurasian bird belonging to the family Emberizidae (order Passeriformes). The name is derived from the German *Ammer,* "bunting." It is a 16-centimetre- (6-inch-) long streaked brown bird with yellow-



Yellowhammer (*Emberiza citrinella*) adult feeding its three hatchlings
S. Dalton from the Natural History Photographic Agency

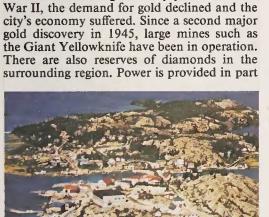
tinged head and breast. Its rapid song is heard in fields from Britain to Central Asia.

In the southern United States a woodpecker, the yellow-shafted flicker (*see* flicker), is often called yellowhammer, on account of its drumming.

Yellowhead Pass, route through the Rocky Mountains, at the Alberta–British Columbia border, Canada, just west of Jasper and leading from Jasper National Park into Mount Robson Provincial Park. It lies at 3,711 feet (1,131 m) above sea level. The pass was noted by Sandford Fleming in his railroad survey of 1870 and was later used by the main line of the Canadian National Railway. It is now also traversed by the Yellowhead Route of the Trans Canada Highway.

Yellowknife, city and capital (since 1967) of Northwest Territories, Canada. It lies on the north shore of Great Slave Lake, 5 miles (8 km) south of the mouth of the Yellowknife River.

It was founded in 1935, one year after gold was discovered in the area, and derived its name from the Yellowknife band of Athabascan Indians. During the early years of World War II, the demand for gold declined and the city's economy suffered. Since a second major gold discovery in 1945, large mines such as the Giant Yellowknife have been in operation. There are also reserves of diamonds in the surrounding region. Power is provided in part



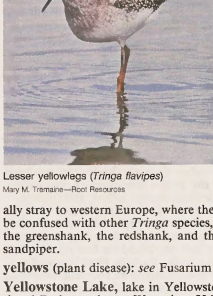
Yellowknife, on the Great Slave Lake, Northwest Territories, Can.
George Hunter

by a hydroelectric station on the nearby Snare River. The city is the largest community and the chief administrative, commercial, and educational centre in the territories. Yellowknife is linked by highway around the lake southward to Hay River and to cities in Alberta. Inc. city, 1970. Pop. (1991) 15,179.

yellowlegs, either of two species of American shorebirds with trim, gray-brown and white streaked bodies, long bills, and long, bright yellow legs. They belong to the genus *Tringa* of the family Scolopacidae; this family also includes the curlews, turnstones, sandpipers, and snipes.

The lesser yellowlegs (*T. flavipes*), about 25 cm (10 inches) long, appears in sizable flocks on mud flats during migration between its breeding grounds across Canada and Alaska and its wintering ground from the Gulf of Mexico to southern Chile and Argentina. The greater yellowlegs (*T. melanoleuca*), about 35 cm (14 inches) long, with a proportionately longer and stouter (and slightly upturned) bill, has similar breeding and wintering ranges but is everywhere less common and more wary than the lesser yellowlegs. Individuals of the two species may be nearly the same size but are easily distinguished by voice: usually the greater yellowlegs gives a clear three-note whistle; the lesser, a flat, light call of one or two notes. Both species feed on small fish and other aquatic creatures (*e.g.,* insects, crabs, snails, and tadpoles).

During the autumn migration, the lesser yellowlegs, and sometimes the greater, occasion-



Lesser yellowlegs (*Tringa flavipes*)
Mary M. Tremaine—Root Resources

ally stray to western Europe, where they might be confused with other *Tringa* species, such as the greenshank, the redshank, and the wood sandpiper.

yellows (plant disease): *see* Fusarium wilt.

Yellowstone Lake, lake in Yellowstone National Park, northwest Wyoming, U.S. It lies at 7,731 feet (2,356 m) above sea level and is the largest body of water in North America at so high an altitude. It is fed and drained by the Yellowstone River, which flows through the lake from south to north. About 20 miles (32 km) long and 14 miles (23 km) wide, the lake has a shoreline of 110 miles (177 km), a maximum depth of 390 feet (119 m), and a surface area of 137 square miles (354 square km). It is a haven for rare species of waterbirds, including trumpeter swans, and is prized for trout fishing.

Yellowstone National Park, the oldest, largest, and probably the best-known national park in the United States. It is situated in northwestern Wyoming and partly in southern Montana and eastern Idaho. The park was established by the U.S. Congress on March 1, 1872, as the nation's—and the world's—first national park. The park covers 3,468 square miles (8,983 square km) and consists mostly of broad volcanic plateaus with an average elevation of 8,000 feet (2,440 m). Among the mountain ranges that protrude into the park are the Gallatin Range on the northwest, the Absaroka Range on the east, the Snow Mountains along the north, and the Tetons along the park's southern boundary. The park is also surrounded by the Custer, Shoshone, Teton, Targhee, Beaverhead, and Gallatin national forests.

Aside from its rugged mountains and spectacular deep valleys, Yellowstone has unusual geologic features, including fossil forests, eroded basaltic lava flows, a black obsidian (volcanic-glass) mountain, and odd erosional forms. Its principal attractions, however, are its 10,000 hot springs, which find surface expression as steam vents, fumaroles, colourful hot pools, mud caldrons, paint pots, hot springs and terraces, hot rivers, and geysers. Of the park's more than 200 geysers, many erupt to heights of 100 feet (30 m) or more. Old Faithful, the most famous geyser in Yellowstone, erupts fairly regularly every 33 to 93 minutes.

Yellowstone is also known for its lakes and rivers; among these are Yellowstone Lake, Shoshone Lake, the Snake River, and the Yellowstone River. The Grand Canyon of the Yellowstone River is a colourful gorge 19 miles (31 km) long that runs through the park. The canyon has brilliantly coloured rock walls, with two majestic waterfalls along its course.

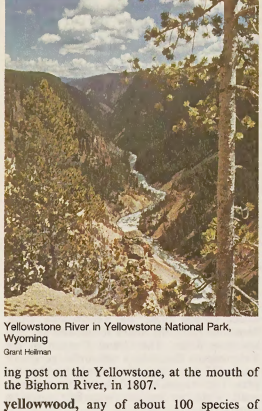
Most of Yellowstone park is forested, and the vast majority of the tree growth consists of lodgepole pine, though there are other conifer species, as well as cottonwoods and aspens. Many types of wildflowers blossom in the warm months. In 1988 a disastrous series of forest fires temporarily laid waste large areas of the park.

Animal life in Yellowstone is typical of the Rocky Mountains and includes buffalo, elk, bighorn sheep, deer, moose, black bear, grizzly bear, and coyotes. Wolves were reintroduced into the park in 1995. Hundreds of different species of birds live in the park, among them many waterfowl. The lakes and streams are stocked with fish; trout is the most popular with anglers.

The park has more than 500 miles (800 km) of roads and more than 1,000 miles (1,600 km) of trails. The John D. Rockefeller, Jr., Memorial Parkway, an 80-mile (130-kilometre) scenic roadway that was established in 1972, connects Yellowstone with Grand Teton National Park.

Yellowstone River, river noted for its scenic beauty, rising on the slopes of Yount Peak in Wyoming, U.S., and entering Yellowstone National Park. It feeds into Yellowstone Lake, below which it plunges 422 feet (129 m) in two spectacular waterfalls, and enters the magnificent Grand Canyon of the Yellowstone. Leaving the park at Gardiner, Mont., the river turns north to Livingston, thence northeast past Billings, Miles City, and Glendive. It crosses the Montana–North Dakota border and, southwest of Williston, N.D., enters the Missouri River after a course of 692 miles (1,114 km). All of its principal tributaries—the Bighorn, Tongue, and Powder rivers (*qq.v.*)—originate in the Absaroka and Wind River ranges and the Bighorn Mountains. The river system drains 70,000 square miles (181,300 square km). It has been developed extensively for irrigation.

The Yellowstone was first explored in 1806, when Lieutenant William Clark sailed down the river on his return from the Pacific Ocean. Manuel Lisa (1772–1820), an Indian trader, accompanied by John Colter, a trapper (said to be the first white man to see the geysers of Yellowstone Park), established the first trad-



Yellowstone River in Yellowstone National Park, Wyoming
Grant Heilman

ing post on the Yellowstone, at the mouth of the Bighorn River, in 1807.

yellowwood, any of about 100 species of coniferous evergreen timber trees and shrubs constituting the genus *Podocarpus* (family Podocarpaceae) and widely distributed in mountain forests of the Southern Hemisphere. Most have yellowish wood, occasionally brownish or reddish; they are often known locally as brown or black pines.

Economically important members of the genus include the brown pine, plum pine, or yellow pine (*Podocarpus elatus*) of southeastern Australia; the black pine, or matai (*P. spicatus*), the kahikatea, or white pine (*P. dacrydioides*), the miro (*P. ferrugineus*), and the totara (*P. totara*), all native to New Zealand; *kusamaki,* or broad-leaved podocarpus (*P. macrophyllus*), of China and Japan; real yellowwood (*P. latifolius*), South African yellowwood (*P. elongatus*), and common, or bastard, yellowwood (*P. falcatus*) of southern Africa; plum-fir, or plum-fruited, yew (*P. andinus*) and willowleaf podocarpus, or *mañio* (*P. salignus*), of the Chilean Andes; and the yacca (*P. coriaceus*) of the West Indies.

Yeltsin, Boris, in full BORIS NIKOLAYEVICH YELTSIN (b. Feb. 1, 1931, Sverdlovsk [now Yekaterinburg], Russia, U.S.S.R.), Russian politician who became president of Russia in 1990. He became the first popularly elected leader in the country's history in 1991, guiding Russia through political and economic retrenching until his resignation on the eve of 2000.

Yeltsin attended the Urals Polytechnic Institute and worked at various construction projects in the Sverdlovsk oblast from 1955 to 1968, joining the Communist Party in 1961. In 1976 he became first secretary of the Sverdlovsk oblast party committee. Thereafter he came to know Mikhail Gorbachev, then his counterpart in the city of Stavropol. In 1985 Gorbachev chose Yeltsin to clean out the corruption in the Moscow party organization and elevated him to the Politburo (as a nonvoting member) in 1986. As Moscow's mayor (*i.e.,* first secretary of Moscow's Communist Party committee), Yeltsin proved an able and determined reformer, but he estranged Gorbachev by criticizing the slow pace of reform at party meetings, challenging party conservatives, and even criticizing Gorbachev himself.

Yeltsin was forced to resign in disgrace from the Moscow party leadership in 1987 and from the Politburo in 1988. He was demoted to a deputy minister for construction but then staged a remarkable comeback. His advocacy of democracy and economic reform made him popular, and he took advantage of Gorbachev's introduction of competitive elections to the U.S.S.R. Congress of People's Deputies (*i.e.,* the new Soviet parliament) to win a seat in that body in March 1989 with a landslide vote from a Moscow constituency. On May 29, 1990, the parliament of the Russian S.F.S.R. elected him president of the Russian republic against Gorbachev's wishes. In his new role, Yeltsin publicly supported the right of Soviet republics to greater autonomy, took steps to give the Russian republic more autonomy, and declared support for a market-oriented economy and a multiparty political system.

In July 1990 Yeltsin quit the Communist Party. His victory in the first direct, popular elections for the presidency of the Russian republic (June 1991) was seen as a mandate for economic reform. During the brief coup against Gorbachev by hard-line communists in August 1991, Yeltsin defied the coup leaders and rallied resistance in Moscow while calling for the return of Gorbachev. When the coup crumbled, Yeltsin emerged as the country's most powerful political figure. In December 1991 he and the presidents of Ukraine and Belarus (Belorussia) established a new Commonwealth of Independent States that replaced the foundering U.S.S.R. When the Soviet Union collapsed after Gorbachev's res-



Yeltsin, 1991
Vario Press/Camera Press from Globe Photos

ignation as Soviet president on December 25, Russia under Yeltsin's leadership assumed many of the former superpower's responsibilities for defense, foreign affairs, and finance.

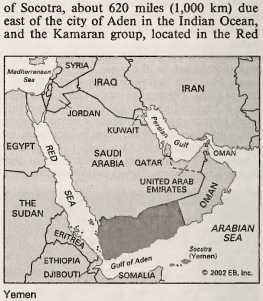
As president of an independent Russia, Yeltsin set about the formidable task of transforming his country's decaying command economy into one based on free markets and private enterprise. Early in 1992 he ended government price subsidies and controls over food and other consumer goods, while also allowing the unhindered growth of free markets in the cities. At the same time, Russia's parliament, the Congress of People's Deputies, had grown increasingly hostile toward his free-market reforms. Yeltsin and the Congress were also deeply divided over the question of the balance of powers in Russia's proposed new constitution, which was needed to replace the obsolete 1978 Soviet-era Russian Constitution. On Sept. 21, 1993, Yeltsin unconstitutionally dissolved the Congress and called for new parliamentary elections. In response, hard-line legislators attempted a coup in early October but were suppressed by army troops loyal to Yeltsin. Parliamentary elections and a referendum on a draft constitution were held in December. Yeltsin's draft constitution, which increased the powers of the presidency, was narrowly approved, but the antireform character of Russia's newly elected parliament, the Federal Assembly, compelled Yeltsin to govern primarily by executive decree in the coming years.

In December 1994 Yeltsin sent Russian army troops into Chechnya, which had seceded from Russia in 1991. The army was unable to suppress the rebels completely, however, and the war further eroded Yeltsin's declining popularity. Owing to the war and the failure of his free-market reforms to spur economic growth, Yeltsin's prospects for reelection appeared dim. In another spectacular comeback, however, he defeated a communist challenger, Gennady Zyuganov, in the second round of voting held in July 1996. He spent the months after his electoral victory recovering from a heart attack he had suffered in June as a result of the rigours of the campaign. The state of Yeltsin's health was a recurring issue.

Early in his second term, Yeltsin signed a cease-fire agreement with Chechnya and in 1997 negotiated a peace treaty; tensions, however, continued. In August 1999 Islāmic rebels from Chechnya invaded Dagestan, and the following month a series of bombings in Russia were blamed on Chechens. Soon after, Yeltsin ordered the return of troops to the republic. In the late 1990s much of the country's government was consumed with political maneuvering as Yeltsin dismissed four premiers and in 1998 fired his entire cabinet, though many cabinet officials were later reappointed. The following year the State Duma initiated an impeachment drive against Yeltsin, charging that he had encouraged the breakup of the Soviet Union in 1991, among other allegations. The Duma, however, was unable to secure the necessary votes to proceed. Ever unpredictable, Yeltsin announced his resignation on Dec. 31, 1999. He named Prime Minister Vladimir V. Putin acting president, and in turn Putin granted Yeltsin immunity from future prosecution.

Yelü Dashi (Chinese emperor): *see* Yeh-lü Ta-shih.

Yemen, officially REPUBLIC OF YEMEN, Arabic AL-YAMAN, or AL-JUMHŪRĪYAH AL-YAMANĪYAH, country occupying the southwestern corner of the Arabian Peninsula. Yemen is about 350 miles (565 km) across (north to south) at its widest extent and about 700 miles (1,100 km) long. It is bordered by Saudi Arabia on the north and by Oman on the east. It is separated from Djibouti and Somalia by the Gulf of Aden on the southwest and from Eritrea by the Red Sea on the west, and its southeastern coastline is formed by the Arabian Sea. Yemen also includes the island of Socotra, about 620 miles (1,000 km) due east of the city of Aden in the Indian Ocean, and the Kamaran group, located in the Red



Yemen

Sea. The capital of Yemen is Ṣan'ā'. Area 214,300 square miles (550,000 square km). Pop. (2000 est.) 17,479,000.

A brief treatment of Yemen follows. For full treatment, *see* MACROPAEDIA: Arabia.

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

The land. The three major regions of Yemen run generally parallel to the Red Sea and

the Gulf of Aden and consist of a narrow coastal plain, the Yemen Highlands farther inland, and a broad desert plateau in the country's northern portion. Extending southward from Saudi Arabia along the Red Sea is the Tihāmah, a narrow coastal plain that is 15 to 25 miles (25 to 40 km) wide. Along the Gulf of Aden the coastal plain is 5 to 10 miles (8 to 16 km) wide and is discontinuous. The Tihāmah of western Yemen merges eastward into highlands that reach elevations between 1,500 and 5,000 feet (450 and 1,500 m). As these highlands run farther east, they are divided by several wadi basins, including the perennial Wadi Ḥaḍramawt. North of the Yemen Highlands is a sandy desert region that is a southern extension of Saudi Arabia's Rub' al-Khali, or Empty Quarter, and which covers as much as half of the country. The highlands region south of Ṣan'ā' is an area of severe seismic activity; a major earthquake centred there in 1982 killed some 3,000 people.

Precipitation in Yemen is influenced greatly by elevation. The eastern lowland coastal regions and the northern desert areas average less than 5 inches (133 mm) of rainfall a year, while the southwestern highlands receive more than 16 inches (400 mm). Sometimes nearly 30 inches (750 mm) of rain falls in the highlands of western Yemen. At Aden, on the southern coast, January and July temperatures average 77° F (25° C) and 90° F (32° C), respectively. Daytime summer temperatures often exceed 100° F (38° C) and are commonly accompanied by 80 percent relative humidity. The highlands are appreciably cooler in the summer and can be cold in winter, with snow and frost not uncommon.

In contrast to the generally barren character of most of the Arabian Peninsula, the highlands in the western portion of Yemen are remarkably fertile. Rainfall there is generally adequate and is distributed between two rainy seasons, and most of the agricultural land is cropped without irrigation. These highlands and intermediate elevations have good soils (in terraces and along the wadi valley floors), and the moderate climate permits the growing of large quantities of cereals (mainly sorghum) and potatoes. However, most of southern and eastern Yemen are devoid of vegetation. Among the exceptions are some cultivated patches along the Wadi Ḥaḍramawt and some natural vegetation scattered along the southern coast and in the adjacent highlands, primarily thorn scrub and dwarf trees (including those from which frankincense and myrrh are obtained).

Yemen is relatively rich in mineral resources. Iron ore is mined and smelted at Mount Nuqum north of Ṣan'ā', and additional iron-ore deposits are found in the north. Salt is mined at Ṣalīf, and deposits of other minerals also exist. Oil was discovered in the mid-1980s in the northeast in the Ma'rib-al-Jawf basin; there also are oil and natural gas reserves farther east in the Shabwah area.

The people. Yemen has a generally homogeneous, ethnically Arab population that can be classified into three main groups: sedentary agriculturists, urban dwellers (more than one-fifth of the total), and pastoral nomads. The principal religion is Islām, and its adherents are divided between the two main Muslim sects, Sunnism and Shī'ism. There are small numbers of Christians, Hindus, and Jews.

Yemen's birth and death rates are both very high by world standards and are the highest found in the Middle East. The annual rate of population growth, however, historically has been comparatively moderate for the region, in part because of substantial employment-related emigration, a characteristic feature of the Yemeni population since ancient times. Half of the population is under 15 years of age.

The economy. Yemen has a developing, partly state, partly private-enterprise economy. The gross national product (GNP) is not growing faster than the population, and the GNP per capita remains one of the lowest in the Middle East.

The economy of Yemen is primarily agricultural. One-fifth of the gross domestic product (GDP) is derived from agriculture; which employs more than half of the labour force. The country is not self-sufficient in foodstuffs, however. In addition to sorghum and potatoes, the principal crops include dates, watermelons, wheat, grapes, barley, corn (maize), cotton, millet, and garden vegetables. Mocha coffee and khat (a narcotic stimulant), grown on irrigated land, are export crops. Pastures support sheep, goats, and cattle.

Industry and mining account for almost one-fifth of Yemen's GDP and employ 5 percent of the country's workforce. The Little Aden petroleum refinery (previously owned by the British) accounts for a major share of total industrial output. Other industries include the processing of foodstuffs and the manufacture of cement blocks, tiles, and bricks; textile manufacturing; rubber and plastic products; salt production; soft-drink bottling; and dairy plants. Electricity is generated entirely from thermal-power plants.

Most of the country's roads are unpaved, and maintenance of existing roads is poor. The country's principal ports are Aden and Al-Ḥudaydah. Aden, Ṣan'ā', Al-Ḥudaydah, and Ta'izz have international airports.

Yemen's exports amount to only a fraction of the value of its imports annually, creating a huge trade deficit. Until 1990, expatriate workers and Saudi Arabian and private monetary transfers helped offset the deficit; since then, most expatriate workers have returned from Saudi Arabia (after losing their privileged status following the Persian Gulf War), and the Saudi government has cut off its aid.

Yemen's principal exports include petroleum products, food (such as coffee, biscuits, grapes, sesame seeds, sugar, and honey), cotton, hides and leather, mainly to the United States, Italy, and Saudi Arabia. Imports include food and live animals, manufactured goods, machinery and transport equipment, and chemical products, mainly from Australia, Thailand, and the United States.

Government and social conditions. Yemen is a republic, formed on May 22, 1990, when the People's Democratic Republic of Yemen (also called Yemen [Aden], or South Yemen) officially merged with the Yemen Arab Republic (also called Yemen [Ṣan'ā'], or North Yemen). The constitution of the Republic of Yemen, ratified in 1991, provides for a five-member Presidential Council, including the president (who is head of state) and vice president; a 301-member House of Representatives; and a Council of Ministers, appointed by the president and headed by a prime minister. The legal system is based on both tribal and Islāmic (Sharī'ah) law.

The social-welfare system is extremely underdeveloped. As a result, many Yemenis suffer from poor health and malnutrition. Diseases such as amoebic and bacillary dysentery, malaria, whooping cough, measles, hepatitis, gonorrhea, pulmonary tuberculosis, and typhoid fever infect significant portions of the population. Yemen has a shortage of medical personnel and hospital beds. The infant mortality rate is one of the highest in the Middle East, and life expectancy is only 49 years for males and 51 years for females.

Yemenis receive free education from the state's primary and secondary schools. It is estimated that about three-fourths of the primary-school-age children attend school. Yemen nonetheless has a high adult illiteracy rate. Ṣan'ā' University (founded 1970) and the University of Aden (founded 1975) are the only institutions of higher learning. Yemen's press is considered among the freest in the Arab world.

History. North Yemen, or Yemen (Ṣan'ā'), occupied the western portion of Yemen, with its coastline along the Red Sea and its capital at Ṣan'ā'. South Yemen, or Yemen (Aden), stretched along the Gulf of Aden (part of the Arabian Sea) and thus lay east of Yemen (Ṣan'ā'). Its chief city was Aden. The political division of these two portions of Yemen throughout most of the 20th century mirrored their previous history, when they were often under different rulers, whether indigenous or foreign.

The Minaean (Ma'in) kingdom of Yemen (Ṣan'ā') traded with the Egyptians as early as the 4th century BC and probably with the Babylonians even earlier. The kingdom's prosperity was based almost entirely on the cultivation and export of frankincense, spices, and other items that were in demand in the eastern Mediterranean area.

A little to the southeast of the Minaean kingdom was the prosperous Sabaean (Saba') kingdom, which was known for its efficient and widespread irrigation system based on a dam at Ma'rib. The Sabaean kingdom expanded over most of South Arabia but declined after the 1st century BC, when the overland incense traffic gave way to competing water routes and the Ma'rib dam fell into disrepair.

Ancient Yemen (Aden), in the meantime, was divided between the Qatabān and Ḥaḍramawt kingdoms (1st millennium BC). These kingdoms participated in the lucrative frankincense and myrrh trade, and they utilized an extensive irrigation system to support their populations. Qatabān fell to the Sabaeans in the late 5th century BC, however.

The whole of South Arabia eventually became a part of the Himyarite kingdom (*c.* 100 BC–AD 525), which for a time had its capital at Ṣan'ā'. Jewish settlers arrived in the region after the fall of Jerusalem in AD 70, and Christian missionaries began coming following the conversion of the Roman emperor Constantine (mid-4th century). Because of their persecution of the Christians, the Ḥimyarites were destroyed by the Christian Abyssinian kingdom (in Ethiopia) in 525. The Persian Sāsānians then took control of the region in 575, and all the area's inhabitants, at least nominally, accepted Islām in the mid-7th century. Yemeni obedience to the caliph (the leader of the Muslim world) was only rarely achieved, however, and Yemen (Aden) was frequently in the hands of local chiefs and warlords thereafter.

Almost from the beginning of the Islāmic era, conflict was present in the Yemen (Ṣan'ā') region as well. A rebellion occurred there as early as 632. By the end of the 9th century, the Shī'ite imam al-Hādī had founded the 'Alīd Zaydī dynasty, whose members figured in the government of Yemen (Ṣan'ā') until 1962.

The Egyptian Ayyūbid dynasty ruled all of Yemen from 1173 to 1229, after which the region passed to the Rasūlids, who had served the Ayyūbids as local governors and who subsequently ruled Yemen from 1229 to 1451. The period of Rasūlid rule was a golden age for Yemen, with achievements in science, agriculture, literature, and architecture. The Rasūlids were followed by the Ṭāhirids, Ṣan'ā' Yemeni tribesmen, who extended their control throughout most of Aden.

The Egyptian Mamlūks tried to take over Yemen in the early 16th century; they succeeded in Yemen (Ṣan'ā') but not in Aden, and by 1517 the entire region had fallen to the Ottoman Turks. In 1635 the Ottomans were expelled by the Zaydis (of Ṣan'ā'), who took Aden but failed to hold it past 1735. Aden consequently was divided between rival tribal chieftains.

The Ottomans returned in the mid-19th century, seeking to secure Arabia from the

crusading Wahhābīyah and the imperialist designs of Muḥammad ʿAlī of Egypt, but they were not able to occupy Ṣanʿāʾ until 1872. Meanwhile, Muḥammad ʿAlī's advances led to the British occupation of Aden in 1839. Aden was administered by Britain's Bombay "presidency" until 1937, when it became a British crown colony and a protectorate. An Anglo-Turkish agreement in 1914 attempted to settle the boundary between Yemen (Ṣanʿāʾ) and the British-held Aden protectorate, but it was not resolved until 1934.

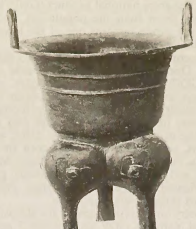
After Turkey's defeat in World War I, Yemen (Ṣanʿāʾ) gained independence under the Zaydī family, which claimed the right to all of historic Yemen, including Aden and the protectorate. A revolution ended Zaydī rule in Yemen (Ṣanʿāʾ) in 1962, and the Yemen Arab Republic was proclaimed. The Yemen (Ṣanʿāʾ) republic was basically pro-Western and was tribal and religious in character, though it also accepted aid from the Soviet Union.

Though the city of Aden was opposed, it was included in the (British-sponsored) Federation of South Arabia, created in 1963. The British promised independence to the federation by 1968, but when they finally vacated the region in 1967, the Marxist-oriented National Liberation Front gained control of the weakening federation. Yemen (Aden) consequently became the People's Republic of South Yemen in 1967 and was renamed the People's Democratic Republic of Yemen in 1970. The Yemen (Aden) republic was Marxist and secular in character. Relations between the two Yemens remained tense and were marked by occasional conflict throughout the 1970s and '80s. Yemen (Aden) in particular suffered from chronic instability, with several coups and a brief but bloody civil war in 1986 that took thousands of lives. Yemen (Aden) maintained close relations with the Soviet Union.

The two countries merged into a single state on May 22, 1990, but the new entity quickly faced difficulty, as it chose to support Iraq during the Persian Gulf War (1990–91). This prompted Saudi Arabia to expel several hundred thousand Yemeni workers and to withdraw financial aid from Yemen, worsening an already dire economic crisis. Elections held in 1993 were the first free, multiparty general elections ever held on the Arabian Peninsula and the first in which women participated. Escalating tensions over the outcome of the elections led to an outbreak of violence in mid-1994, but the conflict was soon resolved. By the end of the decade, Yemen had also resolved two border disputes—with Eritrea over the Great Hanish Island (1998, the island was ceded to Yemen) and with Saudi Arabia (2000) over their shared border—and held further free national and local elections. Brigands from Yemen's largely unpoliced tribal areas kidnapped dozens of foreign tourists during the 1990s; those areas also served as a redoubt for Islāmic militants who engaged in terrorist activity in Yemen and elsewhere, notably a suicide bomb attack in 2000 on a U.S. warship in the harbour of Aden. However, following the September 11 attacks (*q.v.*) in 2001, Yemeni authorities cooperated with U.S. officials in tracking suspected terrorists.

Yemmiganūr, formerly EMMIGANŪR, or EMMIGANŪRU, town, western Andhra Pradesh state, southern India. It lies west of the city of Kurnool. Yemmiganūr was included in the Hindu kingdom of Vijayanagar, which flourished during medieval times (14th–16th century). Later, the city came under Muslim rule. Yemmiganūr's chief industries are cotton ginning, peanut (groundnut) milling, and weaving. Pop. (2001 prelim.) 76,428.

yen, also called HSIEN, Pinyin YAN, type of Chinese bronze vessel produced during the Shang, or Yin (18th–12th century BC), and Chou (1111–255 BC) dynasties. A steamer, or cooking vessel, used particularly for grain, the *yen* consists of a deep upper bowl with a pierced bottom placed upon or attached to a lower, legged vessel similar in shape to the *li*.



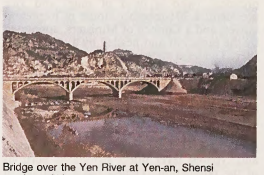
Bronze *yen*, Chou dynasty (c. 1111–255 BC); in the Field Museum of Natural History, Chicago
By courtesy of the Field Museum of Natural History, Chicago

The *yen* is not usually elaborately decorated. The form is derived from a Neolithic (*c.* 3000–1500 BC) pottery predecessor and is found in the bronze art of the Shang dynasty and in that of the Chou, especially the early Chou (1111–*c.* 900 BC).

yen, the monetary unit of Japan. It was divided into 100 sen and into 1,000 rin until 1954, when these tiny denominations were removed from circulation. The yen's symbol is ¥, or Y. First minted in 1869, after the Meiji Restoration, the yen was officially adopted as the basic unit in the monetary reform of 1871. In that year, the government suspended the exchange of clan notes, paper money that feudal lords had issued and circulated since the late 16th century. (According to a Ministry of Finance survey of 1868, a total of 1,694 denominations of clan money had been issued by 244 clans, 14 magistrates' offices, and 9 shogunate retainers during the Tokugawa regime.) By 1879 the replacement of clan notes by the yen-based government notes had been completed.

The term yen derives from an ancient term for Chinese round money (*yüan*).

Yen-an, Pinyin YAN'AN, town in northeastern Shensi *sheng* (province), China. It became famous as the wartime stronghold of the Chinese Communists from the mid-1930s to 1949. The area around the town is a heavily dissected plateau of loess (windblown soil) that is deeply etched by gullies. Yen-an stands on the south bank of the Yen River in a basin surrounded by hills and is a road junction in northeast Shensi. It was a strategic town in historical times, being located near the border—between the part of Shensi where agriculture is practicable and the arid Northwest, which merges into the Ordos Desert.



Bridge over the Yen River at Yen-an, Shensi province, China
A. Topping from Rapho/Photo Researchers

The name Yen-an was first given to the commandery set up there by the Sui dynasty (581–618). A vital frontier post under the T'ang dynasty (618–907), and a part of the defenses of the Sung dynasties (960–1279) against the northwestern Hsia dynasty (1038–1227), it was the scene of a crucial victory by Mongol armies over the forces of the Juchen dynasty in 1221. Since the 15th century, the importance of the area has declined. It was badly affected by Muslim uprisings of 1864–75, by droughts and famines in the 1870s that decimated the population, and by almost equally disastrous droughts in the 1920s and '30s that depopulated whole counties.

The Communist armies, driven from their bases in the Kiangsi Soviet areas by the Kuomintang (Chinese Nationalist Party) in 1934, eventually reached Yen-an after their epic 6,000-mile (9,600-kilometre) Long March (1934–35). They made the town their headquarters during the war against the Japanese (1937–45) and during the civil war that brought Communist victory in 1949. Yen-an has thus come to represent a symbol of the heroic phase of the Chinese Communist Revolution, when the leadership of Mao Zedong was firmly established and the Communists mastered both guerrilla warfare and the peasant-based reform policies that were to bring them to power in 1949. Remote Yen-an stands as a national shrine for the Communist government and is a popular tourist attraction.

The town itself is a relatively minor place. The original walled settlement was ruined by Japanese bombing in 1938–39. Modern Yen-an is the centre of a district that has suffered seriously from soil erosion, but it has begun to be reclaimed as part of the vast scheme for the development of the Huang Ho (Yellow River) drainage region. The surrounding area has been increasingly devoted to livestock, and the town has a long-established woolen-textile industry.

The entire area lies in a rich coal- and oil-bearing plain, and power production is a mainstay of the town's economy. It is also a major transportation hub and is connected by road, rail, and air to surrounding regions. Pop. (1999 est.) 133,226.

Yen-ch'eng, Pinyin YANCHENG, city in the eastern coastal district of northern Kiangsu *sheng* (province), China.

Yen-ch'eng is now some 25 miles (40 km) from the coast; but in ancient times it was close to the sea and, from the 8th century onward, had to be constantly protected by dikes. The most famous of these was the Dike of Lord Fan, constructed early in the 11th century by a famous statesman, Fan Chung-yen. The inhabitants of the surrounding area did not cultivate the land but lived from the profits of salt production, salt dealing, and fisheries. From the 8th century onward, Yen-ch'eng was the centre of a network of canals connecting the salt pans of the coastal region with the canal between Huai-an and Yangchou. In the vicinity were innumerable saltworks, as well as the government depots that administered the salt monopoly.

The development of extensive irrigation works in the 1950s and '60s improved flood control in the area, and in 1983 Yen-ch'eng was declared a prefecture-level city. In 1988 the city was opened up to foreign trade and has since developed a mixed economy based on food processing, machinery manufacturing, and electronics. Yen-ch'eng's transportation infrastructure was improved greatly by the end of the 20th century, and was now connected by highway and railway to surrounding regions. Pop. (1999 est.) 332,125.

Yen-chi, Pinyin YANJI, city, eastern Kirin *sheng* (province), China. It is a county-level *shih* (municipality) and the administrative seat of Yen-pien-ch'ao-hsien-tsu (Yen-pien Korean) autonomous *chou* (prefecture), which covers a mountainous area on the North

Korean–Chinese border, more than half of whose inhabitants are Korean.

Until the late 19th century the area was almost completely undeveloped. Basically it comprises the fertile Tumen River valley and the wild ranges of the Ch'ang-pai Mountains. Chinese settlers began to move into the area illegally in 1820–50, and in 1860 the Chinese government lifted the ban on settlement to preempt possible Russian encroachment. The area, however, was so remote that few Chinese settlers went there, whereas Koreans moved into the area in great numbers. In 1885 special bureaus were set up to control and tax the Korean immigrants. In 1895 Yen-chi *hsien* (county) was established. The area was the source of constant border disputes, first with Korea, and then—after the establishment of the Japanese protectorate in Korea in 1905—with Japan. Under the Japanese occupation of the 1930s, railways were built through the area, linking T'u-men to Chi-lin (Kirin) to the west and to Chia-mu-ssu to the north. The railroads did much to open up the area, and further lines were then constructed to exploit the forests of the Ch'ang-pai Mountains.

Yen-chi is the principal commercial centre of the Yen-pien Korean autonomous prefecture and is a collecting centre for local agricultural products. There are food-processing plants, rice-polishing, oil-pressing, and flax-processing factories, and a variety of consumer industries making such products as earthenware, furniture, and knitted textiles. Agricultural implements are also manufactured. A secondary industrial centre is some 9 miles (15 km) to the south at Lung-ching, where there are machinery works, a power station, and a paper mill. Yen-chi is also an important cultural centre for the Korean minority, providing radio and newspaper services in Korean. Medical and normal colleges form Yen-pien University. Pop. (1989 est.) 207,600.

Yen Fu, Pinyin YAN FU (b. Jan. 8, 1854, Fu-chou, Fukien province, China—d. Oct. 27, 1921, China), Chinese scholar who translated into Chinese works by T.H. Huxley, J.S. Mill, Herbert Spencer, Adam Smith, and others in an attempt to show that the secret to Western wealth and power did not lie in Western technological advances, such as gunmaking, but in the ideas and institutions that lay behind these techniques.

Yen Fu was sent to England to study naval techniques, but he soon became interested in British government, jurisprudence, economics, and sociology. He returned to China in 1879. China's humiliating defeat by Japan in 1895 prompted him to advocate liberal social and political reform. He did so because he detected in liberal institutions a way of strengthening the state. His understanding of Darwinism convinced him that change must come through a gradual shift in the thought of the Chinese elite, not from revolution. In the chaotic years after the Revolution of 1911, he opposed republicanism in China and supported Yüan Shih-k'ai in his attempt to restore the monarchy. In his late years, Yen Fu rejected his earlier position regarding Western thought and turned increasingly to Confucianism and ancient Chinese culture.

Yen Fu wrote poetry in addition to his translations; two collections of his poetry were published posthumously.

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Yen Hsi-chai (Chinese philosopher): *see* Yen Yüan.

Yen Jo-chü, Pinyin YAN RUOJU (b. Nov. 11, 1636, Huai-an, Kiangsu, China—d. July 9, 1704, Peking), great Chinese scholar from the early period of the Ch'ing dynasty (1644–1911/12) who proved that 25 chapters of the *Shu Ching* (*q.v.*), or *Shang shu,* one of the Five Classics of Confucianism, upon which the government modeled itself for more than a thousand years, were forged.

Yen early became interested in determining the authenticity of the *Shu Ching.* The work dated from the early Chou period (1122–771 BC), but after the years of turmoil following the end of the Han dynasty (206 BC–AD 220), only 29 chapters of it remained extant. Then, in the 4th century AD, an alleged copy of the 16 chapters of the "ancient script" text appeared, with 9 additional chapters. These were accepted as authentic. The 54 chapters (later some chapters were divided to make a total of 58) were made one of the bases of the Chinese civil service examination.

Yen spent 30 years making an intensive textual analysis of the work and then published his *Shang shu ku-wen shu-cheng* ("Inquiry into the Authenticity of the Ancient Text of the *Shang shu*"), which utilized historical and philological reasoning to prove that the so-called "ancient script" chapters of the *Shu Ching* had been forged. Yen's book helped bring about a new critical reexamination of the Classics.

Yen La Wang (Chinese general): *see* An Lu-shan.

Yen Li-pen, Pinyin YAN LIBEN (b. *c.* 600—d. 673), one of the most famous of Chinese figure painters in the early years of the T'ang dynasty (618–907).

Yen Li-pen was a high official within the imperial court, but his fame derives from his skill as a painter. He is recorded as having painted Buddhist and Taoist subjects and as having received various imperial commissions; but among the extant works attributed to him, the most important is a hand scroll of "Portraits of the Emperors" in the Museum of Fine Arts, Boston, depicting a series of emperors selected from about the preceding 800 years of history (only the last seven of the portraits are original; the first six were copies of earlier works). Yen Li-pen has imbued them with subtly defined characters through a tightly controlled line and limited use of colour. His brother, Yen Li-teh (d. 656), was also a famous official and painter.

Yen-t'ai, Pinyin YANTAI, conventional CHEFOO, port city on the northern coast of Shantung (Shang*tung*) province, China.

It was traditionally known as Chih-fu, which was the name of the island that protects Yen-t'ai's fine natural deepwater harbour, where a port has been located from early times. The name Yen-t'ai ("Beacon Tower") derives from a lookout beacon built as part of the 15th-century coastal defense system erected against Japanese pirates. The port was occupied by an Anglo-French force in 1860, and in 1863 was opened to international commerce as a treaty port. It achieved some fame as the site of negotiations between the British and Chinese that resulted in the Chefoo Convention (1876), which opened new treaty ports to trade and led to China's sending its first minister to the Court of St. James's in London.

Although Yen-t'ai was a treaty port, it had no foreign concession or settlement. Considerable numbers of foreign traders lived there, however, and a flourishing trade grew up in the late 19th century, consisting partly of exports of silk, beans, and local produce from Shantung and partly of imports from the West. Goods were also transshipped from steamships to the junks serving the small coastal ports of northern Shantung and Hopeh. In the decade 1891–1901 the city's population almost doubled. Yen-t'ai's commerce was, however, almost ruined by the development of Tsingtao by the Germans after 1898. By 1904 a rail link connected Tsingtao with Chi-nan, after which the export trade of Shantung became concentrated at the better port of Tsingtao. As a result, Yen-t'ai and the other ports of northern Shantung stagnated. Its revival began in 1956 when it was linked by rail with Lan-ts'un, just north of Tsingtao.

By the early 1970s Yen-t'ai had developed into a local market and collecting centre for the agriculture of the peninsula. It is also a major fishing port. It has a variety of industries, including flour milling, tobacco processing, and the canning of fish, meat, vegetables, and fruit, as well as wine making and brandy distilling. Ships are repaired at the port, and there are various manufactures connected with the shipping and fishing industries. A small-scale iron and steel complex was founded in 1967, manufacturing such machinery as diesel engines, mostly for local agricultural use. In 1984 Yen-t'ai was designated one of China's "open" cities in the new open-door policy of inviting foreign trade and investment. Pop. (1989 est.) 422,500.

Yen Ti (Chinese mythology): *see* Shen Nung.

Yen Yüan, Pinyin YAN YUAN, literary name (Wade-Giles romanization) YEN HSI-CHAI (b. April 27, 1635, Chihli [now Hopeh] province, China—d. Sept. 30, 1704, Chihli province), Chinese founder of a pragmatic empirical school of Confucianism opposed to the speculative Neo-Confucian philosophy that had dominated China since the 11th century.

Yen's father was abducted into the Manchu army when Yen was three. He never returned, and the family lived in poverty. As a young man, Yen became interested in Confucianism and studied to pass his civil-service examinations, which would have given him entrance into the bureaucracy. But after failing the examination several times he decided to devote himself to teaching.

His revolt against Neo-Confucian metaphysics stemmed initially from his aversion to the newly established Manchu rule of the Ch'ing dynasty (1644–1911). He believed that the Manchu conquest was made possible by faulty government and education, which had rendered China easy prey to alien conquerors. He urged that people return to the study of the ancient Confucian Classics instead of the Neo-Confucian interpretations of them. He advocated implementation of the ancient "well-field" plan of the Confucian sage Mencius, in which eight families lived on a patch of land that was equally divided into nine squares. Each family would cultivate its own piece of land, and all eight families would jointly cultivate the remaining central square for the government. Yen felt that this system, by providing for an equal distribution of the land, would ensure a livelihood for all. Similarly he urged a revival of compulsory military service to make each citizen a competent defender of his country. He believed that useful knowledge and education come only from practical experience: as long as scholars buried themselves in books and in abstruse discourse, shunning physical activity and despising soldiery, China would continue to be weak.

Yen put his educational theory into practice when he became director of the Chang-nan Academy in 1696. His curriculum included mathematics, geography, military tactics and strategy, archery, and wrestling, in addition to history and the Confucian classics. Yen's writings, together with those of his most eminent student, Li Kung (1659–1733), became the major works of a new philosophical movement known as the Yen-Li school. A short-lived society to study and disseminate its doctrines was formed in 1920 in Peking. Yen's major works were reprinted in the late 19th century as the *Yen-Li i-shu* ("Works of Yen and Li").

Yenagoa, town, Rivers state, southern Nigeria, in the Niger Delta. Situated in an area of swamps and mangrove and tropical rain

forests, it is a traditional home of the Ijo people, a fishing group who, following contact with European traders, became middlemen in the export of slaves through the ports of Brass and Nembe. When the slave trade was abolished, the Ijo economy turned to the export of palm oil and kernels. Yenagoa is still a market and administrative centre for a largely agricultural region, but the exploitation of petroleum and natural-gas deposits nearby has brought some diversification.

Yenakiyeve, Russian YENAKIYEVO, also spelled ENAKIEVO, or JENAKIJEVO, city, Donetsk *oblast* (province), eastern Ukraine. It lies along the Krynka River. A pig-iron concern began there in 1858 but lasted only eight years; not until the first coal mines opened in the locality in 1883 did industrialization begin. A metallurgical factory established in 1895–97 was later reconstructed. The city was incorporated in 1925 and now has a wide industrial base, with numerous metallurgical (notably iron and steel) concerns and coke-based chemical, cement, and construction industries. It has colleges of mining and metallurgical technology. Pop. (1996 est.) 114,000.

Yenangyaung, town, west-central Myanmar (Burma), on the Irrawaddy River, 135 miles (217 km) southwest of Mandalay. It is the centre of oil fields that were long the most productive in Myanmar. Pop. (1993 est.) 82,500.

Yenbo (Saudi Arabia): *see* Yanbu'.

Yendys, Sydney: *see* Dobell, Sydney Thompson.

Yengema, town, east-central Sierra Leone. The headquarters of a diamond-mining area inhabited mainly by the Kono and Mandingo peoples, the town has diamond-washing plants, a hospital, and several schools. Pop. (1985 prelim.) 12,938.

Yeni Osmanlılar (Turkish secret organization): *see* Young Ottomans.

yeniçeri (Turkish soldier): *see* Janissary.

Yeniseian languages, also spelled YENISEYAN, formerly called YENISEY-OSTYAK LANGUAGES, small group of languages grouped with Yukaghir, Nivkh, and the Luorawetlan languages as Paleo-Siberian languages. The Yeniseian group contains at least four languages—Ket, Kott, Arin (Arrin), and Assan—but only Ket is a living language. *See also* Paleo-Siberian languages.

Yenisey River, also spelled YENISEI, or ENISEI, river of Asia, one of the longest rivers on the continent, flowing from south to north across central Russia.

A brief treatment of the Yenisey River follows. For full treatment, *see* MACROPAEDIA: Asia.

The headwaters of the Yenisey rise in the mountainous borderland of south-central Russia and Mongolia. Its main course flows northward along the eastern margin of the West Siberian Plain at the foot of the Central Siberian Plateau and empties into the icy waters of the Kara Sea, a section of the Arctic Ocean, through the Yenisey Gulf. The length of the river is calculated at 2,540 miles (4,090 km) if the Great Yenisey River in Tuva is reckoned as its source; but if the headwaters of the Selenga (Selenge) River, which rise in western Mongolia, are considered as its ultimate source, the length is 3,442 miles (5,540 km).

Most of the 996,000 square miles (2,580,000 square km) of the Yenisey drainage basin stretches over the western sector of the Central Siberian Plateau, averaging between 1,640 and 2,300 feet (500 and 700 m) in elevation. The major tributaries to the Yenisey River system are the Abakan, Eloguy, and Turukhan rivers from the west and the Tuba, Kan, Angara, Stony (Podkamennaya) Tunguska, Lower (Nizhnyaya) Tunguska, and Kureyka rivers from the east. About half of the Yenisey's water comes from melting snow, more than a third from rainwater, and the remainder from groundwater. In terms of runoff, the Yenisey is the greatest river of Russia, with an average annual discharge of 699,200 cubic feet per second (19,800 cubic metres per second); violent floods occur in the spring.

The climate of the northern portion of the river basin is subarctic, while that of the middle and southern portions is distinctly continental. Ice begins to form on the lower Yenisey early in October, and the entire river is frozen by mid-November. Thawing is not complete until late May or mid-June. Most of the river's basin is covered with taiga (dense, marshy forest), with Siberian spruce, fir, and cedar predominating in the south and larch farther north.

Hunting, fishing, the breeding of reindeer, and fur farming are the chief occupations of the basin's more northerly peoples, and mining of coal, copper, and nickel is also important. Processing and manufacturing industries are pursued in the south. The hydroelectric potential of the Yenisey and its major tributary, the Angara, is estimated at 25,000,000 kilowatts. Approximately 1,900 miles (3,000 km) of the river, between Sayanogorsk (formerly Oznachennoye) and the Kara Sea, are navigable. Lumber is the main cargo transported through the chief ports along the river: Krasnoyarsk, Strelka, Yeniseysk, Igarka, Dudinka, and Ust-Port. Seagoing vessels can sail inland up the river to Igarka.

yeoman, in English history, a class intermediate between the gentry and the labourers; a yeoman was usually a landholder but could also be a retainer, guard, attendant, or subordinate official. The word appears in Middle English as *yemen,* or *yoman,* and is perhaps a contraction of *yeng man* or *yong man,* meaning young man, or attendant. Geoffrey Chaucer's *Canterbury Tales* (late 14th century) depicts a yeoman who is a forester and a retainer. Most yeomen of the later Middle Ages were probably occupied in cultivating the land; Raphael Holinshed, in his *Chronicles* (1577), described them as having free land worth £6 (originally 40 shillings) annually and as not being entitled to bear arms.

Articles are alphabetized word by word, not letter by letter

Yeomen of the Guard, the personal bodyguard of the sovereign of England, in continuous existence since they were established by King Henry VII in 1485. They should not be confused with the yeomen warders of the Tower of London, often called "Beefeaters," who, like the Yeomen of the Guard, wear Tudor costume. Originally, the Yeomen of the Guard were responsible for the king's safety on journeys at home or abroad and on the battlefield; within the precincts of his palaces, they guarded the entrances and tasted the king's food. In the 20th century the yeomen are called to their guardroom at St. James's Palace, London, only when required, a circumstance occurring normally only when the sovereign is performing certain ceremonial functions or receiving foreign heads of state. At the royal opening of Parliament, a party of yeomen, by custom since the Gunpowder Plot of 1605, search the vaults of the Palace of Westminster. Originally the guard numbered 50, but there are now 79 yeomen, chosen from the army, the marines, and the Royal Air Force, together with a captain (appointed by the government) and various other officers



A member of the Yeomen of the Guard
The Press Association

and members chosen for distinguished service from the army.

Yeotmāl, also spelled YAVATMĀL, city, northeastern Mahārāshtra state, western India. Yeotmāl lies on major roads to Nāgpur, Bombay, and Hyderābād. It is the regional centre of an agricultural area (cotton and wheat) and has several colleges affiliated with Amrāvati University. Pop. (1991) 108,578.

Yeovil (England): *see* South Somerset.

Yepes y Álvarez, Juan de: *see* John of the Cross, Saint.

Yeppoon, coastal town, east-central Queensland, Australia. It lies 26 miles (42 km) northeast of Rockhampton and 435 miles (700 km) north of the state capital, Brisbane. Surveyed in 1872, the town was at first known as Bald Hill. European settlement of the area began in 1865, and the town's present name is presumably of Aboriginal origin. The Yeppoon district is given to agriculture, lumbering, and fruit growing. It is of interest to naturalists because it is the merging place for tropical and temperate species of plants and birds. Yeppoon is the centre for a major fishery (including prawning) and has seafood-processing factories, timber mills, and brickworks. The town is also an important tourist centre with beaches, lakes, sand cliffs, and the Great Barrier Reef in close proximity. Pop. (1991) 7,542.

yerba maté (beverage): *see* maté.

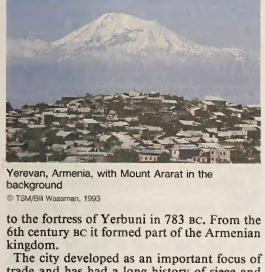
Yerby, Frank, in full FRANK GARVIN YERBY (b. Sept. 5, 1916, Augusta, Ga., U.S.—d. Nov. 29, 1991, Madrid, Spain), American author of popular historical fiction.

Yerby's story "Health Card" won the O. Henry Memorial Award for best first published short story in 1944. In 1946 his first novel, *The Foxes of Harrow,* was an immediate success. His novels are action-packed, usually featuring a strong hero in an earlier period. The stories unfold in colourful language and include characters of all ethnic backgrounds enmeshed in complex story lines laced with romantic intrigue and violence. His best work may be his novel *The Dahomean* (1971).

As a black author, Yerby was widely criticized for not giving more attention to racial problems in his fiction. But though Yerby himself said that writers should amuse and not preach to their readers, some critics see in his writings a savage critique of historical myths, especially of the United States and the American South.

Discrimination in the United States caused Yerby to leave and live in self-imposed exile in Madrid from 1955 until his death.

Yerevan, also spelled EREVAN, ERIVAN, or JEREVAN, capital of Armenia. It is situated on the Hrazdan River, 14 miles (23 km) from the Turkish frontier. Though first historically recorded in AD 607, Yerevan dates by archaeological evidence to a settlement on the site in the 6th–3rd millennium BC and subsequently



Yerevan, Armenia, with Mount Ararat in the background
© TSM/Bill Wassman, 1993

to the fortress of Yerbuni in 783 BC. From the 6th century BC it formed part of the Armenian kingdom.

The city developed as an important focus of trade and has had a long history of siege and storm. At different times it came under the Romans (a ruined fortress remains), Parthians, Arabs, Mongols, Turks, Persians, Georgians, and Russians. In 1582 it fell to the Turks, in 1604 to the Persians, and finally in 1827 to the Russians. In 1920 Yerevan became the capital of the independent Armenian republic. It remained the capital during the periods of Soviet rule and of renewed independence.

Modern Yerevan, which climbs the hillsides from the deep trench of the Hrazdan, is an attractive city in a fine natural setting framed by the extinct volcanic peaks of Mount Aragats and Mount Azhdaak to the north and Mount Ararat across the Turkish frontier to the south. Many modern buildings along its tree-lined streets have been constructed in traditional Armenian styles and of variously coloured local stone. Yerevan is a major cultural centre, with a university founded in 1919 and many other institutions of higher education. The Armenian Academy of Sciences (est. 1943) is the most prominent of the many research institutions in the city. The Matenadaran archives (founded 1920) hold a rich collection of ancient Armenian manuscripts, such as the Lazarus Gospel of 887. Yerevan also has many theatres and museums.

The rapid growth of the city, from a population of about 30,000 in 1914, is due to industrial development and to the hydroelectric plants on the Hrazdan. The city's chemical industries produce acetylene, plastics, synthetic rubber, and tires. Aluminum is smelted, and other industries make cars, turbines, electrical machinery, compressors, cables, and machine tools. Pop. (2000 est.) 1,248,200.

Yerkes, Charles Tyson (b. June 25, 1837, Philadelphia, Pa., U.S.—d. Dec. 29, 1905, New York, N.Y.), American financier who put together the syndicate of companies that built Chicago's mass-transit system.

Yerkes started as a clerk at a Philadelphia commission broker, and by 1862 he was able to purchase his own banking house. In 1871 a stock exchange panic brought on by the Chicago fire found him unable to deliver money that he had received as an agent in a municipal bond sale. For misappropriation of funds he was imprisoned for seven months.

Pardoned and released, Yerkes managed to recoup much of his fortune by buying stock cheaply during the Panic of 1873. In 1882 he moved to Chicago and bought the option on a street-railway line. Over the next 15 years, Yerkes used stock in one line as collateral to acquire the next, creating a tangle of companies to own, build, or operate various parts of his transit system. He made notable physical improvements in his lines: replacing horse-cars with cable traction, connecting city and suburbs with 500 additional miles of lines, installing electricity for 240 miles of his system, and constructing the north-side elevated tracks and the Union Loop, which circles downtown Chicago.

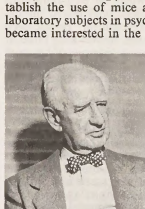
Extending his lines required franchises for the use of public land, and Yerkes relied on bribery to control both municipal and state politicians. When the legislature renewed his land franchises for a century without exacting any payment, the public was outraged. In the 1899 elections, the "boodle" legislators who had voted for Yerkes were defeated, and the law was repealed.

By 1901 Yerkes had sold his interests in the financially overburdened streetcar and elevated systems to Philadelphia transit kings Peter Widener and William Elkins. He went to London with $15,000,000 to convert its subways from steam to electricity. In 1892 Yerkes gave the University of Chicago the funding for an observatory, the Yerkes Observatory in Williams Bay, Wis. The observatory's 40-inch (102-centimetre) refracting telescope is still the largest refractor in the world.

The American novelist Theodore Dreiser wrote a trilogy of important novels based on Yerkes' life: *The Financier* (1912), *The Titan* (1914), and *The Stoic* (1947).

Yerkes, Robert M., in full ROBERT MEARNS YERKES (b. May 26, 1876, Breadysville, Pa., U.S.—d. Feb. 3, 1956, New Haven, Conn.), American psychologist and a principal developer of comparative (animal) psychology in the United States.

After graduating from Ursinus College, Yerkes took his Ph.D. degree at Harvard University in 1902 and then served first as instructor and then as professor of psychology at Harvard until 1917. His early studies of the behaviour of invertebrates soon gave way to work with the lower mammals, and his first book, *The Dancing Mouse* (1907), helped establish the use of mice and rats as standard laboratory subjects in psychological testing. He became interested in the psychological testing



Robert M. Yerkes, 1952
Institute for Sex Research; photograph by Dellenback

of humans, and he contributed much to the development of multiple-choice testing and a widely used point scale (1915) for measuring human mental ability. During World War I he spearheaded the first mass-scale testing program, which administered psychological tests to 1,726,000 men.

When Yerkes became professor of psychology at Yale University in 1924, he renewed his studies of chimpanzees and other higher primates and was soon the world's foremost authority on the great apes. His major work, *The Great Apes* (1929; cowritten with his wife, Ada Watterson Yerkes), remained for several decades the standard work on the psychology and physiology of these animals. In 1929 he realized a longtime ambition by establishing the Yale Laboratories of Primate Biology, Orange Park, Fla. A unique centre for the study of the neural and physiological bases of behaviour, it was renamed Yerkes Laboratories of Primate Biology after his resignation as director in 1941. *Chimpanzees* (1943), his other major work, was also his last. He retired from his teaching post at Yale in 1944.

Yermak TIMOFEYEVICH, Yermak also spelled ERMAK (d. Aug. 6, 1584/5, Siberia), Cossack leader of an expeditionary force during the initial Russian attempts to annex western Siberia, who became a hero of Russian folklore.

In 1579 the merchant and factory-owning Stroganov family enlisted the assistance of Yermak and a band of Cossacks to defend its possessions against attacks by Siberian tribesmen. Yermak set out with an expeditionary force of 840 men on Sept. 1, 1581, and in the spring of 1582 reached the central regions of the Tatar khanate of Sibir, whose head, Kuchum, ruled over the local tribes. Because his men had firearms Yermak was able to defeat the numerically superior forces of Khan Kuchum and occupy the capital, Kashlyk (or Sibir), on the Irtysh River.

Although the tsar sent Yermak another 500 men, revolts flared on all sides. In August 1584 (or 1585) Kuchum attacked and destroyed a small party of Cossacks led by Yermak, who, fighting his way to the boats, was drowned in the Irtysh, apparently by the weight of the coat of chain mail sent to him by the tsar.

Yermolova, Maria Nikolayevna (b. July 3, 1853, Moscow, Russia—d. March 12, 1928, Moscow), Russian dramatic actress whose 50-year career was devoted to imbuing her portrayals of stage heroines with a liberal spirit of active independence.

Yermolova was trained at the Moscow Theatre School and made her debut at age 17 in the title role of Gotthold Lessing's *Emilia Galotti* at the Maly Theatre (1870). Her interpretation of Emilia as an active protagonist of self-willed romanticism and turbulent emotions, in comparison with the passive characterizations of the past, established the direction of Yermolova's career. She excelled in the depiction of principals in heroic tragedy, and her lifelong membership in the Maly company was spent in this endeavour.

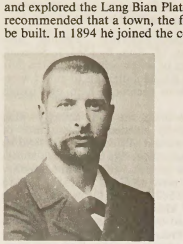
Yermolova's many outstanding roles included Katerina in Aleksandr N. Ostrovsky's *The Storm,* Laurencia in Lope de Vega's *Fuente Ovejuna,* Lady Anne in Shakespeare's *Richard III,* Lady Macbeth, and the title roles in Jean Racine's *Phèdre* and Friedrich Schiller's *Mary Stuart* and *Maid of Orleans.* Each of these characters was depicted in such a manner as to emphasize her independence of spirit and her popular heroism in defiance of corrupt authority. Konstantin Stanislavsky was of the opinion that Yermolova was the greatest actress he had ever observed. In 1920 Yermolova became the first person in the Soviet Union accorded the honour of being proclaimed a People's Artist of the Republic. She retired from the stage in 1921.

Yersin, Alexandre, in full ALEXANDRE-ÉMILE-JOHN YERSIN, also called ALEXANDRE-JOHN-ÉMILE YERSIN (b. Sept. 23, 1863, Aubonne, near Lausanne, Switz.—d. March 1, 1943, Nha Trang, Annam, Indochina [now in Vietnam]), Swiss-born French bacteriologist and one of the discoverers of the plague bacillus, *Pasteurella pestis* (also called *Yersinia pestis* and *Bacillus pestis*).

Yersin studied medicine at the universities of Lausanne, Marburg, and Paris and bacteriology with Émile Roux in Paris and Robert Koch in Berlin. In 1889 he was engaged by Roux to prepare and teach a course in microbiology at the Pasteur Institute in Paris.

Yersin left Europe in 1890 to serve as a physician aboard steamships operating off

the coast of Indochina and soon began his four-year exploration of the central region. He discovered the sources of the Dong Nai River and explored the Lang Bian Plateau, where he recommended that a town, the future Da Lat, be built. In 1894 he joined the colonial health



Yersin
Harlingue—H. Roger-Viollet

service and was sent to Hong Kong, where he and Kitasato Shibasaburo independently discovered the plague bacillus while studying an outbreak of plague in China.

The next year Yersin established a laboratory at Nha Trang. There he prepared serums against plague in human beings and cattle and studied cattle diseases, tetanus, cholera, and smallpox. To finance the laboratory, designated the Pasteur Institute of Nha Trang in 1903, he undertook the cultivation of corn (maize), rice, and coffee and introduced the rubber tree (*Hevea brasiliensis*) to Indochina. In 1903–04 he founded a medical school in Hanoi but returned to Nha Trang, where he introduced (1920–23) a source of quinine (*Cinchona ledgeriana*). He was named honorary director of the Pasteur Institute in Paris in 1933.

Yerushalayim (Israel): *see* Jerusalem.

Yerwa, also called YERWA-MAIDUGURI (Nigeria): *see* Maiduguri.

Yesenin, Sergey Aleksandrovich, Yesenin also spelled ESENIN (b. Oct. 3 [Sept. 21, old style], 1895, Konstantinovo, Ryazan province, Russia—d. Dec. 27, 1925, Leningrad), the self-styled "last poet of wooden Russia," whose dual image—that of a devout and simple peasant singer and that of a rowdy and blasphemous exhibitionist—reflects his tragic maladjustment to the changing world of the revolutionary era.

The son of a peasant family of Old Believers, he left his village at 17 for Moscow and later Petrograd (subsequently Leningrad, now St. Petersburg). In the cities he became acquainted with Aleksandr Blok, the peasant poet Nikolay Klyuyev, and revolutionary politics. In 1916 he published his first book, characteristically titled for a religious feast day, *Radunitsa* ("Ritual for the Dead"). It celebrates in church book imagery the "wooden Russia" of his childhood, a world blessed by saints in painted icons, where storks nest in chimneys and the sky above the birch trees is a bright blue scarf.

Yesenin welcomed the Revolution as the social and spiritual transformation that would lead to the peasant millennium he envisioned in his next book, *Inoniya* (1918; "Otherland"). His roseate utopian view of Otherland was still informed by a simple ethos—the defense of "wooden things" against the vile world of iron, stone, and steel (urban industrialization). In 1920–21 he composed his long poetic drama *Pugachyov,* glorifying the 18th-century rebel who led a mass peasant revolt during the reign of Catherine II. In 1919 he signed the literary manifesto of the Imagists (a group of Russian poets, unrelated to the Anglo-American movement of this name). He was soon the leading exponent of the school. He became a habitué of the literary cafés of Moscow, where he gave poetry recitals and drank excessively. A marriage to Zinaida Reich (later the wife of the actor-director Vsevolod Meyerhold) ended in divorce. In 1922 he married the American dancer Isadora Duncan and accompanied her on tour, during which he smashed suites in the best hotels in Europe in drunken rampages. They visited the United States, their quarrels and public scenes duly observed in the world press. On their separation Yesenin returned to Russia. For some time he had been writing the consciously cynical, swaggering tavern poetry that appeared in *Ispoved khuligana* (1921; "Confessions of a Hooligan") and *Moskva kabatskaya* (1924; "Moscow of the Taverns"). His verse barely concealed the sense of self-depreciation that was overwhelming him. He married again, a granddaughter of Tolstoy, but continued to drink heavily and to take cocaine. In 1924 he tried to go home again but found the village peasants quoting Soviet slogans, when he himself had not been able to read five pages of Marx. Tormented by guilt that he had been unable to fulfill the messianic role of poet of the people, he tried to get in step with the national trend. In the poem "Neuyutnaya zhidkaya lunnost" (1925; "Desolate and Pale Moonlight"), he went so far as to praise stone and steel as the secret of Russia's coming strength. But another poem, "The Stern October Has Deceived Me," bluntly voiced his alienation from Bolshevik Russia. His last major work, the confessional poem "Cherny chelovek" ("The Black Man"), is a ruthless self-castigation for his failures. In 1925 he was briefly hospitalized for a nervous breakdown. Soon after, he hanged himself in a Leningrad hotel, having written his last lines in his own blood.

A prolific and somewhat uneven writer, Yesenin had a true gift of song. His poignant short lyrics are full of striking imagery. He was very popular both during his lifetime and after his death. Frowned on by Communist critics and party leaders, who feared the debilitating effect of "Yeseninism" on the civic dedication of the young, he was long more or less out of official favour. Editions of his work that became available (1956–60) attested to his continued popularity. His complete works were published in 1966–68.

Yesha'yahu (Jewish prophet): *see* Isaiah.

yeshiva, also spelled YESHIVAH, or YESHIBAH (Hebrew "sitting"), plural YESHIVAS, YESHIVOT, YESHIVOTH, or YESHIBOT, any of numerous Jewish academies of Talmudic learning, whose biblical and legal exegesis and application of Scripture have defined and regulated Jewish religious life for centuries. The early history of the yeshiva as an institution is known only through indirect evidence, and the word itself did not come into current use until the 1st century AD. Rabbinic literature refers to religious study during the periods of the biblical patriarchs, the bondage in Egypt, and the wandering in the wilderness; Ecclesiasticus, written *c.* 190 BC, mentions the school of its author, Ben Sira. Influential religious academies were led by the sages Hillel and Shammai in the 1st century AD.

During the period of the Second Temple of Jerusalem (6th century BC–AD 70), however, the Great Sanhedrin, the supreme judicial body, was regarded as the major source of religious learning. Intimately connected with its function as a *bet din* ("house of judgment") was that of a *bet midrash* ("house of study"); the sages of the Sanhedrin were anxious to gather and train students well versed in Jewish law so that they could participate in deliberations conducted by the Sanhedrin or by local courts under its jurisdiction. Thus, before making a judicial decision, its 71 members would "sit" before students (hence the Hebrew *yeshiva* and Aramaic *metivta*) and study the written and oral (Halakha) law.

Following the destruction of the Second Temple in AD 70, religious life centred upon the great rabbis, then located outside Jerusalem. The yeshiva of major importance in this period was that of Johanan ben Zakkai, who established an academy at Jabneh (or Jamnia, now Yibna) near the Judaean coast. Succeeding *tanaim* ("teachers") and sages who dominated religious scholarship were Simeon ben Gamaliel (died 175) and his son, Judah ha-Nasi (*c.* 135–*c.* 220), under whose tutelage the compilation of the Mishna was completed.

From the mid-3rd century, Jewish scholarship concentrated on the legal exegesis of the Mishna by the *amoraim* ("lecturers," or "interpreters"). In Palestine yeshivas were established in Lydda, Caesarea, Sepphoris, and Tiberias. These academies produced the Palestinian Talmud and undertook the collection of Midrashim (homiletic commentaries on the Bible).

Other yeshivas simultaneously flourished in Babylonia, two of which gained extraordinary renown. The first was established by Abba Arika after his arrival at Sura in 218. The other was set up at Pumbedita by Judah bar Ezekiel. From *c.* 200 to 1040 these two yeshivas had immense authority as centres of learning and issued "official" interpretations of the law.

As the Babylonian yeshivas declined, others arose in Spain, France, Italy, Germany, and central Europe. Then, as Jews moved eastward, outstanding yeshivas were established in Poland. Important new centres of Jewish learning appeared in Turkey and Palestine following the expulsion of the Jews from Spain in 1492.

The Polish yeshivas suffered a debilitating blow in the violent persecutions of 1648–49, but by the latter part of the 18th century a mystical and pietistic movement called Hasidism won over large masses of Polish and Ukrainian Jews and in due course gave rise to new yeshivas.

When the Enlightenment movement (Haskala) of eastern Europe (latter half of the 18th century) challenged the traditions of the yeshivas by adapting Judaism to modern culture, Hayyim ben Isaac attempted to counter its influence by establishing a yeshiva (1803) at Volozhin, Russia. It profoundly influenced Russian Jewry until its final closing in 1892. By including secular subjects in its training of future rabbis, Volozhin departed from the traditional curriculum of European (Lithuanian, Polish, Hungarian) yeshivas.

The first yeshiva in the United States was 'Etz Hayyim of New York (1886), modelled after that in Volozhin. It developed into the Rabbi Isaac Elchanan Yeshiva (1896), which in turn became Yeshiva College in 1928 and Yeshiva University in 1945.

In the Nazi persecution of European Jews prior to and during World War II (1939–45) numerous yeshivas were destroyed and many scholars and rabbinic students were forced to seek other lands, notably England, Canada, the United States, and Palestine. Today the most outstanding yeshivas are located in the United States and Israel.

Rabbinic seminaries of Reform and Conservative Judaism are not usually called yeshivas. In the United States, a day school under Orthodox Jewish auspices is generally known as a "small yeshiva" (*yeshiva qetana*).

Yessentuki, also spelled JESSENTUKI, or ESSENTUKI, city, Stavropol *kray* (region), southwestern Russia, in the valley of the Podkumok River. It was founded in 1798, developed as a fortress in the 1830s, and became a city in 1917. It is located at mineral springs at the base of the Caucasus Mountains. The

city is composed of an old Cossack village in the southern sector and a newer city in the north. It is a major health resort, with sanatoriums and medicinal mud baths. It also has food-processing and garment industries. Pop. (1991 est.) 95,500.

Yesuj, also spelled YĀSŪJ, town, southwestern Iran. The town has a sugar mill and other local industry producing bricks and mosaic tiles, livestock feed, mats and baskets, and carpets and rugs. Roads link it with Dogonbaden, Dehdasht, Shiraj, Nurābād, and Bandar-e Būshehr. There is a thermoelectric power station located at Yesuj. Pop. (1986) 29,991.

Yeti: *see* Abominable Snowman.

Yevpatoriya, also spelled EVPATORIIA, or JEVPATORIJA, city, Crimea, southern Ukraine, on the Kalamit Bay on the west coast of the Crimean Peninsula. Founded in the 6th century BC as a Greek colony and later renamed for Mithradates VI Eupator, sixth king of Pontus, the city has known many masters, passing to Russia with the annexation of the Crimea in 1783. Nearby the Allied armies landed (1854) during the Crimean War. With magnificent beaches, modern Yevpatoriya is a popular resort and minor coastal and fishing port. Pop. (1991 est.) 110,500.

Yevreyskaya, also spelled EVREISKAIA, also called BIROBIDZHAN, autonomous *oblast* (province) in Khabarovsk *kray* (region), far eastern Russia, occupying an area of 13,900 sq mi (36,000 sq km) in the basin of the middle Amur River. Most of the *oblast* consists of level plain, with extensive swamps, patches of swampy forest, and grassland on fertile soils, now largely plowed up. In the north and northwest are the hills of the Bureya Range and the Lesser Khingan, clothed in dense forest of spruce, pine, fir, and larch. Winters are dry and severely cold, summers hot and moist. Although established in 1934 theoretically as a home for Jews in the Soviet Union, no mass Jewish emigration developed, and Russian and Ukrainian settlers heavily outnumber the Jews. Most of the population live along the two main lines of communication, the Trans-Siberian Railroad and the navigable Amur. Timber working is well developed at centres on the railway, and tin is mined at Khingansk. Iron ore has not been exploited. Agriculture—chiefly the cultivation of wheat, rye, oats, soybeans, sunflowers, and vegetables—is concentrated in the Amur plain; fishing, especially for salmon, is important on the rivers. Birobidzhan (*q.v.*) is the administrative centre. Pop. (1991 est.) 220,200.

Consult the INDEX *first*

Yevtushenko, Yevgeny (Aleksandrovich), Yevtushenko also spelled EVGENII EVTUSHENKO (b. July 18, 1933, Zima, Irkutsk *oblast*, Russian S.F.S.R.), poet and spokesman for the younger post-Stalin generation of Russian poets, whose internationally publicized demands for greater artistic freedom and for a literature based on aesthetics rather than political standards signalled an easing of Soviet control over artists in the late 1950s and '60s.

Yevtushenko, a fourth-generation descendant of Ukrainians exiled to Siberia, grew up in Moscow and the small town on the Trans-Siberian Railway line that is the setting of his first important narrative poem, *Stantsiya Zima* (1956; *Zima Junction,* 1962). He was invited to study at the Gorky Institute of World Literature in Moscow, and he gained popularity and official recognition after Premier Joseph Stalin's death. Yevtushenko's gifts as an orator and publicist, his magnetic personality, and his fearless fight for a return to artistic honesty soon made him a leader of Soviet youth. He revived the brash, slangy,



Yevtushenko
Tass—Sovfoto

unpoetic language of the early Revolutionary poets Vladimir Mayakovsky and Sergey Yesenin and reintroduced such traditions as love lyrics and personal lyrics, frowned upon under Stalinism. His poem *Baby Yar* (1961), mourning the Nazi massacre of an estimated 34,000 Ukrainian Jews, was an attack on lingering Soviet anti-Semitism. His travels and poetry readings in the United States and Europe established cultural links with the West, but he fell into disfavour at home when he published his *Precocious Autobiography* in Paris in 1963. He was recalled and his privileges were withdrawn, but he was restored to favour when he published his most ambitious cycle of poems, *Bratsk Station* (1966; originally published in Russian), in which he contrasts the symbol of a Siberian power plant bringing light to Russia with the symbol of Siberia as a prison throughout Russian history.

Yevtushenko's play *Under the Skin of the Statue of Liberty,* which was composed of selections from his earlier poems about the United States, was produced in Moscow in 1972. His first novel, published in Russian in 1982, was translated and published in English as *Wild Berries* in 1984; that same year, a novella, *Ardabiola,* appeared in English translation. In 1978 he embarked on an acting career, and in 1981 a book of his photographs, *Invisible Threads,* was published.

yew, any tree or shrub of the genus *Taxus* (family Taxaceae), approximately eight species of ornamental evergreens, distributed throughout the Northern Hemisphere. Other trees called yew but not in this genus are the plum-yew (*q.v.*), Prince Albert yew (*see* Podocarpaceae), and stinking yew (*q.v.*). Two species are always shrubby, but the others may become trees up to 25 metres (about 80 feet) tall. Yews have rich, dark-green foliage. The branches are erect or spreading and are closely covered with flattened, linear leaves about 1½ to 3 centimetres (about ½ to 1½ inches) long. The leaves have two yellowish- or grayish-green bands along the underside. They are attached in spirals around the branch but, because of a twist at their bases, appear to grow in two rows along the sides of the branch. The reproductive structures, small, rounded, scaly, and conelike on male plants and minute, green, and solitary on female plants, are located between the leafstalk and the stem. The seeds are usually solitary, borne at the ends of short branches. As a seed matures, it is enveloped by a fleshy, red, cup-shaped aril. The foliage and seeds, but not the arils, contain a poisonous alkaloid, sometimes fatal to livestock.

The many horticultural varieties of yews differ primarily in growth habit. Yew trees grow slowly but are long-lived and only moderately susceptible to attack by pests.

Yew wood is hard, finegrained, and heavy, with white or creamy sapwood and amber to brown heartwood. The lumber was once popular for cabinetwork, implements, and archery bows; it is used more today for carved articles and turnery.

Yeysk, also spelled JEJSK, or EISK, city, Krasnodar *kray* (region), southwestern Russia. It was founded as a port in 1848 on the southern side of Taganrog Gulf of the Sea of Azov. Fishing and associated industries (fish canning) are important; other industries include agricultural processing. The city is a noted health resort, famed for its medicinal sulfur and mud baths. A college of agricultural technology is located in the city. Pop. (1991 est.) 86,300.

Yezd (Iran): *see* Yazd.

Yezdegerd, also spelled YEZDEGIRD (name of Sāsānian rulers): *see under* Yazdegerd.

Yezhov, Nikolay Ivanovich, Yezhov also spelled EZHOV, byname THE DWARF, Russian KARLIK (b. 1895, St. Petersburg, Russia—d. after January 1939), Russian Communist Party official who, while chief of the Soviet security police (NKVD) from 1936 to 1938, administered the most severe stage of the great purges, known as *Yezhovshchina* (or *Ezhovshchina*).

Nothing is known of his early life (he was nicknamed the "Dwarf" because he was but five feet tall and lame). Joining the Communist Party in March 1917, he was a political commissar in the Red Army during the Civil War and thereafter rose through several political posts, becoming a functionary for the Party Central Committee in Moscow by 1927 and one of Stalin's favourites. On April 29, 1933, he was named a member of a newly established central Purge Commission, which conducted a bloodless purge that ejected more than a million members from the Party. In January 1934, at the 17th Party Congress, he became a full member of the Central Committee and then, in February, succeeded L.M. Kaganovich in the key post of chairman of the Party Control Commission. In October 1937 he became a candidate member of the Politburo.

Meanwhile, on Sept. 26, 1936, he had succeeded G.G. Yagoda as chief of the NKVD and, in January 1937, acquired the newly created title of General Commissar of State Security. In these roles he perpetrated the grand excesses known as the *Yezhovshchina,* the cruel, ruthless elimination or repression of Stalin's enemies or alleged enemies in the Great Purge (*see* purge trials). The liquidations gradually extended from the Party leaders to the Party and state *apparatchiki* and finally to the general population.

By the summer of 1938, however, Yezhov himself had become the object of Stalin's suspicions, for reasons unknown. In December, L.P. Beria replaced him as head of the NKVD; and Yezhov, last heard of in January 1939, disappeared, probably executed.

Yezīdī (religious sect): *see* Yazīdī.

Yggdrasill, Old Norse MIMAMEIDR, in Norse mythology, the world tree, a giant ash supporting the universe. One of its roots extended into Niflheim, the underworld; another into Jötunheim, land of the giants; and the third into Asgard, home of the gods. At its base were three wells: Urdarbrunnr (Well of Fate), from which the tree was watered by the Norns (the Fates); Hvergelmir (Roaring Kettle), in which dwelt Nidhogg, the monster that gnawed at the tree's roots; and Mímisbrunnr (Mimir's Well), source of wisdom, for the waters of which Odin sacrificed an eye. After Ragnarök (*q.v.*; Doomsday), the world tree, though badly shaken, was to be the source of new life.

YHWH, in Hebrew, the name of God as revealed to Moses. Because of its four letters, it is also known as the Tetragrammaton. *See* Yahweh.

Yi, also called LOLO, or WU-MAN, ethnic group of Austro-Asiatic origin living largely in the mountains of southwest China and speaking a Tibeto-Burman language; the term is used by the Chinese to designate what they formerly called the Lolo or Wu-man. The Yi people numbered about 5.9 million in the late 20th century. Their principal concentrations were in Yunnan and Szechwan provinces, with smaller numbers in northwestern Kweichow province and in the northern part of Kwangsi Chuang autonomous region. Almost two-thirds of the Yi live in Yunnan province alone. The Yi language is spoken in six relatively distinct dialects. Among lesser minorities within the Yi language group are the Lisu, Nakhi (former Moso), Hani, Lahu, and Pai.

The traditional Yi culture includes a primitive hoe-using agriculture, livestock herding, and hunting. A caste system formerly divided the Yi into two groups. The Black Bone Yi, the ruling group, were apparently descended from a people that originated in northwest China. The far more numerous White Bone Yi were formerly subjugated or enslaved by the Black Bones. The subjugation of the White Bones was ended by the Chinese government in the 1950s. The White Bones have spread over the highlands of Yunnan and Kweichow, while the heartland of the Black Bones lies in the great and lesser Liang Mountains southwest of the Szechwan Basin.

The Lisu group, numbering about 520,000 in China, have spread southward from Yunnan as far as Myanmar (Burma) and northern Thailand. The Chinese distinguish between Black Lisu, White Lisu, and Flowery Lisu, terms that seem to relate to their degree of assimilation to Chinese culture. In the 1960s the Black Lisu, living highest up in the Salween River valley, were least civilized; they wore coarse clothes of homespun hemp, while the others dressed in colourful and elaborate garments. In their migrations the Lisu have kept to the highest parts of hill ranges, where they cultivate hill rice, corn (maize), and buckwheat on frequently shifted fields worked mainly with hoes. Their houses are of wood and bamboo. Crossbows, poisoned arrows, and dogs are used for hunting. They have a clan organization, men of one clan taking wives from others. They worship their ancestors and gods of earth and sky, wind, lightning, and forest.

The Nakhi, also known as Nasi, Mosu, or Moso, are estimated to number about 270,000. In common with the Tibetans, many of them embrace Tibetan Buddhism; they also believe in various spirits and demons and, along with their shamans, have priest-exorcists of the Bon cult of Tibet.

Yi DYNASTY, also called CHOSŎN DYNASTY, the last and longest-lived imperial dynasty (1392–1910) of Korea. Founded by General Yi Sŏng-gye, who established the capital at Hanyang (present-day Seoul), the kingdom was named Chosŏn after the state of the same name that had dominated the Korean peninsula in ancient times. But the regime is also frequently referred to as the Yi dynasty, after its ruling family.

General Yi established close relationships with the neighbouring Ming dynasty (1368–1644) of China, which considered Korea a client state, and Chinese cultural influences were very strong during this period. Chosŏn's administration was modeled after the Chinese bureaucracy, and Neo-Confucianism was adopted as the ideology of the state and society.

Under the previous dynasties, ownership of land was concentrated in the hands of a few high-ranking bureaucrats, but Yi Sŏng-gye and his successors redistributed the land throughout the various levels of officialdom, creating a new aristocracy called the *yangban (q.v.)*. Scholarship flourished under the Yi dynasty, and in 1443 the Korean phonetic alphabet, Han'gŭl, was invented. By the time of the Yi ruler King Sŏngjong (1470–94), a bureaucratic system for government administration was established.

In 1592 Korea suffered an invasion from Japan. Although Chinese troops helped repel the invaders, the country was devastated. This was followed by the invasion of northwestern Korea, in 1627, by the Manchu tribes of Manchuria, who were attempting to protect their rear in preparation for their invasion of China. Many cultural assets were lost, and the power of the central government was severely weakened. By the reigns of King Yŏngjo (1724–76) and King Chŏngjo (1776–1800), the country had largely recovered from the destruction of the wars. With an increased use of irrigation, agriculture was in a prosperous condition, and a monetary economy was burgeoning. In an effort to solve administrative problems, a school of learning called Silhak, or "Practical Learning," arose.

Korea maintained an isolationist policy until the 1880s. Starting with the conclusion of a treaty with Japan in 1876, doors to the West were opened for the first time in Korea's long history, and the country soon became an arena for competition among the powers. Japanese influence in the area became predominant, especially after the Japanese victory in wars with China (1894–95) and Russia (1904–05). In 1910 Japan formally annexed Korea, bringing the Yi dynasty to an end.

Yi Ching (Confucian text): *see* I Ching.

Yi Chŏng, also called T'ANŬM (Korean: "Ocean Hermit") (b. 1541, Korea), painter who was one of the most popular 16th-century Korean artists.

The great-great-grandson of King Sejong (1397–1450), Yi is said to have personified the ideal Korean aristocrat. He is as famous for his regal and generous disposition and his scholarly tastes as he is for his painting, and he is also well known as a poet and calligrapher. A master of the traditional styles, he especially excelled in monochrome painting of bamboo; he liked the bamboo, he said, because he felt it to be unyielding and yet graceful.



"Bamboo," scroll in ink on silk by Yi Chŏng (b. 1541); in the collection of Chung Sung-woo, Seoul
By courtesy of Chung Sung-woo, Seoul

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yi-dam, in Tibetan Buddhism, a tutelary, or guardian, deity with whom a lama (monk) has a special, secret relationship. The lama first prepares himself by meditation, then selects from among the guardian deities the one that reveals itself as offering the right guidance for a specific or lifelong goal. The lama will thereafter begin each day by worshiping his *yi-dam.* Any of the principal deities in the Tibetan Buddhist pantheon can be selected as a *yi-dam,* who is generally worshiped in union with his female consort (*yab-yum*). Their appearance can be either mild, in which case they are represented as "crowned" Buddhas, wearing the ornaments of a bodhisattva ("Buddha-to-be"), or wrathful, in which case they wear crowns of skulls and garlands of severed heads and carry such implements as the chopper and the skull cup.

Yi In-mun, also called YU-CH'UN (Korean: "Exist Spring") (b. 1745, Haejo, Korea—d. 1821, Seoul), famous Korean landscape painter.

A follower of the traditional Northern school of Chinese painting, Yi was known for the subtlety of his designs and the confidence of his brushstrokes. His most famous work, "River in Spring," is a long horizontal scroll depicting an endless landscape along a river. His use of watercolour, unusual in landscape painting before that time, started a new trend in Korean art.

Yi Li (Confucian classic): *see* I li.

Yi Sang-cha, also called HAKP'O (Korean: Study Garden) (fl. 16th century, Korea), noted



"Moon Viewing," scroll in ink and colour on silk by Yi Sang-cha; in the National Museum, Seoul
By courtesy of the National Museum, Seoul

Korean painter famous for the freshness and originality of his style.

Yi was originally a slave in a scholar's household, but his great artistic talents soon came to the attention of the king, and he was admitted to the Korean Royal Academy and made a member of the middle class. He is known for his landscapes as well as for his portraits of the royal family. His talents were so great that in 1546 he was made an official court painter and a member of the court officialdom, an extremely unusual honour for a man of his background.

Yi Sun-shin, also spelled YI SUN-SIN (b. April 28, 1545, Seoul, Korea [now in South Korea]—d. Dec. 16, 1598, off Noryang), Korean admiral and national hero whose naval victories were instrumental in repelling Japanese invasions of Korea in the 1590s.

After passing the government examinations to become a military officer in 1576, Yi served at various army and navy posts. Although he was twice discharged after being falsely accused by jealous colleagues, in 1591 he was appointed commander of the naval forces in Left Chŏlla province, where he concentrated on training his men, stocking equipment and supplies, and developing the renowned *kŏbuksŏn* ("turtle ship"). The *kŏbuksŏn* is thought to have been the first ironclad battleship in history. Its upper deck was covered with armoured plates to protect its crew, and spikes and knives were attached to the plates to discourage enemies from boarding. The ship's bow was equipped with a dragon head through which cannon could be fired and clouds of smoke could be emitted to obscure the ship's position. Cannon and guns could also be fired from the stern and the sides of the ship.

As a result of Yi's preparations, his forces, unlike most of the Korean military, were ready to fight when the Japanese invaded in 1592. Yi's victories off the southern coast effectively cut off the Japanese troops in Korea from supplies and reinforcements and prevented the Japanese from pressing their initial advantage. In 1593 Yi was given command of the entire Korean fleet, but, following peace negotiations, in 1597 he was again falsely accused of disloyalty and demoted to the rank of common soldier. The Japanese then launched a second invasion and succeeded in destroying almost all of the Korean navy. Yi was reinstated as commander of the few remaining ships and, continuing his undefeated battle record, soon restored Korea's control of the seas. He was killed by a stray bullet as he pursued the retreating Japanese forces during the final campaign of the war.

Yibin (China): *see* I-pin.

Yichang (China): *see* I-ch'ang.

Yichun (China): *see* I-ch'un.

Yiddish drama, the literature, productions, and acting style of the professional Yiddish theatre, which developed in Europe from crude beginnings in the mid-19th century and rose during its short history to peaks of brilliant artistic expression.

European Jewish drama had its origin in the Middle Ages, when dancers, mimics, and professional jesters entertained at weddings and Purim celebrations with songs and monologues. Purim, the holiday celebrating the downfall of Haman, a persecutor of the Jews in the Bible, became the occasion for increasingly elaborate plays, some of which continue to the present day. By the 16th century these plays, with their interpolated songs and free use of improvisation, were being performed in Yiddish, the language of the majority of central and eastern European Jews.

The beginning of professional Yiddish theatre is usually dated in 1876, when Abraham Goldfaden, a former schoolteacher and journalist, joined forces with two traveling musicians to present his own two-act musical sketch in a tavern in Romania. The little play was well received, and Goldfaden went on to organize a full-time professional troupe, for which he wrote songs, dialogues, and, finally, full-length plays. Groups of imitators sprang up, some of them formed by Goldfaden's actors or associates.



Scene from the 1945 production of H. Leivick's *Miracle of the Warsaw Ghetto*
From the Collection of the YIVO Institute

Goldfaden and newer Yiddish dramatists, such as Joseph Judah Lerner, became well established in Russia, but the anti-Semitic laws promulgated in 1883 expressly forbade Yiddish plays, and the playwrights and many of their actors immigrated to England and the United States. New York became the centre of Yiddish drama at the turn of the century, with a vast immigrant population that supported both the commercial theatre of musical farce and sentimental melodrama and the serious art theatre. The early acting style was noted for its lack of restraint.

In the early 1880s Boris Tomashevsky came to New York from London with some other Jewish actors and presented the first Yiddish play in the United States. Jacob Gordin is credited with bringing new material and new life into the American Yiddish theatre with free adaptations of the works of major European dramatists, such as his *The Jewish King Lear* (1892). The role of Lear was interpreted by Jacob P. Adler, founder of a family of Yiddish- and English-speaking actors that included Sarah (his wife), Celia, Julia, Stella, and Luther Adler. Sholem Asch and Sholem Aleichem explored Jewish folk themes and characters with rich humour and sensitivity. H. Leivick (pseudonym of Leivick Halpern) produced social dramas of Jewish workers as well as powerful works such as *The Golem* (published 1921) and *Miracle of the Warsaw Ghetto* (performed 1945).

In 1918 Maurice Schwartz founded the Yiddish Art Theatre, in which he served as director and leading actor. Schwartz became the most highly esteemed actor of the Yiddish stage in its heyday, and the theatre became the training ground for a generation of actors. Among the notable names associated with it are Rudolph Schildkraut, Jacob Ben-Ami, and Muni Weisenfreund (later known in motion pictures as Paul Muni).

World War II and the Nazi concentration camps destroyed most of the Yiddish culture of Germany and eastern Europe, and the language is rapidly dying out elsewhere, as the children of immigrants are assimilated into new cultures. All of these factors combined have had a devastating impact on the Yiddish theatre. In the second half of the 20th century, only a few Yiddish theatres of uncertain future survived in New York City, London, Bucharest, Buenos Aires, and Warsaw.

Yiddish language, the language of Ashkenazic Jewry (central and eastern European Jews and their descendants). Written in the Hebrew alphabet, Yiddish became one of the world's most widespread languages, appearing in most countries with a Jewish population by the 19th century. Along with Hebrew and Aramaic, it is one of the three major literary languages in Jewish history.

The earliest dated Yiddish documents are from the 12th century, but scholars reconstruct an origin in the 9th century when the Ashkenazim emerged as a unique cultural entity in central Europe. Yiddish first arose through an intricate fusion of two linguistic stocks: a Semitic component (containing post-classical Hebrew and Aramaic that the first settlers brought with them to Europe from the Middle East) and a grammatically and lexically more potent Germanic component (gleaned from a number of Upper and Central German dialects). In addition, a sprinkling of Romance words also seems to have appeared in Yiddish from early on. From its birthplace on German-speaking soil, Yiddish spread to nearly all of eastern Europe, where the language acquired a Slavic component.

Western Yiddish, the only form of Yiddish that was used during the earliest history of the language, remained the dominant branch during the Old Yiddish period (ending about 1500). It comprises Southwestern (Swiss–Alsatian–Southern German), Midwestern (Central German), and Northwestern (Netherlandic–Northern German) Yiddish. Eastern Yiddish, roughly equal in importance to its western counterpart during the Middle Yiddish period (c. 1500–1700), vastly overtook it in the Modern Yiddish period (from about 1700) and includes all present-day spoken Yiddish. The major Eastern Yiddish dialects are Southeastern (Ukrainian–Romanian), Mideastern (Polish–Galician–Eastern Hungarian), and Northeastern (Lithuanian–White Russian) Yiddish, upon which modern standard pronunciation of the language is based, though the grammar of the literary language draws from all three.

From its inception, Yiddish was the language of both the marketplace and the sophisticated logical argumentation in the Talmudic academies. Its literary functions continued to grow over the centuries, especially in genres not covered by traditional Hebrew and Aramaic. The rise of Yiddish printing in the 16th century stimulated the development of a standardized literary language on a Western Yiddish model. Owing to its gradual assimilation to German, as well as to a political campaign to stamp out the language waged by adherents of the late 18th century Germanizing movement, Western Yiddish faded into eventual extinction.

By the early 19th century, Eastern Yiddish, by contrast, blossomed and became the basis for the new literary language. Prompted at first by the mystical Ḥasidic movement in the 18th and 19th centuries and spurred later by other social, educational, and political movements, Yiddish was carried to all the world's continents by massive migrations from eastern Europe, extending its traditional role as the Jewish lingua franca. The Yiddishist movement, dedicated to the growth and enhancement of the language, was strengthened by the proliferation of Yiddish belles lettres. Its achievements include the Czernowitz Language Conference of 1908 (which proclaimed Yiddish a national Jewish language), the orthographic and linguistic reforms introduced by Ber Borokhov in 1913, and the founding of the Yivo (Yiddish Scientific Institute) in Vilna (Vilnius), Lithuania, in 1925 (housed in New York City since 1940).

Millions of Yiddish speakers were victims of the Nazi Holocaust. The number of speakers was further reduced by official suppression in the Soviet Union, by the semiofficial

antagonism (until recently) of Israeli authorities zealously guarding modern Hebrew, and massive voluntary shifts to other primary languages in Western countries. The language nevertheless continues to flourish among the ultra-Orthodox Ḥasidim in numerous countries and among secular students of Yiddish at leading universities, including Columbia University (New York), Hebrew University (Jerusalem), McGill University (Montreal), the University of Oxford, and the University of Paris.

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Yiddish literature, the body of written works produced in the Yiddish language of Ashkenazic Jewry (central and eastern European Jews and their descendants worldwide).

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

The beginnings of Yiddish literature are cloaked in mystery because of the huge number of documents that were lost or destroyed. The earliest-known explicitly dated items are proper names (1096); a rhymed blessing written into a prayer book (1272); and the extensive Cambridge Yiddish Codex (1382), discovered in Egypt and comprising the Jewish tales of Abraham, Joseph, and Moses as well as an early version of the German *Ducus Horant.* Other adaptations from the secular environment include the Yiddish *King Arthur* and the greatest work of old Yiddish literature, *Bove-Buch,* written in Italy in 1507 by Elijah Levita and published in 1541. It is a brilliant reworking of an Italian parallel to the Anglo-Norman *Buève de Hantone* (*Sir Bevis of Hampton*) and represents the first use of ottava rima (an eight-line stanza with a rhyme scheme of *abababcc*) in any Germanic language. A fusion of traditional themes with European forms is evident in the Yiddish epic versions of the biblical books of Samuel and Kings that circulated extensively in manuscript before being published in the 1540s. This same decade witnessed the publication of Yiddish translations of the Pentateuch (first five books of the Old Testament), dictionaries, historical works, and treatises on Jewish ethics, all of which were widely disseminated throughout Ashkenazic Europe. The oldest-known printed book in Yiddish is a Bible concordance (1534), preceded by the inclusion of a single Yiddish Passover poem in a 1526 volume published in Prague.

From the late 16th to the end of the 18th century the chief Yiddish literary works drew on Jewish legend and folklore, ethics, and morality. Some, such as the *Ma'aseh Buch* (first printed Basel 1602), took the shape of collections of short tales that had evolved over many centuries. The best-loved and most reprinted work was the *Tsenerene* by Jacob ben Isaac Ashkenazi of Janów Lubelski, the lost first edition of which was published in Prague in 1608. This book, which influenced Yiddish stylistics for generations, weaves legend, ethical guidelines, and rabbinic commentary around the nucleus of a Yiddish paraphrase of the Pentateuch. The first complete Yiddish renditions of the Old Testament were commissioned almost simultaneously by two competing publishers in Amsterdam in the late 1670s. Other prominent genres of older Yiddish literature include historical songs and drama.

Virtually all written Yiddish until the end of the 18th century was based on a quasi-standardized form of varieties of Western Yiddish, spoken in Central Europe. During the 18th century, western Ashkenazic civilization began to crumble. This was partly because of the influence of the Haskalah, the Berlin enlightenment movement of Moses Mendelssohn and his circle, which advocated the Germanization of the Jewish population in the German-speaking lands. It signaled the death of Yiddish literary creativity in the West, except for a few satiric enlightenment dramas. In eastern Europe, by contrast, the solid Yiddish-speaking population now numbered in the millions, and the rise of Ḥasidism, a religious movement stressing mysticism and the spiritual exaltation of each human being, gave rise to renewed creativity on an indigenous eastern European linguistic base. The wonder stories of Rabbi Naḥman of Bratslav (then Russian), posthumously published in 1815, are the first major literary work created in a form of Eastern Yiddish (the dialects of Poland, the Ukraine, Lithuania, and the surrounding areas, which constitute spoken Yiddish to this day). The eastern European maskilim (adherents of the Europeanizing enlightenment movement) soon began using Yiddish as a vehicle for attacking and satirizing Ḥasidism. Both camps served consciously or unconsciously to develop a proto-eastern European Yiddish literature.

The grandfather of modern Yiddish literature is Sholem Yankev Abramovitsh, who came to be known by the name of his narrator, Mendele Moykher Sforim. Mendele abandoned his original goals of modernization and enlightenment to paint realistic portraits of eastern European Jewry, excelling in satire and allegory. Fusing elements from several Eastern Yiddish dialects into his literary language, Mendele in effect forged present-day literary Yiddish. The other two classicists, forming with Mendele the triumvirate of classical modern Yiddish literature, are Sholem Aleichem, the eminent humourist upon whose works the later popular musical *Fiddler on the Roof* (1964) was based, and Isaac Leib Peretz, a symbolist who romanticized traditional Ḥasidic mysticism while drawing Yiddish closer to the norms and trends of mainstream European literature.

Shortly after World War I, Yiddish literature, both in its native eastern European heartland (split into Soviet and non-Soviet groupings) and in the United States, consciously broke away from the political and social tendentiousness that had characterized much of late 19th- and early 20th-century Yiddish writing on both sides of the Atlantic. The new organizations of young Yiddish writers in Poland, the Soviet Union, and the United States set out to explore the vast potential of Yiddish for the sake of art alone and in the interwar years brought Yiddish literature to the level of great world literature. Among the American Yiddish poets, the mystical and dramatic works of H. Leivick and the poetic experimentation of I.J. Schwartz, Zisha Landau, and Menke Katz complemented the expressionism and symbolism emanating from eastern Europe. In the arena of prose, Lamed Shapiro's impressionistic fiction established him as the undisputed master craftsman of the short story, and such novelists as Israel Joshua Singer, author of *The Brothers Ashkenazi* (1936), and his younger brother, Isaac Bashevis Singer, winner of the 1978 Nobel Prize for Literature and the most widely read of all Yiddish writers, strengthened the claim that New York City had become a major centre of Yiddish literature.

A number of leading Yiddish writers flourished in the Soviet Union in the 1920s, including the poet and modernistic prose master Moyshe Kulbak, the novelist David Bergelson, and the symbolist Der Nister (Pinkhes Kahanovich). The phenomenal growth of Soviet Yiddish belles lettres was curtailed by the stifling of literary freedom on the part of the authorities and the murder of all the great Soviet Yiddish writers, particularly the shooting of the 24 leading literary figures on Aug. 12, 1952, in Moscow's Lubianka Prison. The great centres of Poland, Lithuania, Hungary, Romania, and adjacent areas, where a vibrant press and all forms of Yiddish literature had developed at a breathtaking pace, fell victim to the Nazis, who slaughtered an estimated 6,000,000 Jewish victims, the majority of whom were Yiddish speakers.

Since the Holocaust, Yiddish literature has continued to explore modernistic literary trends and thereby secure its links with mainstream European literature. It has also returned to its Jewish roots, synthesizing the romance of the destroyed shtetl (eastern European Jewish village) with the great city life of its present centres in North America and Israel and, to a lesser degree, in western Europe, South America, South Africa, and Australia. While the aging generation of eastern European-born Yiddish writers has failed to cultivate a younger generation of authors, the burgeoning youth-for-Yiddish movements in North America and western Europe may yet write a new chapter in the history of Yiddish literature.

yield point, in mechanical engineering, load at which a solid material that is being stretched begins to flow, or change shape permanently, divided by its original cross-sectional area; or the amount of stress in a solid at the onset of permanent deformation. The yield point, alternatively called the elastic limit, marks the end of elastic behaviour and the beginning of plastic behaviour. When stresses less than the yield point are removed, the material returns to its original shape. For many materials that do not have a well-defined yield point, a quantity called yield strength is substituted. Yield strength is the stress at which a material has undergone some arbitrarily chosen amount of permanent deformation, often 0.2 percent. A few materials start to yield, or flow plastically, at a fairly well-defined stress (upper yield point) that falls rapidly to a lower steady value (lower yield point) as deformation continues. Any increase in the stress beyond the yield point causes greater permanent deformation and eventually fracture.

Yildirim: *see* Bayezid I.

Yima, in ancient Iranian religion, the first man, the progenitor of the human race, and son of the sun. Yima is the subject of conflicting legends obscurely reflecting different religious currents.

According to one legend, Yima declined God's (Ahura Mazdā's) offer to make him the vehicle of the religion and was instead given the task of establishing man's life on earth. He became king in a golden age in which need, death, disease, aging, and extremes of temperature were banished from the earth because of his virtue. The golden age ended, says one tale, when Ahura Mazdā told Yima of a terrible winter to come. He was instructed to build an excellent domain under the earth, lit by its own light, and take in it the best individuals from each species to preserve their seed. There they should dwell through the winter's destruction, then emerge and repopulate the earth.

Zoroastrian tradition dislodged Yima as the first man, replacing him with the figure of Gayōmart. In later Persian literature Yima is the subject of many tales under the name Jamshid.

Yin DYNASTY: *see* Shang dynasty.

Yin-chen (Chinese emperor): *see* Yung-cheng.

Yin-ch'uan, Pinyin YINCHUAN, conventional YINCHWAN, capital of Hui Autonomous Region of Ningsia, north-central China. The city is located near the western bank of the upper course of the Huang Ho, near the western

end of the Great Wall of China in the south-central section of the Ho-lan Mountains and Ordos Desert. It is served by a river port at Heng-ch'eng, about 9.5 miles (15 km) to the east. Until the 1950s the river, which is navigable downstream as far as Pao-t'ou in the Inner Mongolian autonomous region and upstream to Chung-wei and Chung-ning, was the chief communication link. Highways also link the city to Pao-t'ou along the river, to Lan-chou in Kansu province to the southwest, to Wu-wei in Kansu to the west, and to Hsi-an (Sian [Ch'ang-an]) in Shensi province to the southeast. Since 1958 the city has been on the railway from Lan-chou to Pao-t'ou and is thus linked to other parts of China by rail.

Yin-ch'uan originally was a *hsien* (county) under the name of Fu-p'ing in the 1st century BC; its name was changed to Huai-yuan in the 6th century AD. After the fall of the T'ang dynasty in 907, it was occupied by the Tangut Peoples' Hsi-Hsia dynasty, of which it was the capital. After the destruction of the Hsi-Hsia dynasty by the Mongols in 1227, it came under the rule of the Mongol dynasty. Under the Ming (1368–1644) and Ch'ing (1644–1911) dynasties, it was the *fu* (prefecture) of Ning-hsia. In 1928, when the province of Ning-hsia was formed from parts of Kansu and Inner Mongolia, it became the capital city. In 1954, when Ning-hsia province was abolished, the city was put in Kansu province; but, with the establishment of the Ningsia Hui autonomous region in 1958, Yin-ch'uan once again became the capital.

Traditionally, Yin-ch'uan was an administrative and commercial centre. In the 1950s it had many commercial enterprises, and there were some handicrafts but no modern industry. The city has since grown considerably. Extensive coal deposits discovered on the eastern bank of the Huang Ho, near Shih-tsui-shan, 60 miles (100 km) to the north, have made Shih-tsui-shan a coal-mining centre.

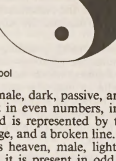
Yin-ch'uan, however, remains largely non-industrial. The immediate plains area, intensively irrigated by a system developed as long ago as the Han (206 BC–AD 220) and T'ang (618–907) dynasties, is extremely productive. Yin-ch'uan is the chief agricultural market and distribution centre for this area and also deals in animal products from the herds tended by nomads in the surrounding grasslands. It is a market for grain and has flour mills, as well as rice-hulling and oil-extraction plants. The wool produced in the surrounding plains supplies a woolen-textile mill. Yin-ch'uan is a centre for the Muslim (Hui) minority peoples, who constitute a third of the population. Pop. (1989 est.) 329,600.

Yin-hsien (China): *see* Ning-po.

Yin Mountains, Wade-Giles and Pinyin romanization YIN SHAN, range in the Inner Mongolian autonomous *ch'ü* (region), China, comprising the Ta-ch'ing, Wu-la, Hara-narin, Sheyten, and Lang mountains. The Yin Mountains mostly rise to heights of about 6,500 feet (2,000 m). The highest peaks in the southwestern Ta-ch'ing Mountains reach 7,175 feet (2,187 m). The subranges run roughly east to west along the northern bend of the Huang Ho (Yellow River) to the north of the Ordos Desert. They are sharply tilted, presenting a sharp and abrupt southern slope, and a gentle northern slope that merges into the high plateau of the Gobi (desert) to the north. The southern slope drains into the Huang Ho proper or into its tributaries, the Ta-hei River to the east and the Wu-chia River in the west. The northern slopes drain northward into the desert; two of the longest of the northward-flowing streams are the Hsi-la-mu-lun River (Mongolian Shira Muren) and Ai-pu-kai River.

The Yin ranges as a whole are mostly composed of ancient metamorphic rocks, but particularly in the southern ranges of the Wu-la and Ta-ch'ing mountains there are thick sedimentary rocks. These include rich coal beds, and large coal mines are in operation at Shih-kuai-kou to supply power stations as well as the giant iron and steel complex at nearby Pao-t'ou, which also draws its supplies of iron ore from the northern part of the Yin Mountains at Pai-yün-o-po. Most of the Yin range is arid, particularly in the western ranges, such as the Lang Mountains. In the central and eastern districts the climate is more moist; the vegetation is mostly grassland, with some trees such as birch and elm.

yin-yang, Pinyin YINYANG, Japanese IN-YŌ, in Eastern thought, the two complementary forces, or principles, that make up all aspects and phenomena of life. Yin is conceived of



Yin-yang symbol

as earth, female, dark, passive, and absorbing; it is present in even numbers, in valleys and streams, and is represented by the tiger, the colour orange, and a broken line. Yang is conceived of as heaven, male, light, active, and penetrating; it is present in odd numbers, in mountains, and is represented by the dragon, the colour azure, and an unbroken line. The two are both said to proceed from the Supreme Ultimate (T'ai Chi), their interplay on one another (as one increases the other decreases) being a description of the actual process of the universe and all that is in it. In harmony, the two are depicted as the light and dark halves of a circle.

The concept of yin-yang is associated in Chinese thought with the idea of the five agents, or elements (Wu hsing)—metal, wood, water, fire, and earth—both of these ideas lending substance to the characteristically Chinese belief in a cyclical theory of becoming and dissolution and an interdependence between the world of nature and human events.

The origins of the yin-yang idea are obscure but ancient. In the 3rd century BC in China, it formed the basis of an entire school of cosmology (the Yin-Yang school), whose main representative was Tsou Yen. The significance of yin-yang through the centuries has permeated every aspect of Chinese thought, influencing astrology, divination, medicine, art, and government. The concept entered Japan in early times as *in-yō*. A government bureau existed in Japan as early as AD 675 to advise the government on divination and on control of the calendar according to *in-yō* principles, but it later fell into disuse. *In-yō* notions permeated every level of Japanese society and persist even into modern times, as evident in the widespread belief in lucky and unlucky days and directions and in consideration of the zodiac signs when arranging marriages.

ying-ch'ing ware, Pinyin YINGQING, type of refined, thinly potted Chinese porcelain produced at Ching-te-chen, Kiangsi province, and in Hopeh province primarily during the Sung dynasty (960–1279), although it is likely that production began in the T'ang dynasty (618–907) and continued into the Ming dynasty (1368–1644). Authentic surviving examples appear to be from Sung and Yüan (1279–1368) times. *Ying-ch'ing* ("shadowy blue") ware is distinctive for its light buff-to-white, usually translucent, body covered with a white glaze that is tinged with a pale blue (*ch'ing pai*) ranging in tone from bluish gray to bluish green. Sung wares are often decorated with finely carved or incised floral and animal motifs. Lightly molded relief is also found; however, it is more usual on Yüan wares. Typical are vase forms, including the *mei p'ing* style; ewers, often multilobed; conical bowls, some of which have copperbound rims; and stem cups. A certain amount of *ying-ch'ing* ware was exported. Forgeries are common.

Ying-k'ou, Pinyin YINGKOU, conventional NEWCHWANG, city and port in Liaoning *sheng* (province), China. Ying-k'ou is situated near the mouth of the Hun River, some 11 miles (18 km) from the mouth of the Liao River. Ying-k'ou began to develop as a river port in the second quarter of the 19th century, replacing Niu-chuang and T'ien-chuang-t'ai farther upstream. At first the new port was called Mo-kou-ying (Mo-kou Encampment) after the garrison of coastal defense troops that was quartered there, and the name was later changed to Ying-tzu-k'ou, or Ying-k'ou. Under the Treaty of Tientsin (1858), Niu-chuang was opened to foreign trade, but silt in the Liao River (connected upstream with the Hun River) made it unusable, and instead Ying-k'ou was used as the port from 1864 onward. Somewhat confusingly, Europeans referred to the port as Newchwang (Niu-chuang), the name of the original treaty port.

In the late 19th century Ying-k'ou grew into a major port and was the principal outlet for goods from Manchuria. It was essentially a cargo transshipment point between the small junks that used the Liao River and seagoing ships. It was not, however, a very satisfactory port, since it was constantly silting up and was also icebound for three months of the year. Its importance largely vanished in the first decade of the 20th century because of the construction of railways in Manchuria, which diverted most of Ying-k'ou's former trade to Lü-ta (Dairen). With the construction of its own rail link with the line from Lü-ta to Shen-yang (Mukden), Ying-k'ou later regained something of its old importance, exporting great quantities of soybeans and manufacturing bean cake and vegetable oil. The city had a large foreign, mainly Japanese, community.

Modern Ying-k'ou has developed into an important secondary industrial city, being mostly engaged in light industry. There are cotton mills, knitting factories, oil-extraction plants, canneries, food-processing plants, and paper mills. The area also has a fishing industry and some large salt pans. An engineering industry, specializing in machine-tool manufacture, has also grown up, and a large-scale oil refinery had been established. In 1985 Ying-k'ou was designated one of China's "open" cities as part of the new open-door policy of inviting foreign trade and investment. Pop. (1989 est.) 401,000.

Ying Tsung (Chinese emperor): *see* Cheng-t'ung.

Yining (China): *see* I-ning.

Yirmeyahu (Hebrew prophet): *see* Jeremiah.

Yisra'el: *see* Israel.

Yisra'el, Muse'on: *see* Israel Museum.

Yithion, also spelled GYTHION, historically GYTHIUM, small port of Laconia, southern Peloponnese, Greece. It lies at the northwestern extremity of the Lakonikós Gulf at the mouth of the Gythius River. The town is connected by a causeway to Marathonísi Island, on which, according to the 2nd-century-AD Greek geographer Pausanias, the legendary Paris celebrated his nuptials with Helen. Yithion is built on the site of Migonium, founded by the Phoenicians close to the site of an earlier

town founded by the Minoans; according to ancient legend the town was founded by Heracles and Apollo. In antiquity it served as the harbour and arsenal of Sparta, about 23 miles (37 km) to the northwest. The modern town exports olives and olive oil. Extant ruins are all of Roman date, though on a hill behind the town a sanctuary to Dionysus stood in antiquity. Pop. (1981) 4,054.

Yiyang (China): *see* I-yang.

yizkor (Hebrew: "may he [*i.e.*, God] remember"), the opening word of memorial prayers recited for the dead by Ashkenazic (Germanrite) Jews during synagogue services on Yom Kippur (Day of Atonement), on the eighth day of Passover (Pesaḥ), on Shemini Atzeret (the eighth day of Sukkot, the Feast of Tabernacles), and on the second day of Shavuot (Feast of Weeks). The prayers, recited after the reading of the Law and before the Torah scrolls are returned to their place in the holy ark, permit the worshipers to insert the names of departed relatives, who, it is believed, are also in need of atonement. This now-popular custom of praying for the dead arose during the European Middle Ages, when the names of Jewish martyrs were regularly read aloud during the services.

Sephardic (Spanish-rite) Jews have a somewhat similar custom, in which a person called up for the reading of the Torah may offer a short prayer (*hashkava*) for his departed relatives.

Yizre'el, 'Emeq (Israel): *see* Esdraelon, Plain of.

ylang-ylang, also spelled ILANG-ILANG, also called PERFUME TREE (*Cananga odorata*), South Asian tree of the custard apple family (Annonaceae), in the order Magnoliales. A penetrating but evanescent perfume is distilled from its flowers.

Ylang-ylang in Tagalog (a Philippine language) means "flower of flowers." The slim, smooth-barked evergreen reaches about 25 m (80 feet) and is covered year-round with drooping, long-stalked, rich-scented flowers that have six narrow, greenish yellow petals 5 cm (2 inches) long. The alternate, pointed oval leaves have wavy margins and are 13 to 20 cm long. The clustered, oval black fruits hang from long stalks. Leis are made from the blooms, and the perfume is steam-distilled from the flowers.

Ylang-ylang vine (*Artabotrys odoratissimus*), also in the family Annonaceae, produces masses of small, greenish white flowers in spring and clustered, long-stalked, yellow, plumlike, two-seeded fruits in fall. It is not a source of commercial perfume. A 2- to 3.5-metre woody climber, it supports itself by hooks formed at the middle of the flower (and later fruit) stalks. Evergreen glossy leaves and fragrant flowers and fruits make it a valuable trellis or patio vine in areas of warm, moist climate.

YMCA: *see* Young Men's Christian Association.

Ymir (Norse mythology): *see* Aurgelmir.

Yngvi (Norse mythology): *see* Freyr.

Yo Fei (Chinese general): *see* Yüeh Fei.

Yobe, state, northeastern Nigeria. It borders the Republic of Niger to the north and the Nigerian states of Borno to the east, Bauchi to the southwest, and Jigawa to the northwest. Yobe state was created in 1991 from the western half of Borno state.

Yobe's terrain consists of plains that are drained by the seasonal Komadugu Yobe River and its tributaries in the north and by the Gongola River in the south. The state's vegetation is predominantly of the Sudan savanna type, with scattered acacia trees. There is also an area of Sahel savanna, consisting of sandy soils and thorn scrub, which is located in the far north. The Kanuri are the principal ethnic group in the state. Sorghum, millet, peanuts (groundnuts), cowpeas, corn (maize), sesame, and cotton are the primary crops. Cattle herding and farming are the chief occupations. Damaturu is the state capital, and Nguru, Potiskum, and Gashua are sizable market towns. The state is served by trunk roads connecting Potiskum, Damaturu, and Maiduguri (in Borno state). Pop. (1991) 1,411,481.

yodel, type of singing in which high falsetto and low chest notes are rapidly alternated; its production is helped by the enunciation of open and closed vowels on the low and high notes of wide intervals. Yodeling is also used as a means of communicating over moderate distances by the inhabitants of mountainous regions. It is associated with the Alpine peoples of Switzerland and the Austrian Tirol. But it is found also in other mountain regions (*e.g.*, in China and the Americas) and among the Pygmies of Africa and the Aboriginal peoples of Australia.

In Alpine folk singing, yodeling—frequently mixed with nonsense syllables—occurs in passages called *Jodlers,* which occur at the beginning, middle, or end of a song. The origin of yodeling is buried in antiquity. It has been suggested that it originated as an imitation of the music of the alpenhorn (alphorn), but this point is uncertain.

Yodo River, Japanese YODO-GAWA, river, central western Honshu, Japan. The Yodo is the sole outlet of Lake Biwa, the country's largest freshwater lake, from which it issues in a southwesterly direction to Osaka Bay, connecting the Kyōto Basin with the Ōsaka Plain. It was a major means of transportation and communication during the Tokugawa period (1603–1867). The river is dammed for hydroelectricity and irrigation.

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Yoga (Sanskrit: "Yoking," or "Union"), one of the six orthodox systems (darshans) of Indian philosophy. Its influence has been widespread among many other schools of Indian thought. Its basic text is the *Yoga-sūtras* by Patañjali (*c.* 2nd century BC?).

The practical aspects of Yoga play a more important part than does its intellectual content, which is largely based on the philosophy of Saṃkhyā (*q.v.*), with the exception that Yoga assumes the existence of God, who is the model for the aspirant to spiritual release. Yoga holds with Saṃkhyā that the achievement of spiritual liberation occurs when the self (purusha) is freed from the bondages of matter (prakriti) that have resulted because of ignorance and illusion. The Saṃkhyā view of the evolution of the world through identifiable stages leads Yoga to an attempt to reverse this order, as it were, so that a person can increasingly dephenomenalize himself until the self reenters its original state of purity and consciousness. Once the aspirant has learned to control and suppress the obscuring mental activities of his mind and has succeeded in ending his attachment to material objects, he will be able to enter samadhi—*i.e.,* a state of deep concentration that results in a blissful, ecstatic union with the ultimate reality.

Generally the Yoga process is described in eight stages (*aṣṭāṅga-yoga,* "eight-membered Yoga"). The first two stages are ethical preparations. They are *yama* ("restraint"), which denotes abstinence from injury (ahimsa), falsehood, stealing, lust, and avarice; and *niyama* ("observance"), which denotes cleanliness of body, contentment, austerity, study, and devotion to God.

The next two stages are physical preparations. Asana ("seat"), a series of exercises in physical posture, is intended to condition the aspirant's body and make it supple, flexible, and healthy. Mastery of the asanas is reckoned by one's ability to hold one of the prescribed postures for an extended period of time without involuntary movement or physical distractions. *Prāṇāyāma* ("breath control") is a series of exercises intended to stabilize the rhythm of breathing in order to encourage complete respiratory relaxation.

The fifth stage, *pratyāhāra* ("withdrawal"), involves control of the senses, or the ability to withdraw the attention of the senses from outward objects to the mind.

The first five stages are called external aids to Yoga; the remaining three are purely mental or internal aids. Dharana ("holding on") is the ability to hold and confine awareness of externals to one object for a long period of time (a common exercise is fixing the mind on an object of meditation, such as the tip of the nose or an image of the deity). Dhyana ("concentrated meditation") is the uninterrupted contemplation of the object of meditation, beyond any memory of ego. Samadhi ("self-collectedness") is the final stage and is a precondition of attaining release from the cycle of rebirth. In this stage the meditator perceives or experiences the object of his meditation and himself as one.

The prehistory of Yoga is not clear. The early Vedic texts speak of ecstatics, who may well have been predecessors of the later yogis (followers of Yoga). Although Yoga has been made into a separate school (*darśana*), its influence and many of its practices have been felt in other schools.

In the course of time, certain stages of Yoga became ends in themselves, notably, the breathing exercises and sitting postures, as in the Yoga school of Haṭha Yoga (*q.v.*). Patañjali's Yoga is sometimes known as Rāja ("Royal") Yoga, to distinguish it from the other schools.

Yoga, in a less technical sense of achieving union with God, is also used, as in the epic poem the *Bhagavadgītā,* to distinguish the alternate paths (margas) to such a union.

In the 20th century, the philosophy and practice of Yoga became increasingly popular in the West. The first important organization for practitioners in the United States was the Self-Realization Fellowship, founded by Paramahansa Yogananda in 1920. Some 50 years later, instruction emphasizing both the physical and spiritual benefits of Yogic techniques was available through a wide variety of sectarian Yoga organizations, nonsectarian classes, and television programs in the United States and Europe.

Yogācāra (Sanskrit: "Practice of Yoga [Union]"), also called VIJÑĀNAVĀDA ("Doctrine of Consciousness"), an important idealistic school of Mahāyāna Buddhism. Yogācāra attacked both the complete realism of Theravāda Buddhism and the provisional practical realism of the Mādhyamika school of Mahāyāna Buddhism. The name of the school is derived from the title of an important 4th- or 5th-century text of the school, the *Yogācārabhūmi-śāstra* ("The Science of the Stages of Yoga Practice").

The other name of the school, Vijñānavāda, is more descriptive of its philosophical position, which is that the reality a human being perceives does not exist, any more than do the images called up by a monk in meditation. Only the consciousness that one has of the momentary interconnected events (dharmas) that make up the cosmic flux can be said to exist. Consciousness, however, also clearly

discerns in these so-called unreal events consistent patterns of continuity and regularity; in order to explain this order in which only chaos really could prevail, the school developed the tenet of the *ālaya-vijñāna,* or "storage consciousness." Sense perceptions are ordered as coherent and regular by a store of consciousness, of which one is consciously unaware. Sense impressions produce certain configurations (samskaras) in this unconscious that "perfume" later impressions so that they appear consistent and regular. Each being possesses this storage consciousness, which thus becomes a kind of collective consciousness that orders human perceptions of the world, though this world does not exist. This doctrine was cheerfully attacked by the adherents of the Mādhyamika school of Mahāyāna Buddhism, who pointed out the obvious logical difficulties of such a tenet.

Apart from human consciousness, another principle was accepted as real, the so-called suchness (*tathatā*), which was the equivalent of the void (*śūnya*) of the Mādhyamika school.

The school emerged in India about the 2nd century AD but had its period of greatest productivity in the 4th century, during the time of Asaṅga and Vasubandha. Following them, the school divided into two branches, the Āgamānusariṇo Vijñānavādinaḥ ("Vijñānavāda School of the Scriptural Tradition") and the Nyāyānusariṇo Vijñānavādinaḥ ("Vijñānavāda School of the Logical Tradition"), the latter subschool postulating the views of the logician Dignāga (*c.* AD 480–540) and his successor, Dharmakīrti (*c.* AD 600–660).

The teachings of the Yogācāra school were introduced into China by the 7th-century monk-traveler Hsüan-tsang and formed the basis of the Fa-hsiang school founded by Hsüan-tsang's pupil K'uei-chi. Because of its idealistic content it is also called Wei-shih ("Ideation Only").

Transmitted to Japan, as Hossō, sometimo after 654, the Yogācāra school split into two branches, the Northern and the Southern. During the 8th century it enjoyed a period of political influence and produced such celebrated priests as Gembō and Dōkyō. In modern times the school retained the important temples of Horyū, Yakushi, and Kōfuku, all located in or near Nara and all treasure-houses of Japanese religious art.

yogurt, also spelled YOGHURT, YOURT, or YOGHOURT, semifluid fermented milk food having a smooth texture and mildly sour flavour because of its lactic acid content. Yogurt may be made from the milk of cows, sheep, goats, or water buffalo. Cow's milk is used in the United States and north-central Europe; sheep's and goat's milk are preferred in Turkey and southeastern Europe; milk from the water buffalo is most commonly used in Egypt and India.

Yogurt is have originated in Turkey, although there are many stories about its discovery. It is made in Turkish homes by boiling milk in an uncovered pan to sterilize it and to evaporate water; after cooling, the milk is inoculated with yogurt from a previous batch, incubated a few hours, then slowly cooled to room temperature before use.

Commercial .dairies usually add milk solids to cow's milk to make yogurt with a custard-like consistency. Concentrated sterilized milk is inoculated with *Streptococcus thermophilus* and *Lactobacillus bulgaricus;* sometimes *L. acidophilus* or a lactose-fermenting yeast is also added. This inoculated milk is then incubated four or five hours at about 43° to 44° C (110° to 112° F) until curd forms.

Yogurt is known and consumed in almost all parts of the world. Various flavours and sweetening may be added, or natural yogurt may be mixed with fresh fruits or vegetables. A salad of yogurt, cucumbers, and spices is served in India (*raita*) and several Middle Eastern countries (*jajik*). Yogurt is also used in soups and sauces.

Yogyakarta, *daerah istimewa* (special district), south-central Java, Indonesia. It is bounded on the west, north, and east by Jawa Tengah *provinsi* ("province") and fronts the Indian Ocean on the south. The district includes the city of Yogyakarta.

Most of the western half of the special district comprises coastal plains, as much as 15 miles (24 km) wide, consisting of lava and ash soils that are frequently replenished by the volcanic discharges of the Merapi Mountains to the north. The eastern part of Yogyakarta is an extension of the Kendang Plateau, which runs east-west near the coast. The major rivers in the district are the Oyo and the Progo; they flow southward into the Indian Ocean. Agriculture and fishing are the principal means of livelihood of the people of the coastal lowlands. Their products include rice, rubber, copra, and sugar.

Yogyakarta is one of the more industrially developed areas in Indonesia, and its industries include railroad workshops, printing, textile making, tanning, food processing, and the production of transport equipment, paper, chemicals, and electrical machinery. A network of roads and railways links Yogyakarta city, the capital of the special district, with nearby Bantul, Magelang, and Surakarta. The population consists mainly of Javanese, Sundanese, and Balinese Muslims. There are also numerous Chinese, Indians, and Europeans. Area 1,224 square miles (3,169 square km). Pop. (1995 est.) 2,916,700.

Yogyakarta, also spelled DJOKJAKARTA, JOGJAKARTA, JOKYAKARTA, or JOKJAKARTA, *kotamadya* (municipality) and capital, Yogyakarta *daerah istimewa* (special district), Java, Indonesia. It lies 18 miles (29 km) inland from the southern Java coast and near Mount Merapi (9,551 feet [2,911 m]).

In the 8th century the city formed part of the Buddhist kingdom of Śailendras, which was contemporaneous with the Śrivijaya empire of Palembang (Sumatra). It was probably included in the later Kaḍiri and Singhasāri kingdoms that ruled the region successively. At the end of the 13th century the Hindu Majapahit empire rose in eastern Java, and what is now Yogyakarta passed under its rule. In the early 16th century, central Java had two Muslim kingdoms, Demak and Pajang, which were incorporated into the powerful Muslim kingdom of Mataram by Senapati Ingalaga (reigned 1584–1601). The Dutch became established in the region in 1602. After numerous conflicts, Mataram subdued the state of Surabaya in eastern Java in 1625 and gained general supremacy in the territory.

In rebellion against Dutch intervention in Javanese politics, Sultan Hamengkubuwana I moved his court from Kuta Gede to Yogya in Mataram in 1755 and renamed the town Yogyakarta. The British captured Yogyakarta in 1811, and Sultan Hamengkubuwana II was deposed and exiled. In 1816 the Dutch repossessed the island of Java, and by 1830 Dutch colonial rule was firmly established in the sultanate. After the period of Japanese occupation during World War II, the Republic of Indonesia was formed. The national capital was removed to Yogyakarta when the Dutch occupied Jakarta in 1946; it was moved back to Jakarta in 1950 upon independence, and Yogyakarta was given the status of a special district in the Republic of Indonesia.

The city is famous as a cultural centre and for its handtooled silver products, batik, and leather goods. It also has railway workshops, textile mills, tanneries, and pharmaceutical factories. In Yogyakarta are the 18th-century palace (*kraton*) of the sultan (the only traditional ruler in Indonesia retaining any temporal power), a state university (Gadjah Mada University, founded 1949), the Hatta Foundation Library, the Sono Budoyo museum, an art academy, and a private university. The city also houses the *kraton* of the Paku Alam, another traditional ruler. Other tourist attractions are the nearby ancient temples of Borobudur and of Prambanan, the country around Kaliurang, a hill resort high on Mount Merapi, and the village of Kotagede, centre of the silver industry. The city has an airport and extensive rail and road connections. Pop. (1990) 412,392.

Yohannes IV, English JOHN IV, original name KASSA (b. 1831—d. March 10, 1889, Metema, Sudan), emperor of Ethiopia (1872–89). Like his predecessor, Tewodros II (reigned 1855–68), he was a strong, progressive ruler, but he had to spend most of his time repelling military threats from Egypt, Italy, and the Mahdists of the Sudan.

Superior weaponry allowed Yohannes, a *dejazmatch* (earl) of Tigray in northern Ethiopia, to fight his way to the Ethiopian throne on Jan. 21, 1872, four years after Tewodros' death. His main rival was Menilek II, king of Shewa, who did not recognize Yohannes as emperor until 1878/79, after a military defeat. Menilek's eclipse, however, was only temporary. In 1882 a dynastic marriage was arranged between Menilek's daughter and Yohannes' son, and it was agreed that Menilek would be Yohannes' successor as emperor. Yohannes also recognized Menilek's control of the south, and their separate spheres of influence were carefully defined. Tensions between the two rose again by 1888, however, when Menilek, fearing that Yohannes' son might try to follow his father to the throne, made an agreement with the Italians in exchange for arms.

Aside from the recurrent problem of the powerful king of Shewa, Yohannes' domestic concerns were mainly to reduce the power of the other regional nobles (and thus create a unitary government) and to increase his hold on his subjects through enforced conversion to the Ethiopian Orthodox Church. His attempt to use religion as a basis for unity aroused resistance, however, particularly from Muslims who were ordered to build churches, pay tithes, and eventually be baptized.

The expansionist khedive (Ottoman viceroy) Ismā'īl Pasha of Egypt posed the first external threat to Yohannes' empire. By the mid-1870s Egypt had encroached on Ethiopia to the east and south, but Ethiopian forces, in what verged on an anti-Muslim crusade, won decisive victories in the mountainous country of the north in 1875 and 1876. Italy, the next aggressor, in 1885 occupied the former Turkish and Egyptian Red Sea port of Mitsiwa (now Massawa, Eritrea) and then began to expand inland toward the province of Tigray, only to be soundly defeated by Yohannes in 1887. In the same year, the Islāmic revivalist Mahdist forces, gaining ground in the Sudan, invaded Ethiopia and devastated the old capital, Gonder. In retaliation, and possibly in the hope of getting Sudanese gold and slaves and even of gaining access to the Nile River, Yohannes invaded the Sudan and was killed in the Battle of Metema (March 1889).

Yoho National Park, park in southeastern British Columbia, Canada. The park occupies 507 square miles (1,313 square km) of the western slopes of the Rocky Mountains and is adjacent to two other national parks—Banff on the east and Kootenay on the south. Its features include Takakkaw Falls, Natural Bridge, and Emerald Lake. A mountaineering centre, the park has several peaks of more than 10,000 feet (3,050 m), including Mounts Goodsir and Gordon. On the west side of Mount Stephen are the Burgess Shale fossil beds, which are thought to be 520,000,000 years old. The park's fauna includes a wide

variety of bird life, black and grizzly bears, mule deer, elk, and mountain goats. A natural salt deposit (animal lick) near Field townsite in the centre of the park is a favourite gathering place of moose.

Yoi (people): *see* Puyi.

Yojoa, Lake, Spanish LAGO DE YOJOA, lake in northwestern Honduras. The nation's largest inland lake, Yojoa has an area of 110 square miles (285 square km). It is volcanic in origin and nestles at an elevation of 2,133 feet (650 m) amid forested mountains. The region is a popular tourist resort, with fishing and duck shooting on the lake and hunting in the surrounding hills. Yojoa is easily accessible, lying on the main highway linking Tegucigalpa, the national capital, with San Pedro Sula and urban centres on the Caribbean.

yoke, wooden bar or frame used to join draft animals at the heads or necks so that they pull together. In the early Middle East and in Greece and Rome, oxen and onagers were yoked across the horns or necks. Control of a team of yoked beasts was difficult. Furthermore, ancient yokes pressed against a hard-pulling animal's windpipe, choking it. The invention of the horse collar solved this problem and led to the replacement of oxen by horses. In some areas of the world, however, oxen still are yoked together much as they were in medieval Europe.

Yokkaichi, city, Mie *ken* (prefecture), Honshu, Japan. It lies facing Ise Bay, southwest of Nagoya. The city developed around a castle built in 1470. By the Tokugawa period (1603–1867), it had become an important trade centre, with markets open on the fourth day of each month (*yokka* means "fourth day in the month," and *ichi* means "market"). The city suffered heavy damage during World War II, but later became the site of a large petrochemical complex. Automobiles, textiles, and chemicals are produced in factories built on reclaimed land. Yokkaichi's growing port imports raw materials and exports its industrial products. The city is considered the nucleus of the Northern Ise Industrial Zone. Pop. (1993 est.) 282,197.

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Yokohama, city and port, capital of Kanagawa *ken* (prefecture), Japan, and part of the Tokyo-Yokohama metropolitan area, which is the largest urban agglomeration in Japan.

A brief treatment of Yokohama follows. For full treatment, *see* MACROPAEDIA: Tokyo-Yokohama Metropolitan Area.

Situated on the western coast of Tokyo Bay, about 20 miles (32 km) southwest of Tokyo, Yokohama was only a small fishing village when in 1859 the neighbouring town of Kanagawa was designated Japan's major port where foreigners could reside and trade. The area flourished with the growth of Japan's foreign trade and shipping after the Meiji Restoration (1868), and in 1889 the city of Yokohama was established through the amalgamation of Kanagawa and Yokohama. The city has become the second largest in Japan and is a major port and industrial centre. It was destroyed by the Great Kantō Earthquake and subsequent fire in 1923 and severely damaged by U.S. air raids in 1945 during World War II but was rebuilt both times.

Yokohama stands on a plain shut in by hills, one of which terminates toward the southeast in a promontory called Cape Hommoku. The climate is mild in winter and hot and humid in summer. Early summer and early autumn are rainy seasons; typhoons often strike in September.

Yokohama and Kawasaki (between Yokohama and Tokyo) form the centre of the Keihin Industrial Zone. Much of the metropolitan area's heavy manufacturing is concentrated there, including shipbuilding and the production of chemicals, machinery, primary metals, petroleum products, automobiles, and fabricated metal goods. The port of Yokohama, one of the largest in Japan, handles imports of raw materials for the surrounding industrial zone and a wide range of exports.

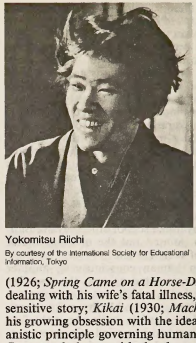
Yokohama's business district, containing many important banks and other businesses, is concentrated around the port. At the northern extremity of the business district, near Sakuragi-cho railway station, is the central shopping street of Isezaki; the industrial area is farther north along the coast. To the south of the business district is Yamate, a hilly residential area. Yamashita Park, which was laid out in 1925 along the base of one of the piers, offers a splendid view of the harbour. Farther south and a short way from the shore, Sankei Garden contains a collection of historic buildings (notably an ancient pagoda) that were brought from other parts of the country. Positioned on a hill above Yamashita Park is Nogeyama Park, which, with its beautiful gardens, open-air theatre, concert hall, and zoo, is one of the largest parks in the city.

Yokohama's active cultural life is enhanced by its four universities, two privately owned and two public. The Kanazawa Library, founded in 1275, is renowned for its collection of historical books and documents. Yokohama has a commercial and industrial museum, and its numerous theatres present everything from traditional kabuki plays to modern drama.

Local transportation is provided by buses and subway lines. Yokohama is connected by highways and railways with Tokyo and with other major cities of Japan. Atsugi Airport, west of Yokohama, is used by some domestic airlines. The city is also served by Tokyo's Haneda airport and the international airport at Narita across the bay in Chiba prefecture. Area 167 square miles (433 square km); Pop. (1993 est.) 3,288,464.

Yokomitsu Riichi, also called YOKOMITSU TOSHIKAZU (b. March 17, 1898, Higashiyama Hot Springs, Fukushima prefecture, Japan—d. Dec. 30, 1947, Tokyo), Japanese writer who, with Kawabata Yasunari, was one of the mainstays of the New Sensationalist school (Shinkankaku-ha) of Japanese writers, influenced by the avant-garde trends in European literature of the 1920s.

Yokomitsu began writing while still at Waseda University, Tokyo, which he left without graduating. In 1923 he joined the playwright Kikuchi Kan's journal *Bungei shunjū*. In 1924 he joined Kawabata in publishing the journal *Bungei jidai* (both can be translated "Literary Age"). Yokomitsu's story *Atama narabi ni hara* ("Heads and Bellies"), published there that year, was hailed as a new kind of writing. In opposition to the autobiographical legacy of naturalism and the social pleading of proletarian literature, Yokomitsu developed an aesthetic of sensual impressions presented in fresh, startling ways. *Haru wa basha ni notte*



Yokomitsu Riichi
By courtesy of the International Society for Educational Information, Tokyo

(1926; *Spring Came on a Horse-Drawn Cart*), dealing with his wife's fatal illness, is a lyrical, sensitive story; *Kikai* (1930; *Machine*) shows his growing obsession with the idea of a mechanistic principle governing human behaviour. Concerned always with the theory of writing, he put forth his ideas in *Junsui shōsetsu ron* (1935; "On the Pure Novel").

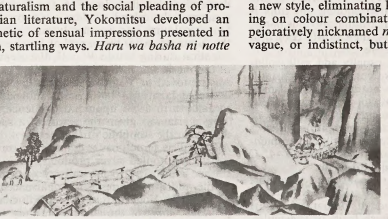
BIBLIOGRAPHY. Dennis Keene, *Yokomitsu Riichi, Modernist* (1980).

Yokosuka, seaport, Kanagawa *ken* (prefecture), Honshu, Japan. It lies on the western shore of Tokyo Bay, about 15 miles (24 km) south of Yokohama. Its site on the Miura Peninsula was occupied by a small fishing village until a shipyard was established there in 1865. By 1884 it had become a major naval station and, after World War II, served as a base for the U.S. Navy and later also for the Japanese Maritime Self-Defense Force.

Yokosuka has become one of Japan's important trade and fishing ports. In the east are the two fine harbours of Yokosuka and Nagaura. The main industries are shipbuilding and automobile manufacturing. Yokosuka also serves as a residential district for the Tokyo-Yokohama metropolitan area. Pop. (1993 est.) 435,383.

Yokoyama Taikan, original name SAKAI HIDEMARO (b. Nov. 2, 1868, Mito, Japan—d. Feb. 26, 1958, Tokyo), Japanese painter who, with his friend Hishida Shunsō, contributed to the revitalization of traditional Japanese painting in the modern era.

Yokoyama studied Japanese painting with Hashimoto Gahō at the Tokyo Art School and became a favourite of its principal, Okakura Kakuzo (Tenshin). Yokoyama started teaching design at the school in 1896 but left it when the principal was ousted. When the latter started the Japan Fine Arts Academy with Hishida, Shimomura Kanzan, and others, Yokoyama also joined him, in 1898. He tried to reconsider the whole technique of traditional Japanese painting, which relied heavily on line drawing, and with Hishida developed a new style, eliminating lines and concentrating on colour combinations. This style was pejoratively nicknamed *mōrōtai* (*mōrō* means vague, or indistinct, but at that time had a



"Transformations," detail of a painting by Yokoyama Taikan, 1923; in the Tokyo National Museum
By courtesy of the Tokyo National Museum

stronger negative sense; *mōrō shafu* meant a hooligan rickshaw man).

Yokoyama became one of the examiners for the Fine Arts Exhibition sponsored by the Ministry of Education (founded in 1907; the exhibition was abbreviated as Bunten). Internal squabbling subsequently resulted in his being ousted from this post, and he concentrated on reviving the Japan Fine Arts Academy, which had closed down upon Okakura Kakuzo's death. The Academy was revived in 1914, and its annual exhibitions, which have the abbreviated name Inten, became an important, nongovernmental outlet for young talents. Among Yokoyama's works are "Mountain Path," "Vicissitudes," and "Cherry Blossoms."

To make the best use of the Britannica, consult the INDEX *first*

Yokuts, also called MARIPOSAN, California Indians speaking a language of Penutian stock who historically inhabited the San Joaquin Valley and the western foothills of the Sierra Nevada south of the Fresno River. The Yokuts were divided into tribes, perhaps as many as 50, each having a dialect, territory, and name of its own.

The Yokuts gathered such plant foods as seeds and roots but were also hunters, with elaborate systems for snaring deer and running down antelope and elk to shoot them with bow and arrow. The most characteristic Yokuts dwelling was the mat-covered communal house inhabited by 10 families or more. In addition, flat roofs were erected on poles for shade. Clothing was simple: men wore loincloths or went naked; women wore fringed aprons front and back.

Chiefs headed tribes and villages. In addition to wealth, they were expected to have more than the usual knowledge, especially in religious matters. The office was hereditary and could be held by women. Two other important offices were those of jester, or clown, and of undertaker, usually a male transvestite whose exclusive function was to prepare bodies for burial or cremation. Polygamy was socially acceptable among the Yokuts, but it was rarely practiced.

Yokuts ceremonies included puberty rite for boys, involving use of the hallucinogen toloachs, made from the jimsonweed. Other ceremonies, including one to prevent rattlesnake bites, were performed by shamans—medicine men who also participated in intertribal contests of shamanistic power.

Yola, town, capital of Adamawa state, and seat of the traditional Adamawa emirate, eastern Nigeria. The town is served by the port of Jimeta (5.5 miles [9 km] north-northwest) on the Benue River, about 500 miles (800 km) above its confluence with the Niger, and by an airfield. Yola also has road connections with Numan, Jalingo, Ganye, Fufore, and Jimeta.

The name of the town is derived from *yolde,* a Fulfulde (Fulani language) word signifying a settlement on rising ground. Yola was founded and made the political centre of Adamawa emirate in 1841, when Modibbo ("Learned One") Adama, the Fulani founder of the emirate, established Yola as a base in his jihad (holy war) against the indigenous Bata (Batta) and Vere (Verre) peoples.

Several European explorers visited the town, and in 1891 a Frenchman, Lieutenant Louis Mizon, convinced the emir to recognize French territorial claims. By 1893 the British had extended their control over this part of the emirate, and shortly afterward the Royal Niger Company established a trading post in the town. After Emir Lauwal Zubeiru forced the company to evacuate the town in 1901, a British expedition was sent there from Lokoja and defeated the Fulani forces. Although German forces raided Yola from Kamerun (Cameroon) in 1914, the town was successfully defended by the British. It was merged by the Fulani administration with neighbouring Jimeta in 1935, but in the 1963 census they were again recognized as separate municipalities.

Much of Yola's trade has now shifted to Jimeta, but both towns are sizable market centres. Especially during the latter part of the rainy season—from July to October, when the Benue River is navigable by vessels of 4-foot (1.2-metre) draft—merchants from Yola and Jimeta collect peanuts (groundnuts), cotton, hides, and skins for shipment to the Niger River delta ports of Burutu and Warri. Local trade is primarily in sorghum, millet, shea nuts, yams, rice, cowpeas, sugarcane, peanuts, fish, onions, peppers, indigo, cattle, goats, poultry, sheep, and cotton. Yola also has a substantial bakery.

The town has taken on growing functions in both administration and education and is the site of a federal university of technology (founded 1981). Yola also has a central mosque and a Roman Catholic church. Pop. town (latest census), 8,573.

Yolande DE BRIENNE: *see* Isabella II *under* Isabella (Jerusalem).

yolk, also called DEUTOPLASM, the nutritive material of an egg, used as food by a developing, embryonic animal. Eggs with relatively little, uniformly distributed yolk are termed isolecithal. This condition occurs in invertebrates and in all but the lowest mammals. Eggs with abundant yolk concentrated in one hemisphere of the egg are termed telolecithal. This occurs in many invertebrates and in all vertebrates lower than marsupial mammals. In arthropods, the yolk is massed near the centre of the egg; such eggs are termed centrolecithal.

Yom Kippur, Hebrew YOM HA-KIPPURIM, English DAY OF ATONEMENT, the most solemn of Jewish religious holidays, observed on the 10th day of the lunar month of Tishri (in the course of September and October), when Jews seek to expiate their sins and achieve a reconciliation with God. Yom Kippur concludes the "10 days of repentance" that begin with Rosh Hoshanah (New Year's Day) on the first day of Tishri. The Bible refers to Yom Kippur as Shabbat Shabbaton ("Sabbath of Solemn Rest," or "Sabbath of Sabbaths") because, even though the holy day may fall on a weekday, it is on Yom Kippur that solemnity and cessation of work are most complete. The purpose of Yom Kippur is to effect individual and collective purification by the practice of forgiveness of the sins of others and by sincere repentance for one's own sins against God.

Yom Kippur is marked by abstention from food, drink, and sex. Among extremely Orthodox Jews the wearing of leather shoes and anointing oneself with oil are forbidden. Orthodox Jews may wear long white robes called *kippelot.*

Jewish congregations spend the eve of Yom Kippur and the entire day in prayer and meditation. On the eve of Yom Kippur the Kol Nidre is recited. Famous for its beautiful melody, the Kol Nidre is a declaration annulling all vows made during the course of the year insofar as they concern oneself (obligations toward others are excluded). Friends also ask and accept forgiveness from one another for past offenses on the evening before Yom Kippur, since obtaining forgiveness from one's fellows signifies God's forgiveness. God is believed to forgive the sins of those who sincerely repent and show their repentance by improved behaviour and performance of good deeds.

The services on Yom Kippur itself last continuously from morning to evening and include readings from the Torah and the reciting of penitential prayers. Yiskur, which are memorial prayers for the recently deceased, may also be recited by members of the congregation. The services end with closing prayers and the blowing of the ritual horn known as the shofar.

Before the destruction of the Temple in Jerusalem, the high priest performed an elaborate sacrificial ceremony in the Temple, successively confessing his own sins, the sins of priests, and the sins of all Israel. Clothed in white linen, he then entered the Holy of Holies—allowed only at Yom Kippur—to sprinkle the blood of the sacrifice and to offer incense. The ceremony concluded when a goat (the scapegoat), symbolically carrying the sins of Israel, was driven to its death in the wilderness.

Yomiuri shimbun, Japanese national daily newspaper, the largest in circulation and the most sensational in editorial style of Japan's "big three" dailies.

Yomiuri was founded in 1874, one of five new dailies created early in the Meiji period (1868–1912) to meet the need for a vernacular newspaper in the rapidly modernizing society of Japan. *Yomiuri* ("selling by reading") was the practice of news vendors of the Tokugawa period (1603–1867), who hawked newssheets, printed from hand-graven blocks before the advent of movable type, by reading them aloud.

Like its more sedate rivals *Asahi* and *Mainichi, Yomiuri* has five regional morning and evening editions plus an English-language edition in Tokyo. *Yomiuri* was consciously influenced by the journalistic style of the American papers of William Randolph Hearst, Sr., in the early decades of the 20th century. The paper's main appeal is to working-class readers. The paper also established the first professional baseball team in Japan (now called the Yomiuri Giants), which helped to increase its circulation.

Yomou, town, southeastern Guinea. It is the chief trading centre (rice, cassava, coffee, and palm oil and kernels) for a densely forested region of the Guinea Highlands mainly inhabited by the Guerze (Kpelle) and Mano (Manon) peoples. The surrounding area borders Liberia on the east, west, and south and the Guinean regions of Macenta on the northwest and Nzérékoré on the northeast. Pop. (1983 prelim.) 10,055.

Yomut carpet, Yomut also spelled YOMUD, floor covering that is handwoven by the Yomut Turkmens of Turkmenistan, and is usually of good to excellent quality. In contrast to Tekke carpets, there is considerable variety of design among the larger Yomut carpets. Many have diagonal rows in which a single diamond- or lozenge-shaped motif is repeated with diverse colourings. This motif may be edged with latch hooks; but the most characteristic edging is composed of a graduated group of vertical bands, each of which is graced with tiny florets. A second series of carpets has vertical rows of parti-coloured octagons on which appear tiny, stylized two-headed dogs. The border is usually a highly geometric vine design on white; and end aprons are covered with stylized designs of leaves and stems or, in some cases, elaborate flowering plants. Colouring ranges from bright red to plum shades, with white being used for the field in some of the small bag faces (the fronts of saddlebags or storage bags).

A weaving apparently peculiar to the Yomuts is a five-sided decorative panel resembling a storage-bag face, usually ornamented with a diamond lattice or a row of conventionalized fir trees. Yomut tent bands (used to decorate tents) and brocaded flat-surfaced rugs are also noteworthy. The larger Yomut carpets

are entirely of wool or goat hair, usually in Ghiordes knotting; in small pieces, for which Sehna knotting is used more frequently, white cotton has been combined occasionally with



Yomut carpet from Russian Turkistan, 19th century; in the Metropolitan Museum of Art, New York City

Courtesy of the Metropolitan Museum of Art, New York City, gift of J.F. Ballard; photograph, Otto E. Nelson—EB Inc.

wool in the weft. Like Tekke carpets, Yomut carpets were often sold as Bokharas. *See* also Bokhara rug.

Yonago, city, Tottori *ken* (prefecture), western Honshu, Japan, on the delta of the Hino River, which forms the Yonago Plain. The city occupies the base of a sandspit called the Yumiga Beach, which extends from the mouth of the river northwest into the Sea of Japan. Yonago was originally a fishing village called Kano. With the construction of Yonago castle (1601), it grew into a regional centre of transport and commerce. The city is now a major industrial site, producing pulp, processed foods, iron and steel, and textiles. Yonago is also a gateway to the Daisen-Oki National Park. Pop. (2000) 138,756.

Yonezawa, city, Yamagata *ken* (prefecture), northern Honshu, Japan, on the Ōu Line (railway). From the Muromachi period (1338–1573) to the Meiji Restoration (1868) it was a castle town of the Uesugi daimyo family (*see* Uesugi family). The ruling family initiated agrarian reforms by constructing irrigation systems and allowing samurai (warriors) to cultivate the fields and manufacture silk. Industrialization was slow until the early 1960s, when traditional small-scale textile manufacture was supplemented with the production of electrical appliances and lumber.

Matsugasaki Park, located on the old castle site, contains the shrines of two well-known members of the Uesugi family—Uesugi Kenshin (1530–78), who won a battle in defense of his fief against the Hōjō clan, and Uesugi Harunori (1756–1822), who introduced silk weaving into the city. Pop. (2000) 95,392.

Yong'an (China): *see* Yung-an.

Yonge, Charlotte M(ary) (b. Aug. 11, 1823, Otterbourne, Hampshire, Eng.—d. March 24, 1901, Otterbourne), English novelist who dedicated her talents as a writer to the service of the church. Her books helped to spread the influence of the Oxford Movement, which



Charlotte Yonge, detail of a watercolour by George Richmond, 1844; in the National Portrait Gallery, London

Courtesy of the National Portrait Gallery, London

sought to bring about a return of the Church of England to the High Church ideals of the late 17th century.

Her first success came with *The Heir of Redclyffe* (1853), whose hero made goodness attractive and romantic. Her other novels include *Heartsease* (1854); *The Daisy Chain* (1856), which depicts the moral conflict of sheltered lives; and *The Young Stepmother* (1861). She also edited a magazine for girls, *The Monthly Packet,* for which she wrote historical cameos, and composed religious tracts. Her best work has a vitality that saves it from being propagandist.

Yonglo (Chinese emperor): *see* Yung-lo.

Yŏngsan River, Korean YŎNGSAN-GANG, river, southwestern South Korea. Rising in extreme northern Chŏlla-namdo (North Chŏlla Province), the Yŏngsan River flows southwest into the Yellow Sea near Mokp'o. The drainage basin is South Korea's most important rice growing area and was the scene in the mid-1970s of the construction of four multipurpose dams for both flood control and water storage.

Yongzheng (Chinese emperor): *see* Yungcheng.

yoni (Sanskrit: "holder"), in Hinduism, representation of the female sexual organ and thereby the symbol of the goddess Śakti, consort of Śiva. The *yoni* is often associated with the *liṅga (q.v.),* the representation of the phallus and symbol of the god Śiva, in the iconography of Śaivism.

Yonkers, city, Westchester county, southeastern New York, U.S. It is situated on the east shore of the Hudson River in a hilly region north of the Bronx, New York City. The site, once a major village, Nappeckamack, of the Manhattan Indians, was acquired by the Dutch West India Company in 1639. Adriaen van der Donck—known as De Jonkheer, a courtesy title roughly equivalent to "young lord," or "gentleman" (whence, phonetically, Yonkers)—was given a land grant in 1646 and established the patroonship (estate) of Colendonck in 1652. The lands were then bought by Frederick Philipse, who built a manor house there in 1682 (later used as the Yonkers city hall). The manor was confiscated (1779) because the founder's great-grandson espoused the Tory cause during the American Revolution; it is now a state historic site.

A thriving farm village within the Town (township) of Yonkers (established in 1788), Yonkers was connected to New York City by railroad in 1849. The Otis Elevator Works was established there in 1854. The southern portion of old Yonkers was annexed to what later became the Bronx in 1874. Industry is now well diversified and includes the manufacture of plastic bags, valves, electronic components, and stamped metal products. St. Joseph's Seminary and College was established there in 1891. St. Andrews Golf Club, the oldest in the United States, was organized in Yonkers in 1888; it has since moved to nearby Hastings-on-Hudson. The local Hudson River Museum of Westchester has regional art and science exhibits. Inc. village, 1855; city, 1872. Pop. (2003 est.) 197,388.

Yonne, *département,* Bourgogne region, central France. It was created from portions of the historic provinces of Champagne and Burgundy (Bourgogne) with additional small sections of the old provinces of Orléanais and Nivernais. It is named for the Yonne River, a tributary of the Seine River that bisects the *département* and flows south-north through Auxerre, the capital, and Sens. The eastern section is drained by the Armaçon River, accompanied by the Burgundy Canal (Canal de Bourgogne). The Loing River, which rises in the *département* near the southern border, crosses its southeastern corner.

Woodland and heath occupy much of the *département,* which comprises plains and plateaus extending southeast from the Seine valley to the forested Morvan heights. The western region includes part of the Gâtinais woodland and heath district; the east includes the hilly Othe Forest area. The climate is temperate with warm summers.

Much of western Yonne *département* around Sens and Auxerre is cultivated for cereals (notably wheat) and rapeseed and sunflowers; cattle rearing is of growing impor- tance in the southeast. Some of the valley slopes produce famous wines, especially those of Chablis, east of Auxerre. Although there are no large urban centres, the *département* has attracted a range of manufacturing industries, including electronics and electrical equipment, machinery, and pharmaceuticals. Many of these plants have moved there from the Paris region.

The *département*'s relatively close proximity to Paris—Auxerre is about 80 miles (130 km) from the metropolis's southeastern edge—and its excellent rail and highway network have drawn an influx of Parisians who live there (especially the western areas) and commute to the capital. Its numerous ancient villages, historic churches, and châteaus are popular tourist attractions. Beside the cathedrals of Auxerre and Sens, the Romanesque basilica of Vézelay is of particular interest, as are the châteaus of Ancy-le-Franc, Tanlay, Fleurigny, and Saint-Fargeau.

The *département* has three *arrondissements,* Auxerre, Avallon, and Sens. It is in the educational division of Dijon. Area 2,868 square miles (7,427 square km). Pop. (1999) 333,221.

Yonne River, Latin ICAUNA, river, north central France, a left-bank tributary of the Seine River. From its source in the Nièvre *département* at the foot of Mont Preneley, located in the Morvan heights west of Autun, to its confluence with the Seine at Montereau, the Yonne is 182 miles (293 km) long. It speeds north-northwest through deep, wooded gorges to Pannessières–Chaumard, where its turbulent waters are dammed to regulate its flow as well as that of the Seine. Passing through Clamecy, accompanied by the Canal du Nivernais, it enters the Yonne *département* and receives the Cure above Auxerre. The canalized Armançon joins it above Joigny, through which it flows before passing Sens and veering northwest to Montereau. It is navigable for 70 miles (115 km) downstream from Auxerre.

Yono, former city, Saitama *ken* (prefecture), east-central Honshu, Japan. In 2001 it merged with the neighbouring cities of Ōmiya and Urawa to form the city of Saitama (*q.v.*).

Yoram (Old Testament king): *see* Jehoram.

Yorck von Wartenburg, Johann (David Ludwig), Graf (count), Yorck also spelled YORK, Johann also rendered HANS (b. Sept. 26, 1759, Potsdam, Prussia [now in Germany]— d. Oct. 4, 1830, Klein-Öls, Silesia [now Oleśnica, Pol.]), Prussian field marshal, reformer, and successful commander during the Wars of Liberation (1813–15) against France. His initiative in signing a separate neutrality agreement with Russia during the Napoleonic invasion of that country (Convention of Tauroggen, 1812) opened the way for Prussia to join the Allied powers against Napoleon.

Yorck entered the Prussian army in 1772 but was cashiered for disobedience in 1779. Joining the Dutch army, he served mainly in the Dutch East Indies, where he became familiar with skirmish warfare and open battle formations. After reinstatement in the Prussian army (1787), he fought in Poland (1794) and successfully commanded the rear guard after Napoleon's rout of the Prussian army at Jena (October 1806). Promoted to major general in 1807, Yorck, as inspector of light infantry, played a leading role in the reorganization of the Prussian army. An excellent tactician, he became the tactical teacher of the



Yorck von Wartenburg, detail from a portrait by Karl Hermann
Courtesy of Bildarchiv Preussischer Kulturbesitz BPK, Berlin

army, developing the infantry scout and the line of skirmishes. His conservatism, however, led him to oppose the liberal army reforms proposed by General August Neidhardt von Gneisenau.

In 1812 Yorck led the Prussian contingent of Napoleon's invading army in Russia. During Napoleon's disastrous retreat, he concluded the Tauroggen Convention with the Russians, neutralizing his force. The Prussian king Frederick William III signed the Treaty of Kalisch (Feb. 28, 1813), which justified Yorck's action and brought Prussia into the Allied camp. In the subsequent campaigns, Yorck distinguished himself again and was created Graf von Wartenburg in 1814. He remained in the army after the conclusion of peace.

Yorghan Tepe (ancient Mesopotamian city): *see* Nuzu.

Yorimitsu, also called RAIKŌ, one of the most popular of the legendary Japanese warrior heroes and a member of the martial Minamoto clan. In his exploits he is always accompanied by four trusty lieutenants. One adventure concerns his vanquishing the boy-faced giant Shuten-dōji ("Drunkard Boy"), who lived on human blood and who together with his repulsive retainers terrorized the countryside around his stronghold on Ōye-yama. To gain admittance to the stronghold, Yorimitsu and his companions disguised themselves as mountain priests. They first befuddled the creatures with a magic drink, then threw off their priestly robes to reveal themselves as warriors. Shuten-dōji's severed head continued to attack Yorimitsu even after the giant's

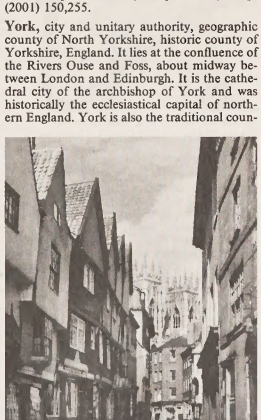


Yorimitsu being harried by the earth spider, woodblock print by Utagawa Kuniyoshi (1797–1861)
Courtesy of the Victoria and Albert Museum, London

death, but the Minamoto warriors eventually triumphed.

York, former city (1983–98), southeastern Ontario, Canada. In 1998 it was amalgamated with the cities of Toronto, Etobicoke, Scarborough, and North York and the borough of East York to form the City of Toronto. It is situated in the west-central part of the new city. York was established as a borough in 1967, through the amalgamation of the township of York and the town of Weston (incorporated 1881). It was incorporated as a city in 1983. The original York Township was formed in 1793, and it was once called Dublin. Area 9 square miles (23 square km). Pop. (2001) 150,255.

York, city and unitary authority, geographic county of North Yorkshire, historic county of Yorkshire, England. It lies at the confluence of the Rivers Ouse and Foss, about midway between London and Edinburgh. It is the cathedral city of the archbishop of York and was historically the ecclesiastical capital of northern England. York is also the traditional county town of Yorkshire, located at the convergence of the three ridings ("thirds"; the administrative jurisdictions into which Yorkshire was formerly divided).



A street in York, North Yorkshire, with the towers of York Minster in the background
Noel Habgood—Bruce Coleman Inc.

The Romans occupied the site in AD 71 and built a fortress and wall, traces of which remain. Under the name Eboracum, the settlement served as the Romans' northern military headquarters until they withdrew about 400. Anglo-Saxon rule eventually followed. In the 7th century Paulinus became the first archbishop of York, and Edwin, king of Northumbria, built a church where the present Minster stands. The Danes conquered York in 867 and retained it as their Northumbrian capital. The city's present name was derived from the Danish Yorvick.

York suffered severely in William I's conquest of northern England. Part of the city was demolished, land was flooded, and two defensive castles (now sites of Clifford's Tower and the Castle Museum complex) were built to subdue the rebellious north. In time the city revived and prospered as a staple (wholesale commerce) town, dealing especially in wool. The York cycle of 48 mystery plays, performed by York's many medieval craft guilds, survives. The city was incorporated in the 12th century and for a time was second only to London in size and importance. York's Cathedral (Minster) of St. Peter, the largest Gothic church in England, was built between the 13th and the 15th centuries. Other medieval buildings include the Guildhall (1446–48; restored after bombing in World War II), the Merchant Adventurers' Hall (1357), St. William's College (1453; founded for chantry priests), and many more. The medieval walls that surround the city are 2.5 miles (4 km) in circumference and date from the 14th century.

Modern York is a major rail junction and the site of the National Railway Museum (1975), the only national museum outside London. The city's industrial products include railway cars as well as shock absorbers, optical instruments, glass containers, and sugar and chocolate candies. York's many medieval churches and other historic buildings make tourism a significant component of the economy. The University of York (1963) and the archbishop's residence at Bishopthorpe lie just outside the city centre. The city and unitary authority also encompass open countryside and several rural villages. Area 105 square miles (272 square km). Pop. (2001) 181,094.

York, town, York county, southwestern Maine, U.S., situated at the mouth of the York River on the Atlantic Ocean, 43 miles (69 km) southwest of Portland. York includes the communities of York Village, Cape Neddick, York Beach, and York Harbor. Settled in 1624 on a site called Agamenticus by Captain John Smith, who had explored the area in 1614, it became the first English city on the American continent when Sir Ferdinando Gorges endowed it with a city charter under the name of Gorgeana in 1641. The Massachusetts Bay Company took over the Gorges property in 1652, revoked the charter, reduced Gorgeana to the status of a town, and changed its name to York (for the town in Yorkshire, England). It was almost destroyed on Feb. 2, 1692, in a raid by Abenaki Indians.

With its snug harbours, sandy beaches, and restored colonial buildings, including Old Gaol Museum (1719, one of the oldest English public buildings in the United States), the modern town of York is an attraction for photographers, artists, and vacationers. Area 55 square miles (142 square km). Pop. (2003 est.) 13,390.

York, city, seat (1749) of York county, southeastern Pennsylvania, U.S., on Codorus Creek, 28 miles (45 km) southeast of Harrisburg. It is the focus of a metropolitan district

that includes the boroughs of North York and West York and a number of townships. It was laid out (1741) in Springettsbury Manor, a tract owned by Springett Penn, William Penn's grandson, and was named for the English city. In 1777 the Continental Congress left Philadelphia at the British approach and, after holding a one-day session in Lancaster, moved to York and met in the national capital (Sept. 30, 1777–June 27, 1778). In the old county courthouse (built 1754–56, demolished 1849), Congress passed the Articles of Confederation, received the news of Gen. John Burgoyne's surrender at Saratoga, issued the first national thanksgiving proclamation, and received word from Benjamin Franklin in Paris that France would aid the nascent United States. It was in York that the Conway Cabal, led by Thomas Conway to deprive George Washington of command of the army, was frustrated by the Marquis de Lafayette's toast to Washington in General Gates' House (*c.* 1751; restored). York was also the site where $1,500,000 in silver, lent by France, was brought in September 1778, and where $10,000,000 in Continental money was issued from Benjamin Franklin's printing press. During the Civil War, Confederate troops entered the town (June 28, 1863), forcing the retreat of the small Federal force.

The economy is well diversified, based on agriculture, manufacturing, and distribution. Manufactures include refrigerating and ordnance equipment, paper, furniture, and textiles. York College of Pennsylvania was opened in 1941, and the York campus of Pennsylvania State University in 1949. York is noted for its markets tended mostly by Mennonite and Dunkard farm families. Inc. borough, 1787; city, 1887. Pop. (1990) city, 42,192; York MSA, 417,848.

York, DUKES OF, titled English nobility of several creations, grouped below chronologically and indicated by the symbol •.

• **York, Edmund of Langley, 1st duke of,** also called (1362–85) EARL OF CAMBRIDGE (b. June 5, 1341, King's Langley, Hertfordshire, Eng.—d. Aug. 1, 1402, King's Langley), fourth surviving legitimate son of King Edward III of England and founder of the House of York as a branch of the Plantagenet dynasty.

Created earl of Cambridge in 1362 and duke of York in 1385, Edmund was the least able of Edward III's sons, and in the political strife of Richard II's reign he played an ineffective part. Between 1359 and 1378 he served without distinction in several campaigns in France, Spain, and Brittany, and his one independent command, the Lisbon expedition of 1381–82 to aid King Ferdinand of Portugal against Castile, was a failure. York was appointed keeper of the realm during Richard II's absence in Ireland in 1394–95, and again on the King's departure for his second Irish expedition in May 1399. When Henry of Lancaster (afterward King Henry IV) invaded England (July), York tried to organize resistance, but he soon submitted (July 27), recognizing that Richard's cause was lost.

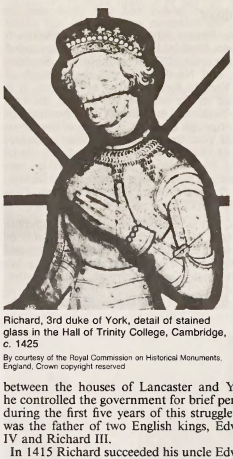
• **York, Edward of Norwich, 2nd duke of** (b. *c.* 1373, Norwich?, Norfolk, Eng.—d. Oct. 25, 1415, Agincourt, Fr.), Yorkist who led a checkered career in the reigns of Richard II of England and the usurper Henry IV.

Son of the 1st Duke of York, he was prominent among Richard II's favourites and was made earl of Rutland in 1390 and earl of Cork in 1394 and given many important offices. After Richard II's coup d'etat of 1397, he succeeded his uncle, Thomas, duke of Gloucester, as constable of England, obtaining also Gloucester's lordship of Holderness in Yorkshire, and was created duke of Aumarle (Albemarle) in September 1397. He deserted Richard II in August 1399 but was denounced as Gloucester's murderer in Henry IV's first Parliament and was lucky to lose only his recent gains, including his ducal title.

He was royal lieutenant in Aquitaine in 1402 when his father's death made him duke of York, and later he served against the rebels in South Wales. Accused by his sister, Constance, Lady Despenser, of being involved in her conspiracy against King Henry IV in 1405, York was imprisoned in the Tower of London and later in Pevensey Castle, but was soon pardoned. After joining the French expedition of Thomas, duke of Clarence, in 1412, he remained in Aquitaine until August 1413. Edward was killed at the Battle of Agincourt. He died childless, and his heir was his nephew, Richard, 3rd duke of York.

Edward was the author of *The Master of Game,* the oldest English book on hunting; this work was based on a translation of the *Livre de la Chasse* of Gaston III Phoebus, comte de Foix, with an added five chapters on the conditions and practice of hunting and of game management in England. Long copied and circulated, the work was not printed until 1904.

• **York, Richard, 3rd duke of** (b. Sept. 21, 1411—d. Dec. 30, 1460, near Wakefield, Yorkshire, Eng.), claimant to the English throne whose attempts to gain power helped precipitate the Wars of the Roses (1455–85)



Richard, 3rd duke of York, detail of stained glass in the Hall of Trinity College, Cambridge, *c.* 1425

By courtesy of the Royal Commission on Historical Monuments, England. Crown copyright reserved

between the houses of Lancaster and York; he controlled the government for brief periods during the first five years of this struggle. He was the father of two English kings, Edward IV and Richard III.

In 1415 Richard succeeded his uncle Edward as duke of York. As a descendant of Lionel, duke of Clarence, third son of King Edward III (ruled 1327–77), York had a hereditary claim to the throne that was stronger, by primogeniture, than that of Henry VI (who became king in 1422), who was descended from Edward's fourth son. Nevertheless, York served Henry faithfully as governor of France and Normandy from 1436 to 1437 and 1440 to 1445. At the same time, he became an opponent of the powerful Beaufort family, which was gaining control of Henry's government. The death of Humphrey, duke of Gloucester, in 1447 left York next in line for succession to the throne, and the Beauforts had him sent—virtually banished—to Ireland as lord lieutenant. He returned to England in 1450 and led the opposition to Henry's new chief minister, Edmund Beaufort, duke of Somerset. When the King suffered a nervous breakdown in July 1453, the ambitious queen, Margaret of Anjou, backed by Somerset, claimed the regency, but her rule was so unpopular that Parliament appointed York protector of the realm in March 1454. York was hated and feared by Margaret because he was a potential rival to the throne she hoped to obtain for her son, then an infant. Consequently, upon Henry's recovery, in December 1454, Margaret persuaded him to dismiss York and restore Somerset to power. York immediately took up arms. At St. Albans, Hertfordshire, on May 22, 1455, his forces killed Somerset in battle, and he had control of the government until Margaret again gained the upper hand in October 1456. Hostilities between the two sides reopened late in 1459; in July 1460 York's able lieutenant Richard Neville, earl of Warwick, defeated the Lancastrians at Northampton and captured the King. A compromise was then worked out whereby Henry was to remain king for life and York was to succeed him. But Margaret, who would never agree to the disinheritance of her son, raised a rebellion in northern England. York's attempt to deal with her resulted in his death when he was attacked by the Lancastrians outside his castle near Wakefield. His son Edward seized power the following year as Edward IV.

• **York, James, duke of:** *see* James II *under* James (Great Britain).

• **York, Henry Stuart, cardinal duke of** (b. March 6, 1725, Rome—d. July 13, 1807, Frascati, Italy), last legitimate descendant of the deposed (1688) Stuart monarch James II of Great Britain. To the Jacobites—supporters of Stuart claims to the British throne—he was known as King Henry IX of Great Britain for the last 19 years of his life.

Shortly after his birth, Stuart was named duke of York by his father, the exiled Stuart claimant James Edward, the Old Pretender, son of James II. Stuart raised forces in France to help his elder brother, Charles Edward, the Young Pretender, during the unsuccessful Forty-five Rebellion (Jacobite rebellion of 1745–46), but the uprising was crushed before Stuart's troops could be deployed. In 1747 the pious, mild-mannered duke was created cardinal of York by Pope Benedict XIV. He was consecrated archbishop of Corinth in 1758 and was later (1761–1803) bishop of Frascati, in Italy.

Upon the death of the Young Pretender in 1788, Stuart proclaimed himself king as Henry IX. He lost his property during the Napoleonic invasion of Italy, and after 1800 he survived on a yearly pension granted him by King



Henry Stuart, the cardinal duke of York, detail of a painting by an unknown artist; in the Scottish National Portrait Gallery, Edinburgh

By courtesy of the Scottish National Portrait Gallery, Edinburgh

George III of England. Brian Fothergill's biography *The Cardinal King* was published in 1958.

• **York, Prince Albert, duke of:** *see* George VI *under* George (Great Britain).

York, HOUSE OF, younger branch of the house of Plantagenet (*q.v.*) of England. In the 15th century, having usurped the throne from the house of Lancaster (*q.v.*), it provided three kings of England—Edward IV, Edward V, and Richard III—and, in turn defeated, passed on its claims to the Tudor dynasty.

The house was founded by King Edward III's fifth son, Edmund of Langley (1341–1402), 1st Duke of York, but Edmund and his own son, Edward, 2nd Duke of York, had for the most part undistinguished careers. Edward, dying childless, passed on the dukedom to his nephew Richard (whose mother was a descendant of Edward III's second surviving son, Lionel, Duke of Clarence). Richard, 3rd Duke of York (1411–60), was the initial Yorkist claimant to the crown, in opposition to the Lancastrian Henry VI. It may be said that his claim, when it was advanced, was rightly barred by prescription, the house of Lancaster having then occupied the throne for three generations, and that it was really owing to the misgovernment of Queen Margaret of Anjou and her favourites that it was advanced at all. Yet it was founded upon strict principles of lineal descent, for the 3rd Duke of York was descended from Lionel, Duke of Clarence, the second surviving son of Edward III, whereas the house of Lancaster came of John of Gaunt, a younger brother of Lionel. One thing that might possibly have been considered an element of weakness in Richard's claim was that it was derived through females—an objection actually brought against it by Chief Justice John Fortescue. But apart from strict legality, Richard's claim was probably supported in the popular view by the fact that he was descended from Edward III through his father no less than through his mother.

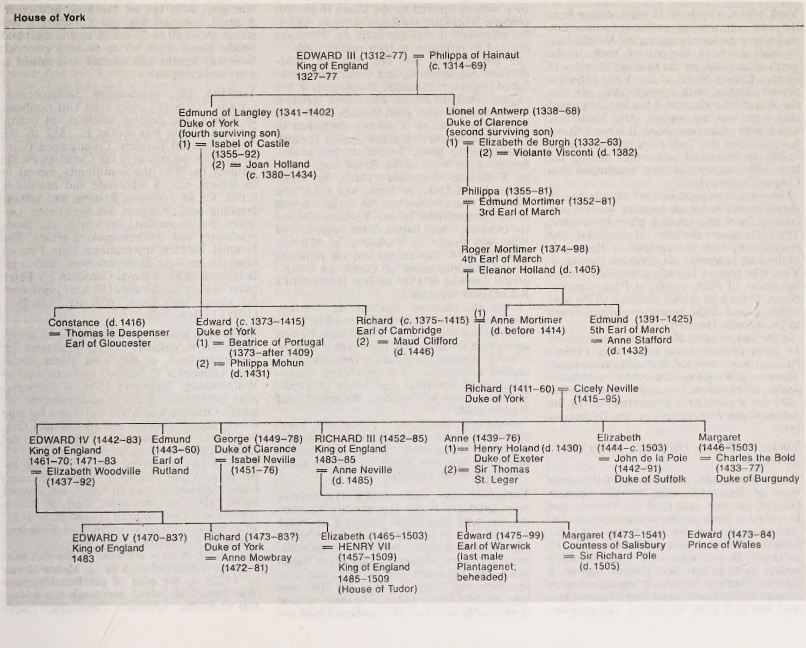
After seeking for many years to correct the weakness of Henry VI's government, Richard first took up arms and at length claimed the crown in Parliament as his right. The Lords, or those who did not purposely stay away from the House, admitted that his claim was unimpeachable but suggested as a compromise that Henry should retain the crown for life and that Richard and his heirs succeed after his death. This was accepted by Richard, and an act to that effect received Henry's own assent. But the act was repudiated by Margaret of Anjou and her followers, and Richard was slain at Wakefield fighting against them. In little more than two months, however, his son was proclaimed king at London by the title of Edward IV, and the bloody victory of Towton immediately after drove his enemies into exile and paved the way for his coronation.

After his recovery of the throne in 1471, Edward IV had little more to fear from the rivalry of the house of Lancaster. But the seeds of distrust had already been sown among the members of his own family, and in 1478 his brother Clarence was put to death—secretly, indeed, within the Tower of London, but still by his authority and that of Parliament—as a traitor. In 1483 Edward himself died; and his eldest son, Edward V, after a nominal reign of two months and a half, was put aside by his uncle, the Duke of Gloucester, who became Richard III, and then, it is said, caused him and his brother Richard, Duke of York, to be murdered. But in little more than two years Richard was slain at Bosworth Field by the Tudor Earl of Richmond, who, being proclaimed king as Henry VII, shortly afterwards fulfilled his pledge to marry the eldest daughter of Edward IV and so unite the houses of York and Lancaster.

Here the dynastic history of the house of York ends, for its claims were henceforth merged in those of the house of Tudor.

York, Alvin Cullum (b. Dec. 13, 1887, Pall Mall, Tenn., U.S.—d. Sept. 2, 1964, Nashville, Tenn.), celebrated American hero of World War I, immortalized by the film version of his life story, *Sergeant York* (1941).

A blacksmith from Cumberland Hill, Tenn., York was denied status as a conscientious objector and was drafted into the army during World War I. While serving in the 82nd Infantry Division at the Meuse-Argonne Offensive (October 1918), he was among a patrol of 17 men ordered to take out a German machine-gun emplacement that was checking his regiment's advance. Behind enemy lines the patrol lost half its men but managed to take a handful of prisoners before it was pinned down by extremely heavy rifle and machine-gun fire. Corporal York assumed command and, while the rest of the survivors took up defensive positions and stood guard over the prisoners, York attacked alone and, firing rapidly and with deadly accuracy at the enemy gunners, killed 25 of them, which prompted the others to surrender. En route back to the American lines, he captured still more Germans, to a total of 132. York was promoted to the rank of sergeant and later received the Congressional Medal of Honor and similar honors from France and other countries. After the war he returned to Tennessee, where he lived on a farm given him by that state and helped establish an industrial institute and a Bible school for the education of rural youth.



His autobiography, *Sergeant York, His Own Life Story and War Diary* (ed. by T. Skeyhill), appeared in 1928.

York, Cape, northernmost point of the Australian continent, comprising the northern tip of Cape York Peninsula, in the state of Queensland. The cape juts north-northeast from the peninsula into Torres Strait, which separates it from the island of New Guinea. The cape is about 15 miles (25 km) long and 12 miles (19 km) wide. It was named in 1770 by Captain James Cook for the Duke of York, brother of King George III.

York, Elizabeth Angela Marguerite, Duchess of (queen consort of George VI of Great Britain): *see* Elizabeth.

York Factory, historic settlement, northeastern Manitoba, Canada. It lies at the mouth of the Hayes River, on Hudson Bay. It was the site of a Hudson's Bay Company post (Fort Nelson) built in 1682 and destroyed in 1684 by the French; a new fort, named for the Duke of York (later King James II), was quickly erected. The fort changed hands several times until by the Treaty of Utrecht (1713) it became British. As York Factory it was the chief port, supply depot, and headquarters for the fur-trading centres of northern Canada, but its importance declined with the completion in 1885 and 1915 of the transcontinental railroads and in 1931 of the branch line to Churchill on Hudson Bay, 140 miles (225 km) northwest. The trading post closed in 1957, ending 275 years of nearly continuous operation; it has been designated a national historic site and is accessible only by air or canoe.

York plays, a cycle of 48 plays, dating from the 14th century, of unknown authorship, which were performed during the Middle Ages by craft guilds in the city of York, in the north of England, on the summer feast day of Corpus Christi. Some of the York plays are almost identical with corresponding plays in the Wakefield cycle, and it has been suggested that there was an original (now lost) from which both cycles descended. It is more likely, however, that the York cycle was transferred bodily to Wakefield some time during the later 14th century and there established as a Corpus Christi cycle.

The plays were given in York on one day, in chronological order, on pageant wagons proceeding from one selected place to another. The cycle covers the story of man's fall and redemption, from the creation of the angels to the Last Judgment; six plays are peculiar to York (the play of Herod's son, of the Transfiguration, of Pilate's wife, of Pilate's majordomo, of the high priests' purchase of the field of blood, and of the appearance of the Virgin to the Apostle Thomas).

In the last revision of the York plays, about 14 plays (mainly those concerning Christ's Passion) were redacted into alliterative verse. These are powerful and the work of a dramatic genius, often referred to as the York Realist.

The York plays have been preserved in the Ashburnham Manuscript, in the British Library.

Yorke, Philip: *see* Hardwicke, Philip Yorke, 1st Earl of.

Yorke Peninsula, promontory of the south coast of South Australia, between Spencer Gulf to the west and Gulf St. Vincent and Investigator Strait to the east and south. Extending southward for 160 miles (260 km) from Port Pirie to Cape Spencer, it is 20–35 miles (32–56 km) wide, with a gently rolling surface rising to 400 feet (120 m). Sighted in 1802 by Matthew Flinders, it was named after Charles Philip Yorke (later Lord Hardwicke), then first lord of the Admiralty. The peninsula's soils yield grain crops, chiefly barley and wheat. Other resources are salt (by evaporation), limestone, and gypsum. Wallaroo is a major grain-shipping port for the peninsula. A dry, sunny climate has encouraged the growth of coastal resorts.

Yorkshire, former county of England, until 1974 the country's largest county. Historically, Yorkshire was divided into three ridings ("thirds"), each of which had the full administrative status of a county: the North Riding (now in North Yorkshire, Cleveland, and Durham); the East Riding (now in Humberside and North Yorkshire); the West Riding (now distributed among parts of the areas of Greater Manchester, South Yorkshire, and West Yorkshire and parts of four counties: North Yorkshire, Cumbria, Lancashire, and Humberside); and the City (and County) of York, where the three ridings converged. Although there was one high sheriff for the county, for most purposes the ridings were separate administrative units for a thousand years. Each riding had its own court of quarter sessions and its own county council. Yorkshire and the ridings passed out of existence with the administrative reorganization of 1974.

Many prehistoric remains have been discovered in Yorkshire, the most prominent being the hill forts found throughout the county. The Romans found the region inhabited by the Brigantes and, in the eastern portion, the Parisi. The Romans established control over the region in the 1st century AD and garrisoned the town of Eboracum (now York). Yorkshire served the Romans as a frontier base from which to repel invasions from the north. After Roman rule there ended in the early 5th century, the Angles and then the Northumbrians established themselves in Yorkshire until they were conquered by the Danes in the 9th century. Yorkshire remained strongly Anglo-Scandinavian in culture until the Normans crushed all resistance to their rule in 1069.

In the ensuing two centuries the Benedictines, Augustinians, and Cistercians established important monastic foundations in the county, while the Percys, Mowbrays, Nevilles, Warennes, and other great families established large landed estates. Yorkshire continued to serve as a defensive frontier against Scottish raids from the north. Two of the best-known battles of the Wars of the Roses were fought in Yorkshire: Wakefield (1460), in which Richard, 3rd Duke of York, was slain, and Towton (1461), which saw the decisive defeat of the Lancastrians by the Yorkists. One of the most important battles of the English Civil Wars was fought in Yorkshire, at Marston Moor in 1644. The county was the principal site of the Pilgrimage of Grace, an unsuccessful uprising in 1536 against Henry VIII's Reformation legislation.

Local sheepherding enabled the woolen-textile industry to become established in Yorkshire in the 14th and 15th centuries, though agriculture remained the dominant economic activity. Yorkshire entered the Industrial Revolution as a centre of woolen-textile manufacturing in the cities and towns of Leeds, Sheffield, Bradford, Halifax, Wakefield, and Huddersfield.

Owing to its long history, present-day Yorkshire has a wealth of old castles, cathedrals and churches, monasteries, abbeys, and country mansions. *See also* North Yorkshire; South Yorkshire; West Yorkshire.

Yorkshire, also called LARGE WHITE, breed of swine produced in the 18th century by crossing the large indigenous white pig of North England with the smaller, fatter, white Chinese pig. The well-fleshed Yorkshire is solid white with erect ears. Although originally a bacon breed, the Yorkshire rose to prominence in the lean-meat category during the 20th century in the United States. The boar is used considerably as a sire of crossbred litters out of coloured dams. The Yorkshire is probably the most widely distributed breed of pig in the world.

Yorkshire fog: *see* velvet grass.

Yorkshire Post, daily newspaper that is the chief Conservative paper published in England outside London. It is one of the most prestigious provincial papers in Britain.

The *Post* is descended from the *Leeds Intelligencer,* a four-page weekly founded in Leeds, Yorkshire, Eng., by Griffith Knight in 1754. When it was purchased by a group of Conservatives in 1866, the *Intelligencer* changed its name to the *Yorkshire Post* and went to daily publication. It soon won a reputation as a serious newspaper interested in developments beyond the borders of Yorkshire.

Starting in 1882, when Charles Pebody assumed the duties of editor, the *Yorkshire Post* began to attract a continually broadening readership by stressing important local, national, and international news and by thoughtful, perceptive editorials reflecting an independent policy. In the 1930s the *Post* opposed any appeasement of Nazi Germany. By the 1960s it was ranked among Britain's most influential dailies and was considered in the same class with such papers as *The Guardian* of Manchester and *The Scotsman* of Edinburgh.

Yorkshire terrier, also called YORKIE, breed of toy dog developed about the mid-1800s in the English counties of Yorkshire and Lancashire. The lineage of the breed is unknown but appears to include several terriers, such as the Skye and Dandie Dinmont; it may also include the Maltese. The most outstanding feature of the Yorkie is its straight, silky coat, parted on the back from nose to tail and long enough to sweep the ground. Colour is dark blue-gray, with tan on the head and chest. A small, compact dog, the Yorkshire terrier stands about 20 to 23 cm (8 to 9 inches) and weighs about 2 to 3.5 kg (4 to 8 pounds). Generally healthy and spirited, it is valued as a pet and companion.

Yorkton, city, southeastern Saskatchewan, Canada. It lies 117 miles (189 km) northeast of Regina. The original townsite, on nearby Yorkton Creek, was settled in 1882 by the York (Ontario) Farmers' Colonization Company. With the arrival of the Canadian Pacific Railway in 1890, the community moved to its present site. A wholesale and marketing centre for an extensive farming and turkey-breeding area, Yorkton has stockyards, tanneries, poultry markets, brickyards, and farm-machinery and concrete-making plants. The biennial Yorkton International Film Festival (open to amateur films) has been held regularly since 1950. A Royal Canadian Air Force radar station is 12 miles (19 km) northwest. Inc. village, 1894; town, 1900; city, 1928. Pop. (1991) 15,315.

Yorktown, historic town, seat of York county, southeastern Virginia, U.S. It is situated on the south bank of the York River across from Gloucester Point, just east-southeast of Williamsburg. Settled in 1631, it developed after 1680 when a port was authorized by Virginia's General Assembly. Yorktown became a busy shipping centre, and its Colonial Custom House (1706; restored) is regarded as the cradle of the American tariff system. By 1750, however, its commercial role had declined together with the Tidewater Virginia tobacco trade. Yorktown's place in history was assured by the siege and surrender there of British forces under General Lord Cornwallis in 1781, an event that virtually assured an American victory in the Revolutionary War.

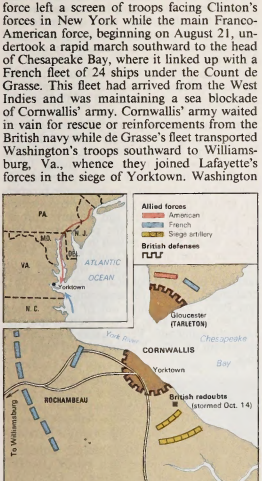
Yorktown is now included in the Colonial National Historical Park (*q.v.*). Moore House (*c.* 1725), at the edge of the Revolutionary War battlefield (which surrounds the town), was where the "Articles of Capitulation" were

drafted (Oct. 18, 1781) prior to their signing the next day in a British redoubt. The reconstructed York County Courthouse (1633), Grace Episcopal Church (1697; used by the British as a powder magazine), the Monument to Alliance and Victory (1881; commemorating the American-French alliance), and the Yorktown National Civil War Cemetery are other points of interest.

Yorktown, Siege of (Sept. 28–Oct. 19, 1781), joint Franco-American land and sea campaign that entrapped a major British army on a peninsula at Yorktown, Va., and forced its surrender. The siege virtually ended military operations in the U.S. War of Independence.

After a series of reverses and the depletion of his forces' strength, the British commander in the southern colonies, General Lord Cornwallis, moved his army from Wilmington, N.C., eastward to Petersburg, Va., on the Atlantic coast, in May 1781. Cornwallis had about 7,500 men and was confronted in the region by only about 4,500 American troops under the Marquis de Lafayette, General Anthony Wayne, and Baron von Steuben. In order to maintain his seaborne lines of communication with the main British army of General Henry Clinton in New York City, Cornwallis then retreated through Virginia, first to Richmond, next to Williamsburg, and finally, near the end of July, to Yorktown and the adjacent promontory of Gloucester, both of which he proceeded to fortify.

The American commander in chief, General George Washington, ordered Lafayette to block Cornwallis' possible escape from Yorktown by land. In the meantime Washington's 2,500 Continental troops in New York were joined by 4,000 French troops under the Count de Rochambeau. This combined allied force left a screen of troops facing Clinton's forces in New York while the main Franco-American force, beginning on August 21, undertook a rapid march southward to the head of Chesapeake Bay, where it linked up with a French fleet of 24 ships under the Count de Grasse. This fleet had arrived from the West Indies and was maintaining a sea blockade of Cornwallis' army. Cornwallis' army waited in vain for rescue or reinforcements from the British navy while de Grasse's fleet transported Washington's troops southward to Williamsburg, Va., whence they joined Lafayette's forces in the siege of Yorktown. Washington



Yorktown, siege and (inset) Washington's march, August–October 1781

From David Eggenberger, *A Dictionary of Battles*, copyright © 1967 by David Eggenberger, reprinted with permission of the publisher, Thomas Y. Crowell Company, Inc.

was thus vindicated in his hopes of entrapping Cornwallis on the Yorktown Peninsula.

Meanwhile, a smaller British fleet under Admiral Thomas Graves was unable to counter French naval superiority at the Battle of Virginia Capes (*see* Virginia Capes, Battle of) and felt forced to return to New York. A British rescue fleet, two-thirds the size of the French, set out for Virginia on October 17 with some 7,000 British troops, but it was too late. Throughout early October Washington's 14,000 Franco-American troops steadily overcame the British army's fortified positions at Yorktown. Surrounded, outgunned, and running low on food, Cornwallis surrendered his entire army on October 19. The total number of British prisoners taken was about 8,000, along with about 240 guns. Casualties on both sides were relatively light. The victory at Yorktown ended fighting in the War of Independence and virtually assured success to the American cause.

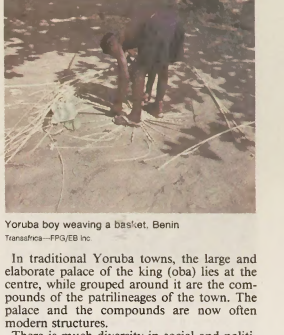
Yoro, city, northwestern Honduras. Situated in the highlands at an elevation of 1,837 feet (559 m), it is located near the headwaters of the Aguán River. Although its founding date is uncertain, it was first mentioned in 1684. It is now a commercial and manufacturing centre in a fertile agricultural area. Coffee, tobacco, livestock, and timber are the principal products of the region. In the city are sugar refineries, a tannery, and sawmills; shoes, clothing, and metalware are also manufactured. Pop. (1983 est.) mun., 32,752.

yortzeit (Judaism): *see* yahrzeit.

Yoruba, one of the two largest ethnic groups of Nigeria, being concentrated in the southwestern part of that country. Much smaller, scattered groups live in Benin and northern Togo. The Yoruba numbered more than 24 million in the late 20th century. They speak a language of the Kwa branch of the Niger-Congo family.

Most Yoruba men are farmers, growing yams, corn (maize), and millet as staples, and plantains, peanuts (groundnuts), beans, and peas as subsidiary crops; cocoa is a major cash crop. Other Yoruba men are traders or craftsmen. Women do no farm work but control much of the complex market system—their status depends more on their own position in the marketplace than on their husbands' status. The Yoruba have traditionally been among the most skilled and productive craftsmen of Africa. They worked at such trades as blacksmithing, weaving, leatherworking, glassmaking, and ivory- and woodcarving. In the 13th and 14th centuries Yoruba bronze casting using the lost-wax (cire perdue) method reached a peak of technical excellence never subsequently equaled in west Africa. Yoruba women engage in cotton-spinning, basketwork, and dyeing.

Historically, the Yoruba have shared a common language and culture but were probably never a single political unit. They seem to have migrated from the east to their present lands west of the lower Niger River more than a millennium ago. They eventually became the most urbanized Africans of precolonial times. They formed numerous kingdoms of various sizes, each of which was centred on a capital city, or town, and ruled by a hereditary king, or oba. Their towns became densely populated and eventually grew into the present-day cities of Oyo, Ife-Iodun, Ilesha, Ilorin, Ijebu, Ikere-Ekiti, and others. Oyo developed in the 17th century into the largest of the Yoruba kingdoms (*see* Oyo empire), while Ife-Iodun (*q.v.*) remained a town of potent religious significance as the site of the earth's creation according to Yoruban mythology. Oyo and the other kingdoms declined in the late 18th and 19th centuries owing to disputes between minor Yoruba rulers and invasions by the Fon of Dahomey (now Benin) and by the Muslim Fulani. The traditional Yoruba kingships still survive, though with only a shadow of their former political power.



Yoruba boy weaving a basket, Benin
Transafrica—FPG/EB Inc

In traditional Yoruba towns, the large and elaborate palace of the king (oba) lies at the centre, while grouped around it are the compounds of the patrilineages of the town. The palace and the compounds are now often modern structures.

There is much diversity in social and political organization among the Yoruba, but they share many basic features. Inheritance and succession are based on patrilineal descent; members of the patrilineage live together under the authority of a headman, share certain names and taboos, worship their own deity, and have rights in lineage lands. The Yoruba also have several kinds of voluntary associations, including the *egbe*, a male recreational association; the *aro*, a mutual-aid association of farmers; and the *esusu*, whose members contribute a fixed amount of money and from which they can receive loans. Political authority is vested in the oba and a council of chiefs; constituent towns each have their own ruler, who is subordinate to the oba. The king is also a ritual leader and is considered sacred.

Although some Yoruba are now Christians or Muslims, belief in their traditional religion continues. The traditional religion has an elaborate hierarchy of deities, which includes a supreme creator and some 400 lesser gods and spirits, most of whom are associated with their own cults and priests. The Yoruba language has an extensive literature of poetry, short stories, myths, and proverbs.

Yosa Buson: *see* Buson.

Yosano Akiko, also called HO SHO (b. Dec. 7, 1878, near Ōsaka, Japan—d. May 29, 1942, Tokyo), Japanese poet whose new style caused a sensation in Japanese literary circles.

Yosano was interested in poetry from her school days, and with a group of friends she published a private poetry magazine. In 1900 she joined the Shinshisha (New Poetry Association) of Yosano Tekkan and began to contribute to his magazine *Myōjō*. She met Tekkan that year and the next year left her family and went to Tokyo, where she married him. The freshness and unconventionality of her poetry had already attracted attention; *Midaregami* (1901; *Tangled Hair,* 1935) brought her fame. *Yume no hana* (1906; "Dream Flowers") revealed her developing art.

In 1912 she followed her husband to France and spent a year there; *Natsu yori aki e* (1914; "From Summer to Autumn") is a collection of poetry resulting from that period. Upon her return from France she embarked on a project of translating into modern Japanese

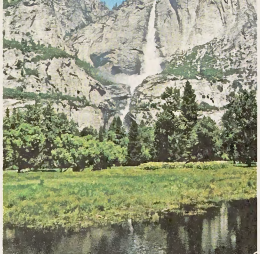
the 11th-century classic *Genji monogatari* of Murasaki Shikibu. In 1921 she established the Bunka Gakuin School for Girls, where she also taught; and in later years she was a literary critic. A posthumous collection of poetry, *Hakuōshū* (1942; "White Cherry"), expressed



Yosano Akiko
By courtesy of the International Society for Educational Information, Tokyo

her feelings in the years following the death of her husband in 1935.

Yosemite Falls, falls in Yosemite National Park, central California, U.S., near Yosemite Village, formed by creeks tumbling into the Yosemite Valley over the edges of hanging tributary valleys. The Upper Yosemite Fall



Yosemite Falls from Sentinel Meadow, Yosemite National Park, California
By courtesy of the U.S. Department of the Interior, National Park Service

drops 1,430 ft (436 m), the Lower 320 ft. With the cascades between, the total drop from the crest of the Upper to the base of the Lower is 2,425 ft, creating one of the world's highest cataracts. Maximum flow is reached in May and June; it diminishes greatly in years of little rainfall.

Yosemite National Park, scenic mountain region in central California, U.S. It was first set aside as a state park in 1864 and, together with additional surrounding territory, made a national park in 1890. It encompasses 761,320 ac (308,106 ha) in the Sierra Nevada Range,



Half Dome, Yosemite National Park, California
Ray Atkeson—EB Inc

including the Yosemite Valley of the Merced River, and features giant sequoia groves with trees thousands of years old and points of geological interest. Yosemite Valley alone has a number of attractions, such as sheer rock walls, Yosemite Falls, and huge domes and peaks. The greatest of these is El Capitan, a granite buttress that rises 3,604 ft (1,098 m) from the valley floor. Winter sports centre on the Badger Pass Ski Area.

The plant life of the park changes markedly with altitude. Lower elevations are characterized by scattered trees, both deciduous and coniferous. At the level of Yosemite Valley grow larger stands of conifers; higher up, closer to the tree line, are mountain hemlock and lodgepole pine. The park's animal life includes mule deer, various squirrels, chipmunks, and black bears.

Yoshida Isoya (b. Dec. 19, 1894, Tokyo—d. March 24, 1974, Tokyo), Japanese architect who was a pioneer in the modern *sukiya* style of building, in which an affinity for natural materials and traditional construction techniques finds expression in contemporary structures.

Yoshida attended Tokyo Art School (now Tokyo University of Fine Arts), receiving a diploma in architecture in 1923. He concentrated on private homes and exclusive restaurants prior to World War II but afterward turned to public and, finally, to religious architecture, seeking new applications for his innovative traditionalism. Though the *sukiya* style—which has been used for tea-houses, private residences, and restaurants—is ordinarily based on handcrafting in wood, Yoshida claimed that one could use modern materials as long as they were used in the "spirit of the style." He also designed museums and other public structures, that gained him note for his grandeur of design.

Yoshida received the Japan Arts Academy Award (1952) and the Japan Cultural Medal (1964). Among his many works are the Inomata and Gokiya residences (Tokyo, 1967 and 1971), the Tsuriya restaurant (Kyōto, 1964), the Gotō Art Museum in Tokyo (1960), and the Yamato Cultural Museum at Nara (1960). He taught at his old art school from 1941 to 1961, and in 1964 he became only the second architect in Japanese history to receive the Order of Cultural Merit.

Yoshida Kenkō, original name URABE KANEYOSHI (b. *c.* 1283, Kyōto?—d. *c.* 1350/52, near Kyōto?), Japanese poet and essayist, the outstanding literary figure of his time. His collection of essays, *Tsurezure-gusa* (*c.* 1330; *Essays in Idleness,* 1967), became, especially after the 17th century, a basic part of Japanese education, and his views have had a prominent place in subsequent Japanese life.

He early served at court and took Buddhist orders after the death of the emperor Go-Uda in 1324; but becoming a priest did not cause him to withdraw from society. On the contrary, he continued to take active interest in all forms of worldly activities, as his essays indicate. His poetry is conventional, but the essays of *Tsurezure-gusa* display a perceptiveness and wit that have delighted readers since the 14th century. Lamentations over the passing of old customs express his conviction that life had sadly deteriorated from its former glory.

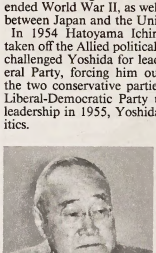
Tsurezure-gusa has also been acclaimed for its sections treating aesthetic matters. Beauty for Yoshida implied impermanence; the shorter-lived a moment or object of beauty, the more precious he considered it.

Yoshida Shigeru (b. Sept. 22, 1878, Tokyo—d. Oct. 20, 1967, Ōiso, Japan), Japanese political leader who served several terms as prime minister of Japan during most of the critical transition period after World War II, when Allied troops occupied the country and Japan was attempting to build new democratic institutions.

After graduating in law from Tokyo Imperial University in 1906, Yoshida entered the Foreign Ministry. In 1928 he was appointed minister to Sweden, Norway, and Denmark and then vice foreign minister (1928–30). In 1936 the army vetoed his appointment as foreign minister, and he was instead made ambassador to Great Britain, serving until 1939. During World War II his attempts to force an early Japanese surrender led to his arrest in June 1945. He was not freed until the Allied occupation in September of that year, and he then served as foreign minister in the Cabinet of Shidehara Kijūrō, which was formed following the surrender. After the head of the Liberal Party, Hatoyama Ichirō, was prohibited by the Allies from participation in politics, Yoshida assumed the party reins and succeeded to the prime ministership on May 22, 1946.

Although the Socialist leader Katayama Tetsu was able to form a Cabinet in 1947 and 1948, and the leftist Ashida Hitoshi held office for a while in 1948, Yoshida served as prime minister for most of the period between 1946 and 1954, forming five separate cabinets. Having built a large personal following, he was able to rule almost autocratically, giving Japan stability in this critical recovery period. He guided his country back to economic prosperity, setting the course for postwar cooperation with the United States and western Europe. In 1951 he negotiated the peace treaty that ended World War II, as well as a security pact between Japan and the United States.

In 1954 Hatoyama Ichirō, who had been taken off the Allied political purge list in 1951, challenged Yoshida for leadership of the Liberal Party, forcing him out of office. When the two conservative parties merged into the Liberal-Democratic Party under Hatoyama's leadership in 1955, Yoshida retired from politics.



Yoshida Shigeru
AP/Wide World Photos

Yoshida Tetsurō (b. May 18, 1894, Fukuno, Toyama prefecture, Japan—d. Sept. 8, 1956), Japanese architect who spread knowledge of Japan's architecture to the West and at the same time introduced Western motifs in his own works.

While on a visit to Europe during 1931–32, Yoshida met the German architects Hugo Häring and Ludwig Hilberseimer. At their



Private house in Tokyo designed by Yoshida Tetsurō, 1937

By courtesy of the International Society for Educational Information, Tokyo

urging, he wrote a book, *The Japanese House* (1935), explaining Japanese architecture to the West. Two other books, one on Japanese architecture and the other on the Japanese garden, were published in 1952 and 1957, respectively. Yoshida's interest in Western architecture is reflected in his own works, such as the post office at Kyōto (1922), the town hall at Beppu (1928), the general post offices at Tokyo (1931) and Ōsaka (1939), and a bank at Niigata (1951).

Consult the INDEX *first*

Yoshikawa Eiji, pseudonym of YOSHIKAWA HIDETSUGU (b. Aug. 11, 1892, Kanagawa prefecture, Japan—d. Sept. 7, 1962, Tokyo), Japanese novelist who achieved the first rank among 20th-century writers both for his popularized versions of classical Japanese literature and for his own original novels.

Because of his father's failure in business, Yoshikawa received only a primary-school education, and his early years were difficult. In 1925 he published *Kennan jonan* ("Troubles with Swords and Women"), and his position as a writer was established with *Naruto hichō* (1926–27; "A Secret Record of Naruto"). Later, in the romantic tradition, he wrote some light novels, but gradually he turned to a more serious exploration of the human character; he achieved a kind of perfection with the historical novel *Miyamoto Musashi* (1935–39; *Musashi*), dealing with the life of a famous samurai. Later he tried to penetrate more deeply into the lives of Japanese historical figures in *Shin Heike monogatari* (1950–57; *The Heike Story*) and *Shihon taihei-ki* (1958–61; "A Private Book of War History"). Yoshikawa's exquisite style, his psychological insight, and his knowledge of history brought him a broad range of readers. In 1960 he became the first popular author to receive the Order of Cultural Merit.

Yoshino Sakūzō (b. Jan. 29, 1878, Furukawa, Miyagi prefecture, Japan—d. March 18, 1933, Zushi, Kanagawa prefecture), Japanese Christian politician and educator who was a leader in the movement to further democracy in Japan in the early part of the 20th century.

Yoshino converted to Christianity while still in secondary school, and he soon became prominent in the Christian Socialist movement in his country. After studying abroad from 1910 to 1913, he returned home to become a professor at Tokyo Imperial University and one of the most forceful advocates of parliamentary government in the country.

Without questioning the sovereignty of the emperor, an unheard-of act at this time, Yoshino nevertheless called for a "government for the people" (*minponshugi*), insisting that the people's demands be the basic goal of government. To this end he advocated universal suffrage, civilian control over the army, the transformation of the House of Peers to a popularly elected body, and the gradual establishment of a socialist state.

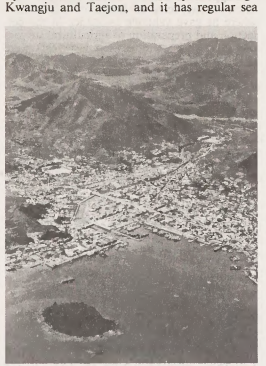
In hopes of furthering these goals, Yoshino briefly entered politics, forming his own party, the Reimeikai, in 1918. In 1924 he resigned his university post to write for the daily *Asahi shimbun*, and, even after he severed that connection, he continued to write for the wider public about current affairs and problems. Yoshino also played an important part in the preservation and publication of historical sources for the Meiji period.

Although for a time he captured public attention, his combination of Christian Socialism, trade unionism, and Confucian morality had only limited intellectual basis in Japanese tradition. Most intellectuals deserted his cause for Marxism, and the popular movement died with the economic and political difficulties of the post-World War I period.

Yoshkar-Ola, also spelled IOSHKAR-OLA, or JOŠKAR-OLA, city and capital of Mari El republic, western Russia, on the Malaya (little) Kokshaga River. Yoshkar-Ola was founded in 1578, and in 1584 the fortress of Tsaryovokokshaysk was built there by Tsar Boris Godunov. Its remoteness from lines of communication prevented any development.

In 1919 the city, renamed Krasnokokshaysk, became capital of the then Mari autonomous oblast, to be renamed Yoshkar-Ola in 1927. The building of a railway to Zelenodolsk on the Volga River in 1927 fostered industries, especially light engineering. The city has teacher-training and forestry institutes. Pop. (1991 est.) 274,600.

Yŏsu, city, Chŏlla-nam *dō* (province), on Yŏsu Peninsula, extreme southern South Korea. Such large islands as Namhae, Dolsan, and Kŭmŏ protect its natural port. The Korean navy headquarters was located there during the Yi dynasty (1392–1910) before being moved to T'ongjeyŏng (present Ch'ungmu). In 1949 it became an open port with the status of a municipality. It is connected with Seoul by rail through Kwangju and Taejon, and it has regular sea



Yŏsu and its harbour, South Korea

Shostal

lines to Pusan, Mokp'o, and Cheju. The harbour is divided into two parts: the old western port is used mainly for fishing, and the new eastern port for trade. The city exports fresh fish. Petrochemical and other industries have been developed in the Yochon Industrial District. Pop. (1990 prelim.) 173,164.

you (Chinese vessel): *see* yu.

You Di (Taoist deity): *see* Yü Ti.

Youbou River (western Africa): *see* Cavalla River.

Youghal, urban district, market town, and fishing port on the west side of the Blackwater Estuary in County Cork, Ireland. It is possible that Danes originally occupied Youghal, but the first known history is that of the establishment of a baronial town by the Anglo-Normans in the 13th century and the granting of a charter by John of England (1199–1216). The town was fortified with walls and towers, parts of which remain. St. Mary's Church was erected about 1250 and contains the elaborate tomb of Richard Boyle, 1st Earl of Cork, who died in the mid-17th century. Sir Walter Raleigh, the Elizabethan adventurer, was once mayor of the town, and his house, Myrtle Grove, survives. A convent school in Youghal was a centre for the making of Irish needle lace (*q.v.*) from the mid-19th century to the 20th.

The town is now chiefly noted as an important resort. There are also small textile industries. Pop. (1991 prelim.) 5,532.

Youghiogheny River, river rising in Preston county, W.Va., U.S., at Backbone Mountain, near the western edge of Maryland. It flows past Connellsville, Pa., to enter the Monongahela River at McKeesport, Pa., after a course of 135 miles (217 km). The Youghiogheny is the only river in western Maryland that does not flow south into the Potomac River. Its name is derived from the Algonquian word meaning "contrary stream." The former borough of Somerfield, Pa., the site of a pioneer ford, was inundated by the reservoir formed by a dam (completed 1948) on the Youghiogheny (there joined by the Casselman River) at Confluence, Pa.

Youmans, Vincent (Millie) (b. Sept. 27, 1898, New York, N.Y., U.S.—d. April 5, 1946, Denver, Colo.), American songwriter best known for writing the scores for the musicals *No, No, Nanette* (1925), *Hit the Deck* (1927), and the first Fred Astaire–Ginger Rogers vehicle, *Flying Down to Rio* (1933).

Youmans started writing songs while he was in the U.S. Navy during World War I. After the war he worked as a "song-plugger" (a singer hired by a music publisher to help popularize and sell sheet music) and with composer Victor Herbert as a rehearsal pianist. His songwriting gained popularity on Broadway. He worked with a number of lyricists, including Ira Gershwin, Oscar Hammerstein II, and Edward Heyman.

Forced to retire in 1934 because of tuberculosis, Youmans recovered slowly and was unable to work steadily. An attempted comeback in 1944 failed, and Youmans' health once again deteriorated.

Youmans' songs were notable for their simplicity. Of his fewer than 100 published songs, some 18 are considered standards. These include "Tea for Two," "I Want to be Happy," "More Than You Know," "Time on My Hands," "Drums in My Heart," "Flying Down to Rio," "Carioca," and "Orchids in the Moonlight."

Young, town, south-central New South Wales, Australia, on Burrangong Creek and the Western Slopes of the Great Dividing Range. The

first settlement in 1830 was a sheep station. Known as Lambing Flat, the locality was the scene in 1860 of anti-Chinese rioting over local gold diggings. Proclaimed a town in 1861 and a municipality in 1882, the community was named after Sir John Young, state governor (1861–67), and now serves a district of cherry, prune, apple, and pear orchards and cereal, cattle, poultry, and pig farming. Industries include fruit processing, magnesium oxide treatment, knitwear production, brandy distilling, steel fabrication, and flour milling. The town has rail and road links to Sydney (168 miles [270 km] northeast). Pop. (1986) 6,797.

Young, Andrew, in full ANDREW JACKSON YOUNG, JR. (b. March 12, 1932, New Orleans, La., U.S.), American politician, civil-rights leader, and clergyman.

Young was reared in a middle-class black family, attended segregated Southern schools, and later entered Howard University (Washington, D.C.) as a premed student. But he turned to the ministry and graduated in 1955 from the Hartford Theological Seminary (Hartford, Conn.) with a divinity degree.

A pastor at several black churches in the South, Young became active in the civil-rights movement—especially in voter registration drives. His work brought him in contact with Dr. Martin Luther King, Jr., and Young joined with King in leading the Southern Christian Leadership Conference (SCLC). Following King's assassination in 1968, Young worked with Ralph Abernathy until he resigned from the SCLC in 1970.

Defeated that year in his first bid for a seat in Congress, Young ran again in 1972 and won. He was reelected in 1974 and 1976. In the House he opposed cuts in funds for social programs while trying to block additional funding for the war in Vietnam. He was an early supporter of Jimmy Carter, and, after Carter's victory in the 1976 presidential elections, Andrew Young was made the United States' ambassador to the United Nations. His apparent sympathy with the Third World made him very controversial, and he was finally forced to resign in 1979 after it became known that he had met with a representative of the Palestine Liberation Organization. In 1981 Young was elected mayor of Atlanta, and he was reelected to that post in 1985.

Young, Art, byname of ARTHUR HENRY YOUNG (b. Jan. 14, 1866, near Orangeville, Ill., U.S.—d. Dec. 29, 1943, New York, N.Y.), satiric American cartoonist and crusader whose cartoons expressed his human warmth as well as his indignation at injustice.

In 1884 Young moved to Chicago, where he studied art and supported himself by drawing newspaper cartoons. Later he also studied art in New York City and Paris. After settling in New York City permanently around 1903, he became a socialist and was active in campaigns for woman suffrage, labour organization, the abolition of child labour, and racial equality.

His concerns were reflected in his cartoons, especially those for *The Masses* (1911–17), one of the best known of which depicted a ragged little boy looking at the sky and saying to his young companion, "Chee, Annie, look at the stars, thick as bedbugs!" That kind of compassionate satire, rather than bitter attack, characterized his simple, economical drawings. His autobiography, *Art Young: His Life and Times,* appeared in 1939.

Young, Arthur (b. Sept. 11, 1741, London, Eng.—d. April 20, 1820, London), prolific English writer on agriculture, politics, and economics. Besides his books on agricultural subjects, he was the author of the famous *Travels in France* (or *Travels During the Years 1787, 1788 and 1789, Undertaken More Particularly with a View of Ascertaining the Cultivation, Resources, and National Prosperity, of the Kingdom of France,* 1792). The book is especially valued for its vivid descriptions of the French Revolution.

The son of a rector, Young was initially employed in a mercantile house at King's Lynn, Norfolk, but showed no taste for commerce. When he was only 17 years old he published the pamphlet *On the War in North America,* and in 1761 he went to London to start a periodical, *The Universal Museum.* He also wrote four novels during this period.

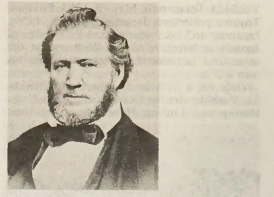
After his father's death in 1759, his mother gave him the direction of the family estate, but the property was small and encumbered with debt. In 1767 he undertook on his own account the management of a farm in Essex. He engaged in various experiments and embodied the results in *A Course of Experimental Agriculture* (1770). Though Young's early farming experiments were, in general, unsuccessful, he thus acquired a solid knowledge of agriculture. He had already begun a series of journeys through England and Wales and gave an account of his observations in several books that appeared from 1768 to 1770, including *A Six Weeks Tour Through the Southern Counties of England and Wales.* He said that these books contained the only extant information relative to the agricultural rentals, produce, and livestock of England that was founded on actual examination. The books were favourably received, being translated into most European languages by 1792.

He published in 1768 *The Farmer's Letters to the People of England,* in 1771 *The Farmer's Calendar,* which went through a great number of editions, and in 1774 his *Political Arithmetic,* which was widely translated. He made tours of Ireland from 1776 to 1778, publishing his *A Tour in Ireland* in 1780. In 1784 he began the publication of the *Annals of Agriculture,* which was continued for 45 volumes; this periodical had many contributors, among whom was George III, writing under the nom de plume of "Ralph Robinson."

Young's first visit to France was made in 1787. Traversing that country in every direction just before and during the first movements of the Revolution, he gave valuable accounts of the condition of the people and the conduct of public affairs at that critical juncture. The *Travels in France* appeared in two volumes in 1792. On his return home he was appointed secretary of the British government's newly created Board of Agriculture, where he gave valuable assistance in the collection and preparation of agricultural surveys of the English counties. His last years were spent in reclusion.

Though not a particularly successful farmer himself, Young was an important propagandist for the progressive agricultural practices of his time. He advocated such innovations as the seed drill, improved crop rotations, and the use of marl as fertilizer. He advocated the enclosure of open fields and the settlement of the indigent on newly enclosed waste agricultural lands. His many books on agriculture were highly influential in their day.

Young, Brigham (b. June 1, 1801, Whittingham, Vt., U.S.—d. Aug. 29, 1877, Salt Lake City, Utah), American religious leader, second president of the Mormon church, and colonizer who significantly influenced the development of the American West.



Brigham Young
By courtesy of Utah State Historical Society

A carpenter, joiner, painter, and glazier, Young settled in 1829 at Mendon, N.Y., near where the *Book of Mormon* was published in 1830. The book soon attracted Young's interest, and he was baptized into Joseph Smith's new church (the Church of Jesus Christ of Latter-day Saints) on April 14, 1832. In the spring of 1834 he joined in the march to Missouri to help dispossessed Mormons regain their lands. He was named third of the Quorum of the Twelve Apostles in 1835. In 1838, when the Mormons were driven out of Missouri, Young, who had become senior member of the Quorum, directed the move to Nauvoo, Ill. In 1839 he went to England, where he established a mission that contributed many British converts to the Mormon church in America and that opened the way to winning converts on the European continent, especially in Scandinavia.

When Joseph Smith was murdered (June 1844), Young was in Boston, pressing his leader's presidential campaign. He returned to Nauvoo and took command of the church. In the face of mob pressure, he led the Mormons westward out of Illinois in 1846. He got no farther than the Missouri River that summer, but in 1847 he conducted a pioneer company to the Rocky Mountains. After selecting the site of Salt Lake City as a gathering place for the Mormons, Young returned to Winter Quarters (Florence, Neb., now a part of Omaha) and in December 1847 became president of the church. He returned to Utah with the Mormon emigration of 1848 and remained there for the rest of his life.

With Salt Lake City as the base for Mormon colonizing, Young dispatched missions not only in Utah but to areas now in California, Arizona, Nevada, Idaho, and Wyoming.

In 1849 the Mormons established the provisional state of Deseret, with Young as governor. The next year this area became the territory of Utah, again with Young as governor. He was appointed to a second term in 1854, but friction between the Mormons and the federal judiciary led President James Buchanan to replace him in 1857, at which time an army was sent to establish the primacy of federal rule in Utah. He never again held political office, but as president of the Mormon church he effectively ruled the people of Utah until his death.

An eminently practical man, Young made few doctrinal contributions. He was an iron-fisted administrator who stabilized Mormon society and gave it a cohesion made possible, in part, by its comparative isolation. Young encouraged education and the theatre, always stressed self-sufficiency, and became a notably wealthy man. Having accepted the doctrine of plural marriage, he took more than 20 wives and fathered 47 children.

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Young, Charles Augustus (b. Dec. 15, 1834, Hanover, N.H., U.S.—d. Jan. 3, 1908, Hanover), American astronomer who made the first observations of the flash spectrum of the Sun, during the solar eclipses of 1869 and 1870.

He studied the Sun extensively, particularly with the spectroscope, and wrote several important books on astronomy, of which the

best known was *General Astronomy* (1888). In 1879 he made accurate measurements of the diameter of Mars. He was professor of astronomy at Princeton University from 1877 to 1905.

Young, Chic, pseudonym of MURAT BERNARD YOUNG (b. Jan. 9, 1901, Chicago—d. March 14, 1973, St. Petersburg, Fla., U.S.), U.S. cartoonist who created the comic strip "Blondie," which, by the 1960s, was syndicated in more than 1,500 newspapers throughout the world.

Young was born into an artistic family and worked at several jobs, including one as a stenographer in a railroad office, for a number of years. He secured his first cartooning job through his friend Edgar Martin, the creator of "Boots and Her Buddies." Moving to New York City in the mid-1920s, he briefly drew the "Beautiful Babs" series and then for six years drew the "Dumb Dora" comic strip. In 1930 "Blondie" appeared, introducing the pretty, curlyheaded Blondie and her adoring suitor (later husband), the bumbling Dagwood Bumstead. Later were added Mr. Dithers (the tyrannical boss), Baby Dumpling ("born" 1934), Cookie ("born" 1941), and Daisy and her pups. A comedy of situations that only slightly exaggerates life, Blondie was adapted to motion pictures and to a television series and a radio series. The term Dagwood sandwich came into popular usage to describe a towering, multilayered sandwich like the ones that Dagwood made to allay nocturnal hunger.

Young, Cy, byname of DENTON TRUE YOUNG (b. March 29, 1867, Gilmore, Ohio, U.S.—d. Nov. 4, 1955, Newcomerstown, Ohio), professional U.S. baseball player, winner of more major league games than any other pitcher. His victory total is variously given as 509 or 511, the sum of his defeats 313, 315, or 316. In each of 16 seasons (14 consecutive, 1891–1904) he won more than 20 games; in five of those years he won more than 30. Among his other records are games started, 816 or 818; completed starts, 750 or 751; and innings pitched, 7,356 or 7,377. (Many important early records of baseball are in dispute.)

Young, a big (6 feet 2 inches, 210 pounds) right-hander, pitched for five teams during his 22 years (1890–1911) in the major leagues, spending the first nine seasons with the Cleveland team in the National League, and the period 1901–08 with the Boston Red Sox in the American League. In 1897 and 1908 he pitched no-hit games, and on May 5, 1904, he registered a perfect game (no player reaching first base) for the Red Sox against the Philadelphia Athletics. He also played for the St. Louis Cardinals (1899–1901) and the Boston Braves (1911) in the National League and the Cleveland Indians (1909–11) in the American League.

Elected to the Baseball Hall of Fame in 1937, Young is commemorated in the Cy Young Award, instituted in 1956 to honour the best major league pitcher each year (separate awards for each league from 1967).

Young, Edward (baptized July 3, 1683, Upham, Hampshire, Eng.—d. April 5, 1765, Welwyn, Hertfordshire), English poet, dramatist, and literary critic, author of *The Complaint: or, Night Thoughts* (1742–45), a long, didactic poem on death. The poem was inspired by the successive deaths of his stepdaughter, in 1736; her husband, in 1740; and Young's wife, in 1741. The poem is a blank-verse dramatic monologue of nearly 10,000 lines, divided into nine parts, or "Nights." It was enormously popular.

As a dramatist, Young lacked a theatrical sense, and his plays are rarely performed. Of them, *The Revenge* (Drury Lane, April 1721) is generally thought to be the best.

Young's fame in Europe, particularly in Germany, was augmented by a prose work, the *Conjectures on Original Composition* (1759), addressed to his friend Samuel Richardson. It sums up succinctly and forcefully many strains of thought later regarded as Romantic.



Edward Young, detail of an oil painting by Joseph Highmore; in All Souls College, Oxford
By courtesy of the Warden and Fellows of All Souls College, Oxford; photograph, Thomas Photos

Young, Francis Brett (b. June 29, 1884, Halesowen, Worcestershire, Eng.—d. March 28, 1954, Cape Town, S.Af.), English novelist and poet who, although at times sentimental and long-winded, achieved wide popularity for his considerable skill as a storyteller. Among his best known novels, many of which are set in his native Worcestershire, are *The Dark Tower* (1914), *Portrait of Claire* (1927), *My Brother Jonathan* (1928), *They Seek a Country* (1937), and *A Man About the House* (1942).

Young, John W(atts) (b. Sept. 24, 1930, San Francisco), U.S. astronaut who participated in the Gemini, Apollo, and space shuttle projects. He served as Virgil Grissom's co-pilot on Gemini 3 (1965), the first U.S. two-man space flight.



John W. Young, 1964
By courtesy of the National Aeronautics and Space Administration

After graduating from Georgia Institute of Technology (1952) with a degree in aeronautical engineering, Young joined the U.S. Navy. He served in Korea before participating in a test project, during which, in 1962, he set two altitude records in an F4B Navy jet. During 1962–64 Young trained for his part in the National Aeronautics and Space Administration (NASA) project.

Gemini 3, launched on March 23, 1965, reached a maximum altitude of 139 miles (224 kilometres) on the initial orbit. The orbit was changed three times, and after 4 hours 53 minutes flight time, the spacecraft landed in the South Atlantic Ocean. After this flight U.S. Pres. Lyndon B. Johnson conferred the NASA Exceptional Service medal on Young. On July 18, 1966, Young joined Michael Collins on the Gemini 10 flight. The two docked with an Agena target vehicle and, using the Agena's engine, attained an altitude of 475 miles (764 kilometres). On May 18, 1969, Apollo 10 was launched, with Thomas P. Stafford, Eugene A. Cernan, and Young on board. The flight, which orbited the Moon, was the last checkout of Apollo systems before the Moon landing of Apollo 11.

Young was commander of the Apollo 16 mission (April 16–27, 1972; with Charles M. Duke, Jr., and Thomas K. Mattingly), the fifth manned landing on the Moon. He retired from the Navy in 1976 but remained with the space program, becoming chief of the astronaut office. He was commander of the first space shuttle mission (April 12–14, 1981; with Robert L. Crippen), guiding the orbiter "Columbia" to a landing at Edwards Air Force Base in California after it had circled the Earth 36 times. In 1983 Young commanded the joint NASA and European Space Agency (ESA) mission, which from November 28 to December 8 placed the Spacelab (a permanently orbiting workshop) above the Earth.

Young, Lester (Willis), byname PRES, or PREZ (b. Aug. 27, 1909, Woodville, Miss., U.S.—d. March 15, 1959, New York City), U.S. tenor saxophonist who emerged in the mid-1930s Kansas City, Mo., jazz world with the Count Basie band and introduced an approach to improvisation that provided much of the basis for modern jazz solo conception.



Lester Young, *c.* 1955
By courtesy of down *beat* magazine

Young's tone was a striking departure from the accepted full-bodied, dark, heavy variety, with its quick vibrato, because his was light in weight, colour, and texture, with a slow vibrato. The swinging, rhythmic feeling in his improvisations was far more relaxed and graceful than that usually heard in the work of others during the 1930s. His lines were streamlined, logical, and refreshingly melodic. The impact of his style was so broad that he has been cited as a favourite by such diverse modern jazz figures as Charlie Parker, Stan Getz, and John Coltrane. Much of the West Coast "cool" style was a direct product of Lester Young's approach, many saxophonists playing his lines note for note in their own performances. He was so important that singer Billie Holiday called him president of tenor saxophonists, and he was known thereafter as Pres (or Prez). *Lester Young*, a biography by Lewis R. Porter, was published in 1981.

Young, Murat Bernard: *see* Young, Chic.

Young, Owen D. (b. Oct. 27, 1874, Van Hornesville, N.Y., U.S.—d. July 11, 1962, St. Augustine, Fla.), U.S. lawyer and businessman best known for his efforts to solve reparations issues after World War I.

Educated at St. Lawrence University and Boston University Law School, Young practiced law in Boston until 1912 and then be-

came general counsel for the General Electric Company, serving also as chairman of the board of directors (1922–39). He organized the Radio Corporation of America (RCA) in



Owen D. Young, 1956
By courtesy of General Electric Co.

1919, was honorary chairman of its board of directors (1919–29), and was chairman of the executive committee (1929–33). He also served in a number of public capacities, notably as a member of the first committee of experts appointed to advise the Reparations Commission concerning the stabilization of German currency after World War I. In 1929 he was chairman of the second committee of experts, which drafted a permanent plan—generally known as the Young Plan—for the settlement of reparations and also established the Bank for International Settlements.

Young, Thomas (b. June 13, 1773, Milverton, Somerset, Eng.—d. May 10, 1829, London), English physician and physicist who established the principle of interference of light and thus resurrected the century-old wave theory of light. He was also an Egyptologist who helped decipher the Rosetta Stone.

In 1799 Young set up a medical practice in London. His primary interest was in sense perception, and, while still a medical student, he had discovered the way in which the lens of the eye changes shape to focus on objects at differing distances. He discovered the cause of astigmatism in 1801, the same year he turned to the study of light.

By allowing light to pass through two closely set pinholes onto a screen, Young found that the light beams spread apart and overlapped, and, in the area of overlap, bands of bright light alternated with bands of darkness. With this demonstration of the interference of light, Young definitely established the wave nature of light. He used his new wave theory of light to explain the colours of thin films (such as soap bubbles), and, relating colour to wavelength, he calculated the approximate wavelengths of the seven colours recognized by Newton. In 1817 he proposed that light waves were transverse (vibrating at right angles to the direction of travel), rather than longitudinal (vibrating in the direction of travel) as had long been assumed, and thus explained polarization, the alignment of light waves to vibrate in the same plane.

Young's work was disparaged by most English scientists: any opposition to a theory of Newton's was unthinkable. It was only with the work of the French physicists Augustin J. Fresnel and François Arago that Young's wave theory finally achieved acceptance in Europe.

Young also studied the problem of colour perception and proposed that there is no need for a separate mechanism in the eye for every colour, it being sufficient to have three—one each for blue, green, and red. Developed later by the German physicist Hermann L.F. von Helmholtz, this theory is known as the Young–Helmholtz three-colour theory.

Having become interested in Egyptology, Young began studying the texts of the Rosetta Stone in 1814. After obtaining additional hieroglyphic writings from other sources, he succeeded in providing a nearly accurate translation within a few years and thus contributed heavily to deciphering the ancient Egyptian language.

Young also did work on measuring the size of molecules, surface tension in liquids, and on elasticity. He was the first to give the word energy its scientific significance, and Young's modulus, a constant in the mathematical equation describing elasticity, was named in his honour.

Young, Whitney M(oore), Jr. (b. July 31, 1921, Lincoln Ridge, Ky., U.S.—d. March 11, 1971, Lagos, Nigeria), articulate U.S. civil rights leader who spearheaded the drive for equal opportunity for blacks in U.S. industry and government service during his 10 years as head of the National Urban League (1961–71), the world's largest social-civil rights organization. His advocacy of a "Domestic Marshall Plan"—massive funds to help solve America's



Whitney M. Young
AP/Wide World Photos

racial problems—was felt to have strongly influenced federal poverty programs sponsored by Democratic Party administrations in Washington (1963–69).

After army service in World War II, Young switched his career interest from medicine to social work, in which he took his M.A. from the University of Minnesota (1947). Starting as director of industrial relations for the Urban League at St. Paul, Minn. (1947–50), he moved to Omaha, Neb., where he served as executive secretary (1950–54). Becoming dean of the School of Social Work of Atlanta (Georgia) University in 1954, he was instrumental in improving relations between city and university.

Appointed executive director of the National Urban League in 1961, Young won an impressive reputation as a national black activist who helped bridge the gap between white political and business leaders and poor blacks and militants. Under his direction the organization grew from 60 to 98 chapters and shifted its focus from middle-class concerns to the needs of the urban poor. He was particularly credited with almost singlehandedly persuading corporate America and major foundations to aid the civil rights movement through financial contributions in support of self-help programs for jobs, housing, education, and family rehabilitation.

Young, who had been a consultant on racial matters to both Pres. John F. Kennedy and Pres. Lyndon B. Johnson, was in Nigeria at a conference sponsored by the Ford Foundation to enhance Afro-American understanding when he died.

Young America Movement, philosophical, economic, spiritual, and political concept in vogue in the United States during the mid-1840s and early 1850s. Taking as its inspiration the European youth movements of the 1830s, Young America flowered a decade later in the United States. Characterized by energy and enthusiasm for free-market capitalism and expanded territorial boundaries, it first took concrete form in 1845 as a political organization under the leadership of Edwin de Leon and George Henry Evans.

Espousing a credo of free trade, expansion of foreign markets, annexation of lands southward, and encouragement of republican movements abroad, Young America became a faction within the Democratic Party early in the 1850s. George Nicholas Sanders became its chief spokesman, and the *Democratic Review* was its organ.

At a time when the nation was torn by sectional controversy, Young America tried to unite disparate segments within the Democratic Party on the basis of its nationalistic program. Stephen A. Douglas was one of the group's champions in this regard, but Young America accomplished little and faded quickly as the sectional strife became ever more divisive.

Young Christian Workers, Roman Catholic movement begun in Belgium in 1912 by Father (later Cardinal) Joseph Cardijn; it attempts to train workers to evangelize and to help them adjust to the work atmosphere in offices and factories. Organized on a national basis in 1925, Cardijn's groups were approved by the Belgian bishops and had the support of Pope Pius XI. The organization was innovative, however, in that the apostolic activity was the effort of workers rather than of the clergy. In their attempt to bring Christian principles to their work situations, the workers made use of the formula "See-judge-act." Members in French-speaking areas have traditionally been called Jocists, from Jeunesse Ouvrière Chrétienne. Using the same organizational and methodological principles, Cardijn organized similar groups of young farmers, students, and married couples. In the late 20th century the organization was known in some areas as the Young Christian Movement.

Articles are alphabetized word by word, not letter by letter

Young Germany, German JUNGES DEUTSCHLAND, a social reform and literary movement in 19th-century Germany (about 1830–50), influenced by French revolutionary ideas, which was opposed to the extreme forms of Romanticism and nationalism then current. The name was first used in Ludolf Wienbarg's *Ästhetische Feldzüge* ("Aesthetic Campaigns," 1834). Members of Young Germany, in spite of their intellectual and literary gifts and penetrating political awareness, failed to command the enthusiasm of their countrymen but, rather, excited widespread animosity. This was partly due to their lack of social standing and higher education. The Jewish origins of some of the members was also a hindrance. The movement leaders were Ludolf Wienbarg, Karl Gutzkow, and Theodor Mundt. Heinrich Laube, Georg Herwegh, Ludwig Börne, and Heinrich Heine were also associated with the movement. They were identified collectively as Young Germany in a resolution of the Diet of the German Confederation passed on Dec. 10, 1835, which demanded the suppression of their writings by strict censorship in all the German states. Although several members of the group were gifted poets, they tended in general towards sober prose discourses, in which they tried to scour the dreamier aspects of Romanticism from the public consciousness and to arouse a drive for social and political justice. Young Germany also aimed for a vital democratic and national theatre and, in what was their most direct influence on literature, prepared the way for dramatic realism in Germany. The revolutionary movements of 1848–49 led to its decline.

Young Ireland, Irish nationalist movement of the 1840s. Begun by a group of Irish intellectuals who founded and wrote for the *Nation,* the movement advocated the study of Irish history and the revival of the Irish (Gaelic) language as a means of developing Irish nationalism and achieving independence. The influence of the group waned after a break with the National Repeal Association in 1846. In 1848 the movement came to an end when a revolt led by the radical wing of the Young Irelanders was suppressed.

Young Italy, Italian GIOVINE ITALIA, movement founded by Giuseppe Mazzini in 1831 to work for a united, republican Italian nation. Attracting many Italians to the cause of independence, it played an important role in the Risorgimento (struggle for Italian unification).

Mazzini, in exile at Marseille for his revolutionary activities, was prompted to found a new society because of the repeated failures of revolts led by the Carbonari (liberal secret societies). In contrast to the clandestine methods of the Carbonari and their dependence on foreign support, Young Italy was to be based on the moral and spiritual revival of the Italian people; it was to have a popular character and educate the people in their political role. The movement was dedicated to the struggle for a republican government because, as its official program stated, "all the men of the nation are called by the law of God and Humanity to be free and equal brothers, and only a republic could assure this." It also favoured a unitary state because "without unity there is not truly a nation, since without unity there is no strength." To propagate these ideas, Mazzini published the journal *Giovine Italia* from 1832 to 1834.

According to Mazzini, the movement grew from 40 members at its 1831 beginnings to more than 50,000 by 1833. Young Italy spread rapidly in northern Italy (in Liguria and in Piedmont), where a high literacy rate made possible wide distribution of the society's publication, but it always remained a middle-class movement.

Mazzini's vision was not limited to Italy. In 1834 he started Young Europe to encourage the rise of national organizations throughout Europe as well.

Young Italy plotted conspiracies against the existing governments in Italy during the 1830s and the 1840s, but its revolts met with failure. The lack of popular support for insurrection as the road to independence discredited the society. In 1848 Mazzini himself replaced Young Italy with the Italian National Committee (Associazione Nazionale Italiana). After 1850, with Piedmont leading the struggle for unification, Mazzini's influence declined.

Young Maori Party, association of educated, westernized Maori of the late 19th and early 20th centuries, dedicated to bringing about a degree of cultural assimilation of the Maori nation to the dominant *pakeha* (white) culture of New Zealand. The party was organized in the 1890s by a number of graduates of Te Aute College, a Maori college; its most notable leaders were Apirana Ngata, Te Rangi Hiroa (Peter Buck), and Maui Pomare. All three were eventually knighted.

The Maori population had declined as a result of their wars with white settlers in the 1860s, and although a dramatic upsurge in the rate of population growth began in the late 1890s, assuring the survival of the Maori, they continued to have an aversion to the cultural and material aspects of *pakeha* society. The Young Maori sought to break through this barrier, especially in the fields of public health and education. Working through the government administration (especially 1909–12) and as a parliamentary bloc, the Young Maori made gains in these and other areas.

Young Men's and Young Women's Hebrew Association (YM–YWHA), also called JEWISH COMMUNITY CENTRE, Jewish community organization in various countries that provides a wide range of cultural, educational, recreational, and social activities for all age groups in Jewish communities. The goals of the YM–YWHA are to prepare the young for participation in a democratic society, to ensure Judaism's role as a positive element in community life, and to further the cultural unity of the Jewish community.

Jewish community centres originated in the Jewish young men's literary societies that were formed in U.S. cities in the 1840s. The first organization to be called the Young Men's Hebrew Association was established in Baltimore, Md., in 1854. The first women's organization (YWHA) began as an auxiliary of the New York YMHA in the 1880s, with the first independent YWHA being established in 1902. These men's and women's organizations eventually merged into single entities.

There were more than 750,000 members in more than 400 Jewish Community Centres or YM–YWHA's in 240 U.S. and Canadian cities by the late 20th century. Many of these centres sponsored day camps, summer camps, and nursery schools, as well as concerts, arts-and-crafts programs, lectures, and physical- and health-education programs. The centre movement has spread to some 20 other countries around the world and is linked through the World Federation of YMHA's and Jewish Community Centres.

Young Men's Christian Association (YMCA), nonsectarian, nonpolitical Christian lay movement that aims to develop high standards of Christian character through group activities and citizenship training. It originated in London in 1844, when 12 young men, led by George Williams, an employee in, and subsequently the head of, a draper's house, formed a club for the "improvement of the spiritual condition of young men in the drapery and other trades." Similar clubs spread rapidly in the United Kingdom and reached Australia in 1850 and North America in 1851, where the organization eventually reached its greatest development. The first club in North America was founded in Montreal, the second in Boston.

The YMCA programs include sports and physical education, camping, counselling, formal and informal education, public affairs, and citizenship activities. Among other activities, the YMCA sponsors hotels, residence halls, and cafeterias. In the United States it operates several degree-granting institutions as well as many other schools at all levels, including night classes for adults.

YMCA services to the armed forces began, in the United States, with the Civil War, and it continued giving service through all wars thereafter. By the Geneva Convention of 1929, it was charged with promoting educational and recreational facilities in many prisoner of war camps.

Local YMCA organizations are affiliated with national councils, which in turn are members of the World Alliance of YMCA's, established in 1855 with headquarters in Geneva. At the centennial of the World Alliance in 1955, a series of conferences held in Paris was attended by 8,000 delegates representing more than 4,000,000 members in 76 countries and territories.

Young New Zealand Party, parliamentary group that became most palpable as a vigorous faction within the parliamentary opposition to the Conservative government of Harry Albert Atkinson (1887–90) and that provided the Liberal Party with many of its future major figures. Prominent in the party were William Pember Reeves, Joseph Ward, and John McKenzie, all advocates of modern social and economic ideas that were required to raise the standards of New Zealand society. The party was bound together not only by its program but also by a national self-consciousness that moved its members to think of themselves as New Zealanders rather than as transplanted Britons.

Young Ottomans, Turkish YENI OSMANLILAR, secret Turkish nationalist organization formed in Istanbul in June 1865. A forerunner of other Turkish nationalist groups (*see* Young Turks), the Young Ottomans favoured converting the Turkish-dominated multinational Ottoman Empire into a more purely Turkish state and called for the creation of a constitutional government. By 1867 the Young Ottomans had expanded from the original 6 members to 245, including the noted poets Namık Kemal and Ziya Paşa; they were further supported financially and materially by the Egyptian prince Mustafa Fazıl and had attracted the attention of the Ottoman princes Murad and Abdülhamid.

Exiled for revolutionary activities by the grand vizier Âli Paşa in 1867, the society established itself in Paris; there it made European contacts and began publishing *Hürriyet* ("Freedom"), an inflammatory newspaper, subsequently smuggled into Turkey, calling on the Turkish people to demand a constitution. The return to Istanbul of Mustafa Fazıl and Namık Kemal weakened the Young Ottomans, and in 1871–72, during the amnesty declared after the death of Âli Paşa, most of them returned to Turkey. The movement, however, had lost its impetus and, except for the isolated activity of such individuals as Namık Kemal, ceased to be a factor in national affairs.

Young Plan (1929), second renegotiation of Germany's World War I reparation payments. A new committee, chaired by the American Owen D. Young, met in Paris on Feb. 11, 1929, to revise the Dawes Plan of 1924. Its report (June 7, 1929), accepted with minor changes, went into effect on Sept. 1, 1930. It reduced the amount due from Germany to 121,000,000,000 Reichsmarks in 59 annuities, set up the Bank for International Settlements to handle the transfer of funds, and ended foreign controls on German economic life. However, hardly had the Young Plan started operation than the world depression of the 1930s began, and Germany's ability to pay dwindled to the vanishing point. In 1932 the Lausanne Conference proposed to reduce reparations to the token sum of 3,000,000,000 marks, but the proposal was never ratified. Adolf Hitler came to power in 1933, and within a few years all important obligations under the Treaty of Versailles—political as well as economic—were repudiated.

Young Poland movement, diverse group of early 20th-century neo-Romantic writers brought together in reaction against Naturalism and Positivism to revive the unfettered expression of feeling and imagination in Polish literature and to extend this reawakening to all the Polish arts. They looked back to the Polish Romantic writers and also to contemporary western European trends, such as Symbolism, for inspiration. Centred in Kraków, the movement was pioneered by the poet Antoni Lange and the editor and critic Zenon Przesmycki ("Miriam").

The most prominent figure of the Young Poland movement was the painter and dramatist Stanisław Wyspiański, whose play *Wesele* (1901; "The Wedding"), a masterpiece of evocative allusion, is written in the stylized verse of the traditional puppet-theatre. Other writers included the peasant poet Jan Kasprowicz, who established a tonic poetic metre that became the characteristic rhythm

of modern Polish poetry, and the novelists Stefan Żeromski, Władysław Stanisław Reymont, and Karol Irzykowski.

Young Pretender, the: *see* Charles Edward, the Young Pretender.

Young Tunisians, French JEUNES TUNISIENS, political party formed in 1907 by young French-educated Tunisian intellectuals in opposition to the French protectorate established in 1883.

The party, headed by Ali Bash Hamba and Bashir Sfar, demanded complete Tunisian control of the government and administration of the country and full citizenship rights for both Tunisians and Frenchmen. The party attracted a following among the young, educated, professional Muslims, but the liberal attitudes and European ways of its members alienated the common people.

In 1911 the Young Tunisians protested against Italy's invasion of neighbouring Muslim Tripolitania. In Tunisia itself, massive protests against French registration of a Muslim cemetery as public property ended in violent riots and killings; boycotts and labour strikes were called against Italian-owned companies in Tunis. The French responded by exiling the leaders of the party, including Ali Bash Hamba and Abd al-Aziz ath-Thaalibi (1912), and driving the Young Tunisians underground. At the end of World War I they emerged again as activists in the Tunisian nationalist movement and, led by ath-Thaalibi, reorganized themselves (1920) into the Destour (*q.v.*) Party, which remained active until 1957.

Young Turks, Turkish JÖNTÜRKLER, coalition of various reform groups that led a revolutionary movement against the authoritarian regime of Ottoman sultan Abdülhamid II, which culminated in the establishment of a constitutional government. After their rise to power, the Young Turks introduced programs that promoted the modernization of the Ottoman Empire and a new spirit of Turkish nationalism. Their handling of foreign affairs, however, resulted in the dissolution of the Ottoman state.

In 1889 a group of students in the Imperial Medical Academy in Istanbul initiated a conspiracy against Abdülhamid that spread rapidly to other colleges in the city. When the plot was uncovered, many of its leaders fled abroad, mainly to Paris, where they prepared the groundwork for a future revolution against Abdülhamid. Among the most notable of the liberal émigrés was Ahmed Rıza, who became a key spokesman for the influential Young Turk organization known as the Committee of Union and Progress (CUP), which advocated a program of orderly reform under a strong central government and the exclusion of all foreign influence. A major rival faction was formed by Prince Sabaheddin. His group, called the League of Private Initiative and Decentralization, espoused many of the same liberal principles as those propounded by the CUP, but, unlike the latter, it favoured administrative decentralization and European assistance to implement reforms.

Although the CUP and the League played a significant role in disseminating and stimulating liberal thought, the actual impetus for the Young Turk Revolution of 1908 came from groups within the empire, particularly from discontented members of the 3rd Army Corps in Macedonia. Many young officers of the corps garrisoned at Salonika (now Thessaloníka, Greece) organized to form the Ottoman Liberty Society in 1906. This secret revolutionary group merged with the CUP in Paris the following year, bringing to the Young Turk ideologists the command of the 3rd Army Corps. Later in 1907 the CUP and the League of Private Initiative and Decentralization agreed, though reluctantly, to work together to achieve their common goal.

On July 3, 1908, Maj. Ahmed Niyazi of the 3rd Corps led a revolt against the provincial authorities in Resna. Other conspirators soon followed his example, and the rebellion rapidly spread throughout the empire. Unable to rely on government troops, Abdülhamid announced on July 23 the restoration of the 1876 constitution and recalled parliament. The Young Turks had succeeded in establishing a constitutional government, but their deep-seated ideological differences resurfaced and prevented them from taking effective control of that government until 1913, when the CUP under new leaders—the triumvirate of Talât Paşa, Ahmed Cemal Paşa, and Enver Paşa—set itself up as the real arbiter of Ottoman politics.

While in power, the Young Turks carried out administrative reforms, especially of provincial administration, that led to more centralization. They were also the first Ottoman reformers to promote industrialization. In addition, the programs of the Young Turk regime effectuated greater secularization of the legal system and provided for the education of women and better state-operated primary schools. Such positive developments in domestic affairs, however, were largely overshadowed by the disastrous consequences of the regime's foreign policy decisions. An overly hasty appraisal of Germany's military capability by the Young Turk leaders led them to break neutrality and enter World War I (1914–18) on the side of the Central Powers. Upon the end of the war, with defeat imminent, the CUP Cabinet resigned on Oct. 9, 1918, less than a month before the Ottomans signed the Armistice of Mudros.

Young Women's Christian Association (YWCA), nonsectarian Christian organization that aims "to advance the physical, social, intellectual, moral, and spiritual interests of young women." The recreational, educational, and spiritual aspects of its program are symbolized in its insignia, a blue triangle the three sides of which stand for body, mind, and spirit. The YWCA and the Young Men's Christian Association (YMCA) are completely independent organizations.

The first YWCA was established in England in 1855, when two groups met to aid women: one group formed a Prayer Union to pray for women, and the other founded Christian homes for young women. The two groups merged in 1877 and took the name Young Women's Christian Association. In 1884 the organization adopted a constitution.

In the United States 35 women met in New York City and formed the first Ladies' Christian Association to provide for the "temporal, moral, and religious welfare of young women who are dependent on their own exertions for support." In 1866, in Boston, another group of women met with similar aims, formed an organization, and wrote the constitution for the Young Women's Christian Association. By 1900 hundreds of YWCAs were in existence in the United States; the national organization was formed in 1906.

The early YWCA groups were influenced by the profound social effects of the Industrial Revolution on the lives of young women, especially in the cities. The organization has continued its efforts to alleviate poverty and to help girls and women move into the mainstream of society. It provides housing for girls seeking inexpensive, safe, and comfortable quarters as they start their lives away from home. Summer camps and programs of education and recreation are offered, all without regard to the economic, racial, or religious background of participants.

Local YWCA organizations are affiliated with their national associations, which in turn are members of the World YWCA, organized in London in 1894, with headquarters in Geneva. By the 1980s the YWCA organization in the United States offered numerous service and development programs to all females 12 years of age and older; men and boys also participated as associates or registrants. YWCA programs were concerned with racial equality and harmony, public policy, health, physical education, and recreation. In the United States in 1980 there were almost 1,278,000 members, and YWCA programs served almost 2,412,500 persons.

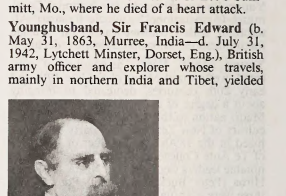
Younger BROTHERS, four Midwestern American outlaws of the post-Civil War era—Thomas Coleman ("Cole"; 1844–1916), John (1846–74); James ("Jim"; 1850–1902), and Robert ("Bob"; 1853–89)—who were often allied with Jesse James.

As youngsters in Lee's Summit, Mo., the Youngers were witness to the bloody Kansas–Missouri border skirmishes and then the strife of the Civil War. Cole Younger joined William C. Quantrill's raiders, Confederate guerrillas and near-outlaws, and met Frank James, another member. After the war, in 1866, Cole joined Jesse and Frank James and other outlaws in a gang robbing banks in Missouri and in surrounding states. Jim Younger joined them in 1868, John Younger about a year later, and Bob Younger about 1872. The next summer the gang added train robberies to their derring-do.

By this time, Pinkerton agents and Missouri sheriffs had been long in pursuit. In March 1874 three of them found John and Jim Younger and killed John in a shootout.

The three remaining Youngers reached the end of their career on Sept. 7, 1876, when, with Frank and Jesse James and three others, they attempted to rob the First National Bank of Northfield, Minn. Leaving the bank, they were met by the gunfire of a mob of citizens, who pursued them as they fled into nearby swamps. Three of the gang (Clell Miller, Bill Chadwell, and Charlie Pitts) were killed. Frank and Jesse James escaped; and the Youngers, with Jim badly wounded, were captured. The three Youngers pleaded guilty to robbery and murder and were sentenced to life imprisonment. Bob died in prison of tuberculosis. Cole and Jim were granted pardons in 1901. Jim, in ill health, put a bullet through his head the following year. Cole wrote *The Story of Cole Younger, by Himself* (1903), played in Wild West shows and carnivals for a few years, and then retired to his hometown of Lee's Summitt, Mo., where he died of a heart attack.

Younghusband, Sir Francis Edward (b. May 31, 1863, Murree, India—d. July 31, 1942, Lytchett Minster, Dorset, Eng.), British army officer and explorer whose travels, mainly in northern India and Tibet, yielded



Younghusband, detail from an oil painting by W.Q. Orchardson, 1906; in the National Portrait Gallery, London

By courtesy of the National Portrait Gallery, London

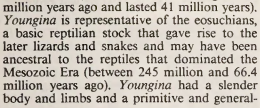
major contributions to geographical research; he also forced the conclusion of the Anglo-

Tibetan Treaty (Sept. 6, 1904) that gained Britain long-sought trade concessions.

Younghusband entered the army in 1882 and in 1886–87 crossed Central Asia from Peking to Yarkand, now in Sinkiang Uighur Autonomous Region, China. Continuing on to India by way of the long-unused Mustagh Pass of the Karakoram Range, he proved the range to be the water divide between India and Turkestan. On two later expeditions to Central Asia he explored the Pamir Mountains.

After repeated British attempts to gain trading rights with Tibet, Lord Curzon, viceroy of India, authorized Younghusband, accompanied by a military escort, to cross the Tibetan border to negotiate trade and frontier issues (July 1903). When efforts to begin negotiations failed, the British, under the command of Major General James Macdonald, invaded the country and slaughtered some 600 Tibetans at Guru. Younghusband moved on to Chiang-tzu (Gyantze), where his second attempt to begin trade negotiations also failed. He then marched into Lhasa, the capital, with British troops and forced the conclusion of a trade treaty with the Dalai Lama, Tibet's ruler. This action brought him a knighthood in 1904. G. Seaver published a biography, *Francis Younghusband,* in 1952.

Youngina, extinct genus of primitive reptiles found as fossils in Late Permian deposits of South Africa (the Permian Period began 286 million years ago and lasted 41 million years). *Youngina* is representative of the eosuchians, a basic reptilian stock that gave rise to the later lizards and snakes and may have been ancestral to the reptiles that dominated the Mesozoic Era (between 245 million and 66.4 million years ago). *Youngina* had a slender body and limbs and a primitive and generalized skull. *Youngina* retained the pineal eye, a light-receptive organ that in effect was a third eye.

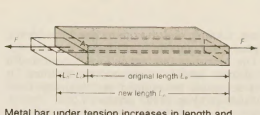


Youngina skull

Reprinted from *Vertebrate Paleontology* by A.S. Romer, by permission of the University of Chicago, copyright 1933, 1945, 1966; all rights reserved

Young's experiment, classical investigation into the nature of light, an investigation that provided the basic element in the development of the wave theory and was first performed by the English physicist and physician Thomas Young in 1801. In this experiment, Young identified the phenomenon called interference. Observing that when light from a single source is split into two beams, and the two beams are then recombined, the combined beam shows a pattern of light and dark fringes, Young concluded that the fringes result from the fact that when the beams recombine their peaks and troughs may not be in phase (in step). When two peaks coincide they reinforce each other, and a line of light results; when a peak and a trough coincide they cancel each other, and a dark line results. English scientists did not accept Young's wave theory until the work of the French physicists François Arago and Augustin-Jean Fresnel had confirmed it many years later.

Young's modulus, numerical constant, named for the 18th-century English physician and physicist Thomas Young, that describes the elastic properties of a solid undergoing tension or compression in only one direction, as in the case of a metal rod that after being stretched or compressed lengthwise returns to its original length. Young's modulus is a measure of the ability of a material to withstand changes in length when under lengthwise tension or compression. Sometimes referred to as the modulus of elasticity, Young's modulus is equal to the longitudinal stress divided by the strain. Stress and strain may be described as follows in the case of a metal bar under tension.



Metal bar under tension increases in length and decreases in cross section

If a metal bar of cross-sectional area A is pulled by a force F at each end, the bar stretches from its original length L_o to a new length L_n. (Simultaneously the cross section decreases.) The stress is the quotient of the tensile force divided by the cross-sectional area, or F/A. (Its units in the English system are pounds per square inch, usually abbreviated psi.) The strain or relative deformation is the change in length, $L_n - L_o$, divided by the original length, or $(L_n - L_o)/L_o$. (Strain is dimensionless.) Thus Young's modulus may be expressed mathematically as

$$\text{Young's modulus} = \frac{\text{stress}}{\text{strain}} = \frac{F/A}{(L_n - L_o)/L_o}$$

This is a specific form of Hooke's law of elasticity. The units of Young's modulus in the English system are pounds per square inch, and in the metric system newtons per square metre (N/m^2). The value of Young's modulus for aluminum is about 1.0×10^7 psi, or 7.0×10^{10} N/m^2. The value for steel is about three times greater, which means that it takes three times as much force to stretch a steel bar the same amount as a similarly shaped aluminum bar.

Young's modulus is meaningful only in the range in which the stress is proportional to the strain, and the material returns to its original dimensions when the external force is removed. As stresses increase, Young's modulus may no longer remain constant but decrease, or the material may either flow, undergoing permanent deformation, or finally break.

When a metal bar under tension is elongated, its width is slightly diminished. This lateral shrinkage constitutes a transverse strain that is equal to the change in the width divided by the original width. The ratio of the transverse strain to the longitudinal strain is called Poisson's ratio. The average value of Poisson's ratio for steels is 0.28, and for aluminum alloys, 0.33. The volume of materials that have Poisson's ratios less than 0.50 increase under longitudinal tension and decrease under longitudinal compression.

To make the best use of the Britannica, consult the INDEX *first*

Youngstown, city, Mahoning and Trumbull counties, seat (1876) of Mahoning County, northeastern Ohio, U.S. It lies along the Mahoning River, near the Pennsylvania border, and is equidistant (65 miles [105 km]) from Cleveland (northwest) and Pittsburgh (southeast). Youngstown is the heart of a steel–industrial complex that includes the cities of Warren, Niles, Campbell, Struthers, and Girard. The region was part of the Western Reserve until John Young, a surveyor from New York, purchased a tract of land there from the Connecticut Land Company (1797) and laid out a town (Young's town). Colonel James Hillman, a local trader, was responsible for the early development of the community, which was organized as a town in 1802. In 1805 James and Daniel Heaton built Ohio's first furnace at nearby Yellow Creek to produce iron by reducing ore with charcoal and limestone. Later, it was discovered that locally mined block coal could be used directly for iron smelting. In 1855 the first Sault Ste. Marie locks were opened, making available to Youngstown and its neighbouring steel centres the rich iron ores from the upper Great Lakes region; subsequently, four main railroad lines and four branch lines were built to transport ores and coal to Youngstown. By 1920 the city had become one of the largest steel-producing centres in the United States. Youngstown still produces steel, but in much smaller quantities after some major mill closings in the 1970s; other manufactures include aluminum, rubber, and paper products, office furniture, aircraft and automotive parts, storm windows and doors, and awnings.

Youngstown State University was first established as a night school (1908). In the city are the Butler Institute of American Art, the Youngstown Playhouse, and the Youngstown Symphony Center. The city's scenic Mill Creek Park is bisected by a 6-mile- (10-kilometre-) long gorge with three lakes and a waterfall; it is the site of the Ford Nature Education Center and several historic landmarks. Inc. village, 1848; city, 1867. Pop. (1990) city, 95,732; Youngstown-Warren MSA, 492,619.

Yourcenar, Marguerite, original name MARGUERITE DE CRAYENCOUR (b. June 8, 1903, Brussels—d. Dec. 17, 1987, Northeast Harbor, Maine, U.S.), novelist, essayist, and short-story writer who became the first woman to be elected to the Académie Française (French Academy), an exclusive literary institution with a membership limited to 40.

Crayencour was educated at home in French Flanders and spent much of her early life traveling with her father. She began writing as a teenager and continued to do so after her father's death left her independently wealthy. She led a nomadic life until the outbreak of World War II, at which time she settled permanently in the United States. She became a naturalized U.S. citizen in 1947. The name "Yourcenar" is an imperfect anagram of her original name, "Crayencour."



Marguerite Yourcenar, 1971

© Gisele Freund 1971

Yourcenar's literary works are notable for their rigorously classical style, their erudition, and their psychological subtlety. In her most important books she re-creates past eras and personages, meditating thereby on human destiny, morality, and power. Her masterpiece is *Mémoires d'Hadrien* (1951; *Memoirs of Hadrian*), a historical novel constituting the fictionalized memoirs of that 2nd-century Roman emperor. Another historical novel is *L'Oeuvre au noir* (1968; *The Abyss*), an imaginary biography of a 16th-century alchemist and scholar. Among Yourcenar's other works

are the short stories collected in *Nouvelles Orientales* (1938; "Oriental Tales"), the prose poem *Feux* (1936; *Fires*), and the short novel *Le Coup de Grace* (1939). She wrote numerous essays and also translated Negro spirituals and various English and American novels into French.

Membership in the Académie Française requires French citizenship. Yourcenar had become a U.S. citizen, however, so the president of France granted her a special dual U.S.-French citizenship in 1979, and she was subsequently elected to the Académie on March 6, 1980.

youth hostel, supervised shelter providing inexpensive overnight lodging, particularly for young people. Hostels range from simple accommodations in a farm house to hotels able to house several hundred guests for days at a time. They are located in many parts of the world, usually in scenic areas, and are spaced at intervals so that hostelers can hike, bicycle, or canoe from one to the next in a day. Hostelers often cook their own meals, make their own beds, and do other light work to help maintain the hostel. In return they receive lodging at much less than the usual commercial rate. In some countries hostels impose a maximum age limit on guests. Limits on the length of stay are also common.

Youth hostels were common in Germany in the early 1900s. After World War I they spread rapidly through Europe and other areas of the world. The International Youth Hostel Federation was formed in 1932 to coordinate activities of the various national youth hostel associations and to facilitate international travel by members; by 1980 its membership included national federations in 50 countries. National organizations regularly publish handbooks describing hostel locations and facilities.

Yovkov, Yordan Stefanovich (b. Nov. 9, 1880, Zheravna, Bulg.—d. Oct. 15, 1937, Sofia), Bulgarian short-story writer, novelist, and dramatist whose stories of Balkan peasant life and military experiences show a fine mastery of prose.

Yovkov grew up in the Dobruja region and, after studying in Sofia, returned there to teach. He later worked in the Bulgarian legation in Bucharest. He drew upon Balkan folktales for *Staroplaninski Legendi* (1927; "Balkan Legends"). His novel *Chiflikut krai granitsata* (1933; "The Farm by the Frontier") deals with village life in the Dobruja region. Yovkov's experiences as a military officer inspired some of his best stories. His plays include *Albena* (1930), *Boryana* (1932), and a comedy, *Milionerut* (1930; "The Millionaire").

Yozgat, city, central Turkey. The city lies on the site of a Bronze Age settlement 100 miles (160 km) east of Ankara in a valley of the Ak Mountains, at an elevation of 4,360 feet (1,329 m). The main road between Sivas and Ankara passes through it, but the rail line bypasses it to the southwest, and the city functions primarily as a local market and administrative centre. Mohair, wool, grain, gum, and lead are the chief products of the surrounding area, which is well-forested. There are also many ancient Hittite archaeological sites within the region. Pop. (1997) 59,466.

Ypacaraí, city, southern Paraguay. It is situated in the westward extension of the Brazilian Highlands. Its name means "water of God" in the ancient Guaraní language. Founded in 1887, it serves as a commercial and manufacturing centre for the agricultural and pastoral hinterland, the major yields of which include tobacco, cotton, fruit, and livestock. Among the industrial activities in Ypacaraí are cotton ginning, tobacco and petroleum processing, tanning, and the production of ceramics, glass, soap, and stringed musical instruments. The Maria Asunta agricultural school and a business school are located in Ypacaraí. It is accessible by railroad and highway from Asunción. Pop. (1992 prelim.) 7,098.

Ypres (French), Flemish **IEPER,** municipality, West Flanders *province,* western Belgium. It lies along the Yperlee (Ieperlee) River, south of Ostend. Ypres became a major cloth-weaving city in the Middle Ages, and together with Brugge and Ghent it virtually controlled Flanders in the 13th century. At that time it was reputed to have a population of 80,000. An unsuccessful but devastating siege of the city by the English in 1383 during the Hundred Years' War helped cause Ypres' decline, however, and by the late 16th century its population had dwindled to 5,000. The town was frequently besieged by the French in the 17th century.

Ypres was the principal town within an important salient, or bulge, in the British lines on the Western Front during World War I. The Ypres salient was the site of three major battles, the second (1915) of which marked the Germans' first use of poison gas as a weapon. More than 250,000 British and other Allied soldiers lost their lives at the successive battles of Ypres. 55,000 of them having no known graves.

Ypres itself was completely destroyed during the fighting and was subsequently rebuilt in its original style. Its notable structures include the magnificent Cloth Hall (originally from 1214); the Cathedral of St. Martin (13th century), which contains the tomb of Cornelius Jansen, bishop of Ypres and founder of Jansenism; the medieval ramparts, which were rebuilt by Sébastien de Vauban in the 17th century; the Lille Gate; and the Menin Gate, a memorial to the British soldiers who died in World War I. There are 140 cemeteries, mostly containing war graves, in the environs. Ypres is now an agricultural market centre and manufactures textiles and building materials. Pop. (1991 est.) mun., 35,235.

Ypres, John (Denton Pinkstone) French, 1st earl of: *see* French, John (Denton Pinkstone).

Ypsilanti, city, Washtenaw County, southeastern Michigan, U.S. It lies along the Huron River just east of Ann Arbor. Originally called Woodruff's Grove, it grew up around a French trading post (1809–19) and was renamed in 1833 for Demetrios Ypsilanti, a Greek patriot whose monument stands in the city. While retaining its role as a farm-trading centre, Ypsilanti has become industrially important with a wide range of manufactures. Immediately east are the Willow Run Airport (serving the Detroit metropolitan area) and the huge Willow Run auto plants. Ypsilanti is the site of Eastern Michigan University (1849) and Cleary College (1883). Inc. village, 1832; city, 1858. Pop. (2000) 22,362.

Yr Wyddgrug (Wales): *see* Mold.

Yrigoyen, Hipólito: *see* Irigoyen, Hipólito.

Yrjö-Koskinen, Sakari, original name **GEORG ZACHARIAS FORSMAN** (b. 1830, Vaasa, Fin.—d. Nov. 13, 1903, Helsingfors), historian and politician, author of the first history of Finland in Finnish. Later he guided the Old Finn Party in its policy of compliance with Russia's unconstitutional Russification program in Finland.

Forsman—later, when he was made a baron, named Yrjö-Koskinen—was a nationalist scholar and a member of the mid-19th-century Fennoman Party, which advocated the development of the Finnish language and its ascendancy over the Swedish of Finland's dominant minority. In his *Suomen kansan historia* (1869–72; "Finnish National History") he demonstrated that Finnish was a suitable language for higher cultural development. Becoming leader of the Fennoman Party in the 1870s, Yrjö-Koskinen entered the Finnish Diet (estates assembly) in 1872 and was appointed to the Senate (the Finnish government) in 1882. Both in the legislative and in the executive bodies he consistently championed the extension of Finnish in all sectors of the grand duchy's society. With the start of intensive Russification in 1898, the Fennoman Party split into a constitutionalist Young Finn group, which opposed by passive resistance the Russian abrogation of the Finnish constitution, and Yrjö-Koskinen's Old Finn majority, which chose to comply with the reactionary measures of the imperial government. The Old Finns were rewarded with control of the Senate, of which Yrjö-Koskinen became head, as well as with a declaration of Finnish equality with Swedish in all public business. In the end, however, the policy of the "compliers" proved bankrupt, and Yrjö-Koskinen was subjected to hostile demonstrations in his last days.

Ysabel (Solomon Islands): *see* Santa Isabel.

Ysaÿe, Eugène (b. July 16, 1858, Liège, Belg.—d. May 12, 1931, Brussels), Belgian violinist, conductor, and composer, the foremost interpreter of the string works of French and Belgian composers of his time.

After a year as conductor of an orchestra in Berlin, Ysaÿe toured Norway, Russia, and France. From 1886 to 1897 he was professor



Ysaÿe
J.P. Zxoio

of violin at the Brussels Conservatory. In 1894 he began in Brussels a series of orchestral concerts that introduced much new music. In the same year he founded the Ysaÿe Quartet, to which Claude Debussy dedicated the string quartet he wrote. From 1918 to 1922 Ysaÿe was conductor of the Cincinnati (Ohio) Symphony Orchestra.

Ysaÿe's playing was known for its virtuosity, expressiveness, and intensive use of vibrato. He inspired works by César Franck (who influenced his early style), Camille Saint-Saëns, Vincent d'Indy, and Gabriel Fauré. Among his own best compositions are six sonatas for unaccompanied violin, containing novel chordal and pizzicato effects. He also wrote eight violin concerti, chamber works, and an opera in Walloon dialect, *Piér li Houïen* (1931; "Peter the Miner").

Yser River, Flemish **IJZER,** a small stream (48 mi [77 km] long), rising on the north flanks of the sandstone hills of Monts Cassell and de Récollets in northern France and flowing in an arc through West Flanders province, western Belgium, into the North Sea below Nieuwpoort. Its estuary seems to have extended as far inland as Loo (Lo) until the 10th century, but gradual land reclamation has since reduced it to a narrow tidal creek. Numerous channels from the surrounding polders drain into the river, and sluices at Nieuwpoort regulate its depth, both for an adequate outfall and for navigation. It has been canalized just east of the French frontier, but for long summer periods it is not navigable. It is linked to

Veurne by the Loo Canal and to Ypres by the Yser (IJzer) Canal.

The German advance toward Calais and the English Channel coast was stopped (October 1914) along the river during World War I. After the evacuation of Antwerp and Ghent, the Belgian army retreated to the Yser. After 15 days of desperate fighting (the Battle of the Yser), the Nieuwpoort sluices were flooded and checked the Germans; the Allies then succeeded in establishing themselves in an impregnable position on the river's left bank.

Ysleta, town, El Paso county, extreme western Texas, U.S., near the Rio Grande. Incorporated in 1955, it was later annexed by El Paso, of which it is now a southeastern section.

Regarded as the oldest settlement within the present boundaries of Texas, Ysleta was founded in 1681–82 by Spanish padres and Christian Indians who, because of a Pueblo Indian uprising, had fled from their settlements along the upper Rio Grande in the region of La Ysleta (an alternate spelling for the Spanish *isleta* ["island"]) in what is now New Mexico. The refugees first sought protection of the Spanish fort El Paso del Norte (now Juarez, Mex., across the river) and then moved to the present site to found Ysleta del Sur and build the Mission Nuestro Señora del Carmen (1682), the oldest mission in Texas, now largely reconstructed.

The Ysleta section of El Paso today is characterized by whitewashed old adobe buildings standing between modern structures. The Tigua (Tiwa) Indians maintain a museum and an arts and crafts centre in Ysleta; many of them are direct descendants of the Indians who fled the Pueblo revolt. A small stretch of irrigated land just east of the mission is claimed to be the oldest continuously cultivated plot in the United States; originally plowed in 1681, it first yielded corn (maize) and later grapes and a high grade of Egyptian long-staple cotton.

Ysopet, also spelled ISOPET, in French literature, a medieval collection of fables, often versions of Aesop's *Fables.* The word was first applied to a collection of tales written by Marie de France in the late 12th century; they were said to be based directly on an English version of Aesop's *Fables* (*Esope*) attributed to King Alfred the Great, of Wessex, and no longer extant. Another source, better-documented, is the medieval *Romuli* (falsely credited to Romulus, son of Tiberius), which includes works of the Latin writers Phaedrus and Avienus.

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ytterbium (Yb), chemical element, rare-earth metal of transition Group IIIb of the periodic table, a low-melting-point, divalent rare earth with little commercial use.

The first concentrate of ytterbium was obtained (1878) by Jean-Charles-Galinard de Marignac and named by him for the town of Ytterby, Sweden, where the first rare-earth mineral was found. Georges Urbain and Carl Auer von Welsbach independently demonstrated (1907–08) that Marignac's earth was composed of two oxides, which Urbain called neoytterbia and lutetia. The metals are now known as ytterbium and lutetium. Ytterbium is among the less-abundant rare earths. It occurs in minute amounts in many rare-earth minerals such as xenotime and euxenite and is found in the products of nuclear fission as well. Natural ytterbium consists of seven stable isotopes: ytterbium-168 (0.135 percent), ytterbium-170 (3.03 percent), ytterbium-171 (14.31 percent), ytterbium-172 (21.82 percent), ytterbium-173 (16.13 percent), ytterbium-174 (31.84 percent), and ytterbium-176 (12.73 percent).

Ytterbium may be separated from the other rare-earth elements by ion-exchange techniques. The elemental metal is prepared by the thermoreduction of its oxide, Yb_2O_3, with lanthanum metal. A divalent compound was first prepared (1929) by W.K. Klemm and W. Schuth, who reduced ytterbium(III) chloride, $YbCl_3$, to ytterbium(II) chloride, $YbCl_2$, with hydrogen. The divalent ion, Yb^{2+}, has also been produced by electrolytic reduction or treatment of a trivalent salt with sodium amalgam. The element forms a series of pale-green divalent salts such as ytterbium(II) sulfate, bromide, hydroxide, and carbonate. The pale-green ytterbium ion Yb^{2+} is unstable in aqueous solution and reduces water readily, liberating hydrogen; it is less stable than the divalent europium ion Eu^{2+} and more stable than the divalent samarium ion Sm^{2+}. In its predominant trivalent state, ytterbium forms a series of white salts such as ytterbium(III) oxide, sulfate, and nitrate.

The relatively soft, silvery-white metal is most conveniently prepared by thermoreduction of the oxide with lanthanum metal followed by distillation of the comparatively volatile ytterbium metal. Elemental ytterbium is oxidized slowly by air at room temperature; and it reacts with water, liberating hydrogen.

atomic number	70
atomic weight	173.04
melting point	824° C
boiling point	1,193°C
specific gravity	6.972 (25° C)
valence	2, 3
electronic config.	2-8-18-32-8-2 or $(Xe)4f^{14}5d^{0}6s^{2}$

yttrium (Y), chemical element, rare-earth metal of transition Group IIIb of the periodic table, used for red phosphors in colour television. Yttrium metal is silvery in colour, ductile, and relatively reactive; turnings of the metal ignite readily in air.

Johan Gadolin in 1794 isolated yttria, a new earth or metallic oxide, from a mineral found at Ytterby, Sweden. Yttria, the first rare earth to be discovered, turned out to be a mixture of oxides from which, over a span of more than a century, nine elements, yttrium, scandium (atomic number 21), and the heavy rare-earth metals from terbium (atomic number 65) to lutetium (atomic number 71), were separated. Yttrium occurs especially in the heavy rare-earth ores, of which gadolinite, euxenite, and xenotime are the most important. In the igneous rocks of the Earth's crust, this element is more plentiful than any of the other rare-earth elements except cerium and is twice as abundant as lead. Yttrium also occurs in the products of nuclear fission. Commercially yttrium is separated from the other rare earths by ion exchange, and the metal is produced by reduction of the fluoride with calcium.

Yttrium is used in alloys and in metallurgical operations. Yttrium compounds are used in optical glasses and in special ceramics, as catalysts, and in electronic and optical devices including phosphors and lasers. Red phosphors containing yttrium and europium have greatly improved colour television. One phosphor is a europium-activated yttrium orthovanadate; another is a europium-activated yttrium oxide. Garnets utilizing yttrium oxide for solid-state microwave devices are used in radar and communication systems; yttrium–iron garnets, for example, transmit shortwave energy with very little loss. Neodymium-doped yttrium–aluminum garnet lasers provide efficient tools for cutting and welding metals. Radioactive yttrium is employed in cancer therapy.

Yttrium behaves chemically as a typical trivalent rare-earth element. Its ionic radius is 0.90 angstrom (Å), near the radii of dysprosium and holmium (0.908 Å and 0.894 Å, respectively); separation from these elements is difficult. It forms a series of nearly white salts such as yttrium oxide, sulfate, chloride, and carbonate. The Y^{3+} ion is diamagnetic. Stable yttrium-89 is the only naturally occurring isotope.

atomic number	39
atomic weight	88.905
melting point	1,523° C
boiling point	3,337° C
specific gravity	4.457 (25° C)
valence	3
electronic config.	2-8-18-9-2 or $(Kr)4d^{1}5s^{2}$

yu, Pinyin YOU, type of Chinese bronze vessel produced during the Shang (18th–12th century BC) and early Chou (1111–c. 900 BC) periods. It is a container, probably meant to transport wine, resembling a bucket with a swing handle and a nobbed lid.

Related to the *hu* (*q.v.*) in profile, the *yu* consists of a base, usually oval in section, and a broad body, slightly swollen at the centre and tapering to a wide neck. The large loop handle swings from two prominent lugs (ear-shaped protuberances) on either side of the neck. Decoration includes a large *t'ao-t'ieh* (*q.v.*), or monster mask, on the broad midsection, as well as other motifs characteristic of Shang and Chou bronze ritual vessels.

Yü Ch'ien, Pinyin YU QIAN (b. 1398, Ch'ien-t'ang, Chekiang province, China—d. 1457, Peking), defense minister who saved China when the Cheng-t'ung emperor (1427–64) of the Ming dynasty was captured in 1449 while leading Chinese troops against the Mongol leader Esen.

With the emperor held hostage and the Mongol armies only 50 miles (80 km) northwest of the capital of Peking, the government was in a state of panic. Yü Ch'ien acted by placing the Cheng-t'ung emperor's brother, the Ching-t'ai emperor (1428–57), on the throne and preparing a cannon defense of the city. Soon after Esen attacked, he found his hostage valueless because a new emperor was on the throne, and he saw that the city was well-fortified. Hence, he abandoned the siege within days and retreated into Mongolia. Yü Ch'ien made no efforts to ransom the abducted emperor, but Esen returned the captive in 1450. The Ching-t'ai emperor, however, continued to rule until he fell ill in 1457. The former captive took advantage of his brother's failing health and returned to the throne with the aid of a group of palace eunuchs. He later had Yü Ch'ien executed as a traitor.

Yu-ch'un (Korean painter): *see* Yi In-mun.

Yu Dafu (Chinese author): *see* Yü Ta-fu.

Yü Huang (Taoist deity): *see* Yü Ti.

Yu-huang Shan (China): *see* T'ai, Mount.

Yu Jiang (China): *see* Yu River.

Yü-lin, Pinyin YULIN, city in the southeast of the Kwangsi Chuang autonomous *ch'ü* (district), China. Situated on the upper waters of the Nan-liu River, which drains southwestward into the Gulf of Tonkin to the west of Pei-hai, it is also a natural route centre from which highways extend in all directions, and since 1957 it has had a rail connection to Liu-chou and Nan-ning in the interior of Kwangsi and to the port of Chan-chiang in Kwangtung *sheng* (province). It is also a commercial and collecting centre for a somewhat unproductive agricultural area that suffers seriously from drought. Pop. (mid-1970s est.) 10,000–50,000.

Yü-men, Pinyin YUMEN, city in western Kansu *sheng* (province), China. It is situated on the ancient Silk Road from China into Central Asia.

It was first brought under Chinese control in the last years of the 2nd century BC when it was given the name Yü-men (Jade Gate). Known as Hui-chi county in the 5th century AD, when the area was recovered by the Northern Wei dynasty, it was renamed Yü-men in 581. Under the T'ang dynasty (618–907), Yü-men county's seat was at Ch'ih-chin-shan, east of the modern city. After about 770 the area fell to the Tibetans, who retained control for some 70 years; and after the end of the T'ang dynasty in 907, Yü-men became a part of the Hsi-Hsia (Tangut) state. During the Ming period (1368–1644) it again became a Tibetan territory, and the county was only reestablished in the early Ch'ing (1644–1911) period. Until the end of the T'ang dynasty the overland route to Western Asia flourished, and Yü-men consequently also prospered. When sea transport subsequently replaced the old route, however, Yü-men became a backwater, although the establishment of Ch'ing hegemony in Central Asia to some extent revived the overland route.

Two important developments in the late 1930s and 1940s led to the city's spectacular revival. The first was the construction of a modern highway, paved as far west as Yü-men, along the old caravan route to Wu-lu-mu-ch'i (Urumchi), and continuing westward to the Soviet Union. This became a vital supply line during World War II, and since 1949 the highway has been improved, and its line has been followed by a railway joining Lan-chou in Kansu to Wu-lu-mu-ch'i, now in Sinkiang Uighur Autonomous Region.

The second was the discovery of oil in the Chiu-ch'üan basin, to the north of the Nan Mountains. The first oil was drilled at Lao-chün-miao near Yü-men in 1939, and large-scale development began after 1949. Prospecting after 1950 revealed vastly larger reserves than had been suspected. Yü-men has its own refinery, but the fields are also linked to the major refinery at Lan-chou by a pipeline, and some of the crude oil is shipped by rail for refining. To staff new oil fields, a university established in 1970 gives courses in mechanics and underground operations. Besides oil drilling and refining, the city has thermal power, machinery, and chemical fertilizer industries. Pop. (1999 est.) 116,194.

Yu Qian (Chinese minister): *see* Yü Ch'ien.

Yü River, Wade–Giles romanization YÜ CHIANG, Pinyin YU JIANG, river in South China. A southern tributary of the Hsi Chiang, it rises in two branches in southeastern Yunnan province and flows about 400 miles (750 km) generally east in Kwangsi province to unite at Kuei-p'ing with the Hung-shui Ho to form the Hsi. It receives the Tso Chiang near Nan-ning. The river is important in China's transportation system.

Yü Ta-fu, Pinyin YU DAFU (b. Dec. 7, 1896, Fuyang, Chekiang province, China—d. Sept. 17, 1945, Sumatra, Dutch East Indies [now in Indonesia]), popular short-story writer of the 1920s in China, one of the founding members of the Creation Society, which was devoted to the promotion of modern literature.

Yü received his higher education in Japan, where he met other young Chinese writers with whom he founded the Creation Society (Ch'ang-tsao she) in 1921. His first collection of short stories, *Ch'en-lun* (1921; "Sinking"), was written in vernacular Chinese, as advocated by the new generation of writers. *Ch'en-lun* became a popular success in China because of its frank treatment of sex; when Yü returned to his country in 1922 he was a literary celebrity.

Yü continued his work with the Creation Society and edited or contributed to literary journals. He also continued to write short stories, but in 1923, after contracting tuberculosis, he abruptly changed his major theme from one of self-preoccupation to one of concern with the state of the masses. In 1927, after disagreeing with the communist members of the Creation Society, Yü attempted to reorganize the group but was forced to resign.

Yü's first novel appeared in 1928 and was only moderately successful; his second followed four years later. In 1935 his last and major work of fiction, *Ch'u-pen* ("Flight"), was published. During the Sino-Japanese War of 1937–45, Yü wrote anti-Japanese propaganda from Wu-han and Singapore. When Singapore fell to the Japanese in 1942, he fled to Sumatra, only to be executed by Japanese military police there shortly after the end of the war.

Of Yü's many works the most popular was *Jih-chi chui-chung* (1927; "Nine Diaries"), an account of his affair with the young left-wing writer Wang Ying-hsia; the book broke all previous sales records in China. The critics' favourite is probably *Kuo-ch'ü* (1927; "The Past"), praised for its psychological depth. Yü also wrote essays and classical poetry. An English translation is *Nights of Spring Fever, and Other Writings* (1984).

Yü Ti, Pinyin YOU DI (Chinese: Jade Emperor), also called YÜ HUANG (Jade August One), the most revered and popular of Chinese Taoist deities. In the official Taoist pantheon, he is an impassive sage-deity, but he is popularly viewed as a celestial sovereign who guides human affairs and rules an enormous heavenly bureaucracy analogous to that of the Chinese empire.

The worship of Yü Ti was officially sanctioned by the Taoist emperors of the Sung dynasty (AD 960–1279), who renamed him Yü Huang Shang Ti (Jade August Supreme Lord) and accorded him a status equivalent to that of the Confucian supreme power. Yü Ti is usually depicted on a throne wearing the Imperial dragon-embroidered robes and beaded bonnet, holding a jade ceremonial tablet.

Yu Ti Shun (Chinese mythology): *see* Shun.

Yü-tz'u, Pinyin YUCI, city, central Shansi province (*sheng*), China. It was a county-level municipality (*shih*) and the administrative centre of Chin-chung prefecture (*ti-ch'ü*). In 1999 it became a prefecture-level city—its area coextensive with the prefecture boundaries—with the name Chin-chung; the former city of Yü-tz'u is now a district of Chin-chung.

From early times Yü-tz'u was overshadowed by T'ai-yüan, nearby to the north, of which it often has been a subordinate county since Han times (206 BC–AD 220). Originally located some distance west, it was moved to its present site in AD 448. Yü-tz'u was always an important road centre, situated where the route from Hopeh province, after traversing the T'ai-hang Mountains, enters the T'ai-yüan Basin. It was traditionally a major agricultural collecting centre for the north of the T'ai-yüan Basin, trading in grain, fruits, cotton, and textiles. Before World War II, however, it was a small market town, with walls some 2 miles (3 km) in circumference. It had, however, already begun to grow in importance as a rail junction, for it was there that the Shih-t'ai railway joined the T'ung-pu railway, which traversed Shansi from Ta-t'ung in the north to Feng-ling-tu in the extreme southwest. Surrounded by cotton fields, the Chin-chung has developed a textile industry, as well as chemical, dyeing, and printing industries. It has the largest textile machinery plant in China. Pop. (1999 est.) 243,948.

Yüan DYNASTY, Pinyin YUAN, also called MONGOL DYNASTY (1206–1368), dynasty established in China by Mongol nomads. Yüan rule stretched throughout most of Asia and eastern Europe, though the Yüan emperors were rarely able to exercise much control over their more distant possessions.

The Mongol dynasty was first established by Genghis Khan (*c.* 1162–1227) in 1206 and gained control of China under his grandson Kublai Khan (1215–94). In half a century or more, Mongols conquered northern China and renamed the dynasty the Yüan dynasty in 1271. It established a Chinese-style administration and continued its conquest of southern China until 1279.

The Yüan was the first dynasty to make Peking (Beijing; then called Ta-tu) its capital. The Yüan rebuilt the Grand Canal and put the roads and postal stations in good order; and their rule coincided with new cultural achievements, including the development of the novel as a literary form. The vast size of the empire resulted in more extensive foreign trade and foreign intercourse than at any other time before the modern period.

Unlike other rulers of China, the Mongols were never totally Sinicized. They continued to maintain their separateness from the native poulation and utilized foreigners, such as the European traveller Marco Polo, to staff the government bureaucracy. Revolts in the mid-14th century overthrew the Yüan, making it the shortest lived major dynasty of China. The administrative centrality of the Yüan was continued by the succeeding Ming (1368–1644) and Ch'ing (1644–1911/12), giving these later Chinese governments a more authoritarian structure than that of previous Chinese dynasties.

Unlike the previous ages of the T'ang (618–907) and the Sung (960–1279), when art was encouraged by the state, artists—especially those native Chinese who steadfastly refused to serve their conquerors—had to seek inspiration within themselves and their traditions. These painters sought a return in their art to what they viewed as more ideal times, especially the T'ang and Northern Sung. Artists such as Chao Meng-fu and the Four Masters of the Yüan dynasty thus firmly fixed the ideal of "literati painting" (*wen-jen-hua*), which valued erudition and personal expression above elegant surface or mere representation. There was also an emphasis upon stark and simple forms (bamboo, rocks, etc.) and upon calligraphy, often with long, complementary inscriptions upon the paintings themselves. Against this radical new direction of the native Chinese in pictorial art, there was a conservative revival of Buddhist art (painting and sculpture), sponsored by the Mongols in an effort to establish their authority over the Chinese.

In addition to a renewed emphasis upon traditional craft arts (silver, lacquer, and other materials), there were important developments in ceramics, which, while continuing various earlier traditions, included new shapes, decoration, and glazes. Of special merit was the first appearance of the underglaze blue-and-white ware that was to become so popular in later periods and among Western collectors.

Under Yüan rule the regional music drama that had gone two separate ways during the Sung dynasty was intermixed as *Yüan-ch'u,* Yüan drama. Popular song styles became freer than before, and several forms of dancing and acrobatics were added to popular entertainment. Poetry emphasized *san-ch'ü* ("nondramatic songs"), and vernacular fiction grew in popularity. Dramatists—including at least a dozen prominent Sinicized Mongols—wrote romantic plays of four or five acts in vernacular, with several songs in each act. This new literary genre attracted many men of letters, as well as large audiences.

Yüan Chen, Pinyin YUAN ZHEN, courtesy name (*tzu*) WEI-CHIH (b. 779, Lo-yang, China—d. 831, Wu-ch'ang, China), a key literary figure of the middle T'ang dynasty of China, influ-

ential in the *ku-wen*, or "ancient literature," revival.

Yüan entered state service through the examination system and briefly held ministerial rank. While in office he joined a famous literary circle under the poet-official Po Chü-i, which espoused Confucian ideals. Deeming literature an instrument of ethical and social improvement, the group rejected the courtly trends of the time and called for a revival of the moral themes and the straightforward style of ancient literature. Yüan thus joined Po Chü-i in reviving an old ballad tradition associated with social protest. Though famed for these *hsin yüeh-fu*, or "new music bureau," ballads, as well as for his more conventional poetry, Yüan was best known for his short fiction. Using contemporary settings, figures, and themes, he adapted the traditional *ch'uan ch'i*, or "marvel tale," to serious moral and social purposes. Works such as his semiautobiographical *Ying-ying chuan* ("Story of Ying-ying") thus set a new standard for the genre of the tale in Chinese literature.

Yüan Chi, Pinyin YUAN JI (b. 210, K'ai-feng, Honan province, China—d. 263, China), eccentric Chinese poet and most prominent member of the Seven Sages of the Bamboo Grove (*q.v.*), a group of 3rd-century poets and philosophers who sought refuge from worldly pressures in a life of drinking and verse making.

Born into a prominent family, Yüan Chi was faced with the choice of silent acceptance of the corrupt political maneuverings of the Wei dynasty court (220–265/266) or severe punishment. He found a solution that enabled him to escape both hypocrisy and harm. In a successful effort to avoid commitment to a marriage alliance that he considered dangerous and distasteful, the poet purposely remained drunk for 60 days. When he felt the need to speak out against the ruling class, he did so through poems and essays heavily veiled in allegory. Finally he retired to a life of pleasure and poetry in the countryside, far from the pressures of the palace.

Despite Yüan Chi's clever tricks at court and his hedonistic outlook on life, his poetry is melancholy and pessimistic and has been praised for its profound view of a troubled time. His best-known collection is *Yung huai shih* ("Singing of Thoughts").

Yüan Chiang: *see* Red River; Yüan River.

Yuan Di (Chinese emperor): *see* Yüan-ti.

Yüan Hung (Chinese emperor): *see* Hsiao-wen Ti.

Yuan Ji (Chinese poet): *see* Yüan Chi.

Yüan River, Wade-Giles romanization YÜAN CHIANG, Pinyin YUAN JIANG, conventional YÜAN KIANG, river of eastern Kweichow and western Hunan provinces, southeast China.

The Yüan River is about 500 miles (800 km) long and rises in the Miao Mountains near Tu-yün in Kweichow. Its upper stream is called the Lung-t'ou River, and downstream it is called the Ch'ing-shui River. It becomes the Yüan River after its confluence with its northern tributary, the Wu River, which flows through Chih-chiang. It then flows northeast along the western flank of the Hsüeh-feng Mountains in Hunan to discharge into the Tung-t'ing Lake at Ch'ang-te and thence into the Yangtze River.

The Yüan River is a major waterway for western Hunan and eastern Kweichow. Large vessels on it can reach Ch'ang-te, and small steamboats can travel as far as T'ao-yüan. Above this there are rapids, but shallow-draft junks can reach Hung-chiang near the Kweichow border and can travel up the Wu River as far as Chih-chiang. Although there are highways using the Yüan River valley, the river is still the chief means of transport for the mountainous areas of western Hunan.

Yüan Shih-k'ai, Pinyin YUAN SHIKAI, literary name JUNG-AN (b. 1859, Honan province, China—d. June 6, 1916), Chinese army leader and reformist minister in the twilight of the Manchu (Ch'ing) dynasty (until 1911) and then first president of the Republic of China (1912–16).

Yüan was from a landed military family of Hsiang-ch'eng in Honan province. In his youth he showed a propensity for pleasure-seeking and excelled in physical activity rather than scholarship, although he was obviously a man of remarkable astuteness. He failed to win even the lowest of the classical degrees but was to have the distinction of being the first Han Chinese to hold a viceroyalty and to become a grand councillor without any academic qualification. In the last days of the empire, he was made a marquess.

Yüan began his career in the Ch'ing brigade of the Anhwei army, commanded by Li Hung-chang, which was dispatched to Korea in 1882 to try to prevent Japanese encroachment in the area. The political crises of that remote kingdom repeatedly offered him opportunities to prove the correctness of his judgment and the promptness of his action, especially in military and economic affairs. In 1885 he was made Chinese commissioner at Seoul, and his energetic and loyal service to the throne contributed to the outbreak of the Sino-Japanese War of 1894–95.

With the destruction of China's navy and army by Japan in the war, Peking was exposed to external and internal attack; in consequence, the training of a new army became an urgent task that fell on Yüan. As the division under his command was the only remnant of China's army that survived the Boxer Rebellion of 1900, Yüan's political stature became greater than that of all others, and in 1901 he was given the viceroyalty of the metropolitan province. In that office, and later as a grand councillor, he was to play a decisive part in China's modernization and defense programs; throughout, he enjoyed the trust and unflinching support of the dowager empress, Tz'u-hsi. On the death of the empress (1908), his opponents, notably the regent for the infant emperor, stripped him of all his offices and sent him home. Nevertheless, when the tide of revolution threatened to engulf the Manchu dynasty, the throne was to need his service once more.

At this critical juncture, Yüan appeared to conservatives and revolutionaries alike as the only man who could lead the country to peace and unity; and so both the emperor in Peking and the provisional president in Nanking recommended Yüan to be the first president of China. The treasury then was empty; the provinces were in the hands of local war lords; a permanent constitution was still in the making; and the newly elected National Assembly was, to Yüan, too quarrelsome and too cumbersome for the good of the country. When his plan for a gigantic foreign loan was obstructed by the Nationalist Party (Kuomintang) in the National Assembly, he ruthlessly murdered the chairman of the party and undermined the assembly, thus bringing about the revolt against him in 1913. His victory in that struggle marked the end of all hopes for parliamentary democracy in China. Thereafter, he contrived to make himself president for life and then boldly tried to create a new imperial dynasty in 1915–16. Though his aim was to unite the country and to strengthen its central leadership, Yüan's last attempt, ironically, sowed dissension even among the conservative civilian and military forces that had supported him. Widespread opposition, backed by Japan, rose to challenge his authority. Yüan found his European friends preoccupied by World War I and his old lieutenants unwilling to fight. (Je.Ch.)

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Yüan-ti, Pinyin YUAN DI (posthumous name, or *shih*), personal name (Wade-Giles romanization) LIU SHIH (b. 75 BC, China—d. 33 or 32 BC, China), emperor (reigned 48–33/32) of the Han dynasty, who ardently promoted and helped firmly establish Confucianism as the official creed of China.

Although Confucianism had been made the state cult of China in 136 BC, previous emperors had often disregarded its teachings. Yüan-ti, however, not only wholeheartedly supported Confucianism, but he also appointed its adherents to important government posts, where they did much to lessen government expenses and to improve the welfare of the people.

Yüan-ti's failure to check the power of his eunuch secretaries, however, contributed to the interruption and eventual ruin of the Han dynasty. Moreover, believing himself exercising Confucian filial piety, he gave great power to the family of his empress dowager, a member of the Wang clan. Wang family members were appointed to high government posts and allowed to dominate the government. Yüan-ti's son and successor, Ch'eng-ti (reigned 33/32–7/6 BC), continued to promote members of his mother's family, and it was her nephew Wang Mang who interrupted the Han succession by seizing power and declaring himself emperor in AD 9.

Yuba City, city, seat (1856) of Sutter county, north-central California, U.S. It lies in the Sacramento Valley, at the junction of the Feather and Yuba rivers. It was laid out during the California Gold Rush of 1849 on the site of an Indian village. The head of river navigation (until the channel filled with mining debris), it developed as an agricultural centre. The city's basic food-processing economy has been supplemented by steel fabrication, light manufacturing, and Beale Air Force Base (15 miles [24 km] east). Natural gas is tapped from Sutter Buttes (12 miles west). Yuba College (1927) is across the Feather River in neighbouring Marysville. Inc. 1908. Pop. (1990) city, 27,437; Yuba City MSA, 122,643.

Yübari, city, central Hokkaido, northern Japan. It lies along the upper Yübari River, in the Yübari Range. It developed as a mining town when coal was discovered in the area in the 1880s, and by the mid-20th century it was the largest mining city in Hokkaido. Most of the coal was sent to Iwate prefecture to be used in the production of iron. The declining yield and closure of the mines after 1960, however, caused the city's population to decline. Pop. (1985) 31,665.

yuca (plant): *see* cassava.

Yucatán, *estada* ("state"), northern Yucatán Peninsula, southeastern Mexico. It is bounded on the north by the Gulf of Mexico, on the east and southeast by Quintana Roo, and on the southwest and west by Campeche. Yucatán occupied the entire peninsula when it became a state in 1824, but the secession of Campeche was ratified in 1858 and Quintana Roo was lost in 1902; later boundary changes reduced the state to its present 14,827 square miles (38,402 square km).

An attempt by the governor of the state in the early 1920s to break up the large henequen plantations failed, but they were eventually expropriated in the 1930s, and many were

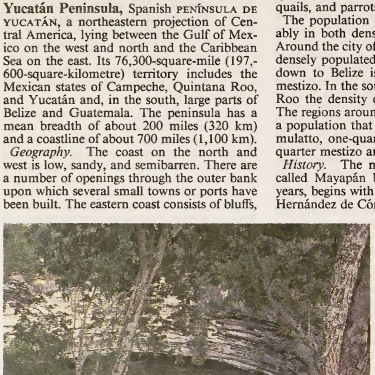
subdivided into cooperative *ejidos* (common lands). Production of henequen fibre, which had reached a low level, was increased after the mid-1950s, but a program to diversify crops also was undertaken. With improved connections with mainland Mexico by railroad and highway, and especially by air, many old Mayan centres, such as Chichén Itzá, Dzibilchaltún, and Uxmal, became easily accessible and tourism became important. Aside from the clusters at Mérida, the state capital, and at Progreso, the chief port, much of the population consists of rural Mayan Indians who speak little Spanish. Pop. (1990 prelim.) 1,363,540.

Yucatán Channel, strait connecting the Gulf of Mexico and the Caribbean Sea, extending for 135 miles (217 km) between Cape Catoche, Mexico, and Cape San Antonio, Cuba. The north and south equatorial currents enter the channel from the southeast and form the beginnings of the Gulf Stream in the Gulf of Mexico.

Yucatán Current, oceanic surface current, the western limb of a clockwise gyre in the eastern Gulf of Mexico flowing from northern Honduras, through the Yucatán Channel, to the central eastern portion of the Gulf. The Yucatán Current is strongest in the summer.

Yucatán Peninsula, Spanish PENÍNSULA DE YUCATÁN, a northeastern projection of Central America, lying between the Gulf of Mexico on the west and north and the Caribbean Sea on the east. Its 76,300-square-mile (197,600-square-kilometre) territory includes the Mexican states of Campeche, Quintana Roo, and Yucatán and, in the south, large parts of Belize and Guatemala. The peninsula has a mean breadth of about 200 miles (320 km) and a coastline of about 700 miles (1,100 km).

Geography. The coast on the north and west is low, sandy, and semibarren. There are a number of openings through the outer bank upon which several small towns or ports have been built. The eastern coast consists of bluffs,



Cenote of Sacrifice, natural well at Chichén Itzá, south-central Yucatán state, Yucatán Peninsula, Mexico
© D. Donne Bryant, D. Donne Bryant Stock

indented with bays and bordered by several islands, the largest and most tourist-developed being Cozumel and Isla Mujeres. There is good fishing all along the coasts, and there are many excellent beaches, including those at the grand resort of Cancún (developed in the 1970s).

The peninsula is almost wholly composed of beds of coralline and porous limestone rocks, forming a low tableland, which rises gradually toward the south. It is covered with a layer of thin, dry soil, formed through a slow weathering of the coral rocks. Where the rocky surface is perforated there are natural wells (*cenotes*) and caverns (*cavernas*), around which the ancient Maya built their cities and ceremonial centres.

The climate of northern Yucatán is hot and dry, and the absence of high mountainous ridges to intercept the moisture-bearing clouds from the Atlantic gives it a limited rainfall. Toward the south, moisture increases from 18 inches (460 mm) to a maximum of 80 inches (2,000 mm) annually, and the scrub forest gives way to tall trees. The temperature ranges from 75° to 98° F (24° to 37° C), but the heat is modified by cool sea winds that prevail day and night through the greater part of the year. The dry season lasts from December to May, and the hottest months are May and June. Most of the peninsula receives adequate rainfall throughout the year.

The regions toward Tabasco and Belize enjoy sufficient rainfall to support forests containing mahogany, sapodilla, several valuable cabinet woods, vanilla, logwood, and other dyewoods. Logwood forests fringe all the lagoons and many parts of the seaboard. Oil was discovered in several parts of the peninsula. The chief cultivated plants are corn (maize), sugarcane, tobacco, cotton, coffee, and especially henequen (for sisal hemp). Animal life includes deer, jaguar, wild boar, and monkeys. Reptiles include big boas, rattlesnakes, and iguanas. Bird life abounds, especially turkeys, quails, and parrots.

The population of Yucatán varies considerably in both density and racial composition. Around the city of Mérida large rural areas are densely populated. The population there and down to Belize is mostly Maya Indian and mestizo. In the southeastern state of Quintana Roo the density declines to sparse numbers. The regions around and including Belize have a population that is about one-half black and mulatto, one-quarter Maya Indian, and one-quarter mestizo and white.

History. The modern history of Yucatán, called Mayapán by the Mexicans for many years, begins with the expedition of Francisco Hernández de Córdoba, a Spanish adventurer from Cuba, who discovered the east coast of Yucatán in February 1517, when on a slave-hunting expedition. In 1518 Juan de Grijalva followed the same route. In 1519 a third expedition, under Hernán Cortés, clashed with the natives of Cozumel Island. In 1525 the inland part of the peninsula was traversed by Cortés during an expedition to Honduras.

The conquest of the peninsula was undertaken in 1527 by Francisco de Montejo, who encountered a more vigorous opposition than Cortés had on the high plateau of Anáhuac. In 1549 Montejo succeeded in establishing Spanish rule over barely half the peninsula, and it was never extended further. The Spaniards discovered the remains of a high aboriginal civilization that had long since suffered a decline. There were deserted cities falling into ruins, and others, like Chichén Itzá, Uxmal, and Tulum, which were still inhabited by remnants of their former Maya populations.

During the colonial period Yucatán remained a remote and unimportant part of the Viceroyalty of New Spain (centred in Mexico). Since the conquest many of the independent Maya have clung to the inland rural areas of the peninsula. They seceded from Mexico in 1839 and kept their independence until 1843. In 1847 another revolt followed, and the Indians were practically independent throughout most of the peninsula until near the beginning of the administration of Porfirio Díaz (1877). In 1910 there was another revolt with some initial successes, after which many of the Indians withdrew to the unknown fastness of Quintana Roo.

Oil has been discovered in several parts of Yucatán, but exploitation in the late 20th century was limited to the natural-gas field at Xicalango and the offshore oil fields of the Bay of Campeche. Logging and chicle industries are important in the south. The restoration of ancient archaeological sites and development of transportation facilities to bring visitors to the natural wonders of the peninsula have made tourism one of the major economic activities.

Until the 20th century, Yucatán was more closely connected with Europe than with the rest of Mexico, and the people of Yucatán within Mexico have generally eschewed being called "Mexicans." Not until 1957 was the narrow-gauge railway line to mainland Mexico widened to standard gauge, thus facilitating the movement of heavy freight. The highway network is still limited, but all the important centres are connected to either Mexico City or Guatemala City by air.

Yucatec language, also called MAYA, American Indian language of the Mayan family, spoken in the Yucatán Peninsula, including not only part of Mexico but also Belize and northern Guatemala. In its classical (*i.e.,* 16th-century) form Yucatec was the language of Yucatán, and it survives in its modern form with little dialectal variation and only minor changes from the classical form. Written materials that may be in Yucatec (but are probably in a Cholan language) include three hieroglyphic codices surviving from the period before the Spanish conquest (*see* Mayan hieroglyphic writing), as well as numerous stone monument inscriptions. These, however, have yet to be deciphered.

The literature that constitutes the body of readable written material in Yucatec was written down in the late 16th and early 17th centuries in an orthography adapted from that of Spanish. Major works are the *Book of Chilam Balam* and the *Book of the Songs of Dzitbalché.*

The phonology of Yucatec is characterized by a series of glottalized consonants as well as voiceless consonants such as *p, t, k.* Voiced stops such as *b, d, g* are rare, occurring only in words borrowed from Spanish. Another characteristic of Yucatec is the use of tones to distinguish between otherwise identical words. In grammar and syntax, Yucatec uses prefixes, suffixes, and infixes to mark grammatical categories such as plural number, possession, and verb tense. Small words called particles function like English prepositions, conjunctions, adverbs, and interjections.

Yucatec Maya, Middle American Indians of the Yucatán Peninsula in eastern Mexico. The Yucatec were participants in the Maya civilization, whose calendar, architecture, and hieroglyphic writing marked them as a highly

civilized people. Modern Yucatec range from groups highly conservative of their culture to groups almost completely acculturated to modern life. About 50 percent speak Mayan, and about 10 percent speak only Mayan. Many acculturated Yucatec live in Spanish-style towns and participate in the henequen-fibre industry. More traditional people live in hamlets or villages and raise corn (maize), beans, squash, chilies, yams, and other vegetables. They live in thatched houses and keep pigs and chickens. Farming techniques consist of slash-and-burn clearing and cultivation with digging sticks, hoes, and machetes. *See also* Maya.

yucca (genus *Yucca*), any of about 40 species of succulent plants of the lily family Agavaceae, native to southern North America. Most species of yucca are stemless, with a rosette of stiff, sword-shaped leaves at the base and clusters of waxy white flowers.



Yucca
By courtesy of the New Mexico Department of Development

The Joshua tree (*Y. brevifolia*) has a stem more than 10 m (33 feet) high. Spanish bayonet (*Y. aloifolia*), Spanish dagger (*Y. gloriosa*), and Adam's needle, or bear grass (*Y. filamentosa*), are commonly cultivated as ornamentals for their unusual appearance and attractive flower clusters.

Yucca House National Monument, national monument consisting of the ruins of a prehistoric American Indian village, located 15 miles south of the town of Cortez in the southwestern corner of Colorado, U.S., near Mesa Verde National Park. Occupying about 10 acres (4 hectares), the site was discovered in 1877 by William H. Holmes and, though declared a national monument by the U.S. Park Service in 1919, has remained largely unexplored and unexcavated. It consists of one mound rising as high as 20 feet (6 m), surrounded by smaller mounds. Limestone from the vicinity was used by the Indians to build their settlement. The site is open to the public but is difficult of access.

yucca moth (genus Tegeticula), any of four species of insects of the Prodoxidae family of moths (order Lepidoptera). The adults are small, diurnal, and have tiny spines covering their wings.

Each of the four species is adapted to a particular species of yucca. The moths emerge when the yucca flowers open. The female gathers pollen from one flower, rolls it into a ball, flies to another flower, lays four or five eggs, and inserts the pollen mass in the opening thus formed. The larvae eat about half the approximately 200 seeds produced by the plant. The yucca can be fertilized by no other insect, and the moth can utilize no other plant. Larvae of the related bogus yucca moth (*Prodoxus*) feed in the stems and seed capsules of the yucca plant and also attack the century plant.



Female yucca moth depositing eggs
William E. Ferguson

Yuci (China): *see* Yü-tz'u.

Yudenich, Nikolay, in full NIKOLAY NIKOLAYEVICH YUDENICH (b. July 18 [July 30, New Style], 1862, Moscow, Russia—d. Oct. 5, 1933, Saint-Laurent-du-Var, Fr.), commander of the White forces in the northwest during the Russian Civil War (1918–20).

Having entered the Imperial Army in 1879, Yudenich graduated from the General Staff Academy in 1887, served on the General Staff from 1887 until 1902, and then became a regimental commander. After participating in the Russo-Japanese War (1904–05), he was promoted to general (1905) and in 1913 was appointed chief of staff of the Caucasian military district. During World War I he commanded all Russian troops in the Caucasus (1914–15 and February–October, 1917).

After the Bolsheviks seized power in October 1917, Yudenich retired to Finland but later went to Tallinn, in Estonia. In May 1919 he launched an offensive toward Petrograd (St. Petersburg), but his volunteer army was driven back to Estonia. In July, Admiral Aleksandr Kolchak (head of the White, or anti-Bolshevik, government in Siberia) recognized him as commander in chief of the northwestern White armies. Yudenich organized the scattered White forces in the Baltic region into an army of 12,000 men. His lack of sympathy for the nationalism of the local Estonian government and his quarrels with his British advisers, however, brought about a decline in his political effectiveness. When he renewed his offensive in October 1919, in coordination with a White attack on Moscow from the south, the Red Army stopped him at Pulkovo, on the outskirts of Petrograd, and forced his army to retreat to Estonia and to disband (January 1920). Yudenich fled to France and died in exile.

Yue Fei (Chinese general): *see* Yüeh Fei.

Yüeh, Pinyin YUE, aboriginal people of South China who in the 5th–4th century BC formed a powerful kingdom in present-day Chekiang and Fukien provinces. The name Vietnam means "south of the Yüeh," and some Chinese scholars consider the Vietnamese to be descendants of the Yüeh.

Yüeh: *see* Cantonese language.

Yüeh-chih, Pinyin YUEZHI, also called INDO-SCYTH, ancient people who ruled in Bactria and India from about 128 BC to about AD 450. The Yüeh-chih are first mentioned in Chinese sources at the beginning of the 2nd century BC as nomads living in the western part of Kansu province, northwest China. When Lao Shang (reigned *c.* 174–161 BC), ruler of the Hsiungnu (a powerful people of North China), defeated them and killed their king, the main body of Yüeh-chih moved westward into Sogdiana and Bactria, putting an end to Greek rule there. They and related tribes are the Asi (or Asiani) and Tocharians (Tochari) of Western sources. About 128 BC the Yüeh-chih were recorded living north of the Oxus River (Amu Darya), ruling Bactria as a dependency, but a little later the Great Yüeh-chih kingdom was in Bactria, and Sogdiana was occupied by the Ta-yuan (Tocharians). The remnant in Kansu were called Little Yüeh-chih.

A new dynasty, that of the Kushans (*see* Kushan dynasty), was subsequently founded by one of the five chieftains among whom Bactria was divided. The Kushan kingdom extended its power southward and eastward into India and northward into Central Asia. From the 3rd century, however, Kushan power declined, and about AD 400 the Kidara dynasty arose in Gandhāra; it survived only to about AD 450, when it was overwhelmed by the Hephtalites (originally a Yüeh-chih tribe).

Missionaries from the Great Yüeh-chih played an important part in the propagation of Buddhism in China. The spread of Indian culture into Central Asia as far as the borders of China probably also resulted from Kushan influence.

yüeh-ch'in, also called LA CH'IN, Pinyin YUEQIN, or LAQIN, also called MOON GUITAR, Chinese lute, one of a family of flat, round-bodied lutes found in Central and East Asia. It was invented, according to tradition, during the Chin dynasty (AD 265–420). It has two



Yüeh-ch'in; in the Pitt-Rivers Museum, Oxford
By courtesy of the Pitt-Rivers Museum, Oxford

pairs of silk strings, tuned (in relative pitch) to c–g, which run from a fastener on the wooden belly to tuning pegs set in the sides of the pegbox. A metal plate is hung inside the body, vibrating against it when the instrument is played.

The *yüeh-ch'in* is frequently found in Chinese opera orchestras. Its precursor, the *ya cheng* (*yazheng*) was bowed with a friction stick—a sorghum stem dusted with resin.

Yüeh-chou (China): *see* Yüeh-yang.

Yüeh Fei, Pinyin YUE FEI, or YO FEI (b. 1103, T'ang-yin, Honan province, China—d. 1141, China), one of China's greatest generals and national heroes.

In 1126 North China was overrun by the nomadic Juchen and the Sung capital at K'aifeng taken. The former emperor Hui-tsung, who had abdicated in 1125/26, together with his son, the emperor Ch'in-tsung (reigned 1125/26–27), was carried into captivity. An-

other son of Hui-tsung, later known as Kao-tsung (reigned 1127–62/63), reestablished the dynasty in the south, hence its designation as the Nan, or Southern, Sung (1127–1279).

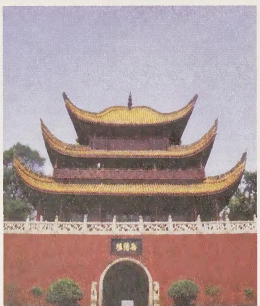
Retreating southward with Kao-tsung, Yüeh Fei assumed command of the Sung forces. He prevented the advance of the Juchen by taking advantage of their difficulty in using their cavalry in hilly South China. Assuming the offensive, he was able to recover and secure some of the occupied territory in central China south of the Yangtze and Huai rivers.

His attempt to push north and recover all the lost Chinese territory was opposed, however, by a peace party within the capital headed by the minister Ch'in Kuei, who believed that further prosecution of the war would be too costly. Ch'in Kuei's faction proved more influential, and in 1141 Yüeh Fei was imprisoned and executed, and a peace treaty was signed that relinquished the northern territory. Yüeh Fei became revered as a great national hero, and Ch'in Kuei came to be viewed as a traitor. In the 20th century, Yüeh has been extolled as a champion of national resistance in the face of foreign domination.

yüeh-fu, Pinyin YUEFU, form of Chinese poetry derived from the folk-ballad tradition. The *yüeh-fu* takes its name from the Yüeh Fu ("Music Bureau"), created in 120 BC by Emperor Wu-ti for the purpose of collecting songs and their musical scores for ceremonial occasions at court. The music for these songs was later lost, but the words remained, forming a collection of Han dynasty (206 BC–AD 220) folk poetry that served as the basis of the *yüeh-fu* form.

These poems were significant because they consisted of lines of varying lengths, with some having a regular form of five words per line rather than the then-standard four-word line. The *yüeh-fu* thus broke ground for the later classic five-word-line poem. Many later writers, including the great Li Po (701–762) and Po Chü-i (772–846), continued to create poems derived from the *yüeh-fu* tradition.

Yüeh-yang, formerly (until 1911) YÜEH-CHOU, Pinyin YUEYANG, or YUEZHOU, city in northern Hunan *sheng* (province), China. The city is situated on the east bank of the outlet from the Tung-t'ing Lake into the Yangtze River, some 5 miles (8 km) from the outlet's confluence with the Yangtze. Its port on the Yangtze is known as Ch'eng-ling-chi. The city is built on a high bluff well above high-water level, in a good defensive position. To the east the land is hilly, while in the west is the low-lying lake plain.



Yüeh-yang Tower, Yüeh-yang, China
Keren Su/China Span

The early city. Known as Mi-tzu under the Ch'u state during the Spring and Autumn and Warring States periods (770–221 BC), it became a fortified place called Pa-ch'iu in Han times (206 BC–AD 220). On the partition of China in AD 221, a major military stronghold was built there and named Pa-ling; it was converted into a civil county before 260. In 439 it was made a commandery, and in 589, after the reunification of China by the Sui dynasty (581–618), it became the prefecture of Yüeh-chou, which name it retained until 1911. Under the Sung dynasty (960–1279) it was heavily fortified, with walls some 4 miles (6.4 km) in circumference, and became the seat of the military prefecture of Yüeh-yang, whence its present name.

In 1368 the Ming dynasty promoted it to the Yüeh-yang superior prefecture. During the Taiping Rebellion, its capture by the rebels in 1852 was an important stage in their advance up the Yangtze River valley to Nanking (Nan-jing), while its recapture in 1854 secured the control of the central government over the middle Yangtze basin.

Modern developments. At the time of the foundation of the Chinese republic in 1911, the city became a county, taking the name Yüeh-yang in place of its former county name, Pa-ling, even though it continued to be referred to as Yüeh-chou. Yüeh-yang briefly held municipal status in 1961–62, and it became a county-level city in 1975. In 1986 it was merged with Yüeh-yang prefecture to form a prefecture-level city.

The city was opened to foreign trade in 1898 (as compensation by the Ch'ing dynasty for the rejection of a British loan), and a foreign settlement and commercial establishments were set up at the river's port of Ch'eng-ling-chi. The railway from Han-k'ou to Canton passes through Yüeh-yang, connecting it to Han-k'ou and Ch'ang-sha. Although planned as early as 1898, the section from Han-k'ou to Ch'ang-sha was not completed until 1917, and the final connection to Canton (Guangzhou) was made only in 1936. The railway is now part of the main trunk line between Canton and Peking (Beijing).

Yüeh-yang is well situated on the railway and with access to water traffic using Tung-t'ing Lake, the Yangtze and its tributaries, the Hsiang River, and other waterways and lakes in northern Hunan. It has developed into the region's major trade and transshipment point. It exports cotton, grain, beans, and ramie fibre, but its most important trade is in timber. Vast rafts of timber are floated down the waterways to Yüeh-yang, from where it is either shipped farther down the Yangtze or else transported by rail. Petrochemicals and textiles have become major industries. Other manufacturing activities include paper making and food processing.

Tourism has increased in economic importance. Visitors are drawn to the city's many historic sites and to the nearby scenery. A notable landmark is wooden Yüeh-yang Tower, originally constructed during the T'ang dynasty (618–907) and subsequently rebuilt. Pop. (2001 est.) 511,000.

yuga, in Hindu cosmology, an age of mankind. Each yuga is progressively shorter than the preceding one, corresponding to decline in the moral and physical state of humanity. Four such yugas (called Kṛta, Tretā, Dvāpara, and Kali after throws of an Indian game of dice) make up the *mahāyuga* ("great yuga"), and 2,000 *mahāyugas* make up the basic cosmic cycle, the kalpa. The first yuga (Kṛta) was an age of perfection, lasting 1,728,000 years. The fourth and most degenerate yuga (Kali) began in 3102 BC and will last 432,000 years. At the close of the Kali yuga, the world will be destroyed, to be re-created after a period of quiescence as the cycle resumes again. In Hindu astronomy, a yuga is a unit of time consisting of five solar years.

Yugoslavia, former federated country situated on the west-central Balkan Peninsula.

This article briefly examines the history of Yugoslavia from 1929 to 2003. For more detail, *see* MACROPAEDIA: Balkan States.

Three federations have borne the name Yugoslavia ("Land of the South Slavs"). The Kingdom of Yugoslavia (Kraljevina Jugoslavija), officially proclaimed in 1929 and lasting until World War II, covered 95,576 square miles (247,542 square km). The postwar Socialist Federal Republic of Yugoslavia (Socijalistička Federativna Republika Jugoslavija) covered 98,766 square miles (255,804 square km) and had a population of about 24 million by 1991. In addition to Serbia and Montenegro, it included four other republics now recognized as independent states: Bosnia and Herzegovina, Croatia, Macedonia, and Slovenia. The "third Yugoslavia," inaugurated on April 27, 1992, had roughly 45 percent of the population and 40 percent of the area of its predecessor and consisted of only the republics of Serbia and Montenegro, which agreed to abandon the name Yugoslavia in 2003 and rename the country Serbia and Montenegro.

The first Yugoslavia. After the Balkan Wars of 1912–13 ended Turkish rule in the Balkan Peninsula and Austria-Hungary was defeated in World War I, the Paris Peace Conference underwrote a new pattern of state boundaries in the Balkans. The major beneficiary there was a newly created Kingdom of Serbs, Croats, and Slovenes, which comprised the former kingdoms of Serbia and Montenegro (including Serbian-held Macedonia), as well as Croatia, Bosnia and Herzegovina, Austrian territory in Dalmatia and Slovenia, and Hungarian land north of the Danube River. Great difficulty was experienced in crafting this multinational state. Croats favoured a federal structure that would respect the diversity of traditions, while Serbs favoured a unitary state that would unite their scattered population in one country. The unitarist solution prevailed. The 1921 constitution established a highly centralized state, under the Serbian Karageorgević dynasty, in which legislative power was exercised jointly by the monarchy and the assembly (Skupština). The king appointed a Council of Ministers and retained significant foreign policy prerogatives. The assembly only considered legislation that had already been drafted, and local government acted in effect as the transmission belt for decisions made in Belgrade. After a decade of acrimonious party struggle, King Alexander I in 1929 prorogued the assembly, declared a royal dictatorship, and changed the name of the state to Yugoslavia. The historical regions were replaced by nine prefectures (*banovine*), all drafted deliberately to cut across the lines of traditional regions. None of these efforts reconciled conflicting views about the nature of the state, until in 1939 Croatian and Serbian leaders negotiated the formation of a new prefecture uniting Croatian areas under a single authority with a measure of autonomy. Whether this would have laid the basis for a durable settlement is unclear, as the first Yugoslavia was brought to an end by World War II and the Axis powers' invasion in April 1941.

The economic problems of the new South Slav state had been to some extent a reflection of its diverse origins. Particularly in the north, communications systems had been built primarily to serve Austria-Hungary, while rail links across the Balkans had been controlled by the European Great Powers. As a result, local needs had never been met. Under the new monarchy, some industrial development took place, significantly financed by foreign

capital. In addition, the centralized government had its own economic influence, as seen in heavy military expenditure, the creation of an inflated civil service, and direct intervention in productive industries and in the marketing of agricultural goods. Modernization of the economy was largely confined to the north, creating deep regional disparities in productivity and standards of living. By the outbreak of war in 1941, Yugoslavia was still a poor and predominantly rural state, with more than three-fourths of economically active people engaged in agriculture. Birth rates were among the highest in Europe, and illiteracy rates exceeded 60 percent in most rural areas.

The second Yugoslavia. Socialist Yugoslavia was formed in 1946 after Josip Broz Tito and his communist-led Partisans had helped liberate the country from German rule in 1944–45. This second Yugoslavia covered much the same territory as its predecessor, with the addition of land acquired from Italy in Istria and Dalmatia. The kingdom was replaced by a federation of six nominally equal republics: Croatia, Montenegro, Serbia, Slovenia, Bosnia and Herzegovina, and Macedonia. In Serbia, the two provinces of Kosovo and Vojvodina were given autonomous status in order to acknowledge the specific interests of Albanians and Magyars, respectively.

Despite this federal form, the new state was at first highly centralized both politically and economically, with power held firmly by Tito's Communist Party of Yugoslavia and a constitution closely modeled on that of the Soviet Union. In 1953, 1963, and 1974, however, a succession of constitutional reforms created an ever more loosely coordinated union, the locus of power being steadily shifted downward from the federal level to economic enterprises, municipalities, and republic-level apparatuses of the Communist Party (renamed the League of Communists of Yugoslavia). Throughout this complex evolution, the Yugoslav system consisted of three levels of government: the communes (*opštine*), the republics, and the federation. The 500 communes were direct agents for the collection of most government revenue, and they also provided social services.

Under the constitution of 1974, the assemblies of the communes, republics, and autonomous provinces consisted of three chambers. The Chamber of Associated Labour was formed from delegations representing self-managing work organizations; the Chamber of Local Communities consisted of citizens drawn from territorial constituencies; and the Sociopolitical Chamber was elected from members of the Socialist Alliance of the Working People of Yugoslavia, the League of Communists, the trade unions, and organizations of war veterans, women, and youth. The federal assembly (Skupština) had only two chambers: the Federal Chamber, consisting of 220 delegates from work organizations, communes, and sociopolitical bodies; and the Chamber of Republics and Provinces, containing 88 delegates from republican and provincial assemblies.

The executive functions of government were carried out by the Federal Executive Council, which consisted of a president, members representing the republics and provinces, and officials representing various administrative agencies. In 1974 the presidency of the federation was vested for life in Tito; following his death in 1980, it was transferred to an unwieldy rotating collective presidency of regional representatives.

After 1945 the communist government nationalized large landholdings, industrial enterprises, public utilities, and other resources and launched a strenuous process of industrialization. After a split with the Soviet Union in 1948, however, Yugoslavia placed greater reliance on market mechanisms. A distinctive feature of this new "Yugoslav system" was "workers' self-management," which reached its fullest form in the 1976 Law on Associated Labour. Under this law, individuals participated in Yugoslav society through the work organizations in which they were employed. Work organizations might be either "Basic Organizations of Associated Labour" (a single industrial enterprise, for instance) or "Complex Organizations of Associated Labour" uniting different segments of an overall activity (*e.g.*, manufacture and distribution). Each work organization was governed by a workers' council, which elected a board of management to run the enterprise. Managers were nominally the servants of the workers' councils, although in practice their training and access to information and other resources gave them a significant advantage over ordinary workers.

Under the new system, remarkable growth was achieved between 1953 and 1965, but development subsequently slowed. In the absence of real stimulus to efficiency, workers' councils often raised wage levels above the true earning capacities of their organizations, usually with the connivance of local banks and political officials. Inflation and unemployment emerged as serious problems, particularly during the 1980s, and productivity remained low. Such defects in the system were patched over by massive and uncoordinated foreign borrowing, but after 1983 the International Monetary Fund demanded extensive economic restructuring as a precondition for further support. The conflict over how to meet this demand resurrected old animosities between the wealthier northern and western regions, which were required to contribute funds to federally administered development programs, and the poorer southern and eastern regions, where these funds were frequently invested in relatively inefficient enterprises or in unproductive prestige projects. Such differences contributed directly to the disintegration of the second Yugoslavia.

The third Yugoslavia. On June 25, 1991, Slovenia and Croatia declared their secession from the Yugoslav federation. Macedonia followed suit on December 19, and, in February–March 1992, Bosnian Croats and Muslims voted to secede. As civil war raged, Serbia and Montenegro created a new federation, adopting a new constitution on April 27, 1992. This document created a federal government consisting of a bicameral legislative assembly, a president elected by the assembly, a prime minister nominated by the president and approved by the assembly, a federal court, a state prosecutor, and a national bank. The greater part of social and economic affairs remains within the purview of the republics, with the federal government taking responsibility for defense and security, foreign policy, the monetary system and unified market, human and civil rights, and communications systems. Serbia and Montenegro also had their own governments under separate constitutions.

Economic sanctions and a reorganization in the Yugoslav parliament finally ended support for Serbian rebellions in Bosnia and Croatia in 1995. Meanwhile, growing pressure in Kosovo from the majority ethnic Albanians for greater autonomy escalated into civil war in 1998. In the wake of failed international efforts to mediate the conflict and in response to a major Serbian military offensive against the Kosovo Liberation Army, the North Atlantic Treaty Organization retaliated in March 1999 with a bombing campaign, prompting Serbian leader Slobodan Milošević to order a campaign of "ethnic cleansing" that made refugees of hundreds of thousands of Kosovar Albanians. In June, however, a peace accord was reached. A change in the Yugoslav government late in 2000 brought reinstatement in the United Nations and the Council of Europe. Nevertheless, agitation continued in Kosovo and Montenegro for independence.

To alleviate the concerns of many European Union (EU) leaders, who feared that independence in Montenegro might once again unleash destructive forces that devastated the former Yugoslavia in the 1990s, the Yugoslav and Montenegrin presidents and the Serbian prime minister agreed to an EU-brokered accord that would maintain the federal union but with greater autonomy for each partner. The agreement, ratified in 2003, renamed the country Serbia and Montenegro and effectively consigned the name Yugoslavia to the annals of history. (J.B.A./Ed.)

Yui Shōsetsu (d. Sept. 10, 1651, Sumpu, Suruga province, Japan), Japanese rebel whose attempted coup d'état against the Tokugawa shogunate led to increased efforts by the gov-







Yugoslavia

ernment to redirect the military ethos of the samurai (warrior) class toward administrative matters.

A famous military teacher in the Japanese capital of Edo (now Tokyo), Yui gained a large following among the local *rōnin* (masterless warriors). Trained only to fight, these *rōnin* were without an occupation or means of support. They were thus happy to follow Yui's plan for the overthrow of the new government. The carefully laid plot, originally scheduled to be carried out in June 1651, was delayed, however, when one of Yui's coconspirators became ill. In the interim, the details of the plot became known to the government; many of Yui's followers and family were captured and executed, and he committed suicide.

The revolt greatly shocked the Tokugawa shogunate, which took action to mollify the thousands of *rōnin* still in existence throughout Japan, providing jobs and retraining them.

Yukaghir, also spelled YUKAGIR, or JUKAGIR, self-name ODUL, remnant of an ancient human population of the tundra and taiga zones of Arctic Siberia east of the Lena River in Russia, an area with one of the most severe climates in the inhabited world. Brought close to extinction by privation, encroachment, and diseases introduced by other groups, they numbered some 1,100 in the late 20th century. The Yukaghir can be further classified into two divisions—the Northern, or Tundra, and the Southern, or Kolyma, Yukaghir. Their dialects are not mutually intelligible, and (until the late 20th century) multilingualism in several combinations of Russian, Chukchi, Even, and Yakut was common. Few of the younger Yukaghir speak their mother tongue, and because of assimilation they are generally monolingual or bilingual in Yakut or Russian. Although they still generally inhabit the upper valley of the Kolyma River, the once-nomadic people are for the most part engaged in hunting, fishing, and reindeer herding. The domestication of reindeer probably started in the mid-17th century, just before Russian contact.

The Yukaghir economy once depended heavily on seasonal migrations of elk and wild reindeer; these were killed in large numbers from canoes at water crossings or tracked by ancient methods. Fishing, next in importance, was based on biannual runs in major rivers. Molting waterfowl also were taken in quantity. The meat supply was supplemented by the gathering of berries, nuts, and other products of trees and shrubs. The groups' activities involved cooperative methods and seasonal movements. Permanent homes were occupied only in winter; skin or bark shelters were used in warmer weather. Metal was rare, and most equipment was of bone or antler.

The Northern Yukaghir were patrilocal (centred on the male's family) while the Southern Yukaghir were matrilocal. Inheritance in both groups was patrilineal. Small family groups were generally organized into clans. Each clan was guided in matters of food provision and clan defense by an able adult male. Although the Yukaghir were Christianized in the 18th century, they retained many traditional beliefs, including the practice of shamanism.

Yukaghir language, language spoken by not more than a few hundred persons in the Kolyma River region of Sakha (Yakutiya) republic of Russia. Yukaghir was traditionally grouped in the catchall category of Paleo-Siberian languages with a number of languages that are not genetically related or structurally similar. More recently, however, Yukaghir has been considered a distant relative of the Uralic language family. Yukaghir and two extinct languages or dialects, Omok and Chuvan (or Chuvantsy), constitute the Yukaghir language group or family.

yukata, comfortable cotton kimono decorated with stencil-dyed patterns usually in shades of indigo, worn by Japanese men and women. The yukata was originally designed as a nightgown and for wear in the home after a bath.



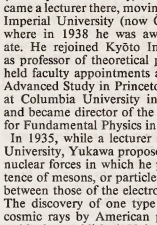
Yukata
Photo by Kenzo Yamamoto/Orion Press, Tokyo

It has become accepted practice to wear a yukata on the street on warm summer evenings. Japanese inns and many hotels supply their guests with yukatas for lounging.

Yukawa Hideki (b. Jan. 23, 1907, Tokyo, Japan—d. Sept. 8, 1981, Kyōto), Japanese physicist who was awarded the Nobel Prize for Physics in 1949 for research in the theory of elementary particles.

Graduating from Kyōto Imperial University (now Kyōto University) in 1929, Yukawa became a lecturer there, moving in 1933 to Ōsaka Imperial University (now Ōsaka University), where in 1938 he was awarded his doctorate. He rejoined Kyōto Imperial University as professor of theoretical physics (1939–50), held faculty appointments at the Institute for Advanced Study in Princeton, N.J., U.S., and at Columbia University in New York City, and became director of the Research Institute for Fundamental Physics in Kyōto (1953–70).

In 1935, while a lecturer at Ōsaka Imperial University, Yukawa proposed a new theory of nuclear forces in which he predicted the existence of mesons, or particles that have masses between those of the electron and the proton. The discovery of one type of meson among cosmic rays by American physicists in 1937 suddenly established Yukawa's fame as the founder of meson theory, which later became an important part of nuclear and high-energy physics. After devoting himself to the development of meson theory, he started work in 1947 on a more comprehensive theory of elementary particles based on his idea of the so-called nonlocal field.



Yukawa
American Institute of Physics, Niels Bohr Library, W.F. Meggers Collection, New York City

Yuki, four groups of North American Indians who lived in the Coast Ranges and along the coast of northwestern California, U.S. They spoke distinctive languages unaffiliated with any other known language. The four Yuki groups were the Yuki proper, who lived along the upper reaches of the Eel River and its tributaries; the Huchnom, who dwelt in the Redwood Valley to the west; the Coast Yuki, who were distributed farther westward along the redwood coast; and the Wappo, who occupied an enclave among the Pomo, some 40 miles (65 km) southward in the Russian River valley.

Only the linguistic identification links the Wappo with other Yuki; culturally they were like the Pomo. The other Yuki groups were organized into communities composed of several scattered settlements or villages occupying a natural area. Each settlement had its own chief, but there was also a head chief for the community as a whole. There were also a war leader, a "dance director," and a shaman, or medicine man. Warfare was apparently frequent between certain communities, between the different Yuki groups, and with other Californian Indians. (The Coast Yuki were generally an exception, usually maintaining friendly relations with their neighbours.) Trade was prevalent among all groups, inland people trading such items as furs with coastal groups, who returned a variety of seafood and shells. Clamshell beads were used as currency.

For food, the Yuki fished, mostly for salmon, gathered acorns, and hunted such animals as bear and deer, though the Coast Yuki relied more on seafood. Interior groups dwelt in domed, earth-covered houses; Coast Yuki had conical houses of bark. All groups had large dance houses and sweat houses.

Religious belief centred generally on two contrasting deities, a creator, whose actions were essentially well intended, and another deity, sometimes associated with thunder, who might help but might also blunder or do evil. Usually the creator was the supreme god of the two, but among the Coast Yuki he had disappeared, and only Thunder remained. All Yuki had a great array of ceremonies, rituals, and initiations. *Compare* Pomo.

Yukon-Charley Rivers National Preserve, national preserve in east-central Alaska, U.S., on the Canadian border. Proclaimed a national monument in 1978, the area underwent boundary and name changes in 1980, becoming a national preserve in the latter year. Preserving the entire 88-mile (142-kilometre) Charley River basin and 115 miles (185 km) of the 1,980-mile (3,190-kilometre) Yukon River, the area contains numerous cabins and other relics of the 1898 gold rush as well as paleontological and archaeological sites. Wildlife includes peregrine falcons and other raptorial birds, caribou, moose, Dall sheep, grizzly bears, and wolves. The total area is 3,943 square miles (10,212 square km).

Yukon River, one of the major rivers of North America, whose remotest headwaters originate in the McNeil River north of the border of the Yukon Territory and British Columbia, Can. It flows northwestward through the Yukon Territory and then arcs westward across the U.S. state of Alaska to enter the Bering Sea at Norton Sound.

A brief treatment of the Yukon River follows. For full treatment, *see* MACROPAEDIA: North America.

The Yukon River is 1,980 miles (3,190 km) long. It drains an area of about 328,000 square miles (850,000 square km) that is largely undeveloped despite the famous gold rush of the 1890s. The Yukon River became known to



Miners panning for gold in the Klondike River, a tributary of the Yukon River, Yukon Territory, 1897
The Bettmann Archive

the world following the rich gold strikes in 1896 on one of its Canadian tributaries, the Klondike. When the spasm of gold-mining activity subsided during the years following World War I, the use of the river for the purpose of water transport also declined.

More important than the McNeil River headwaters are those that flow from Atlin Lake and Tagish Lake in the vicinity of the British Columbia–Yukon Territory border. About 50 miles (80 km) downstream, the Yukon River formerly rushed through the rocky walls of narrow Miles Canyon and tumbled over rock ledges at Whitehorse Rapids. In the mid-20th century the river was dammed just south of Whitehorse for hydroelectric power, and a reservoir now covers the area of the rapids and fills the former Miles Canyon.

The Yukon River then flows through a broad valley, and small islands dot its channel. At the village of Selkirk, the junction of the Pelly River swells the Yukon's volume considerably. The Yukon is then joined by the White River, which adds silt from the glaciers and mountains to the southwest, and the Stewart River, which flows out of a mining area to the east. The Klondike is a small tributary that joins the Yukon at the historic town of Dawson. The valley floor there is covered with sinuous, wormlike ridges of gravel deposited behind the gold dredges that worked their way several times through the valley gravels over a period of nearly a century.

Downstream from Dawson the river valley narrows, and the plateau is broken by mountains that rise above 4,000 feet (1,200 m). After the Yukon crosses the Alaska boundary, the next large tributary is the Porcupine River, which joins the Yukon at Fort Yukon, Alaska. There the Yukon loops over the Arctic Circle and then flows southwestward for about 150 miles (240 km) across a broad, flat valley bounded at its western end by a narrow gorge.

At the junction of the Tanana River, the main southern tributary in Alaska, the Yukon is less than 300 feet (90 m) above sea level. Upstream on the Tanana lies Fairbanks, the largest city in the Yukon River basin. About 175 miles (280 km) downstream from the Tanana confluence, the last major tributary, the Koyukuk, drains into the Yukon, which then turns southward and westward for several hundred miles. As the Yukon nears the Bering Sea it bends sharply northward to empty into Norton Sound of the Bering Sea. The river's delta is about 40 miles (64 km) across, swampy, and dotted with lakes.

The Yukon River basin has remained sparsely populated, and, though the lure of mineral wealth has been the principal factor in the region's settlement, the Yukon basin's scenery, isolation, and sparse population are great attractions to tourists seeking to escape the more crowded areas of the continent.

Yukon Territory, territory of northwestern Canada. It is bounded by the U.S. state of Alaska to the west, the Northwest Territories to the east, and British Columbia to the south and extends northward above the Arctic Circle to the Beaufort Sea. Its capital, Whitehorse, is the largest settlement.

A brief treatment of the Yukon Territory follows. For full treatment, *see* MACROPAEDIA: Canada.

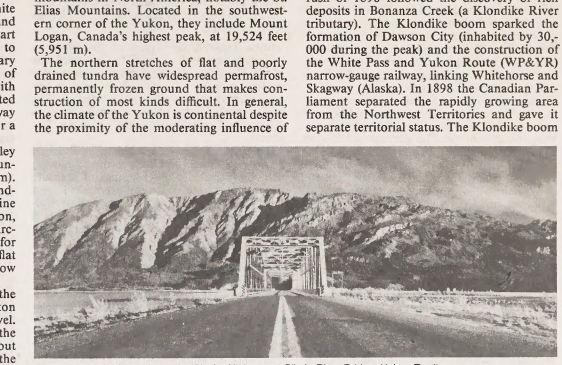
The territory lies within the mountainous Cordilleran region of western North America. The more settled areas lie in a large central plateau surrounded by mountains and drained by the Yukon River system that flows northwestward into Alaska. While that system drains about three-quarters of the territory, the Peel River drains a lesser plateau in the northeast, and the Liard River drains the plain that lies in the southeastern Yukon. The central plateau, with an average elevation of about 4,000 feet (1,200 m), is surrounded by some of the highest and most spectacular mountains in North America, notably the St. Elias Mountains. Located in the southwestern corner of the Yukon, they include Mount Logan, Canada's highest peak, at 19,524 feet (5,951 m).

The northern stretches of flat and poorly drained tundra have widespread permafrost, permanently frozen ground that makes construction of most kinds difficult. In general, the climate of the Yukon is continental despite the proximity of the moderating influence of the Pacific Ocean, which the mountains prevent from acting directly on the territory. Although temperatures vary, sometimes reaching summer highs of 95° F (35° C) and winter lows below −60° F (−51° C), the monthly average readings are not unlike those found in some Canadian cities farther east and south. Summers are short but the days are long, especially in the northern part of the territory lying above the Arctic Circle. Precipitation is light, averaging only 10 inches (250 mm) annually at Whitehorse.

The territory was originally settled by American Indians and Inuit (Eskimos), who today constitute about one-fifth of the population. The Indians are mainly Kutchin and Nahanni, both speaking Athabascan dialects, and the Tagish, who live south of Whitehorse and speak a Tlingit dialect. To the east live small numbers of Inuit. Many of the Indians still rely, at least in part, on hunting, trapping, and fishing, and some move seasonally to fishing or hunting camps; moose is the favourite game. The introduction of rifles and especially snowmobiles, however, has altered traditional lifestyles and permitted overhunting of game. Although there are few occupied Indian reserves, registered Indians are the responsibility of the federal government. The rest of the population is of European or Métis (mostly mixed European and Indian) descent.

The first European visitor to the region was the British explorer Sir John Franklin, who arrived in 1825 from the east seeking the Northwest Passage to the Pacific. He found the Inuit of Herschel Island using metal-tipped arrows obtained in trade from Russians settled in Alaska. Based on his reports, the Hudson's Bay Company sent John Bell to explore further. Bell founded Fort McPherson on the Mackenzie River delta in 1840, followed by Fort Yukon in 1847 at the junction of the Yukon and Porcupine rivers in what was then Russian territory. Trade with the Indians flourished, and numerous trading posts were established. Fort Yukon was twice relocated, first in 1867, when the United States purchased Alaska, and again in 1890.

Gold was discovered on tributaries of the Yukon River in the 1870s, resulting in an influx of miners, American traders, and finally in the mid-1890s a small detachment of North West Mounted Police. The great gold rush of 1898 followed the discovery of rich deposits in Bonanza Creek (a Klondike River tributary). The Klondike boom sparked the formation of Dawson City (inhabited by 30,000 during the peak) and the construction of the White Pass and Yukon Route (WP&YR) narrow-gauge railway, linking Whitehorse and Skagway (Alaska). In 1898 the Canadian Parliament separated the rapidly growing area from the Northwest Territories and gave it separate territorial status. The Klondike boom was short-lived. By 1900 most of the individual miners had given up and were replaced by companies that brought large-scale mechanical mining techniques.



Sheep Mountain rising above the Alaska Highway at Slim's River Bridge, Yukon Territory
Richard Hartmier/First Light

Gold, silver, lead, zinc, copper, asbestos, and coal have been extracted in the Yukon Territory, and there are vast reserves of unmined minerals. Federal assistance stimulated the mining industry in the 1950s, but the industry began to decline in the late 20th century. Government and tourism have become the territory's economic mainstays.

World War II brought improvements in transportation, including construction of the Alaska Highway. The Klondike Highway link-

ing Dawson, Mayo, Whitehorse, and Skagway was built in the 1950s–70s, and the Dempster Highway linking Dawson, Fort McPherson, and Inuvik opened in 1979. The WP&YR railway, however, discontinued service in 1982 (though a small section of the line from Skagway, Alaska, to British Columbia later reopened for tourist travel). Scheduled jet air services operate between Whitehorse and Edmonton, Alta., and Vancouver, B.C. Light aircraft link all settlements in the Yukon. These improvements in transportation, together with advances in communications, have encouraged the development of a tourist industry.

Much of the territory has remained an unspoiled wilderness with abundant animal life, for the northern stretches of poorly drained tundra are covered by permafrost and are inhospitable to exploitation. In some areas farming is possible, but poor climate and soil make it unprofitable. Virtually no settlement has been undertaken for agricultural purposes.

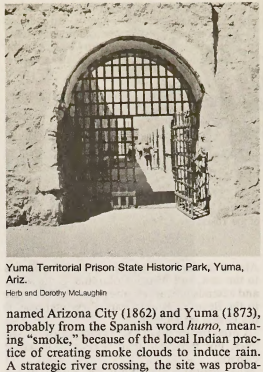
Yukon's territorial government is based on the Yukon Act of 1898 and the Government Organization Act of 1966. It consists of the Legislative Assembly (Yukon Council), elected by universal adult suffrage. A resident commissioner, appointed by the federal government and under the direction of the federal minister of Indian Affairs and Northern Development, is the chief executive officer but in local matters is required to follow the recommendations of the Executive Council. This council, which is headed by the government leader and composed of members of the Legislative Assembly, is responsible for daily governmental affairs. The territorial government has the same local powers as a provincial government, with the exceptions that federal officials administer all of the Yukon's natural resources excluding game, and the territorial government may not legislate its own constitution. The Yukon has one federal senator, appointed by the governor-general of Canada, and one member, popularly elected, of the federal House of Commons.

Education from kindergarten through grade 12 is free and compulsory in public and government-aided Roman Catholic and private Indian schools. The government started a program in Indian communities to promote teaching in indigenous dialects with texts about land and living skills. Yukon College at Whitehorse, with a network of community branches, provides two years of university-level courses and a number of vocational and adult-education programs.

Among Canadian literature about the Yukon, the verse and fiction of Robert Service and *Klondike* (1958) by Yukon-born Pierre Berton are the most famous. Californian Jack London first achieved literary renown with short stories and novels reflecting his experience in the Klondike gold rush. There are museums and displays in Whitehorse and Dawson commemorating the gold-rush days. Several radio and television stations, newspapers, and a library system operating out of Whitehorse provide news and entertainment.

Discovery Day in Dawson, honouring the discovery of gold in the Klondike on Aug. 17, 1896, and the Sourdough Rendezvous (February) in Whitehorse are festivals that feature competitions, music, dancing, and local folklore; Dawson's *Gaslight Follies* and Whitehorse's *Frantic Follies* re-create the atmosphere of those towns in the gold-rush days. Area 186,661 square miles (483,450 square km). Pop. (1993 est.) 32,000.

Yuma, city, seat (1870) of Yuma county, southwestern Arizona, U.S. It is situated on the Colorado River at the mouth of the Gila River, just north of the Mexican frontier. Founded in 1854 as Colorado City, it was renamed Arizona City (1862) and Yuma (1873), probably from the Spanish word *humo,* meaning "smoke," because of the local Indian practice of creating smoke clouds to induce rain. A strategic river crossing, the site was probably visited by Hernando de Alarcón (working with the Coronado expedition) in 1540.



Yuma Territorial Prison State Historic Park, Yuma, Ariz.
Herb and Dorothy McLaughlin

Yuma is the centre of large irrigation districts that have transformed parts of the desert into rich farming land. Thus agriculture, tourism, and some light manufacturing form the basis of the economy, which is augmented by the nearby Yuma Proving Ground (1942), the Marine Corps Air Station (1928), federal and local government centres, and the two-year Arizona Western College (1962). Yuma Territorial Prison (1876), now a state historical park, displays artifacts and photographs of prison life in the old West. Inc. town, 1871; city, 1914. Pop. (1994 est.) city, 67,185; Yuma MSA, 128,511.

Yuma Desert, arid part of the Sonoran Desert. It lies south of the Gila River and east of the Colorado River in the extreme southwestern corner of Arizona, U.S., and in the northwestern corner of Sonora, Mexico. The desert south of the Mexican border often is called the Great Desert (Spanish: Gran Desierto).

The Yuma Desert is a region of low sandy plains and dunes. The area is nearly barren, with only sporadic outcroppings of creosote bush or burr sage. With the Colorado Desert of southern California, U.S., and Baja California, Mex., the Yuma Desert occupies a landform known as the Salton Trough (Salton Basin).

Extensive irrigation works divert water from dams on the Colorado River to support large-scale commercial agriculture in the Colorado and Gila river valleys (winter vegetables, cotton, flax, citrus fruits, dates, and alfalfa); however, the rivers themselves have been greatly disrupted by these and other water-diversion projects and flow only intermittently in their respective lower reaches. The Yuma Desert's clear skies and low precipitation favour activities at the U.S. Marine Corps Air Station at the city of Yuma.

Yuman, any of various Indian groups who traditionally lived in the lower Colorado River valley and adjacent areas in western Arizona, southern California, northern Baja California, and northwestern Sonora and who spoke related languages (Yuman) of Hokan stock.

Two major divisions of Yuman people are recognized: the river Yumans, who lived along the lower Colorado and middle Gila rivers and whose major groups included, from north to south, the Mojave, Halchidhoma, Yuma, and Cocopa, together with the Maricopa in the middle Gila; and the upland Yumans, who inhabited western Arizona south of the Grand Canyon and whose major groups included the Hualapai (Walapai), Havasupai, and Yavapai.

Two other groups of Yuman-speaking people, the Diegueño and the Kamia (now known as the Tipai and Ipai) lived in southern California and northern Baja California. The Kiliwa and Paipai still live in northern Baja California.

The river Yumans were primarily farmers who benefited from the annual floods of the Colorado and Gila rivers. These floods provided regular enrichment of farmland through the rich burdens of silt that they deposited, and they also made irrigation unnecessary. The Maricopa were somewhat influenced by their neighbours, the Pima, and frequently allied with the Pima against other river Yumans such as the Mojave and Yuma.

The upland Yumans in many ways resembled the ancient Desert cultures *(q.v.),* which are ancestral to many of the southwestern cultural traditions. Some farming was done, but a major part of subsistence was based on hunting and on gathering wild plant foods. The Havasupai were exceptions, partly because of contacts with the Hopi and partly because of their location in Cataract Canyon, a side canyon of the Grand Canyon. The creek flowing through this canyon made extensive farming possible through irrigation. Unlike other Yumans, the Havasupai were very peaceful. The Yavapai, on the other hand, frequently allied themselves with bands of western Apache for raiding and were sometimes called Yavapai-Apache.

All Yuman peoples resembled one another in their lack of settled villages and their loose political organization. They had a tribal sense, but not the effective organization. Most had a somewhat warlike spirit and an individual desire for renown in battle. They demonstrated craftsmanship in pottery. Artifacts were made to be functional and were rarely repaired. When something broke, it was replaced. Yuman religion is characterized by belief in a supreme creator, faith in dreams, and use of song narratives in ritual and ceremony.

The total number of Yuman peoples remaining in the late 20th century in the United States and Mexico was uncertain. There were a number of large and small reservations in California and Arizona containing such groups as the Yuma, Mojave, Havasupai, Hualapai, Yavapai, Yavapai-Apache, Cocopa, and Maricopa; these reservation Yumans probably numbered well over 4,000. *See also* Diegueño; Mojave.

Yun, Isang (b. Sept. 17, 1917, T'ongyŏng, Korea [now Ch'ungmu, S.Kor.]—d. Nov. 3, 1995, Berlin, Ger.), Korean-born German composer who sought to express a distinctly Asian sensibility by means of contemporary Western techniques.

Yun began composing at the age of 14 and studied music in Japan in Ōsaka and Tokyo. He returned to Korea, where he was active in the resistance movement against the Japanese during World War II and afterward taught music in T'ongyŏng, Pusan, and Seoul. He later went to Europe for further study, first in Paris (1956–57) and then as a pupil of Boris Blacher in Berlin (1958–59). Following imprisonment (1967–69) in South Korea as an alleged communist, he began teaching in Berlin, becoming a German citizen in 1971.

Yun's main purpose in his compositions was to develop Korean music using East Asian performance practices but with European instruments and other techniques. His operas derive inspiration from Taoist and yin-yang philosophy. He also wrote in the idiom of protest, recalling his time in prison in a 1976 cello concerto and remembering the victims of the 1980 Kwangju massacre in an orchestral memoriam in 1981. Other works included *Loyang* (1962), *Réak* (1966), *Piri* (1971), and *Engel in Flammen* (1994).

Yün-ching-hung (China): *see* Ching-hung.

Yün-kang caves, Pinyin YUNGANG, series of magnificent Chinese Buddhist cave temples, created in the 5th century AD (Six Dynasties period). They are located about 10 miles (16 km) west of the city of Ta-t'ung (Datong), near the northern border of Shansi province (and the Great Wall).



Interior of Cave VI, Yün-kang, Shansi province, second half of the 5th century AD, Six Dynasties period

Seiichi Mizuno

The caves are among the earliest remaining examples of the first major flowering of Buddhist art in China. A low ridge of soft sandstone was excavated to form about 20 major cave temples and many smaller niches and caves, stretching for over half a mile (about 1 km) from east to west. Some of the caves served merely as cell-like enclosures for colossal figures of the Buddha (up to about 45 feet [14 m] tall), while others contained chapels.

The earliest five temples were instituted by the head of the Buddhist church, a monk named T'an-yao, about 460; their construction was among the first acts of propitiation sponsored by the foreign T'o-pa, or Northern Wei, rulers (386–535) for their persecution of Buddhism during the period 446–452. The colossal Buddha images in each cave were equated with the first five emperors of the Northern Wei, thus emphasizing the political and economic role that the court imposed upon Buddhism.

The remaining temples were largely constructed in the succeeding decades until 494, when the Northern Wei court was moved to the city of Lo-yang (Honan province) and a new series of cave temples was instituted at the site of Lung-men (*see* Lung-men caves).

The predominant sculptural style of the innumerable images (primarily of the Buddha, with ancillary figures) is a synthesis of various foreign influences—including Persian, Byzantine, and Greek—ultimately derived from the Buddhist art of India. Late in the period of major work at the site, a new "Chinese style" appeared, based on indigenous styles and forms; Yün-kang, however, is considered as the type site for the first style, and the later caves at Lung-men the type site for the second style. *See also* Northern Wei sculpture.

Yün-lin, *hsien* (county), west-central Taiwan. It is bordered by the *hsien* of Chang-hua (north), Nan-t'ou (east), and Chia-i (south) and by the Taiwan Strait (west).

Yün-lin slopes from the foothills of the A-li Mountains in the east to the fertile alluvial plains in the west. The Cho-shui and Pei-kang rivers run parallel to the northern and southern boundaries, respectively, and are sources of hydroelectricity. Sugarcane, paddy rice, peanuts (groundnuts), jute, and sweet potatoes are grown. Industries based in Yün-lin produce textiles and sugar. Coal is mined in the eastern part of the *hsien,* and there are reserves of crude oil and natural gas.

The temple of Matsu, Goddess of the Sea, at Pei-kang, attracts multitudes of pilgrims from all over Taiwan for annual celebrations. Tou-liu is the administrative seat of the *hsien* and is linked by road and railway with T'aichung to the north and with Chia-i to the south. Area 498 square miles (1,291 square km). Pop. (1994 est.) 753,904.

Yün-lin-hsien (Taiwan): *see* Tou-liu.

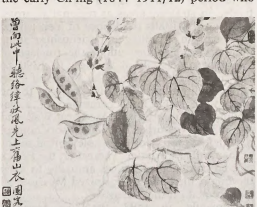
Yun Po Sun (b. 1897, Asan, Korea [now in South Korea]—d. July 18, 1990, Seoul, South Korea), Korean politician who served (1960–62) as a liberal president of South Korea during the Second Republic.

When Japanese rule of Korea ended in 1945, Yun entered politics; his mentor, Korean president Syngman Rhee, appointed him mayor of Seoul in 1948 and minister of commerce and industry in 1949. In time, however, he came to disagree with Rhee's authoritarian rule. He was elected to the National Assembly in 1954, and the next year he was among the founders of the opposition Democratic Party.

After the student-led pro-democracy uprising of 1960 forced Rhee to resign, Yun was elected president. In less than a year a coup brought the army's Major-General Park Chung Hee to power. Though Yun was initially persuaded to stay in office, he resigned in 1962.

He then became a vehement critic of Park's repressive regime and opposed Park in the 1963 and 1967 presidential elections. He was twice convicted of instigating the overthrow of the government and received suspended prison sentences. After Park's assassination in 1979, Yun was tried for organizing a mass pro-reform rally, and again he received a suspended sentence. He retired from politics in 1980.

Yün Shou-p'ing, Pinyin YUN SHOUPING, also called YÜN NAN-T'IEN (b. 1633, Yang-hu, Kiangsu province, China—d. 1690), artist who, together with the Four Wangs and Wu Li, is grouped among the major artists of the early Ch'ing (1644–1911/12) period who



"Flowers," album leaf, ink and slight colour on paper by Yün Shou-p'ing, 17th century; in the Honolulu Academy of Arts

By courtesy of the Honolulu Academy of Arts

continued the orthodox tradition of painting, following the great codifications of the painter and art theoretician Tung Ch'i-ch'ang.

Yün Shou-p'ing had an adventure-filled early life. Following the collapse of the Ming dynasty, Yün was taken along in flight by his father, a Ming loyalist, then separated from his father and adopted by a high-placed family among the ruling Manchus, and, finally, restored by stealth to his father in a Buddhist monastery. Yün refused to serve the foreign Manchus but instead cultivated the learned arts of poetry, calligraphy, and painting. He was a contemporary and close friend of the rich and famous Wang Hui, and Yün much admired him—even to the extent, it is said, of admitting the other's greater mastery in the art of landscape.

Yün is generally associated with the painting of flowers, usually in a "boneless" (*mo-ku*) manner that emphasizes washes instead of lines. Yün earned the respect of both his contemporaries and later generations as an appropriate representative of the school of "literati painting" (*wen-jen-hua*).

Yuna River, Spanish RÍO YUNA, river in central and northeastern Dominican Republic, one of the nation's three most important river systems, the others being the Yaque del Norte and Yaque del Sur rivers.

The Yuna is formed by the union of many headstreams arising near Bonao in the tangled mountains of the Cordillera Central. The river descends northeastward into the fertile region known as the Cibao Valley, turns and receives its major tributary, the Camú, and then flows eastward. It crosses a marshy lowland and empties into Samaná Bay just southwest of the port of Sánchez.

Although the river is about 100 miles (160 km) long, only the lower course is navigable. Its waters are used principally for irrigating rice.

Yung-an, Pinyin YONG'AN, town in central Fukien *sheng* (province), China. Situated on the Sha River, a southern tributary of the Min River, which provides the main southwest-to-northeast route through central Fukien, Yung-an is a natural route centre on the railway line from Kiangsi province via Nan-p'ing to Amoy (Hsia-men). From Yung-an a network of highways radiates to Ch'üan-chou on the coast north of Amoy, to Lung-yen in southern Fukien, and southwestward through the mountains to eastern Kwangtung province. Yung-an is the chief collection and distribution centre for a wide area, shipping large quantities of foodstuffs, timber, and forest products to Amoy and to the north.

Yung-an's prosperity has grown since the railway was opened in 1956; but it has been overshadowed by the emergence of San-ming, 25 miles (40 km) to the northeast, as an industrial city. Yung-an itself has developed minor engineering, chemical, and timber-working industries. Pop. (1990) 111,762.

Yung-cheng, Pinyin YONGZHENG (reign name), personal name (Wade-Giles) YIN-CHEN, temple name (CH'ING) SHIH-TSUNG, posthumous name, or *shih,* HSIEN-TI (b. Dec. 13, 1678, Peking, China—d. Oct. 8, 1735, Peking), the third emperor (reigned 1722–35) of the Ch'ing dynasty, during whose rule the administration was consolidated and power became concentrated in the emperor's hands.

As the fourth son of the previous emperor, Yung-cheng was not immediately in line for the throne; but when the designated heir apparent became mentally deranged, the future emperor saw an opportunity to seize the throne and began to intrigue against his brothers. Several of the chronicles of the period allege that the Yung-cheng emperor murdered his father. In any case, he succeeded to the throne by having military support in Peking when his father, who was known by his reign title as the K'ang-hsi emperor, died. The first years of Yung-cheng's reign were spent consolidating his power. He imprisoned or executed some of his brothers and their supporters and undermined the power of the others. His espionage system was so efficient that every action of his ministers was said to have been reported to him. He even tampered with the imperial

records from the last years of his father's reign and the first years of his own, ordering the suppression of any accounts unfavourable to himself or favourable to his opponents.

More significant was his removal of the Imperial princes from control of the Eight Banners, the major Ch'ing military units. When the Yung-cheng emperor ascended the throne, three of the Eight Banners were controlled directly by the throne, but the rest were under the rule of Ch'ing princes. Fearing that they could use this control for personal advantage—as the Yung-cheng emperor had done in his own ascension to the throne—he compelled all the princes to attend a special palace school, where they were indoctrinated with the idea of subservience to the throne. As a result the Eight Banners remained loyal throughout the existence of the dynasty.

In 1729 the Yung-cheng emperor increased the administrative centralization of the government. The Grand Secretariat was replaced as the top ministerial body by the previously informal Grand Council. The five or six members of the Grand Council worked directly with the Emperor, who conferred with them every day. Their business was handled quickly and secretly. The Emperor thus personally scrutinized and directed all important matters of government.

Although the official records claim he died peacefully, he had many enemies during his life, and according to legend he was murdered by the daughter of a man he had had executed. An able ruler, he left office having checked corruption among his officials, enforced the laws of the empire, and reorganized finances so that the state revenue was increased. In addition to temporal matters, he pursued also the study of religion, writing extensively on the subject of Ch'an (Zen) Buddhism.

Yung-chia (China): *see* Wen-chou.

Yung-ho, *shih* (municipality), T'ai-pei *hsien* (county), northern Taiwan, 1 mi (1.6 km) south of Taipei city, in the northern part of the island's western coastal plain. Situated on the east bank of Shuang Hsi (river), the city flourished in the early 18th century. It is a market centre for the tea and rice produced in the surrounding region. Glass and glass products, and small machinery manufacturing are the main industries; coal is mined nearby. Yung-ho is a southern suburb and serves as a residential area for Taipei city; it is linked by railway with Taipei and Hsin-tien. Several colleges of teacher training and technology are in the city. Pop. (1982 est.) 213,787.

Yung-li (Chinese emperor): *see* Chu Yu-lang.

Yung-lo, Pinyin YONGLO (reign name), temple name (MING) CH'ENG TSU, or (MING) T'AI TSUNG, posthumous name, or *shih,* WEN TI, personal name CHU TI (b. May 2, 1360, Nanking—d. Aug. 5, 1424, en route to Peking), third emperor (1402–24) of China's Ming dynasty, which he raised to its greatest power. He moved the capital from Nanking to Peking, which was rebuilt with the Forbidden City.

Youth and early career. Chu Ti's father, the Hung-wu emperor, had rapidly risen from a poor orphan of peasant origin through stages as a mendicant Buddhist monk and then a subaltern in a popular rebellion against the Mongol rulers of the Yüan dynasty to become a virtually independent satrap in part of the rich eastern Yangtze River Valley, with his headquarters at Nanking. There Chu Ti was born fourth in a brood that ultimately numbered 26 princes. Modern scholarship has suggested that Chu Ti was probably borne by a secondary consort of Korean origin, although in traditional Chinese fashion he always treated his father's principal consort, the revered and influential empress Ma, as his "legal" mother.



The Yung-lo emperor, detail of a portrait; in the National Palace Museum, Taipei

By courtesy of the National Palace Museum, Taipei, Taiwan, Republic of China

In 1360 Hung-wu was struggling with other contenders for supremacy in the Yangtze Valley, while the Yüan government at modern Peking was all but immobilized by court factionalism. In the next seven years the Hung-wu emperor's armies swept central and eastern China clear of opposition, and in 1368 he inaugurated the new Ming dynasty, with its capital at Nanking. He drove the last Mongol emperor out of Peking and then beyond the Great Wall and the Gobi.

At the age of 10, in 1370, Chu Ti was designated prince of Yen (an ancient name for the Peking region). As he grew to manhood during the next decade, the new Ming empire was stabilized, an elaborate governmental apparatus was erected, and a new socioeconomic order characterized by authoritarian reconstruction in many fields was instituted. The boy grew up in the mold of his remarkable father—robust, vigorous, and temperamental—and he became his father's favourite. His natural leadership qualities clearly outshone those of his many brothers.

In 1380, at the age of 20, the Prince of Yen took up residence at Peking. The early Ming governmental system provided that the Imperial princes other than the eldest son, who remained at Nanking as heir apparent, be enfeoffed in strategic areas as regional viceroys. Through the 1380s the Prince of Yen gained experience in patrolling and skirmishing along the northern frontier under the tutelage of the greatest generals of the age. In 1390 he and his older half brother the Prince of Chin (enfeoffed in adjacent Shansi Province to the west) were given joint command of a patrolling expedition beyond the Great Wall, and in 1393 they assumed full supervisory control over defense forces of the whole central sector of the northern frontier. Thereafter, the Prince of Yen campaigned almost annually to keep the fragmented and disorganized Mongols off balance and on the defensive.

Meanwhile, in 1392, the heir apparent died. Some historians believe that the aging Hung-wu emperor seriously considered naming the Prince of Yen his new heir, in violation of tradition and the household rules he had himself promulgated. The Emperor did hesitate for almost half a year before designating his successor, but then he complied with tradition by investing the dead crown prince's son Chu Yün-wen, then only 15 years old. From this time forward, and especially after the deaths of his two remaining seniors in 1395 and in 1398, respectively, the Prince of Yen became increasingly arrogant and imperious; when the old emperor died in the summer of 1398 the Prince of Yen, in full vigour at the age of 38, considered himself the de facto head of the Imperial clan and expected to be treated deferentially by his nephew.

The young new emperor Chu Yün-wen had other intentions. Influenced by Confucian scholar-officials, he instituted a series of reforms unsettling to the newly stabilized government. One of his major goals was to take regional power away from the princes, and in 1398–99 one prince after another was imprisoned, exiled, or driven to suicide. Thus the Prince of Yen found himself steadily more isolated and endangered, and in August 1399 he rose in rebellion, declaring it his avuncular duty to rescue the inexperienced emperor from his malicious advisers.

The rebellion lasted from 1399 into 1402 and devastated much of western Shantung Province and the northern part of the Huai River Basin. The central government at Nanking seems to have underestimated the Prince of Yen's strength and failed to muster its manpower and matériel effectively; the war was a long stalemate. In early 1402 the Prince of Yen's forces broke through the Imperial armies in the north, sped almost unopposed southward along the Grand Canal, accepted surrender of the Imperial fleet on the Yangtze River, and were admitted into the walled capital by court defectors in July 1402. Four days after the fall of Nanking, Chu Ti took the throne himself, although his reign period did not begin until 1403. The emperor Chu Yün-wen had disappeared. Whether he died in a palace fire (as was officially announced) or escaped in disguise to live many more years as a recluse is a puzzle that troubled Chu Ti until his own death and has been a subject of conjecture by Chinese historians ever since.

Accession to the throne. The accession brought terrible retribution to those who had most closely advised Chu Yün-wen. They and all their relatives were put to death. Before the purge ended, thousands had perished. The new emperor also revoked the institutional and policy changes of his nephew-predecessor and even ordered history rewritten so that the founding emperor's era name was extended through 1402, as if Chu Yün-wen had never reigned at all. The one reform policy that remained in effect was that princely powers must be curtailed. Hence, the surviving frontier princes were successively transferred from their strategically located fiefs into central and south China and were deprived of all governmental authority. From the Yung-lo period on, Imperial princes were no more than salaried idlers who socially and ceremonially adorned the cities to which they were assigned and in which they were effectively confined. No subsequent Ming emperor was seriously threatened by a princely uprising.

As the Yung-lo emperor, Chu Ti was domineering, jealous of his authority, and inclined toward self-aggrandizement. He staffed the central government with young men dependent on himself and relied to an unprecedented extent on eunuchs for service outside their traditionally prescribed palace spheres—as foreign envoys, as supervisors of special projects such as the requisitioning of construction supplies, and as regional overseers of military garrisons. In 1420 he established a special eunuch agency called the Eastern Depot (Tung-ch'ang) charged with ferreting out treasonable activities. Although it did not become notorious in his own reign, it came to be a hated and feared secret police in collaboration with the Imperial bodyguard in later decades and centuries.

The Yung-lo emperor also relied heavily on a secretarial group of young scholar-officials assigned to palace duty from the traditional compiling and editing agency, the Hanlin Academy, and by the end of his reign they became a Grand Secretariat, a powerful buffer between the Emperor and the administrative agencies of government. Although the Emperor, like his father, was quick to anger and

sometimes abused officials cruelly, he built a strong and effective administration, and during his reign China settled into the generally stable political and socioeconomic patterns that were to characterize the remainder of the dynasty.

Like his father, Yung-lo had little personal respect for the higher forms of Chinese culture. In the fashion of the Mongol khans, he summoned to China and highly honoured a Tibetan lama, and the strongest intellectual influence on him may have been that of a Taoist priest named Tao-yen, a long-favoured personal adviser. Along more orthodox lines, his government sponsored the compilation and publication of Confucian and Neo-Confucian Classics, and it most notably sponsored the preparation in manuscript form of a monumental compendium of literature called *Yung-lo ta-tien* ("The Great Canon of the Yung-lo Era") in more than 11,000 volumes, which preserved many works that would otherwise have been lost. But the Emperor himself must have considered such activities a kind of busywork for litterateurs who enjoyed public esteem but not his personal trust. A military man of action, the Yung-lo emperor had little enough patience with unavoidable administrative business, much less with intellectual exercises.

Foreign policy. In the early years of his reign, he seems to have been fascinated by the regions beyond China's southern borders, perhaps in part because of rumours that the emperor Chu Yün-wen had escaped overseas. In 1403 the Yung-lo emperor sent out three fleets under eunuch commanders to proclaim his accession throughout Southeast Asia as far as Java and southern India. More vigorously than any other ruler in Chinese history, he sought recognition from faraway potentates in these regions. Throughout his reign "tributary" missions regularly travelled to China from overseas, including local kings of Malacca and Brunei. Most renowned of the Yung-lo emperor's many ocean admirals was the Muslim eunuch Cheng Ho, who led grand armadas on seven great voyages between 1405 and 1433. Cheng Ho visited no fewer than 37 countries, some as far away as the Persian Gulf, the Red Sea, and the east coast of Africa almost as far south as Zanzibar, and from all the states that he visited Cheng Ho brought home envoys bearing tribute to acknowledge the Yung-lo emperor's overlordship.

The Emperor similarly sent a eunuch emissary on repeated tribute-seeking missions to Tibet and Nepal and a civil servant across Central Asia to Afghanistan and Russian Turkistan. The Yung-lo emperor became the only ruler in Chinese history to be acknowledged suzerain by the Japanese, under the Ashikaga shogun Yoshimitsu. For a short time the Japanese were so docile as to send their own subjects to the Chinese court for punishment as piratical plunderers of the Korean and Chinese coasts. But the succession of a new shogun brought about a less submissive attitude in Japan; from 1411 on, no tribute missions arrived from Japan despite the Yung-lo emperor's inquiries, and Japanese raiders became active again on China's coast. The Emperor then threatened to send a punitive expedition against Japan if it would not reform. But in 1419, when the shogunate brusquely denied responsibility for any piratical activities and refused to resume the former tributary relationship, the Yung-lo emperor was too preoccupied with other matters to do more than grumble.

The Yung-lo emperor's expansionist inclinations led China into an ultimately disastrous military adventure against China's southern neighbour, Annam. In 1400 the young Tran dynasty, heir to the Annamite throne, had been deposed and a new dynasty proclaimed. From the beginning of Yung-lo's reign Tran loyalist refugees urged him to intervene and restore legitimate rule, and, when his own envoys to Annam were murdered, in 1406, the Emperor authorized a punitive campaign. Chinese forces rapidly occupied and pacified Annam. Because no Tran heir seemed available, the Yung-lo emperor in 1407 transformed Annam from a tributary state into a new Chinese province. Local resistance broke out almost immediately and continued irrepressibly. Especially after 1418, guerrilla warfare against the Ming authorities made the Chinese position in Annam increasingly precarious. By that time the Emperor had lost most of his early interest in the southern regions, and the situation was allowed to deteriorate until his grandson Hsüan-te realistically, albeit with some humiliation, abandoned direct Ming rule of Annam in 1428.

During the early years of the Yung-lo emperor's reign, the northern frontier, traditionally the zone of greatest danger to any Chinese regime, was relatively quiescent. At the outset of his Peking-based insurrection in 1402, the Yung-lo emperor had sought and won the support of the Mongol tribes directly to his rear, in northeastern China. In later payment for this support, he in effect gave these Uriangkhai Mongols virtual autonomy by withdrawing China's command posts south of the Great Wall, and he regularly sent the Uriangkhai chiefs substantial gifts. Other tribes beyond the northern frontier—the Eastern Mongols, or Tatars, and the Western Mongols, or Oyrats—were too disorganized to do more than struggle among themselves. In the far west, the Turko-Mongol empire builder Timur (Tamerlane) had already invaded and pillaged both India and Syria when the Yung-lo emperor came to the Chinese throne, and in 1404 Timur prepared to launch an expedition against China. Vaguely aware of this, the Yung-lo emperor alerted his commanders in the west to prepare for trouble; but Timur died in 1405, and the expedition was cancelled. Thereafter, the Emperor maintained amicable relations with Timur's heirs at Samarkand and Herat, keeping the Central Asian trade routes open.

After his early years on the throne, the Yung-lo emperor's attention was diverted from the south back to the northern frontier by the emergence of an effective new Tatar leader named Aruqtai. In 1410 the Yung-lo emperor resumed the aggressive extramural patrolling in the north that had preoccupied him as prince in the 1380s and 1390s. Between 1410 and 1424 the Emperor five times personally led grand armies northward into the Gobi, primarily against Aruqtai but occasionally against Oyrats or restless Urianghad groups. The campaigns culminated in only a few battles, in which the Chinese forces won indecisive victories, but they had the effect of forestalling the development of a new large-scale Mongol confederation that might have seriously threatened China. Astute diplomacy was also relied on during these years to keep the Mongols fragmented and to establish at least a nominal Chinese authority over the Jüchen peoples in the far northeast, as distant as the Amur River.

Transfer of capital to Peking. The most notable domestic event of the Yung-lo emperor's reign was the transfer of the national capital and the central government from Nanking to Peking. This reflected and symbolized the Emperor's and the nation's shift of attention from the southern oceans to the northern land frontiers. Peking was perhaps not the ideal site for the national capital: it historically had been associated primarily with "barbarian" dynasties such as the Yüan, it was far removed from China's economic and cultural heartland, and it was dangerously close and exposed to the northern frontier. But it was the Yung-lo emperor's personal power base, and it was a site from which the northern defenses could be kept under effective surveillance. In 1407 the Emperor authorized transfer of the capital there, and from 1409 on he spent most of his time in the north. In 1417 large-scale work began on the reconstruction of Peking, and thereafter the Yung-lo emperor never returned to Nanking. The new Peking palace was completed in 1420, and on New Year's Day of 1421 Peking formally became the national capital.

Before this transfer of the capital could be accomplished and before the northern defenses could be made satisfactorily secure, the Yung-lo emperor had to provide for the reliable transport of grain supplies from the affluent Yangtze Valley to the north. Since the old Grand Canal linking the Yangtze and Yellow River valleys had been neglected for centuries and was largely unusable, coastal transport service around the Shantung peninsula was reorganized, and it proved spectacularly successful in the early years of the Yung-lo emperor's reign under the naval commander Ch'en Hsüan. Rehabilitation and extension of old waterways in the north proceeded simultaneously, so that in 1411 sea transport vessels could enter the Yellow River mouth south of Shantung and thus avoid the most perilous part of the coastal route; then Ch'en Hsüan by 1415 successfully rehabilitated the southern segments of the Grand Canal, and sea transport was abandoned. With Ch'en Hsüan serving as supreme commander of the Grand Canal system until his death in 1433, the new army-operated waterways complex, extending from Hangchow in the south to outside Peking, was able to deliver grain supplies in quantities adequate for the northern needs. In 1421, when Peking became the national capital, deliveries began to exceed 3,000,000 piculs (400,000,000 pounds) annually.

The Yung-lo emperor's overseas expeditions, the ill-fated occupation of Annam, the northern campaigns, the rebuilding of Peking, and the rehabilitation of the Grand Canal all required enormous expenditures of supplies and human effort. That China was able to undertake such projects during his reign gives evidence of the Yung-lo emperor's strong leadership, but they seem to have left the country exhausted and ready for an era of recovery under his successors.

The Emperor fell ill while returning from his campaign of 1424 into Mongolia and died at the age of 64 in August, when the army was still en route to Peking. He was succeeded by his eldest son, Chu Kao-chih, who had served ably as regent during his father's frequent long absences from the capital; he is known to history by the posthumous temple designation Jen Tsung (Benevolent Forebear). The Yung-lo emperor fathered three other sons and five daughters. His principal consort was Empress Hsü, daughter of the great early Ming marshal Hsü Ta; she died early in his reign, in 1407.

The Yung-lo emperor was originally given the posthumous temple designation T'ai Tsung (Grand Forebear), a designation traditionally given to the second emperor of a dynasty. In 1538, long after that designation had come to be considered an unjustifiable insult to the memory of the emperor Chu Yün-wen, it was changed to the equally flattering Ch'eng Tsu (Completing Ancestor), in acknowledgement that it was indeed Chu Ti who consolidated the new dynasty. (C.O.Hu.)

BIBLIOGRAPHY. The major source on the Yung-lo emperor and his reign is the official reign chronicle known as *T'ai-tsung shih-lu* ("Veritable Records of T'ai-tsung"). Relevant modern scholarship, especially by Westerners, is not abundant. One of the more useful references is Gungwu Wang. "China

and South-east Asia, 1402–1424," in Jerome Ch'en and Nicholas Tarling (eds.), *Studies in the Social History of China and South-East Asia,* pp. 375–401 (1970).

Yung-lo ta-tien, Pinyin YONGLUO DADIEN (Chinese: "The Great Canon [or Vast Documents] of the Yung-lo Era"), Chinese compilation that was the world's largest known encyclopaedia. Compiled by thousands of Chinese scholars under the direction of the Yung-lo emperor (reigned 1402–24), it was completed in 1407. The work contained 22,877 manuscript rolls, or chapters, in 11,095 volumes and was designed to include all that had ever been written on the Confucian canon, history, philosophy, and the arts and sciences. It was, in effect, a vast collection of excerpts and entire works from the mass of Chinese literature. Fewer than 400 volumes of the three manuscript copies of the set survived into modern times. A 100-volume portion was published in Chinese in 1962.

Yung-ning (China): *see* Nan-ning.

Yungang caves (cave temples): *see* Yün-kang caves.

Yungas, humid, subtropical region in western Bolivia. It occupies the eastern slopes of the Andean Cordillera Real and extends northeast and north of the cities of La Paz and Cochabamba. This rainy forested belt of rugged terrain (deep valleys and gorges separated by sharp ridges) has its counterparts in Colombia, Ecuador, and Peru. Settlers have been attracted to the area by gold, coca, coffee, cacao, and a great variety of other crops, and government efforts to improve transportation and colonize the region continue. Yungas is an Aymara word meaning "Warm Lands."

Consult the INDEX *first*

Yunnan, Wade-Giles romanization YÜN-NAN, Pinyin YUNNAN, *sheng* (province) of China, bounded by the Tibet Autonomous Region on the northwest, Szechwan province on the north, and the Chuang Autonomous Region of Kwangsi and Kweichow province on the east. To the west Yunnan borders Myanmar (Burma), and to the south and southeast it adjoins Laos and Vietnam. Yunnan is the fourth largest province in China. The capital is K'un-ming.

A brief treatment of Yunnan follows. For full treatment, *see* MACROPAEDIA: China.

The Yüan, or Mongol, dynasty (1206–1368) marked an end to various power struggles in the region. In 1253 the Mongols destroyed a Tai kingdom called Nanchao and, naming the area Yunnan, made it a province of the Chinese empire. Han (Chinese) migration into Yunnan was encouraged during the Ming dynasty (1368–1644), and the province was governed by local leaders representing Chinese magistrates. This policy continued through the Ch'ing dynasty (1644–1911/12) and under the Chinese republic in its various guises (1911/12–49), when efforts were undertaken to bring the province under central government control. Since 1949 Yunnan has been one of China's high-priority industrial belts.

Yunnan's terrain consists of a series of high mountain chains that spread out across the province. These include the Kao-li-kung, Nu, and Yün-ling mountains. Yunnan contains two distinct regions separated by the Ai-lao Mountains—a canyon region to the west of it and a plateau region to the east. Flowing through the deep valleys between these mountains are Yunnan's major rivers: the Nmai Hka (headstream of the Irrawaddy), the Salween, the Mekong, and the Black River. The towering height of the mountains in the north is such that the valley floors lie at heights averaging 4,000 to 5,000 feet (1,200 to 1,500 m) below the mountaintops. In the southern part of the canyon region the mountains are much lower and the valleys more open. The eastern plateau region stretches from the Ai-lao Mountains to the Kweichow-Kwangsi border. Its dominant land use is for rice paddies, but fruit orchards are located in the terraced rims of the basin. This region is noted for its moderate climate. Despite its proximity to the Equator and because of high elevation, summers are cool; winters are mild because of shelter from the mountains. The western canyon region experiences sultry heat with high humidity at the valley bottoms, temperate climates at 6,000 to 11,000 feet (1,800 to 3,400 m), and freezing winds at the mountaintops.

Yunnan's population is known for its great ethnolinguistic complexity. The bulk of both the city population and the agricultural population consists of Han, who live on the plains and in the valleys devoted to rice cultivation, but there has been much intermarriage between the Han and non-Han immigrants and between the Han and Hui (Chinese Muslims). There is a substantial unassimilated non-Han population, which comprises more than 20 nationalities and numerous other minorities. These groups are highly intermixed in distribution: not one county is inhabited by only a single nationality. Approximately one-tenth of Yunnan's population is urban.

In addition to the enormous rice crop, corn (maize), wheat, barley, sweet potatoes, soybeans, and oilseeds are grown. Sugarcane is grown in the southeastern part of Yunnan and bananas, coconuts, and coffee in the deep south. Walnuts, chestnuts, mulberry trees, peaches, and persimmons are grown in many parts of the province. The western canyon region holds enormous timber reserves and produces some tung oil. Industrial crops include tobacco, cotton, and hemp.

Mining is far more important than agriculture. Yunnan has one of the world's largest tin deposits. The province is also a large producer of copper and has moderate deposits of coal and iron. Other mineral products include antimony, tungsten, mercury, phosphorus, and silver. Gypsum, sulfur, fluorite, arsenic, alum, and asbestos exist in large quantities. Deposits of bauxite provide the basis for an aluminum industry. Marble is quarried at Ta-li. Rock salt is also produced.

Yunnan's manufacturing industries produce machinery, refined metals, chemical products, tobacco products, sugar, leather, hemp, and textiles. The K'un-ming area is a giant industrial complex, consisting of steelworks, iron- and copper-smelting facilities, plants for machinery and engineering, facilities for manufacturing fertilizers and industrial chemicals, and textile and food-processing industries.

Since the government has emphasized Yunnan's economic development, the railroad network has been expanded, and the province's highways are well developed. Most of the rivers in Yunnan are unnavigable, except for short distances. K'un-ming serves as the hub for domestic and international air service. Area 168,400 square miles (436,200 square km). Pop. (1994 est.) 38,850,000.

Yunus Emre (b. *c.* 1238, Turkey—d. *c.* 1320, Turkey), poet and mystic who exercised a powerful influence on Turkish literature.

Though legend obscures the facts of his life, he is known to have been a Sūfī (Islāmic mystic) who sat for 40 years at the feet of his master, Tapduk Emre. Yunus Emre was well versed in mystical philosophy, especially that of the 13th-century poet and mystic Jalāl ad-Dīn ar-Rūmī. Like Rūmī, Yunus Emre became a leading representative of mysticism in Anatolia but on a more popular level; he was venerated as a saint after his death.

His poems, which are devoted mainly to the themes of divine love and human destiny, are characterized by deep feeling. He wrote in a straightforward, almost austere style and mainly in the traditional syllabic metre of Anatolian folk poetry. His verse had a decisive influence on later Turkish mystics and inspired the poets of the renaissance of Turkish national poetry after 1910.

Yupik, also called ASIATIC, or ASIAN, ESKIMO, Western Eskimo group of Siberian Asia and of Saint Lawrence Island and the Diomede Islands in the Bering Sea and Strait. They are culturally related to the Chukchi. The traditional economic activity of the Yupik-speaking Eskimo was the hunting of sea mammals, especially seals, walrus, and, until the latter half of the 19th century, whales. Trade with the Russians developed at the end of the 19th century. The Yupik also traded with neighbouring reindeer breeders and with Alaskan Eskimo. Hunting fur-bearing animals, fishing, and collecting plant food were auxiliary activities. Kayaks (one-person, closed skin boats), bidarkas (open, flat-bottomed boats), and whaleboats provided coastal transportation; dog teams and sleds were used on land.

The Yupik practiced shamanism and believed in benign and harmful spirits; the latter caused various misfortunes, especially illness. Certain animals and birds were (and still are) considered sacred and not to be harmed. Rituals, mainly connected with ensuring future success in hunting and with thanksgiving for past hunts, often included dramatic performances and dances. *Compare* Chukchi.

Yupik language, the western division of the Eskimo languages, spoken in southwestern Alaska and in Siberia. *See* Eskimo-Aleut languages.

Yupuru River (South America): *see* Japurá River.

Yurak (people): *see* Nenets.

Yurok, Indians of the Northwest Coast of North America who lived in California along the lower Klamath River and the Pacific coast. They spoke a Macro-Algonquian language related to Wiyot (*q.v.*).

Yurok villages were small; a village was a collection of independent houses owned by individual families rather than a unified community with an overall political authority. Village residents sometimes shared rights to subsistence areas and to the performance of certain rituals, but other rights, such as rights to fishing, hunting, and gathering, generally belonged to particular houses. These rights were acquired by inheritance, dowry, blood money, or sale. In addition to dwellings, villages also had sweathouses that served as dormitories for men of the basic social unit (consisting of relatives reckoned on the paternal side, headed by the senior member). There were also small separate women's menstrual huts.

The Yurok, whose economy focused on salmon and the acorn, produced excellent basketry and made canoes from redwood trees, selling them to inland tribes. Wealth was counted in strings of dentalium shells, obsidian blades, woodpecker scalps, and albino deerskins. Acquiring wealth was a major Yurok ideal. Feuds were common, with payments of blood money worked out on a precise scale depending on the seriousness of the offense. The value of a man's life depended on his social status.

Religion was concerned with the individual effort to elicit supernatural aid, especially through ritual cleanliness, and with rituals for the public welfare. The major ceremonies were those of the World Renewal cycle, which assured an abundance of food, riches, and general well-being. These included the recitation of magical formulas repeating the words of an ancient spirit race and other acts. The

spiritual power to cure disease was restricted to women, giving them prestige and a source of wealth.

The Yurok lacked the potlatch masked dances, representative art, and other features typical of most Northwest Coast cultures.

yurt, also spelled YURTA, Mongol GER, tent-like Central Asian nomad's dwelling, erected



Yurt in the Gobi desert, Mongolia
George Helton—Photo Researchers

on wooden poles and covered with skin, felt, or handwoven textiles in bright colours. The interior is simply furnished with brightly coloured rugs (red often predominating) decorated with geometric or stylized animal patterns. The knotted pile rug, first known from a nomad burial at the foot of the Altai Mountains (5th–3rd century BC), probably developed as a fur substitute to provide warmth and sleeping comfort in the yurt.

Other items found inside a typical yurt include saddlebags, drinking gourds, and tools for spinning and weaving. The yurt is pitched wherever the nomad finds good pasture for his herds and is carried from place to place on horseback or on a small wagon.

Yuruá River (South America): *see* Juruá River.

Yürük rug, also spelled YÖRÜK, floor covering handwoven by nomadic people in various



Detail of the latch-hook motif of a Balıkesir Yürük rug from western Anatolia, 19th century; in the collection of Joseph V. McMullan
Collection of Joseph V. McMullan; photograph, Otto E. Nelson

parts of Anatolia. The Balıkesir Yürük rugs of western Anatolia have diagonal patterns and a maze of latch-hook motifs carried out in red and dark blue with touches of ivory. They are highly reminiscent of and sometimes confused with those Balochi rugs that abjure the use of brown.

Rugs from eastern Anatolia, many of them Kurdish rugs but classed as Yürük, show a wide range of rich and unusual colour shades. Their hexagonal and lozenge patterns are frequently sharpened by the rug's construction, the knots being tied in such a manner (offset) as to produce diagonal rather than vertical rows. The small prayer rugs are nondescript in design and often dismissed as "Anatolian." As with other nomadic rugs, the wool is apt to be more glossy than that in town products and the pile longer and more recumbent, owing to the use of more shoots of weft between the rows.

Yuryev (Estonia): *see* Tartu.

Yuscarán, town, southeastern Honduras. It lies at the eastern foot of the Montaña (ridge) de Monserrat near the Choluteca River, at an elevation of 3,379 feet (1,030 m).

Founded between 1730 and 1740, when gold and silver were discovered in the area, Yuscarán was a prosperous mining centre during the colonial period. Mining halted in the 19th century but was resumed in the 1940s. The town, which preserves a colonial atmosphere, is also a commercial centre in an area producing mainly timber, grains, and fruits; it also has a liquor distillery. It is accessible by highway from Tegucigalpa, the national capital; a road also leads to the Nicaraguan border. Pop. (1988 prelim.) 2,155.

Yust, Walter (b. May 16, 1894, Philadelphia, Pa., U.S.—d. Feb. 29, 1960, Evanston, Ill.), American journalist and editor, editor in chief of all publications of the *Encyclopædia*



Yust
EB Inc.

Britannica from 1938 to 1960—longer than any of his predecessors.

A graduate of the University of Pennsylvania, Yust began his journalism career with the *Philadelphia Evening Ledger* in 1917 and later worked for newspapers in New Orleans and for other publications. He became literary editor of the *Philadelphia Public Ledger* in 1926. Three years later, upon writing a review of the new 14th edition of the *Encyclopædia Britannica,* Yust came to the attention of its president, William Cox. The following year he was named advertising manager for the encyclopaedia and its associate editor in 1932. He served as editor in chief from 1938 until his retirement in 1960.

Yüsuf ibn Tāshufīn, Tāshufīn also spelled TĀSHFĪN (d. 1106), Almoravid ruler who, during his reign from 1061 to 1106, expanded Almoravid land holdings from a small, insecurely held area in the Maghrib into a huge empire that included major portions of present-day Morocco and Algeria, Muslim Spain as far north as Fraga, and the islands of Majorca, Minorca, and Ibiza. A Berber by origin, Ibn Tāshufīn was an excellent general and a devoutly religious ascetic who inspired his followers by example.

In 1061 Abū Bakr, who was then the leader of the Almoravids, went south into the desert to put down a tribal rebellion. He gave the command of his troops in the Maghrib to Ibn Tāshufīn, his cousin. Ibn Tāshufīn proved so popular that when Abū Bakr returned he relinquished his power and even his wife to Tāshufīn. Ibn Tāshufīn went on to found Marrakech (*c.* 1062) and conquered almost all of Morocco and Algeria. The fall of Toledo in 1085 and increasing Christian aggressiveness led the divided Muslims of Spain to appeal for his aid. Ibn Tāshufīn inflicted a serious defeat on Alfonso VI of Castile at az-Zallaqah in 1086, but he returned to Morocco afterward. He returned to Spain in 1089 to begin his conquest in earnest. By the time of his death, Ibn Tāshufīn controlled virtually all of Muslim Spain.

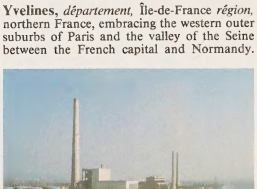
Yuzhno-Sakhalinsk, also spelled IUZHNO-SAKHALINSK, or JUŽNO-SACHALINSK, city and administrative centre of Sakhalin *oblast* (province), far eastern Russia. It lies in the south of Sakhalin Island on the Susuya River, 26 miles (42 km) north of the port of Korsakov. Originally the Japanese settlement of Toyohara, Yuzhno-Sakhalinsk passed to the Soviet Union in 1945 and was given its present name in 1946. It is a communications hub, with railways that extend to Korsakov, to Kholmsk on the west coast, and north to Nysh. There are locomotive and rolling-stock repair shops located in the city. Other industries include the manufacture of furniture and footwear, brewing, and distilling. Pop. (1993 est.) 165,000.

Yuzhny Bug (river): *see* Southern Buh.

Yuzovka (Ukraine): *see* Donetsk.

Yūzū Nembutsu, Japanese Buddhist sect that stresses the permeating effect (*yūzū*) of *nembutsu,* the invocation of the name of the Buddha Amida (Amitābha). Thus, the belief was that not only the person who chants the name but all humanity is said to benefit from the practice of *nembutsu*. The sect was founded in the early 12th century by an evangelistic Tendai monk, Ryōnin, and was a forerunner of the devotional Pure Land Buddhist schools such as Jōdo and Shin. The sect has continued in existence up to the present day, though its membership is considerably smaller than those of the other pietistic Amidist sects.

Yvelines, *département,* Île-de-France *région,* northern France, embracing the western outer suburbs of Paris and the valley of the Seine between the French capital and Normandy.



Thermal generating plant at Porcheville, Yvelines *département,* France
Martine Franck—VIVA

With an area of 882 sq mi (2,284 sq km), the *département* was created in 1964 from the western part of the former Seine-et-Oise

département, which in 1790 was formed from portions of the historic province of Ile-de-France. It takes its name from the vast forest that once covered the whole region. Extensive woods are still found in the *département,* including those around Versailles (the departmental capital), the national forests of Marly and Saint-Germain-en-Laye in the Paris region, and the national forest of Rambouillet, which occupies more than 30,000 acres (12,000 hectares) in the southwest.

The *département* extends across a series of hilly plateaus, indented in the north by the meandering Seine River, which flows around the forest of Saint-Germain and past Poissy, Meulan, and the cathedral city of Mantes-la-Jolie, all of which have become satellite towns of Paris. The climate is mild and equable, with moderate rainfall. Wheat and other cereals are grown in the *département,* particularly in the south and northwest; and market gardening thrives in the valleys, which are less industrialized than those of the eastern outer suburbs of Paris.

Residential areas, now encroaching on the countryside, have been made more accessible to Paris by the improvement of roads and suburban railway services. The construction of the regional express rail service has improved local communications, especially between Saint-Germain-en-Laye and Versailles. The *département* has numerous places of historical interest and relaxation, including the châteaus of Versailles, Rambouillet, Maisons-Laffitte (with a racecourse nearby), and Saint-Germain-en-Laye; and the royal park at Marly. The *département* has four *arrondissements*: Versailles, Mantes-la-Jolie, Rambouillet, and Saint-Germain-en-Laye. It is in the educational division of Paris. Pop. (1990 prelim.) 1,306,400.

Yverdon, German IFERTEN, city, Vaud *canton,* western Switzerland, on the southern shore of Lake Neuchâtel, at the mouth of La Thielle River, north of Lausanne. It originated as the Roman camp Eburodunum, and the ruined Roman walls remain. The castle (1260–78) of the dukes of Savoy was the seat of the boarding school established in 1805 by the Swiss educator Johann Heinrich Pestalozzi, which flourished for 20 years; it now houses a library, a science-fiction museum, and a historical museum with mementos of Pestalozzi. The town hall and the parish church both date from the 18th century.

Yverdon-les-Bains, southeast of the town centre, has been known since Roman times for its small alkaline sulfur spring, which is now housed in the Centre Thermal (reconstructed in 1977). An expanding industrial town, Yverdon has railroad shops and manufactures machinery, precision instruments, and tobacco. Pop. (1987 est.) 21,004.

YWCA: *see* Young Women's Christian Association.

Yzdkrt (name of Sāsānian rulers): *see under* Yazdegerd.

Z particle, electrically neutral carrier of the weak nuclear force that acts upon all known subatomic particles. It is the neutral partner of the electrically charged W particle (*q.v.*). The Z particle has a mass of 91.16 ± 0.03 GeV, or nearly 100 times that of the proton. The W is slightly lighter, with a mass of 80.6 ± 0.4 GeV. Both particles are very short-lived, having lifetimes of only about 10^{-25} second.

The concept that the weak force is carried by intermediary messenger particles arose in the 1930s, following the successful description of electromagnetic interactions in terms of the emission and absorption of photons. For the next 30 years or so it appeared that only charged weak messengers were necessary to account for all observed weak interactions. However, in the 1960s, attempts to produce a gauge-invariant theory of the weak force—*i.e.*, a theory that is symmetric with respect to transformations in space and time—suggested unifying weak and electromagnetic interactions. The resulting electroweak theory required two neutral particles, one of which could be identified with the photon and the other as a new carrier for the weak force, called the Z.

The first evidence for the Z particle came in 1973 in experiments at the European Organization for Nuclear Research (CERN) near Geneva. Experiments revealed the existence of "neutral current" interactions between neutrinos and electrons or nuclei in which no transfer of electric charge occurs. Such reactions could be explained only in terms of the exchange of a neutral Z particle.

Z particles and W particles were later observed more directly in 1983 in further experiments at CERN that collided protons and antiprotons together. Since that time the large electron positron (LEP) collider at CERN has been used to produce thousands of Z particles by colliding together electrons and positrons at total energies around 92 GeV. Studies of the decay of the Z particles produced in this way reveal what is known as the "width" of the Z, or the intrinsic variation in its mass. This width is related to the particle's lifetime through the uncertainty principle, which states that the shorter the lifetime of a quantum state, the greater is the uncertainty in its energy or equivalently its mass. The width of the Z particle thus gives a measure of its lifetime, thereby reflecting the number of ways in which the particle can decay, since the greater the number of ways it can decay, the shorter is its life. In particular, measurements at CERN show that when the Z decays to neutrino-antineutrino pairs, it produces three and only three types of lightweight neutrino. This measurement is of fundamental importance, because it indicates that there are only three sets each of leptons and quarks, the basic building blocks of matter. (Ch.Su.)

za, in feudal Japan, any of the mercantile or craft guilds that flourished about 1100–1590. They did not become fully organized until the Muromachi period (1338–1573), when they began to monopolize the production, transport, and sale of merchandise. In exchange for certain fees, the *za* enjoyed official recognition and exemptions from tolls, transit duties, and market taxes. Many *za* were begun and maintained under the patronage of nobles or of the *zasu* (head priests) of Shintō shrines or Buddhist temples. More than 80 guilds situated in the Nara region specialized in the manufacture or conveyance of paper, sake, salt, vegetable oil, and malt. Other guilds were organized by dancers, musicians, carpenters, and blacksmiths. The *za* gradually declined with the declining authority of their patrons and with the expansion of the market economy. Merchants also often opposed the monopoly development and trade restrictions that characterized the *za*. Market taxes and *za* were officially and nationally abolished by the feudal lords Oda Nobunaga and Toyotomi Hideyoshi about 1590.

Zaanstad, *gemeente* (commune), Noordholland *provincie,* western Netherlands. It lies along the Zaan River near its junction with the North Sea Canal. An industrial area 6 miles (10 km) northwest of Amsterdam, Zaanstad was created in 1974 at the merger of the former *gemeenten* (communes) of Zaandam, Koog aan de Zaan, Zaandijk, Wormerveer, Krommenie, Assendelft, and Westzaan. Zaandam was an important shipbuilding centre in the 17th century; some 17th-century windmills survive, and there is a mill museum at Koog aan de Zaan. Zaanstad is a rail junction and important seat of the Dutch lumber trade and has food and paint industries. Pop. (1999 est.) 135,126.

Zaberma (people): *see* Zerma.

Zabīd, also spelled ZEBID, town, western Yemen. It lies on the bank of the Wadi Zabīd and at the eastern fringe of the Tihāmah coastal plain, about 10 miles (16 km) from the Red Sea coast. An ancient Yemeni centre, Zabīd was refounded in AD 820 by the 'Abbāsids under Muḥammad ibn Ziyād, emissary of the caliph al-Ma'mūn. From there the Ziyādi dynasty, his successors, ruled over large parts of southwestern Arabia. Upon the conquest of Yemen by the Ayyūbids under Tūrān Shāh, brother of Saladin, in 1173–74, the capital was moved to Ta'izz. The city flourished again under the Ṭāhirid dynasty (late 15th century).

A thick wall surrounds Zabīd. Its Great Mosque, once the site of a well-known Shāfi'i madrasah, is prominent. Zabīd was formerly important as a weaving and dyeing centre (cotton, indigo) and for tanneries and leatherwork. Pop. (1994 est.) 44,200.

Articles are alphabetized word by word, not letter by letter

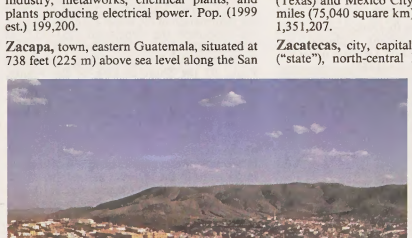
Zabrze, German HINDENBURG (1915–45), town, Katowice *województwo* (province), southwestern Poland. It is situated in the Upper Silesian industrial district. The town became Prussian in 1742, and in 1921, when Upper Silesia was partitioned between Poland and Germany, it remained in German hands. Badly damaged in World War II, it was transferred to Poland in 1945. A major industrial and cultural centre, Zabrze is also one of Poland's oldest mining settlements, the first mine having opened there in 1790. It is economically dependent upon the coal and coke industry, metalworks, chemical plants, and plants producing electrical power. Pop. (1999 est.) 199,200.

Zacapa, town, eastern Guatemala, situated at 738 feet (225 m) above sea level along the San José River. Although the town is old, it grew greatly in size and importance only after the Puerto Barrios–Guatemala City railroad was completed in 1896; it is the junction of the line from El Salvador. Zacapa is also a commercial and manufacturing centre for the agricultural and pastoral hinterland, which yields principally sugarcane, corn (maize), beans, and livestock. The town is locally renowned for cheese and cigars. Buildings in the town suffered much structural damage in the earthquake of 1976. Pop. (1994 est.) 16,400.

Zacapú, in full ZACAPÚ DE MIER, city, north-central Michoacán *estado* ("state"), west-central Mexico. It is in the Sierra de Nahuatzén, 6,500 feet (1,980 m) above sea level and west of Morelia, the state capital. Agriculture and livestock raising are the principal sources of income, the main crops being wheat, beans, and especially corn (maize). The remains of several Tarascan Indian buildings are nearby. The Heroica Nogales–Guadalajara–Mexico City highway passes through Zacapú, which is also accessible by railroad. Pop. (2000 prelim.) 69,739.

Zacatecas, *estado* ("state"), north-central Mexico. It is bordered by Coahuila on the north, San Luis Potosí on the east, Aguascalientes and Jalisco on the south, and Durango on the west. Its territory lies wholly within the central plateau and is traversed by several mountain ranges. The average elevation in the state is about 7,700 feet (2,350 m), and the climate is dry and generally healthful, being warm in the valleys and temperate in the mountains. The state's major rivers are the Aguanaval, Jerez, Juchipila, Tlaltenango, and Valparaíso. Rainfall averages about 20 inches (500 mm) per year. Much of the state's income comes from mining. Its mineral wealth was discovered soon after the Spanish conquest, and some of its mines date from the mid-16th century. Agriculture (cereals, alfalfa, sugarcane, and maguey, from which the beer called pulque is made) is also an important occupation, but the low rainfall limits crop yields, and only a small proportion of the state's farmland is irrigated. Cattle are raised, and meat processing is important. Manufactures are limited chiefly to the reduction of mineral ores, the extraction of rubber from guayule, the refining of sugar, and the manufacture of rum, pulque, mescal (from pulque), and woolen and cotton textiles. The rail, highway, and air routes traversing the state link Zacatecas city, the state capital, with El Paso (Texas) and Mexico City. Area 28,973 square miles (75,040 square km). Pop. (2000 prelim.) 1,351,207.

Zacatecas, city, capital of Zacatecas *estado* ("state"), north-central Mexico. It lies in a



Zacatecas, Méx.
Walter Aguiar

deep, narrow ravine, 8,189 feet (2,496 m) above sea level. Long an indigenous mining centre, the Spanish town was founded in 1548 (by Juan de Tolosa, Cristóbal de Oñate, Diego de Ibarra, and Baltasar Treminño), two years after silver was discovered by Spaniards in the area; it was given city status in 1585. The name means "place where zacate grass grows." During the Spanish colonial era, the mines around Zacatecas yielded as much as one-fifth of the world's silver production. Still a mining centre, the city is also a commercial and manufacturing centre for the agricultural hinterland (wheat, corn [maize], livestock). Zacatecas' cathedral, noted for its highly carved portico, was begun in 1612 and completed in 1752. It contained European paintings and elaborate silverwork and goldwork until the reforms of the 1850s and 1860s, when most of them were confiscated. The extensive Indian ruins of Chicomóztoc are 28 miles (45 km) south-southwest of the city. The major highway and railroad linking Ciudad Juárez and Mexico City pass through Zacatecas, which also has an airport. Pop. (2000) city, 113,947; urban agglom., 232,965.

Zaccaria, Saint Antonio Maria (b. 1502, Cremona, duchy of Milan—d. July 5, 1539, Cremona; canonized May 27, 1897; feast day July 5), Italian priest, physician, and founder of the congregation of Clerks Regular of St. Paul, or Barnabites, a religious order devoted to the study of the Pauline Letters.

Receiving his doctorate in medicine from the University of Padua in 1524, he practiced at Cremona for three years. He then studied theology and was ordained in 1528, later being transferred to Milan, where, under the influence of his confessor, he organized (1530) the Barnabites.

Zaccaria's congregation preached and administered charitable work among the Milanese and was approved by Pope Clement VII in 1533. Zaccaria later founded the Angelicals of St. Paul, a similar order for women, which Pope Paul III approved in 1535. The two congregations performed missionary and educational work in Milan and elsewhere, using the teachings of the Apostle St. Paul as their guide.

Toward the end of his life Zaccaria secured for his order's headquarters the ancient Milanese church of St. Barnabas, from which their popular name derives. There are Barnabite monasteries in Italy, Austria, Belgium, Spain, and South America. G. Chastel's *Saint Antoine-Marie Zaccaria, Barnabite* appeared in 1930.

Zaccaria, Benedetto (b. Genoa—*d. c.* 1307, Genoa), Genoese merchant, diplomat, and admiral, hero of a decisive Genoese naval victory over Pisa at Meloria (1284).

In 1264 Zaccaria was named Genoese ambassador to the Byzantine emperor, Michael VIII Paleologus, who bestowed on him and his brother Manuele the fief of Phocaea, north of Smyrna, with its alum mines. On this foundation the brothers built a commercial empire, trading in North Africa, Spain, France, Flanders, Constantinople, and the Black Sea. Zaccaria returned to Genoa in 1284 and took command of a fleet that blockaded Pisa's Tyrrhenian port, the Porto Pisano, a naval maneuver that led to Pisa's committing its fleet to combat. In the resulting Battle of Meloria, Zaccaria's tactics produced a Genoese victory from which Pisa never recovered.

Leaving Genoa in 1290, Zaccaria served as grand admiral of the fleet of Sancho IV of Castile. Four years later he commanded the fleet of Philip IV of France against England, blockading Flanders in 1299. In about 1301 Zaccaria sailed for Phocaea to protect it against the inroads of Turkish and Catalan pirates and seized the nearby island of Chios. He returned a few years later to Genoa, where he died.

Zacconi, Lodovico (b. June 11, 1555, Pesaro, Papal States [Italy]—d. March 23, 1627, Firenzuola, near Pesaro), Italian musicologist, last of a distinguished line of Renaissance writers on music.

Zacconi became a priest, later an Augustinian, and studied music with Andrea Gabrieli in Venice, where he was musical director for his order. He went to Vienna in 1585 at the invitation of the archduke Charles. In 1592 he published the first part of his *Prattica di musica,* dedicated to William V, duke of Bavaria, whose service he had entered three years earlier. In 1596 he returned to Italy and in 1622 published the second part of his treatise in Venice.

Zacconi's lucidly written work is an authoritative and encyclopaedic summary of the theory and practice of Renaissance music. His handling of theoretical matters is illuminated by the practical nature of the book. His descriptions of contemporary instruments, their construction, compass, and use, and his discussion of improvised ornamentation are particularly valuable to the modern scholar and performer. Zacconi's compositions include a set of *ricercari* (fugal pieces) for organ and four books of canons. His autobiography (1626), in which he describes himself as a musician, painter, and poet, is in the Liceo Musicale, Bologna.

Zacharias (Jewish prophet): *see* Zechariah.

Zacharias, SAINT, English ZACHARY (b. San Severino, duchy of Benevento [Italy]—d. March 14/22, 752, Rome; feast day March 15), pope from 741 to 752.

Of Greek parentage, he was supposedly a Roman deacon when he succeeded Pope St. Gregory III in November/December 741. His pontificate was devoted to diplomatic relations with the Lombard and Frankish kingdoms and with the Byzantine Empire. He initiated a policy of conciliation with the Lombards while endeavouring to dissuade their rulers, Liudprand and Rachis, from conquering the Byzantine exarchate of Ravenna. Successful, he thus made peace with the Lombards. He maintained amiable relations with the Byzantine emperor Constantine V Copronymus, whom he advised to restore the veneration of icons.

Zacharias' relations with the Franks were similarly cordial, and his correspondence with St. Boniface, the apostle of Germany, shows how great his influence was on contemporary events in the Frankish kingdom. In 741 he made Boniface legate and charged him with the reformation of the whole Frankish Church. He supported the deposition (751–752) of Childeric III, the last Merovingian king, and authorized the Frankish Church to anoint Pepin III the Short as king of the Franks. Zacharias' action in the transference of the royal crown from the Merovingians to the house of Pepin (Carolingians) began a new era for church and state by establishing the Carolingian–papal alliance, which was to be of the greatest significance in future relations between pope and emperor and was of extreme importance to the theorists and controversialists of the Investiture Controversy (11th and 12th centuries). The latter dispute concerned secular rulers' right to invest bishops and abbots, which right became one of the paramount aspects in the struggle for power between the papacy and the Holy Roman Empire.

Zacharias is known especially in the East for his Greek translation of the *Dialogues* of Pope St. Gregory I the Great.

Zacharias, Basileios: *see* Zaharoff, Sir Basil.

Zachodniopomorskie, *województwo* (province), northwestern Poland. It comprises the former provinces (1975–98) of Szczecin and Koszalin, as well as portions of Gorzów, Wielkopolski, Piła, and Słupsk. A forested, low-lying, dry region, it borders the Baltic Sea to the north and is drained by the Oder (Odra), Rega, Parsęta, and Ina rivers. The largest cities are Szczecin (the provincial capital), Koszalin, Stargard Szczeciński, and Kołobrzeg; it has one of Poland's lowest population densities. Leading industries are fishing and fish processing, chemicals, brewing, timber, and furniture manufacture. The port of Szczecin is linked by the Oder to the Świnoujście port on the Baltic Sea; together they constitute the largest port complex in Poland. Tourism is well-developed, particularly in spa towns and national parks. Area 8,843 square miles (22,902 square km). Pop. (2003 est.) 1,697,200.

Zacynthus, also spelled ZAKYNTHOS, Modern Greek ZÁKINTHOS, French ZANTE, Italian ZACINTO, island, southernmost and third largest of the Ionian Islands (*q.v.*) of Greece, lying off the west coast of the Peloponnese. Including the tiny Strofádhes Islands to the south, it constitutes the *nomós* (department) of Zákinthos. Zacynthus is indented by a deep bay with high cliffs on its south coast. The island has an area of 155 square miles (402 square km), the *nomós* 157 square miles (407 square km). The centre of Zacynthus is a fertile plain bounded on the west by barren limestone hills, 700 to 1,600 feet (200 to 500 metres) high, with many sinkholes and steep sea cliffs. The hills culminate in the 2,480-foot- (756-metre-) high Mount Vrakhiónas. The plain is bounded on the east by a low range of hills. The capital of the island and *nomós,* Zákinthos town, lies on the east coast on the site of ancient Zacynthus; it is the seat of a metropolitan bishop.

Zacynthus was named for an ancient Arcadian chief; the 5th-century-BC historian Thucydides said that it was colonized by Achaeans from the Peloponnese. The island was used by the Athenians during the Peloponnesian War and again in 374 BC. The Romans captured it in 211 and 191, annexing Zacynthus to keep it out of the Achaean League.

Zacynthus was repeatedly pillaged by the Vandals and Saracens, and in 1185 it was taken, along with the islands of Corfu, Cephalonia, and Leucas, by Margarito of Brindisi. From 1194 to 1328 it was held by the Orsini and from 1328 to 1482 was in the possession of the counts of Tocchi. Venice was granted the island in 1485, to prevent its falling to the Turks, and held it until 1797, when it was ceded to France by the Treaty of Campo Formio. After a short Russian occupation, it became (1815) part of the British protectorate of the Ionian Islands; it prospered with the revival of Greek culture. In 1864 Zacynthus was ceded, with the other Ionian Islands, to Greece.

Both the central plains and eastern hills are cultivated. The chief exports are currants, olive oil, wines, and fresh fruit. Destructive earthquakes were experienced in 1514, 1893, and 1953. The island's buildings were extensively rebuilt after the last earthquake disaster. Pop. (2001) *nomós* and island, 39,015.

Zadar, Italian ZARA, Latin JADERA, picturesque historical town in Croatia, the former capital of Dalmatia. It is located on the end of a low-lying peninsula that is separated by the Zadar Channel from the islands of Ugljan and Pašman. The inlet between the peninsula and the mainland creates a natural deepwater harbour.

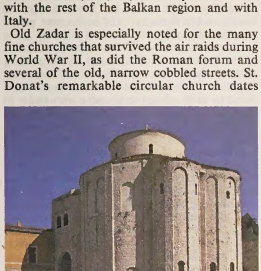
The old town on the peninsula dates from the 9th century BC, when it was a Liburnian settlement called Jadera. The town became Roman in the 1st century BC. Spared in the Avar and Slavic invasions of Dalmatia (*c.* 5th–6th century AD), it remained a thriving commercial, cultural, and artistic centre of Byzantine Dalmatia. Between 1045 and 1358 the

town was intermittently at war with Venice, and in 1409 it was sold to Venice. From this point the town was oppressed by the Venetians from within and the Turks from without. It withstood a Turkish attack in 1571, and in the succeeding period Zadar became the most heavily fortified town on the Adriatic until its fortifications were partly demolished in the late 19th century.

The town was an Austrian possession from 1797 to 1920, except for a brief French interregnum between 1808 and 1813. By the Treaty of Rapallo (1920), Zadar became Italian, thereby losing further ground to Split as the chief town of Dalmatia. During the course of World War II, Allied bombing destroyed 75 percent of Zadar's buildings and damaged the port facilities. Liberated in 1944, it became part of Yugoslavia.

Most new construction has taken place on the mainland. Zadar's industries now include distilling of liqueurs (notably maraska [cherry]), canning and processing of fish, and the production of rope, cotton, and synthetic textiles, cigarettes, plastics, leather, and household appliances. The Zadar Riviera is a developing resort centre for water sports. The town has excellent road, rail, air, and ferry connections with the rest of the Balkan region and with Italy.

Old Zadar is especially noted for the many fine churches that survived the air raids during World War II, as did the Roman forum and several of the old, narrow cobbled streets. St. Donat's remarkable circular church dates



St. Donat's Church, Zadar, Croatia
© Robert Holmes

from the 9th century; St. Mary's Church (1091) has one of the most important church treasuries in Croatia; and the Romanesque Church of St. Krševan was consecrated in 1175. There are also the 13th-century Cathedral of St. Stošija (Anastasia), the largest and finest Romanesque church in Dalmatia, and the Franciscan church and monastery (1282). Zadar has an archaeological museum, the state archives, a theatre, and a small branch of the University of Zagreb. Pop. (1981) 60,371.

ẓaddik (Judaism): *see* tzaddiq.

Zadkine, Ossip (b. July 14, 1890, Smolensk, Russia—d. Nov. 25, 1967, Paris, Fr.), Russian-born French sculptor known for his dramatic Cubist-inspired sculptures of the human figure.

As a boy, Zadkine, the son of a professor of Greek and Latin, preferred clay modeling to his studies. In 1905 his father sent him to stay with relatives in England in order to learn "English and good manners." He attended art



Zadkine, photograph by Yousuf Karsh, 1965
© Karsh from Rapho/Photo Researchers

school and eventually worked for a woodenornament maker in London. After living alternately in London and Smolensk, in 1909 Zadkine moved to Paris, where he briefly studied at the École des Beaux-Arts; he quickly gave up academic training to work independently.

Soon after settling in Paris, Zadkine became friends with a number of avant-garde artists, including Pablo Picasso, who had invented the Cubist style of painting a few years earlier. Zadkine developed a lyrical and expressive style, typically sculpting elongated figures with simplified features. About 1917, however, he adopted a new approach in his drawings and sculptures, substituting his previously graceful and sensitive lines with a more angular approach influenced by Cubism. Zadkine was also drawn to the expressiveness of the 19th-century Romantic sculptor Auguste Rodin, so he combined a Cubist geometric analysis of form with a dramatic emotionalism, as seen in his sculpture *Musicians* (1924).

During World War II Zadkine fled the Holocaust first for unoccupied France and then for the United States, where he taught at the Art Students League in New York City. A mature work, *Birth of Forms* (1947), is a complex sculpture of shapes, lines, and planes that achieves a sense of rhythm and unity. After the war he returned to France. In 1946 he visited the bombed Dutch city of Rotterdam, which inspired his best-known sculpture, *The Destroyed City* (*c.* 1947–51), a monument in which the arms of a large figure, with a hole torn in its body, are outstretched in horror.

Zadkine was awarded the grand prize for sculpture at the Venice Biennale (1950) and the grand prize of the city of Paris (1960). He also created monuments in Jerusalem, Amsterdam, and other cities.

Zadokite Fragments: *see* Damascus Document.

Zaehner, R.C., in full ROBERT CHARLES ZAEHNER (b. April 8, 1913—d. Nov. 24, 1974, Oxford, Eng.), British historian of religion who investigated the evolution of ethical systems and forms of mysticism, particularly in Eastern religions.

The son of Swiss parents who had immigrated to England, Zaehner studied Oriental languages at the University of Oxford, specializing in Persian, Armenian, and Avestan. He became a Roman Catholic in 1946. During and immediately after World War II, he served in the British Army as a press attaché in Tehrān. After resuming his academic career, he succeeded Sir Sarvepalli Radakrishnan as Spalding Professor of Eastern Religions and Ethics at the University of Oxford (1952), enduring criticism at the time because the chair was considered reserved for Asians.

With his magisterial *Zurvan; a Zoroastrian Dilemma* (1955), he began publishing the results of a lifelong study in the history of religions, including *Mysticism Sacred and Profane* (1957), *Hindu and Muslim Mysticism* (1960), *Hinduism* (1962), and a translation of Hindu scriptures (1966). Other works on Zoroastrianism include *The Teachings of the Magi* (1956) and *The Dawn and Twilight of Zoroastrianism* (1961).

Among his later works were *Evolution in Religion* (1971); *Dialectical Christianity and Christian Materialism* (1971); and *Drugs, Mysticism, and Make Believe* (1972). His last book, *Our Savage God* (1974), a philosophical and somewhat provocative view of the ills of modern society, aroused controversy among its critics.

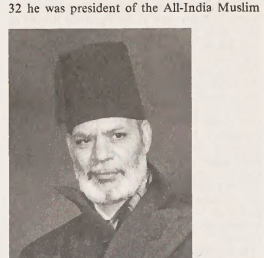
Zaenredam, Pieter Janszoon (Dutch painter): *see* Saenredam, Pieter Janszoon.

Ẓafār, biblical SEPHAR, classical SAPPHAR, or SAPHAR, ancient Arabian site located southwest of Yarīm in southern Yemen. It was the capital of the Ḥimyarites, a tribe that ruled much of southern Arabia from about 115 BC to about AD 525. Up until the Persian conquest (*c.* AD 575), Ẓafār was one of the most important and celebrated towns in southern Arabia—a fact attested to not only by Arab geographers and historians but also by Greek and Roman authors. After the extinction of the Ḥimyar kingdom and the rise of Islām, Ẓafār gradually fell into decay.

Zafarin Islands (Morocco): *see* Chafarinas Islands.

Zafrulla Khan, Sir Muhammad, original name CHAUDHRI MUHAMMAD ZAFRULLA (b. Feb. 6, 1893, Siālkot, India—d. Sept. 1, 1985, Lahore, Pak.), Pakistani politician, diplomat, and international jurist, known particularly for his representation of Pakistan at the United Nations (UN).

The son of the leading attorney of his native city, Zafrulla Khan studied at Government College in Lahore and received his LL.B. from King's College, London University, in 1914. He practiced law in Sialkot and Lahore, became a member of the Punjab Legislative Council in 1926, and was a delegate in 1930, 1931, and 1932 to the Round Table Conferences on Indian reforms in London. In 1931–32 he was president of the All-India Muslim



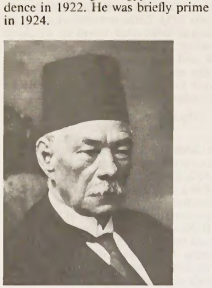
Zafrulla Khan, 1948
AP/Wide World

League, and he sat on the British viceroy's executive council as its Muslim member from 1935 to 1941. He led the Indian delegation to the League of Nations in 1939, and from 1941 to 1947 he served as a judge of the Federal Court of India.

Prior to the partition of India in 1947, Zafrulla Khan presented the Muslim League's view of the future boundaries of Pakistan to Sir Cyril Radcliffe, the man delegated to decide the boundaries between India and Pakistan. Upon the independence of Pakistan, Zafrulla Khan became the new nation's minister of foreign affairs and served concurrently as leader of Pakistan's delegation to the UN (1947–54). From 1954 to 1961 he served as a member of the International Court of Justice at The Hague. He again represented Pakistan at the UN in 1961–64 and served as president of the UN General Assembly in 1962–63. Returning to the International Court of Justice in 1964, he served as the court's president from 1970 to 1973. He was knighted in 1935 and was the author of *Islam: Its Meaning for Modern Man* (1962) and a translation of the Qur'ān (1970).

Zagazig (Egypt): *see* Zaqāzīq, az-.

Zaghlūl, Sa'd, in full SA'D ZAGHLŪL PASHA IBN IBRAHIM (b. July 1857, Ibyānah, Egypt—d. Aug. 23, 1927, Cairo), Egyptian statesman and patriot, leader of the Wafd party and of the nationalist movement of 1918–19, which led Britain to give Egypt nominal independence in 1922. He was briefly prime minister in 1924.



Zaghlūl
AP/Wide World

Zaghlūl was from a well-to-do peasant family in Ibyānah in the Nile River delta. He was educated at the Muslim University of Al-Azhar in Cairo and at the Egyptian School of Law, then practiced as an advocate and also dabbled in journalism. Becoming a judge in the Court of Appeal in 1892, he married, in 1895, a daughter of Muṣṭafā Pasha Fahmī, the prime minister of Egypt. In 1906 he was made head of the newly created Ministry of Education and, soon after, took a leading part in the formation of the Ḥizb al-Ummah ("People's Party"), which, at a time when Egyptian nationalism was beginning to assert itself against the British occupation, was referred to appreciatively by Evelyn Baring, 1st Earl of Cromer, the British consul general and virtual ruler of the country, as advocating a policy of "cooperation with Europeans in the introduction of Western civilization into the country."

He remained as minister of education until 1910, when he became minister of justice, a post from which he resigned in 1912 after a disagreement with the khedive 'Abbās Ḥilmī II. During his six years as a minister he had served in a series of governments that had collaborated with the British occupiers and the members of which were thus regarded almost as traitors by the extreme nationalists. In 1912, however, Zaghlūl's attitude changed. Elected to the Legislative Assembly, a unicameral parliament with limited powers, in 1913, he became its vice president and in the course of one year rehabilitated himself in the eyes of the nationalists by his criticisms of the government.

With the outbreak of World War I in 1914, Egypt became a British protectorate. The khedive was deposed, martial law declared, and the Legislative Assembly dissolved by the British. For the next four years overt political activity in Egypt was at a standstill. Ordinary Egyptians suffered from the effects of inflation, requisitioning, and conscription, and the intelligentsia and the professional classes were frustrated by restrictions on personal freedom and by the evident British intention to convert a temporary protectorate into a permanent colony. By the time the armistice was signed in November 1918, the country was seething with discontent.

Zaghlūl and several former members of the defunct Legislative Assembly, free of the taint of collaboration, had spent the war years forming activist groups throughout Egypt for the ultimate purpose of political agitation and action. On Nov. 13, 1918, two days after the armistice, a delegation (Wafd) of three prominent former members of the Legislative Assembly, led by Zaghlūl, called on Sir Reginald Wingate, the high commissioner (as the British representative in Egypt was now called). They informed him that they regarded themselves and not the government as the true representatives of the Egyptian people and demanded that the protectorate be abolished and replaced by a treaty of alliance. They also demanded that they should be allowed to proceed to London to negotiate such a treaty directly with the British government.

When these demands were refused, widespread disorder broke out, organized through the clandestine bodies set up by Zaghlūl and his associates. In March 1919 Zaghlūl and three of his associates were arrested and deported to Malta, an act that increased the disorder. The British government dismissed Wingate and replaced him with General Edmund Allenby, the wartime conqueror of Palestine. Allenby, faced with the resignation of the government and the prospect of a continuing military campaign to put down a countrywide rebellion, released Zaghlūl and his associates in an attempt to appease Egyptian opinion. Zaghlūl immediately proceeded to Paris, where the Peace Conference was in session, to present Egypt's case to the Allies. He met with very little success there, but in Egypt he had become a national hero and the master of the situation.

Zaghlūl's release put a temporary end to public disorder in Egypt, and in the fall of 1919, on Allenby's recommendation, a mission headed by Lord Milner, the British colonial secretary, proceeded to Egypt to make recommendations for the future relationship between the two countries. Zaghlūl, determined that nobody but himself should negotiate with the British, saw to it that the mission was boycotted by all shades of Egyptian opinion. In the summer of 1920 he himself had a series of meetings with Milner in London, at which Milner agreed—unofficially—to the essence of what Zaghlūl himself had demanded of Wingate in November 1918—the substitution of a treaty of alliance for the protectorate. But Zaghlūl had come to fear that any agreement he made with the British would undermine his position in Egypt, which was based on opposition to the British. So he refused to endorse any agreement and returned to Egypt, where he was greeted with wild enthusiasm. The Milner Report, recommending the end of the protectorate and the negotiation of a treaty, was published in February 1921. A government formed by 'Adlī Pasha Yakan, one of Zaghlūl's rivals, spent most of the year trying to negotiate such a treaty but was inhibited by Zaghlūl's virtual veto power. When 'Adlī consequently resigned, Zaghlūl brought his supporters onto the streets to prevent the formation of any alternative government. Allenby then had Zaghlūl arrested and deported to the Seychelles and prevailed on a reluctant British government to promulgate a unilateral declaration that incorporated the Milner recommendations and conferred a limited measure of independence on Egypt (February 1922).

By this time, a number of Egyptian politicians, including some of Zaghlūl's previous supporters, alarmed at the social implications of the agitation that Zaghlūl had released, were prepared to cooperate with the British under the new dispensation. A new party, the Liberal Constitutionalists, was formed and a constitution promulgated. But the forces unleashed by Zaghlūl could not so easily be suppressed, either by his opponents or even by Zaghlūl himself. Zaghlūl was released to take part in the first elections under the new constitution. His party, the Wafd, swept the board, and in January 1924 he became prime minister. In office, he showed himself quite unable to control the violent agitation he had set in motion. In November 1924, after a year in which numerous British officials and Egyptian "collaborationists" had been murdered by extremists, the British commander in chief of the Egyptian army was assassinated. After the receipt of what amounted to an ultimatum from Allenby, Zaghlūl resigned. The shock resulting from the violent British reaction rallied the moderates and discouraged the extremists—though, in a general election held in May 1926, the Wafd still held the allegiance of the country. But Zaghlūl, an old man of nearly 70, was no longer anxious for office. Under pressure from Lord Lloyd, the new British high commissioner, he agreed to the formation of a coalition government and contented himself with the presidency of the Chamber. In this capacity he succeeded, by and large, in controlling the actions of his more extreme followers until his death.

Zaghlūl was not a constructive statesman. Rather, he was the catalyst whose injection into Egyptian political life set in motion that long course of popular protest against foreign occupation, indigenous despotism, and social feudalism whose end product was the revolution of 1952. His influence resided both in his eloquence and in the fact that—unlike most of his generation in positions of power, which were mainly occupied by members of the old, Turkish-descended aristocracy—he was a purebred Egyptian of peasant stock, a man of the people who became the incarnation of their virtues and their limitations. (Jo.Ma.)

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Zaghwān, also spelled ZAGHOUAN, town, northeastern Tunisia. It lies on the fertile, northern slope of Mount Zaghwān at an elevation of 4,247 feet (1,295 m). It is built on the ancient Roman site of Zigus. Parts of a Roman aqueduct and canal network built in the 2nd century BC under the emperor Hadrian are still used to bring water from Zaghwān to Tūnis. The importance of Zaghwān water is reflected in the location there of a Roman temple of water, as well as a local proverb: "He who drinks from Zaghwān water will re-

turn to Tunisia." Other points of interest are the mausoleum of the marabout (holy man) Sīdī 'Alī Azūz, which has green tiles on its domes and its interior.

Zaghwān is about 50 miles (80 km) south of Tūnis. The town was the scene of bitter fighting during World War II when the Germans retreated toward Tūnis. The Dorsale Mountains lie to the southwest of Zaghwān. The fertile soil and ample water sources of the area in which the town is situated have made the region an agricultural greenbelt. The chief crops are grapes, olives, and vegetables. Local industries in the region include food processing and textile manufacturing. Pop. (2000 est.) 15,300.

Zagorsk (Russia): *see* Sergiyev Posad.

Zagreb, capital and chief city of Croatia. It is situated on the slopes of Medvednica Hill (Zagrebačka Gora) to the north and the floodplain of the Sava River to the south.

Zagreb's old town consists of two medieval settlements on the hill: Grič, the civil settlement, which was renamed Gradec ("Fortress") when it was encircled by walls that were built to defend against the Mongols in the 13th century; and Kaptol, the ecclesiastical settlement, which was fortified in the 16th century. These two towns continued as rival entities until the 19th century, when a spate of new building joined them together and expanded south onto the Sava floodplain, with a rectilinear new town of squares and public buildings. The city experienced rapid growth from 1860 to 1914. Its expansion in the 20th century proceeded eastward and westward, and after 1945 new residential construction went up on the south (right) bank of the Sava River. North of Medvednica Hill is the Zagorje region of woodlands, vineyards, picturesque villages, and ancient châteaus.

Gradec numbers among its notable old buildings the Gothic-style Church of St. Marcus, the Baroque Church of St. Catherine, the palaces of Zrinski and Oršić, a former Jesuit monastery, and the Neoclassical Drašković Palace. Kaptol has the Gothic Cathedral of St. Stephen (13th–15th century), whose sacristy contains a 13th-century fresco; the cathedral was restored at the end of the 19th century. Near the cathedral is the Baroque palace of the archbishops of Zagreb, with a chapel of St. Stephen (mid-13th century).



Cathedral of St. Stephen (top right), Zagreb, Croatia
W. Lehmann—Bruce Coleman Inc.

The city has many open squares and parks. As the cultural centre of Croatia, Zagreb is the seat of the Academy of Sciences and Arts and of the University of Zagreb (1669). Several art galleries have both old and modern collections, and there are various museums and academies of art, theatre, and music. The Croatian National Theatre is housed in a neo-Baroque building in the city.

The site of modern Zagreb was first mentioned in 1093, when a Roman Catholic bishopric was established there. After the Mongol invasion of 1241–42, Gradec became a royal free town and was fortified; several towers that were part of these fortifications still stand. As a political centre, Zagreb played an important role in the history of Croatia, which struggled first against Turkey and later against attempted Germanization by Austria. At the time of the Croatian national revival in the 19th century, the city was the centre of both a pan-Yugoslav movement and a Croatian independence movement.

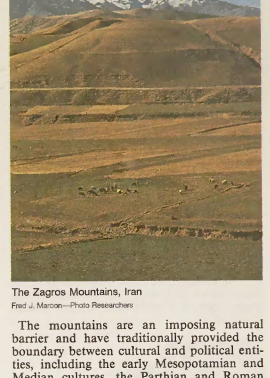
In October 1918 the Croatian Diet, meeting in Zagreb, severed all links with Austria-Hungary and proclaimed Croatia, Slavonia, and Dalmatia an independent state. In December the new Croatia entered into a state union with Serbia, Slovenia, and Montenegro. Between World Wars I and II serious differences continued between aspirants for Croatian national autonomy and Serbian tendencies toward centralization, and Zagreb was a centre of urban membership in the Croatian Peasant Party. In April 1941, during World War II, Zagreb became the capital of a puppet Croatian state under rule of the Axis powers. The city was freed from Axis rule by Yugoslav Partisans in May 1945, and the Croatian state collapsed shortly after the surrender of Germany. Croatia was part of Yugoslavia from 1945 until 1991.

Zagreb is the principal industrial centre of Croatia. Its manufactures include heavy machinery, rolling stock, electrical and metal consumer products, cement, textiles, footwear, chemicals, pharmaceuticals, paper and newsprint, and foods. The city's extensive chemical industry is based on exploitation of local reserves of petroleum and natural gas. Zagreb also serves as host to an annual International Trade Fair. The city is now an important junction of roads and rail lines from west and central Europe to the Adriatic Sea and the Balkans; Pleso airport has services to most of Europe. Pop. (2001) 682,598.

Zagreus, in Orphic myth, a divine child who was the son of Zeus (as a snake) and his daughter Persephone. Zeus intended to make Zagreus his heir and bestow on him unlimited power, but Hera out of jealousy urged the Titans to attack the child while she beguiled him with toys. The Titans, who were opposed to Zeus' power, tore Zagreus to pieces and consumed him except for his heart. Athena managed to save the child's heart and brought it to Zeus, who swallowed it. Zeus punished the Titans for their crime by blasting them into soot with his thunderbolts. From these remains arose mortals, who were partly wicked and partly divine. Zeus then begot a son in the body of Semele, and this child, made from the heart of Zagreus, was called Dionysus. Zagreus thus came to be identified with Dionysus in Orphic mythology, an outgrowth of the Hellenistic mystery religion based on the teaching and songs of Orpheus.

Zagros Mountains, mountain range in southwestern Iran, extending northwest-southeast from the Sīrvān (Diyālā) River to the city of Shīrāz. The Zagros range is about 550 miles (900 km) long and more than 150 miles (240 km) wide. Situated mostly in what is now Iran, it forms the extreme western boundary of the Iranian plateau, though its foothills to the north and west extend into adjacent countries.

Composed primarily of limestone and shale, the mountain range consists of numerous parallel ridges, the highest peaks of which rise above 12,000 feet (3,600 m) and have permanent snow cover; Zard Kuh, in the middle Zagros, reaches an elevation of 14,921 feet (4,548 m). Passes through the mountains are used for reaching the fertile intermontane plains, which generally lie at elevations above 5,000 feet (1,500 m). The rivers draining the range's western face are strong and perennial, flowing through enclosed plains or ravines. Precipitation in the region averages about 40 inches (1,000 mm) annually.



The Zagros Mountains, Iran
Fred J. Maroon—Photo Researchers

The mountains are an imposing natural barrier and have traditionally provided the boundary between cultural and political entities, including the early Mesopotamian and Median cultures, the Parthian and Roman empires, and, more recently, the Persian and Ottoman empires. The mountains and foothills are home to a significant portion of Iran's population. The traditional economy is based largely on animal husbandry, and the production of high-quality rugs and carpets has long been a mainstay of the region. Large reserves of petroleum are located in or near the southwestern foothills.

Zagwe DYNASTY, also spelled ZAGUE, line of 12th- and 13th-century Ethiopian kings who combined a nomadic military life with an impassioned desire to build monuments to their Christian religion. Their tenuous pretensions to succession, based on a legendary marriage to a daughter of one of the last Aksumite kings, the line they deposed, was subsequently confirmed by the church; in return for its support, liberal royal endowments were granted.

Descended mainly from the Agew people, the house of Zagwe originated in the district of Bugna, and its kings moved the administrative capital to Roha (now named Lalibela, *q.v.*), in the safety of their native Lasta Mountains. The Zagwe kings ruled much of what is now northern and central Ethiopia, but any pretensions they may have had to control the hilly country east of the Shewa Plateau lapsed as the region was increasingly occupied by such Muslim states as Ifat and Hadya.

Lalibela, the best-known Zagwe emperor, ruled at the beginning of the 13th century and is known for building the monolithic rock-hewn churches at the Zagwe capital, which was later renamed for him. Zagwe rule was destined to be short-lived, for at the end of the 13th century Yekuno Amlak, a prince of the Amhara, incited so successful a rebellion in Shewa that the Zagwe king, Yitbarek, was driven out and murdered. A new Zagwe king stirred up a counterrebellion but was defeated.

Later legends, modifying the circumstances of the Zagwes' overthrow, attribute much im-

portance to Yasus Moa, a monk who founded a community in the region of Lake Haik and who, the legends maintain, greatly influenced Yekuno Amlak in his bid for the throne. The usurpation of the throne and the murder of the king are obscured still further by later legends, which tell how another monk, Tekle Haimanot, persuaded the king of Lasta to abdicate in Yekuno Amlak's favour.

Zaharias, Babe Didrikson, byname of MILDRED ELLA ZAHARIAS, *née* DIDRIKSON (b. June 26, 1911, Port Arthur, Texas, U.S.—d. Sept. 27, 1956, Galveston), American sportswoman, one of the greatest athletes of the 20th century, a remarkable performer in basketball and in track and field, and later a leading golfer.

From 1930 through 1932, Didrikson was a member of the women's All-America basketball team. During the same period she also won eight events and tied in a ninth in national championship competition in track and field. In the 1932 Women's Amateur Athletic Association (AAU) meet, competing as a team by herself, Didrikson won six individual events and the team title, outscoring the 20-woman runner-up team from the Illinois Athletic Club 30 points to 22. At the 1932 Olympic Games in Los Angeles she won the 80-metre hurdles and the javelin throw. She was deprived of a third gold medal in the high jump because of her use of the then-unorthodox Western roll to achieve the highest jump; she was awarded the silver medal instead. She also excelled in baseball and softball, swimming, figure skating, billiards, and even gridiron football.



Babe Didrikson Zaharias
UPI

In 1938 Didrikson married George Zaharias, a professional wrestler. She began playing golf casually in 1932, but from 1934 she played that game exclusively. Restored to amateur status after some years as a professional, she won the U.S. Women's Amateur tournament in 1946. The next year she won 17 straight golf championships, including the British Ladies Amateur, of which she was the first American holder. As a professional again from 1948, she won the U.S. Women's Open in that year and in 1950. From 1948 through 1951 she was the leading money winner among woman golfers.

Didrikson Zaharias was diagnosed with cancer in 1953 and underwent surgery, but she returned to win the U.S. Open again in 1954. She competed the following year, winning two more tournaments, before the return of her cancer forced her to retire. Her autobiography, *This Life I've Led*, appeared in 1955.

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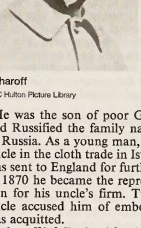
Zaharoff, Sir Basil, original name BASILEIOS ZACHARIAS (b. Oct. 6, 1849, Muğla, Tur.—d. Nov. 27, 1936, Monte Carlo), international armaments dealer and financier. Reputedly one of the richest men in the world, he was described as a "merchant of death" and the "mystery man of Europe."



Zaharoff
BBC Hulton Picture Library

He was the son of poor Greek parents who had Russified the family name while in exile in Russia. As a young man, he worked for his uncle in the cloth trade in Istanbul. In 1866 he was sent to England for further schooling, and in 1870 he became the representative in London for his uncle's firm. Two years later his uncle accused him of embezzlement, but he was acquitted.

Zaharoff left England for the eastern Mediterranean area under an assumed name. For a time he lived in Athens, where he met Stefanos Skoulodis, a financier and diplomat. On the recommendation of Skoulodis he was named agent of Thorsten Nordenfelt, the Swedish gun designer, for the Balkans area. In 1888 Hiram Stevens Maxim, inventor of the machine gun, joined Nordenfelt in business, and Zaharoff became the firm's representative for all of eastern Europe and Russia. When the Vickers Company of England purchased Maxim-Nordenfelt in 1895, Zaharoff's area of operations was extended even farther. Zaharoff became a millionaire from arms sales, and in 1913 he took out French citizenship.

During World War I he became an Allied agent working on the highest levels. Following the war, France recognized his services by making him a grand officer of the Legion of Honour, and Britain honoured him with a knight grand cross of the Order of the Bath.

Zaharoff's first wife, deserted, died in London in the 1890s. Meanwhile, he carried on a liaison for a number of years with the duchess de Villafranca, whose husband, Francisco de Borbón, duke de Marchena, a member of the Spanish royal house, was mentally deranged. When the duke died in 1923, Zaharoff married the widow. Following her death in 1926, he retired to Monte Carlo, where he controlled the casino (but never gambled).

Zāhedān, city and capital of Sīstān va Balūchestān province, southeastern Iran, near the borders of Afghanistan and Pakistan. It is situated in an arid zone at an elevation of 4,435 feet (1,352 m). The population consists mostly of Shī'ite Muslim Persians and Sunnite Muslim Baluchs. Zāhedān is one of the more economically underdeveloped cities in Iran; local industry produces bricks, milled rice, livestock feed, processed foods, mats and baskets, embroidered articles, and ceramics.

Strategically located along routes linking Central Asia with Persian Gulf ports to the south, the city has benefited from regional trade. It has also become an entrepôt for narcotics trafficking and other criminal enterprises across international borders. Roads link it with the Iranian cities of Zābol, Īrānshahr, Chāh Bahār, and Sarārān and with points in Afghanistan and Pakistan. It is the terminus of a rail line connecting Iran with Quetta, Pakistan. Construction began in the mid-1990s on a new line to Kerman to link Europe and the Indian subcontinent. The city also has an international airport. Notable historic buildings include a ruined citadel, in the centre of the city, and the Friday Mosque (Masjid-e Jom'eh). Pop. (1996) 419,518.

Zahedi, Fazlollah, also spelled FADL ALLĀH ZĀHIDĪ (b. 1897, Iran—d. Sept. 2, 1963, Geneva, Switz.), Iranian army officer and politician, prime minister of Iran from 1953 to 1955.

Zahedi early embarked on a military career, graduating from the Iranian military academy in 1916. He joined the Persian Cossack Brigade and at age 25—as a brigadier general—distinguished himself by quelling a Kurdish revolt in western Iran. Three years later he suppressed an Arab autonomy movement headed by the British-sponsored sheikh, Khaz'al Khan, in Khūzestān. Soon thereafter, Reza Shah Pahlavi appointed him military governor of Khūzestān and Eyfahān provinces, a post he held until September 1942, when British and Soviet forces occupied Iran. British military authorities suspected Zahedi of plotting with the Germans, and he was interned in Palestine, returning to Iran in 1945. In November 1949 he was appointed military governor and chief of police of Tehrān. During that time he also became a member of the newly created senate.

After the assassination of Prime Minister Ali Razmara in 1951, Zahedi was named minister of the interior in the cabinet of the new premier, Husayn Ala, a post he kept in the first cabinet of Mohammad Mosaddeq. Disagreeing with Mosaddeq's policy, Zahedi resigned in December 1951 and in October 1952 was accused by the prime minister of plotting a coup. In May 1953 Zahedi took refuge in the Majles (parliament), where he was protected by the speaker, Ayatollah Abu al-Qasim Kashani. After Kashani lost his office in July 1953, Zahedi briefly left Iran.

The escalating power struggle between Mosaddeq and Mohammad Reza Shah Pahlavi culminated on Aug. 16, 1953, when the shah fled Iran. Prior to his departure, the shah—at the urging of the U.S. Central Intelligence Agency—appointed Zahedi prime minister to replace Mosaddeq. On August 19 forces led by Zahedi overthrew Mosaddeq's government, assumed effective power, and called the shah back. The shah, worried that the popular army officer might pose a threat to his own position, pushed Zahedi from office in 1955, sending him to serve as ambassador to the United Nations at its European headquarters in Geneva (1963).

Zahir Shah, Mohammad (b. Oct. 15, 1914, Kabul, Afg.), king of Afghanistan from 1933 to 1973, providing an era of stable government to his country. He was the last king of Afghanistan's Bārakzay dynasty.

The sons of Moḥammed Nāder Shāh, Zahir Shah and his brothers reasserted central government control during a period of anarchy and banditry in the late 1920s. Zahir Shah came to the throne at the age of 19, after the assassination of his father in November 1933, having previously served as a cabinet minister. For a number of years Zahir Shah remained in the background while his relatives ran the government, but he asserted his power through the constitution of 1964, which established a constitutional monarchy and prohibited royal relatives from holding public office.

Zahir Shah undertook a number of economic-development projects, including irrigation and highway construction, that were backed by foreign aid, largely from the United States and the Soviet Union. He was also able to maintain Afghanistan's neutral position in international politics. However, his reforms had little effect outside the Kabul area. In the early 1970s the country suffered drought and famine. Pashto tribes along the Pakistan border continued to press for autonomy, and the political structure in the capital was unable to deal with the country's economic problems.

In a bloodless coup on July 17, 1973, Zahir Shah—who was in Italy undergoing medical treatment—was deposed. The leader of the coup, General Mohammad Daud Khan (the king's brother-in-law), proclaimed Afghanistan a republic with himself as its president. Zahir Shah formally abdicated on Aug. 24, 1973, and remained in Italy, where he spent most of the next three decades. During that time his native home descended further and further into chaos in what came to known as the Afghan War (*q.v.*). He returned to Afghanistan in early 2004, following the collapse of the Taliban militia the previous year, but he declined to reascend the throne.

Ẓahīr-ud-Dīn Muḥammad (emperor of India): *see* Bābur.

Ẓāhirīyah (Arabic: "Literalists"), followers of an Islāmic legal and theological school that insisted on strict adherence to the literal text (*ẓāhir*) of the Qur'ān and Ḥadīth (sayings and actions of the Prophet Muḥammad) as the only source of Muslim law. It rejected practices in law (*fiqh*) such as analogical reasoning (*qiyas*) and pure reason (*ra'y*) as sources of jurisprudence and looked askance at consensus (*ijmā'*). Theologically, the school formed the extreme rejection of anthropomorphism (*tashbīh*), attributing to God only those essential elements and qualities set forth clearly in the Qur'ān. This approach to the Islāmic tradition was apparently pioneered in Iraq in the 9th century. From Iraq it spread to Iran, North Africa, and Muslim Spain. In the western part of the Islāmic world, the philosopher Ibn Ḥazm (*q.v.*) was its chief exponent, and much of what is known of early Ẓāhirī theory comes through him. Although it was strongly attacked by orthodox theologians, the Ẓāhirī school nevertheless survived for about 500 years in various forms and seems finally to have merged with the Ḥanbalī school. (*See* Ḥanābilah.)

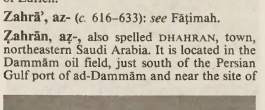
Ẓaḥlah, also spelled ZAHLÉ, city and capital of al-Biqāʿ province, central Lebanon. It lies on the eastern slopes of the Lebanon Mountains, at an elevation of 3,150 feet (960 m) above sea level. An agricultural market centre for the broad al-Biqāʿ Valley, it is also a popular summer resort on the Beirut-Damascus railroad. Ẓaḥlah is noted for its orchards and vineyards and for arrack (a type of alcoholic beverage). Pop. (1998 est.) 77,600.

Zahn, Ernst (b. Jan. 24, 1867, Zürich—d. Feb. 12, 1952, Zürich), Swiss writer, one of the contributors to the Heimatkunst ("homeland") movement—a literature striving for the reproduction of the life and atmosphere of the provinces. His realistic prose, though conventional, shows insight into the daily life of the Alpine people.

Zahn was at first president of the Diet of the canton of Uri and then manager of a railway restaurant at Göschenen. After 1917 literary success enabled him to devote his life solely to writing, and he moved to Meggen, near Luzern. His more popular works include collections of short stories, *Bergvolk* (1896; "Mountain Folk") and *Helden des Alltags* (1906; "Weekday Heroes"), and the novels *Albin Indergand* (1901), *Herrgottsfäden* (1901; *Golden Threads*), *Frau Sixta* (1926), and *Die grosse Lehre* (1943; "The Large Lesson"). Zahn's *Was das Leben zerbricht* (1912; "What Life Breaks") is about the middle-class society of Zürich.

Zahrāʾ, az- (*c.* 616–633): *see* Fāṭimah.

Ẓahrān, aẓ-, also spelled DHAHRAN, town, northeastern Saudi Arabia. It is located in the Dammām oil field, just south of the Persian Gulf port of ad-Dammām and near the site of



The airport buildings, aẓ-Ẓahrān, Saudi Arabia
J. Allan Cash

the original discovery of oil in Saudi Arabia in 1938. It now serves as the administrative headquarters of Saudi Aramco (Arabian American Oil Company). A major U.S. Air Force installation (now King ʿAbd al-ʿAziz Air Base) was built there in 1945, and a number of other U.S. military installations were later established in the area. It was one of the main marshaling and deployment points for U.S. troops during the First Persian Gulf War (*q.v.*), and in 1996 a major terrorist attack there killed more than a dozen U.S. soldiers.

The town has petroleum-extraction and shipping facilities, a stabilizing plant, a modern international airport, and rail connections to Riyadh and ad-Dammām. The government-sponsored King Fahd University of Petroleum and Minerals was founded there in 1963. Pop. (1992) 73,691.

Zähringen, the name of an old and influential German family, taken from the castle and village of that name near Freiburg im Breisgau in present-day Baden-Württemberg state.

The earliest known member of the family was probably one Bezelin, a count in Breisgau in the early 11th century. Bezelin's son Bertold I (d. 1078) was count of Zähringen and was related to the Hohenstaufen family. He received a promise of the duchy of Swabia, which, however, was not fulfilled, but in 1061 he was made duke of Carinthia. Although this title was a titular one only, Bertold lost that honour when he joined an insurrection against King Henry IV (Holy Roman emperor from 1084) in 1073. His son Bertold II (d. 1111)—who, like his father, fought against Henry—inherited the land of the counts of Rheinfelden in 1090 and took the title of duke of Zähringen; he was succeeded in turn by his sons, Bertold III (d. 1122) and Conrad (d. 1152). In 1127 Conrad inherited some land in Burgundy, and about that date the German king Lothair appointed him rector of the kingdom of Burgundy. (The Zähringens held that title until 1218; hence they are sometimes called dukes of Burgundy.) Bertold IV (d. 1186), who followed his father Conrad, spent much of his time in Italy in the service of the emperor Frederick I. His son and successor, Bertold V, showed his prowess by reducing the Burgundian nobles to order. This latter duke is also credited with founding (or at least fortifying) the city of Bern, Switz., and when he died in February 1218 the main line of the Zähringen family became extinct.

By extensive acquisitions of land, the Zähringens had become powerful in the areas that now constitute northern Switzerland and the southern German state of Baden-Württemberg; when their territories were divided in 1218, part of them passed to the counts of Kyburg and thence to the Habsburgs. Another line of Zähringen, margraves of Baden, survived to win the rank of grand dukes of Baden in 1806 and to remain as sovereign princes until the German revolution of 1918.

zaibatsu (Japanese: "wealthy clique"), any of the large capitalist enterprises of Japan before World War II, similar to cartels or trusts but usually organized around a single family. One *zaibatsu* might operate companies in nearly all important areas of economic activity. The Mitsui combine, for example, owned or had large investments in companies engaged in banking, foreign trade, mining, insurance, textiles, sugar, food processing, machinery, and many other fields as well. All *zaibatsu* owned banks, which they used as a means for mobilizing capital.

The four main *zaibatsu* were Mitsui, Mitsubishi, Sumitomo, and Yasuda, but there were many smaller concerns as well. All of them developed after the Meiji Restoration (1868), at which time the government began encouraging economic growth. The *zaibatsu* had grown large before 1900, but their most rapid growth occurred in the 20th century, particularly during World War I, when Japan's limited engagement in the war gave it great industrial and commercial advantages.

In 1946, after the end of World War II, the Allied occupation authorities ordered the *zaibatsu* dissolved. Stock owned by the parent companies was put up for sale, and individual companies of the *zaibatsu* empires were freed from the control of parent companies. The management of the individual companies, however, was not radically changed, and to some extent the coordination and control of the previous organization remained.

After the signing of the peace treaty in 1951, many companies began associating into what became known as enterprise groups (*kigyō shūdan*). Those created with companies that were formerly part of the big *zaibatsu*—Mitsubishi group, Mitsui group, and Sumitomo group (*qq.v.*)—were more loosely organized around leading companies or major banks; they differed most significantly from the old, centrally controlled *zaibatsu* in the informal manner that characterized each group's policy coordination and in the limited degree of financial interdependency between member companies. The cooperative nature of these groups became a major factor in Japan's tremendous postwar economic growth, because, in the pooling of resources, the investments made by these groups in developing industries were large enough to make these industries competitive worldwide.

Zaire (central Africa): *see* Democratic Republic of the Congo.

Zaire River (central Africa): *see* Congo River.

Zakarpatska, Russian ZAKARPATSKAYA, also spelled ZAKARPATTYA, *oblast* (province), western Ukraine. It is bounded by Slovakia and Hungary on the west, Poland on the northwest, and Romania on the south. The *oblast* extends from the northwest–southeast-trending Carpathian Mountain crestline (the Verkhovyna and Gorgany ranges, respectively), across the successive parallel Polonina and Vulhanichnyy ranges, and southwestward down to the Great Hungarian Plain, which is drained by the Tisza (Tysa) River and its tributaries. Deep, longitudinal troughs separate these mountain ranges, while a number of important and fairly easy passes across the Carpathians long have given the area considerable strategic significance. The highest point of the *oblast* is Mount Hoverla (6,762 feet [2,061 m]) in the Polonina Range. Most of the *oblast* is densely forested, but the highest mountainous areas are in Alpine meadows.

The area, part of Hungary before World War

I, was incorporated into Czechoslovakia in 1920 as the province of Ruthenia. In 1945 Ruthenia was ceded to the Soviet Union, and the present *oblast* was formed. Most of the population are Ukrainians (including the Hutsul), with some Magyars, Russians, Romanians, Jews, and Slovaks.

The modern economy is dominated by highly developed lumbering and timber-working industries; some coal (lignite) is mined near Mukacheve. Agriculture is confined to the valleys and plain, but in the latter it is intensive, with about four-fifths of the land under the plow. Corn (maize), wheat, oats, rye, potatoes, and tobacco are the main crops. There are many orchards and vineyards in the Tisza valley and on the lower surrounding slopes. Cattle use the mountain meadows for summer pasture, and pig raising is important in the valleys. Some three-fifths of the *oblast*'s population live in rural areas. Cities, including the administrative centre, Uzhhorod (*q.v.*), are small; Chop, in the southwestern corner of the *oblast*, is the chief point of entry to Ukraine from Slovakia and Hungary. Area 4,900 square miles (12,800 square km). Pop. (2003 est.) 1,253,900.

zakat, Arabic ZAKĀT, an obligatory tax required of Muslims, one of the five Pillars of Islām. The zakat is levied on five categories of property—food grains; fruit; camels, cattle, sheep, and goats; gold and silver; and movable goods—and is payable each year after one year's possession. The tax levy required by religious law varies with the category. Recipients of the zakat include the poor and needy, the collectors themselves, and "those whose hearts it is necessary to conciliate"—*e.g.,* discordant tribesmen, debtors, volunteers in jihad (holy war), and pilgrims.

Under the caliphates, the collection and expenditure of zakat was a function of the state. In the contemporary Muslim world it has been left up to the individual, except in such countries as Saudi Arabia, where the Sharīʿah (Islāmic law) is strictly maintained. Among the Ithnā ʿAsharīyah (Twelver Shīʿites), it is collected and disbursed by the scholars (*'ulamā'*), who act as representatives for Muḥammad al-Mahdī al-Ḥujjah (the Hidden Imam).

The Qurʾān and Ḥadīth also stress *ṣadaqa,* or voluntary almsgiving, which, like zakat, is intended for the needy. Twelver Shīʿites, moreover, require payment of an additional one-fifth tax, the *khums,* to the Hidden Imam and his deputies. It is intended to be spent for the benefit of the imams in addition to orphans, the poor, and travelers.

Zákinthos (Greece): *see* Zacynthus.

Zakopane, city, Małopolskie *województwo* (province), south-central Poland. The city is situated in the Carpathian Mountains near the Slovakian border. Its location at the foot of the Alpine-like Tatra Mountains makes it a major winter-sports and health-resort centre. Situated on good rail and highway routes, Zakopane also serves as the cultural centre for the area. The Chałubiński Memorial Tatra Museum, containing ethnographic and geologic displays, was opened in 1888. Zakopane is also the location of the Exhibition Hall of the Union of Polish Artists, and it has several notable monuments and a public garden.

Settlement rights were granted in 1578, but Zakopane did not become Polish until 1889, when the area was purchased at auction from a Berlin businessman by the Polish patriot Władysław Zamoyski. In 1924 he donated this property to form the basis of Tatra National Park. The town's growth began in 1889 with the extension of a rail line to Zakopane; it was stimulated by the creation of the park and the influx of visitors attracted by



Houses in Zakopane, Pol., at the foot of the Tatras
Gianni Tortoli—Photo Researchers

the area's winter sports and mountaineering. Pop. (2002) 28,203.

Zakrzewska, Marie Elizabeth (b. Sept. 6, 1829, Berlin, Ger.—d. May 12, 1902, Jamaica Plain [now in Boston], Mass., U.S.), German-born American physician who founded the New England Hospital for Women and Children and contributed greatly to women's acceptance as medical professionals.

Zakrzewska early developed a strong interest in medicine, and at age 20 she was admitted to the school for midwives at the Charité Hospital in Berlin. She became a teaching assistant in her second year, graduating in 1851. The following year she was appointed chief midwife and professor in the school, but staff opposition to her forced her to resign after six months.

In 1853 Zakrzewska immigrated to the United States, where she met the pioneering physician Elizabeth Blackwell, who helped her master English and secured her admission to the medical school of Western Reserve University in Cleveland, Ohio (M.D., 1856). Zakrzewska moved to New York City, where she opened her practice and helped raise funds for Blackwell's projected New York Infirmary for Women and Children. The infirmary opened in May 1857, and Zakrzewska served as resident physician and general manager from 1857 to 1859. She then served as resident physician and professor of obstetrics and diseases of women and children at the New England Female Medical College in Boston (1859–62). She resigned over a disagreement with the college's founder, who envisioned the college as simply a training course for midwives. (He had founded it because he found the idea of male doctors attending childbirth to be morally repugnant.)

In 1862 Zakrzewska founded the New England Hospital for Women and Children, which was devoted to clinical care and to the clinical training of women physicians and nurses. She served as resident physician (1862–63), attending physician (1863–87), and advisory physician (1887–99) while also maintaining a growing private practice throughout Boston. Zakrzewska contributed greatly to the eventual acceptance of women physicians. She was also a supporter of woman suffrage.

Zakynthos (Greece): *see* Zacynthus.

Zala, *megye* (county), western Hungary. The county, bordered to the southwest and west by Croatia and Slovenia, consists of wooded, undulating hill country. There is a high incidence of soil erosion on the valley slopes, but wet meadows and pastures are found along the valley floors. Some rivers have been canalized in Zala, along with land-reclamation and soil-conservation measures. Agricultural production is low, but the county is a major source of medicinal herbs. Racehorse breeding is important. Zala contains large petroleum and natural gas deposits. From around Budafapuszta crude oil is piped to Almásfüzitő, Budapest, and Várpalota. Production from the Nagylengyel field is refined at Zalaegerszeg, the county seat. Zalakaros has been developed as a spa for the treatment of rheumatic diseases. Area 1,461 square miles (3,784 square km). Pop. (2001) 298,056.

Zalaegerszeg, town and seat of Zala *megye* (county), western Hungary. It lies on the right bank of the Zala River. The town was of medieval origin and was a frontier fort in Hungary's wars with Turkey (16th–17th century). It was never occupied by the Turks. The town's notable buildings include the Göcsej Museum, with a rich historical and ethnographic collection; the twin-spired Baroque parish church (1750–60); and the County Council House Chapel (1761–77). On the banks of the Zala River there is an open-air Göcsej village museum. (The Göcsej is the local region of southwestern Hungary noted for the peculiarities of its dialect.) The museum displays more than 30 buildings, including timber houses, stables, and a water mill. Zalaegerszeg has a large clothing factory. Pop. (2001) 61,654.

Zalău, town, capital of Sălaj *județ* (county), northwestern Romania. It is located in an isolated part of the country on the northwestern slopes of the Meseş Mountains. It is the terminal of a branch line railway and a local market centre for the district's agricultural produce. A furniture factory in Zalău uses timber from the surrounding hills. The town has an archaeological museum that contains artifacts dating from prehistoric times, as well as materials from the Roman occupation. Highways and a railway connection pass through Zalău. Pop. (2002) 63,305.

Zallāqah, Battle of az- (Oct. 23, 1086), decisive military victory by the Almoravid ruler Yūsuf ibn Tāshufīn over Alfonso VI of Castile and Leon. Crossing over from Almoravid North Africa in response to Muslim appeals, Ibn Tāshufīn met Alfonso at az-Zallāqah (near present-day Badajoz, Spain). The battle ended in a complete rout of Christian troops and put an end to a Castilian offensive against the divided and quarreling local Muslim rulers of Spain known as the "party kings" (*taifa*). The actions of Ibn Tāshufīn thwarted Christian dominance of the region; he returned two years later and in a series of campaigns in 1090–91 dissolved the party kings and extended Almoravid rule to the Iberian Peninsula.

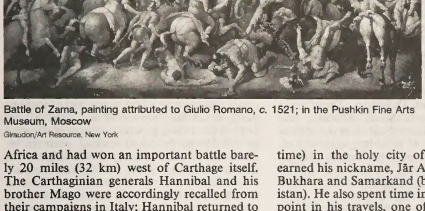
Zaltan, also spelled ZELTEN, town site at the first exploited oil field in Libya. Located 105 miles (169 km) south of the Mediterranean port of Marsā al-Burayqah on the Gulf of Sidra, at the foot of the Zaltan Mountains, the town is in the centre of the so-called oasis group of oil fields that includes Jālū (Gialo), Waha, and Ar-Rāqūbah (Raguba). Discovered in 1959 and recognized as the nation's first large strike (17,500 barrels per day), the Zaltan oil field is connected to Marsā al-Burayqah by pipeline (completed 1961). A gas recovery plant was opened at Marsā al-Burayqah in 1969. Pop. (latest est.) 19,473.

žaltys, in ancient Baltic traditions, a harmless green snake highly respected as a symbol of fertility and wealth. To ensure the prosperity of family and field, a *žaltys* was kept in a special corner of the house, and the entire household gathered at specified times to recite prayers to it.

On special occasions the snake was asked to the table to share the family meal from their plates; should he refuse, misfortune was imminent. To encounter a snake accidentally was also considered auspicious and portended a marriage or a birth. Paralysis or great misfortune awaited anyone who dared kill a *žaltys,* the "sentinel of the gods" and a favourite of Saule, the goddess of the sun.

Zama, Battle of (202 BC), victory of the Romans led by Scipio Africanus over the Carthaginians commanded by Hannibal. It was the last and decisive battle of the Second Punic War. The battle took place at a site identified by the Roman historian Livy as Naraggara (now Sāqiyat Sīdī Yūsuf, Tunisia). The name Zama was given to the site (which modern historians have never precisely identified) by the Roman historian Cornelius Nepos about 150 years after the battle.

By the year 203 Carthage was in great danger of attack from the forces of the Roman general Publius Cornelius Scipio, who had invaded



Battle of Zama, painting attributed to Giulio Romano, c. 1521; in the Pushkin Fine Arts Museum, Moscow

Giraudon/Art Resource, New York

Africa and had won an important battle barely 20 miles (32 km) west of Carthage itself. The Carthaginian generals Hannibal and his brother Mago were accordingly recalled from their campaigns in Italy; Hannibal returned to Africa with his 12,000-man veteran army and soon gathered a total of 37,000 troops with which to defend the approaches to Carthage. Scipio, for his part, marched up the Bagradas (Medjerda) River toward Carthage, seeking a decisive battle with the Carthaginians. Scipio had no more troops than did Hannibal, but his 6,000 Numidian cavalrymen led by Prince Masinissa were superior to the Carthaginian cavalry.

As the two armies approached each other, the Carthaginians unloosed their 80 elephants into the ranks of the Roman infantry, but the great beasts were soon dispersed. Masinissa's cavalry then charged the opposing Carthaginian cavalry on the wings; the latter fled and were pursued by Masinissa's forces. The Roman infantry legions then advanced and attacked Hannibal's infantry, which consisted of three consecutive lines of defense. The Romans crushed the soldiers of the first line and then those of the second, but by this time the legionaries had become nearly exhausted, and they had yet to close with the third line, which consisted of Hannibal's veterans from his Italian campaign, *i.e.,* his best troops. At this crucial juncture Masinissa's Numidian cavalry returned from their rout of the enemy cavalry and attacked the rear of the Carthaginian infantry, who were soon crushed between the combined Roman infantry and cavalry assault. Twenty thousand Carthaginians died in the battle and the rest were captured, while the Romans lost about 1,500 dead.

The Battle of Zama left Carthage helpless, and the city accepted Scipio's peace terms whereby it ceded Spain to Rome, surrendered most of its warships, and began paying a 50-year indemnity to Rome. Scipio was awarded the surname Africanus in tribute of his victory. Hannibal escaped from the battle and soon returned to Carthage.

zamacueca (dance): *see* cueca.

Zamakhsharī, Abū al-Qāsim Maḥmūd ibn ʿUmar az-, also called JĀR ALLĀH (Arabic: "God's Neighbour") (b. March 8, 1075, Zamakhshar, Khwārezm [now in Turkmenistan or Uzbekistan]—d. June 14, 1144, al-Jurjānīyah, Khwārezm), Persian-born Arabic scholar whose chief work is *al-Kashshāf ʿan ḥaqāʾiq at-Tanzīl* ("The Discoverer of Revealed Truths"), his exhaustive linguistic commentary on the Qurʾān.

Little is known of his youth. He resided at least twice (once for an extended period of time) in the holy city of Mecca, where he earned his nickname, Jār Allāh, and studied at Bukhara and Samarkand (both now in Uzbekistan). He also spent time in Baghdad. At some point in his travels, one of his feet had to be amputated (probably because of frostbite), and thereafter—so the story goes—az-Zamakhsharī felt obliged to carry with him affidavits from noted citizens attesting that his foot had not been amputated as punishment for some crime.

Theologically, he was affiliated with the rationalist Muʿtazilah school, of which he was perhaps the last advocate of any great significance. As a philologist, he considered Arabic the queen of languages, in spite of the fact that his own native tongue was Persian (and though he wrote several minor works in that latter language). His great commentary, *al-Kashshāf ʿan ḥaqāʾiq at-Tanzīl,* was written in Arabic and became the work for which he is best known. A comprehensive study of the Muslim scripture that focused on its grammatical nuance, it was completed in 1134 (published at Calcutta in 1856 in 2 vol.). It was widely read, in spite of its Muʿtazilite bias, especially in the East; in the western portions of the Islāmic world, his dogmatic point of view was offensive to the Mālikī school, though the 14th-century Arab historian Ibn Khaldūn regarded the work highly. The commentary has been reprinted many times over the years.

Of az-Zamakhsharī's grammatical works, *al-Mufaṣṣal fī ʿilm al-ʿArabīyah* ("Detailed Treatise on Arabic Linguistics," written 1119–21, published 1859; it is sometimes titled *Kitāb al Mufaṣṣal fī al-Naḥw* ["Detailed Treatise on Grammar"]) is celebrated for its concise but exhaustive exposition. Many commentaries have been written on it. He was also the author of a collection of old proverbs; though well regarded, this work has been considered second to the anthology *al-Amthāl* ("The Proverbs") written by his close contemporary Abū Faḍl al-Maydānī—with whom az-Zamakhsharī had a notorious and somewhat undignified feud. Az-Zamakhsharī's other works include three collections of apothegms as well as treatises on moral discourse and a number of poems.

Zambales Mountains, volcanic range in the southwestern part of northern Luzon in the Philippines. The range stretches northwest-southeast from Lingayen Gulf in the north to the Bataan Peninsula and the entrance to Manila Bay in the south. Its greatest elevation is High Peak (6,683 feet [2,037 m]). Lying farther south and across the bay from Manila is Mount Mariveles (4,659 feet [1,420 m]), which marks the southern termination of the range. The Zambales Mountains are rich in minerals, and their slopes are densely forested.

Consult the INDEX *first*

Zambezi River, also spelled ZAMBESI, river in south-central and southeastern Africa, flowing from its source on the Central African Plateau eastward to the Indian Ocean.

A brief treatment of the Zambezi River follows. For full treatment, *see* MACROPAEDIA: Africa.

The Zambezi River follows an S-shaped double arc from its source about 4,800 feet (1,460 m) above sea level near Kalene Hill, Zambia, south across eastern Angola and western Zambia, then northeastward forming the Zambia-Zimbabwe boundary, and, finally, southeastward across Mozambique to its delta on the Indian Ocean. Among its major tributaries are the Kabompo, Lungué-Bungo (Lungwebungu), Cuando (Kwando), Kafue, and Shire. The Zambezi basin drains the entire south-central region of the continent.

In its upper course through Zambia and Angola, the river drops about 1,000 feet (300 m) in elevation and is met by more than a dozen tributaries of varying sizes. At Kazungula, Zambia, at an elevation of 2,900 feet (880 m), the river reaches its greatest width (4,550 feet [1,380 m]) and its waters plunge over Victoria Falls. For about 450 miles (720 km), the river forms the boundary between Zambia and Zimbabwe, about 175 miles (280 km) of this portion of its course being Lake Kariba, the reservoir impounded by Kariba Dam. In its middle course near the Mozambique border the river enters Lake Cabora Bassa, about 200 miles (320 km) in length, impounded by Cabora Bassa Dam.

In its lower course, the Zambezi enters the Tete basin, passes through Lupata Gorge, and emerges onto the Mozambique Plain, where it occupies a broad valley that spreads out in places to a width of three to five miles. Near Vila Fontes, the river receives its last great tributary, the Shire River. At its mouth, the Zambezi splits into a wide, flat, and marshy delta that is obstructed by sandbars. There are two main channels, each again divided into two. The wider, eastern channel splits into the Muselo River to the north and the main mouth of the Zambezi to the south. The western channel forms both the Inhamissengo River and the smaller Melambe River.

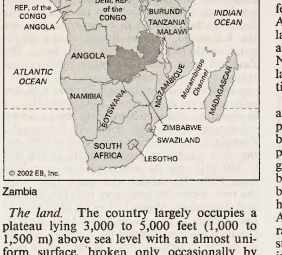
The Zambezi has the same types of natural barriers encountered on other African rivers—sandbars at the mouth, shallowness, and rapids and cataracts. About 1,620 miles (2,600 km) of its length, however, are navigable by shallow-draft steamers. The river has four major crossing points, the Victoria Falls Bridge, the dam wall at Kariba, Zimb., a bridge at Chirundu, Zimb., and a bridge between Mutarara (Dona Ana) and Vila de Sena, Mozambique. The Kariba Dam harnesses the Zambezi at Kariba, producing hydroelectric power. Lake Kariba

stretches for 175 miles (280 km) from the dam to Devil's Gorge and is 20 miles (32 km) across at its widest point. The many peoples who live along the Zambezi River include the Lozi (Barotse), Tonga, Shona, Chewa, and Nsenga. Length 2,200 miles (3,500 km); drainage basin 500,000 square miles (1,300,000 square km); average annual discharge 247,000 cubic feet per second (7,000 cubic m/sec).

Zambia, officially REPUBLIC OF ZAMBIA, formerly (1911–64) NORTHERN RHODESIA, landlocked country in south-central Africa. The country extends at its maximum about 510 miles (821 km) from north to south and 860 miles (1,385 km) from east to west. It is bordered to the west by Angola, to the northwest by Congo (Kinshasa), to the northeast by Tanzania, to the east by Malawi, to the southeast by Mozambique, to the south by Zimbabwe and Botswana, and to the southwest by Namibia. The Zambezi River forms the border with Zimbabwe. The capital is Lusaka. Area 290,586 square miles (752,614 square km). Pop. (2000 est.) 9,582,000.

A brief treatment of Zambia follows. For full treatment, *see* MACROPAEDIA: Southern Africa.

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



Zambia

The land. The country largely occupies a plateau lying 3,000 to 5,000 feet (1,000 to 1,500 m) above sea level with an almost uniform surface, broken only occasionally by widely dispersed hills and ranges. The Muchinga Mountains in the east, forming the divide between the Congo and Zambezi watersheds, include the highest point (7,100 feet [2,200 m]) in the country. Other high elevations are in the Mbala Plateau in the north and the Mafinga Hills in the northeast. Several rift valleys are located within Zambia, the largest being the 350-mile- (560-kilometre-) long Luangwa River valley in the east. The Bangweulu Swamps in the northeast form one of the largest inland wetlands in the world. The Zambezi River, with an extensive drainage basin, is the country's principal river; its rapids and waterfalls, the largest of which is Victoria Falls, limit navigation. Lakes Mweru, Bangweulu, and Tanganyika are situated in the north, and the man-made Lake Kariba is in the south.

Zambia has a subequatorial climate with three distinct seasons: hot and dry (August–October), warm and wet (November–April), and dry and cool (May–July). The average daytime high temperatures in the hottest month (October) range from 102° F (39° C) at Balovale in the southwest to 89° F (31° C) at Mbala in the north, and in the coldest month (July), from 79° F (26° C) at Lusaka in the south to 89° F (31° C) at Mbala. Precipitation, mostly occurring in the form of heavy tropical rainstorms, averages less than 28 inches (700 mm) in the southern river valleys to more than 60 inches (1,500 mm) in the Bangweulu basin. Wooded savanna (miombo and mopane woodland) of tall perennial grasses and small trees covers most of the country. Valuable forests of Zambezi teak (*Baikeia plurijuga*) are found in the southwest; thickets of papyrus grow on the lake shores. The grasslands support domestic livestock (beef and dairy cattle) as well as wildlife (elephant, genet, hyena, leopard, zebra, giraffe, antelope, baboon, and monkey). Several varieties of tsetse fly are widespread. Kafue National Park, 150 miles (240 km) west of Lusaka, is the country's largest and best-known game preserve.

The Copperbelt region (70 miles [110 km] long and 30 miles [50 km] wide) of central Zambia, which was opened and developed during the 1930s, is the most important mineral region of the country. Geologically formed of alternating beds of sandstone, shale, and dolomite, the Copperbelt's considerable reserves amounted to about 5 percent of the world's demonstrated copper reserves, but in the late 20th century they were becoming depleted. Cobalt forms nearly one-fifth of Zambia's exports. Coalfields in the Zambezi River valley and the lead and zinc deposits at Kabwe, though approaching exhaustion, were important. Other mineral resources include gold, silver, iron ore, gemstones (emerald and amethyst), and limestone.

The people. Zambia's ethnic composition is almost entirely Bantu-speaking African, including the Twa (Pygmies), except for a few groups of San. The main Bantu-speaking ethnic groups include the Bemba, Nyanja, Tonga, Lozi, Mambwe, and Tumbuka. There are a few Europeans, white South Africans, and Asians (mostly Indians). English is the official language, and some 80 local languages and dialects are also spoken. The Bemba, Tonga, Nyanja, Lozi, Kaonde, Lunda, and Luvale languages are used in radio broadcasts. Christians are the largest religious group.

Zambia's rate of population growth is average for sub-Saharan Africa. Nearly half the population is less than age 15, ensuring high birth rates and continued rapid growth of the population into the 21st century. The areas of greatest population density and growth have been in the Copperbelt and central provinces because people migrate to those areas with hopes of securing employment and housing. About half of the entire populace lives near the railroad on a single 25-mile (40-kilometre) stretch of land within the Copperbelt. Lusaka is the country's largest city.

The economy. Zambia has a mixed economy in which both the public and private sectors participate, though it moved increasingly toward privatization in the 1990s. It is heavily dependent on the production and export of copper, and, after the fall of world copper prices in the mid-1970s, the economy remained in a difficult period of readjustment into the 21st century. The government resulting from elections in 1991 was committed to using free-enterprise policies to improve the country's declining agricultural and industrial sectors. Zambia's gross national product (GNP) increased only modestly in the 1990s. Despite a slow rate of population growth, the GNP per capita fell slightly during that time, though it remains average for sub-Saharan Africa.

Agriculture accounts for approximately one-sixth of the gross domestic product (GDP) but employs about 70 percent of the workforce. Levels of commercialization are low; subsistence farming is widespread and centres on the production of corn (maize), cassava, millet, beans, peanuts (groundnuts), and sorghum. Large commercial farms were taken over by the state, and the more successful of these account for up to half of Zambia's agricultural output.

The raising of cattle is restricted by the prevalence of the tsetse fly in northern and eastern Zambia. Farmers are often reluctant to slaughter cattle, which are a traditional sign of wealth, and the production of beef and milk falls short of domestic demand.

Forest covers about two-fifths of the country, but much of it is secondary growth because of the widespread practice of slash-and-burn agriculture. An extensive afforestation program was initiated in the 1960s.

Mineral industries account for about one-twelfth of the GDP. Copper and its by-products (mainly cobalt) are the most important minerals mined. In 1969 the government acquired 51 percent of the country's two major copper-mining companies, and in 1982 these were merged into the government-controlled Zambia Consolidated Copper Mines; this was, in part, sold to private interests in 2000.

Manufacturing industries account for roughly one-tenth of the GDP but employ only a tiny fraction of the workforce. In the 1990s large-scale government ownership of industry began to give way to privatization. Manufactures include textiles, chemical fertilizers, bricks, explosives, and motor vehicles.

Zambia's electricity is generated almost entirely from hydroelectric power. The Kariba Dam, Victoria Falls, and the Kafue River project are the major hydroelectric production sites in the country.

Copper dominates exports and is the country's principal source of foreign exchange; capital and consumer goods and fuels are the chief imports. Zambia's balance of trade, which gradually deteriorated beginning in the mid-1970s because of a decline in world copper prices and because of the rising cost of fuel imports, never fully recovered and, after a brief rally in the 1980s, generally remained negative in the 1990s. Principal trading partners include the United States, South Africa, the United Kingdom, Saudi Arabia, and Japan.

Government and social conditions. Zambia is an independent republic that until 1990 was under the rule of a single party. Its constitution (1991) vests executive power in the president, who is elected to a five-year term. The National Assembly is the legislative body from whose elected members the president appoints the cabinet, including the prime minister. The United National Independence Party (UNIP), which ruled Zambia from independence in 1964 to 1990, was the sole legal political party in the country until the latter year, and the cabinet was subordinate to its Central Committee. The UNIP's leader and Zambia's longtime president, Kenneth Kaunda, legalized opposition parties in 1990. Multiparty elections in 1991 ended in defeat for the UNIP and the coming to power of the Movement for Multiparty Democracy. Zambia's highest court and court of appeal is the Supreme Court, and below it are the High Court, magistrate's courts, and the local courts.

Health and medical care is provided through hospitals, rural health centres, urban clinics, and leprosaria. Malnutrition, tuberculosis, parasitic infestations, and leprosy are the major health hazards. These have been countered to some degree by clinics for children under five, developed to improve maternal and child health education; by vaccinations and immunizations; and nutritional education. Generally, however, Zambia suffers from a shortage of trained medical staff and poor health-care facilities. In the rapidly growing urban areas some private industries provide medical facilities for employees and dependents. In the 1980s AIDS began to spread rapidly among the urban population, and by 2000 nearly one in five Zambian adults was infected. This contributed to a drop in the country's average life expectancy to roughly 37 years.

A contributory National Provident Fund provides retirement benefits for a large number of employees, and many voluntary organizations help the government in dealing with

juvenile delinquency, adoption, refugee control, and care for the aged, the indigent, and the handicapped. Urbanization has resulted in an acute housing shortage, and the government directs its efforts toward the improvement of both urban and rural housing.

Zambia has had one of the highest rates of educational expansion in Africa at the primary and secondary levels. More than four-fifths of all primary-school-age children attend school, one of the highest attendance rates for that age group in sub-Saharan Africa. The University of Zambia (1965) is the chief institution of higher education. There are several daily newspapers and a number of provincial newspapers, but the press is frequently subject to threats, censorship, and harassment. Until the 1990s radio and television were controlled by the government. Radio broadcasts include educational and agricultural training programs, and television programs, the latter all in English, are primarily for entertainment.

Cultural life. Traditional Zambian art consists chiefly of wood carving, pottery, basket weaving, and house-wall paintings. Music, dancing, and songs are used in tribal rituals to the accompaniment of drums, stringed bows, flutes, horns and pipes, bells, rattles, and the kalimba, or "African piano." In the urban setting, traditional music has often been modified by the use of Western instruments, and local dancers perform regularly at the Open Air Museum at Livingstone. There is a national museum at Livingstone, and a museum on the Copperbelt displays artifacts from central African history and prehistory.

History. Archaeological evidence suggests that early humans roamed present-day Zambia between 2,000,000 and 1,000,000 years ago. Stone Age sites and artifacts are found in many areas. Early Iron Age peoples settled in the region with their agriculture and domesticated animals about 2,000 years ago. Ancestors of the modern Tonga tribe reached the region early in the 2nd millennium AD, but other modern peoples reached the country only in the 17th and 18th centuries from what are now Congo (Kinshasa) and Angola.

Portuguese trading missions were established early in the 18th century at the confluence of the Zambezi and Luangwa rivers. In 1835 a group of Bantu-speaking Ngoni settled in the Lake Nyasa–Luangwa watershed. The Suto people, the Kololo (Makololo), crossed the upper Zambezi and made themselves masters of Barotseland. The Scottish missionary David Livingstone reached the upper Zambezi River in 1851, discovering Victoria Falls (1855) and subsequently exploring the whole Zambezi basin and the plateau south of Lake Tanganyika. Emissaries of Cecil Rhodes and the British South Africa Company concluded treaties with most of the Zambian chiefs during the 1890s. The company administered the region until 1924, when it became a British protectorate, having been known as Northern Rhodesia since 1911.

The mining industry began to develop in the early 20th century. By 1924, when the Copperbelt began to develop, there were about 4,000 Europeans in Northern Rhodesia. The British South Africa Company retained mineral rights from 1924 to 1960, reaping large profits. In 1935 the capital was moved from Livingstone to Lusaka. During the early 20th century Africans were barely represented in the political power structure, but after 1930 this began to change as they achieved increased power. During the early 1950s the movement for Zambian independence was launched by the United National Independence Party (UNIP) and the African National Congress (ANC). By 1952 the European population had increased to about 43,000, living mostly in the Copperbelt.

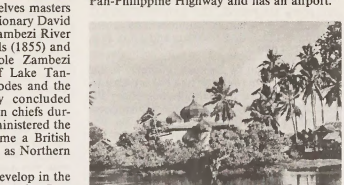
In 1953 Northern Rhodesia, under British auspices and despite strong opposition from the country's African majority, joined with Nyasaland (Malawi) and Southern Rhodesia to form the Central African Federation of Rhodesia and Nyasaland. Growing African nationalism doomed this federation, which was dissolved in 1963, and the next year the former Northern Rhodesia achieved independence as the Republic of Zambia within the British Commonwealth. The UNIP became the party in power, and Kenneth Kaunda became president.

Kaunda remained the dominant political figure in Zambia for nearly three decades. In 1969 he embarked on a policy of nationalization that began with the copper industry and was extended to other industries and to the commercial sector. In 1973 he cemented one-party UNIP rule with a new constitution; the UNIP remained the country's sole party until 1990, when Kaunda signed constitutional amendments that legalized opposition parties. Kaunda also played a prominent role in the country's foreign policy by participating in trade sanctions against white-ruled Rhodesia in the late 1960s and '70s.

Zambia's economy declined in the 1970s owing to these sanctions and to its growing dependence on copper exports as the world price for copper was declining. The production of grain declined in the 1970s and '80s owing to the government's neglect of agriculture.

In response to growing public dissatisfaction with both the economy and his own long rule, Kaunda approved a constitutional amendment in 1990 that legalized opposition parties. In elections held in 1991, he and his governing party were defeated by the Movement for Multiparty Democracy, and its leader, Frederick Chiluba, succeeded Kaunda as president. In the face of extreme fiscal austerity, Chiluba led the country toward the privatization of nationalized lands in the 1990s and early 21st century.

Zamboanga City, city, western Mindanao, Philippines. It is a busy port strategically located on the southwestern tip of the Zamboanga Peninsula, on Basilan Strait and sheltered by Basilan Island. The immediate coastal lowlands are narrow, with low, rugged hills located a short distance inland. A large wharf accommodates interisland and oceangoing vessels. Zamboanga exports rubber, pearls, copra, mahogany and other fine hardwoods, fish, abaca, and fruit products; rice is imported. The city is the southern terminus of the Pan-Philippine Highway and has an airport.



Zamboanga City, Mindanao, Phil.
C.A. Peterson

Zamboanga was founded by Spaniards in 1635 on the site of a native settlement; its name is derived from the Malay *jambangan* ("place of flowers"), and bougainvillea, orchids, and other tropical flowers line its roadsides. Incorporated in 1936, the city was largely rebuilt after World War II. Zamboanga's Spanish-style architecture, fine beaches, and mountainous backdrop combine with a climate that is cooler and less humid than that of Manila to make it a favourite tourist spot.

Fort Pilar, the shrine of Our Lady of the Pillar, was built in the 17th century for the protection of Christian settlers against Moro pirates; it now houses the Zamboanga High School. The city is also the site of Western Mindanao State University (founded 1918).

Rio Hondo, Taluksangay, and Camp Muslim are nearby Muslim villages built on stilts over water. Indigenous peoples in the locality include the Tau Sug, Samal, and Yakans. The colourful Bajau, or sea gypsies, ply the waters of the Basilan Strait for fish, coral, and shells and live on board their multihued vintas (sailboats). Chabacano, the native dialect, is a mixture of Spanish and Cebuano.

Besides its port functions, Zamboanga is a centre for Moro brassware and bronzeware and a collecting point for shells, which are exported or used locally for button manufacture. Pop. (1995) city, 120,000; (2000 prelim.) metropolitan area, 600,000.

Zamboanga Peninsula, long, semicircular peninsula of western Mindanao, Philippines, extending southwest toward the Sulu Archipelago and Borneo. It has an area of roughly 5,600 square miles (14,500 square km). It is bordered on the north and west by the Sulu Sea and on the south by Moro Gulf.

The peninsula is drained in the north by the Lubungan, Dipolog, and Quipit rivers, and its northern highlands generally descend sharply to the coast. Its southern coastline is deeply indented by the Sibuguey and Dumanquilas embayments. In the north, the most populated region is a lowland area of fertile volcanic material from Mounts Ampiro and Malindang. Agriculture (rice, corn [maize], sugarcane, tobacco, abaca), fishing, and logging are the main economic activities. Small sawmills are scattered along the northern coast. Dipolog, an interisland port, is a commercial-fishing centre and is served by an airport and by coastal roads. The port of Dapitan, a city just northeast of Dipolog, was the place of exile from 1892 to 1896 for the Filipino patriot José Rizal and is the site of Rizal National Park.

The main rivers in the south of the peninsula are the Subuco, Pangasinan, and Sioco, which form a delta of mangrove forests that are a source of export timber. The largest lowlands and population centres of the south are in and adjacent to Zamboanga City, on the Sibuguey and Baganian peninsulas, and at the heads of the embayments. Forestry, fishing, agriculture (rubber, corn, rice, fruits, vegetables), and mining are important economic activities in the south as in the north. Iron ore and coal are mined near Malangas. In the southeast, Pagadian ships rice and corn to Manila and the Visayas. Although Muslims are a strong minority, most of the inhabitants of the peninsula are Roman Catholic migrants from the Visayas.

Zamenhof, L.L., in full LUDWIK LEJZER ZAMENHOF, pseudonym DOKTORO ESPERANTO (Esperanto: "Doctor Hopeful") (b. Dec. 15, 1859, Białystok, Pol., Russian Empire [now in Poland]—d. April 14, 1917, Warsaw), Polish physician and oculist who created the most important of the international artificial languages—Esperanto.

A Jew whose family spoke Russian and lived in an environment of racial and national conflict on the Polish-Russian borderland, Zamenhof dedicated himself to promoting tolerance, mainly through the development of an international language. After years of experiment in devising such a tongue, working under the pseudonym of Doktoro Esperanto, he published an expository textbook, *Lingvo*

Internacia (1887; *Dr. Esperanto's International Language*). His pseudonym, Esperanto ("[one] who hopes"), was to become the language's name.

As well as continuing his medical career, Zamenhof worked to develop Esperanto and organize its adherents. The first Esperanto magazine appeared in 1889, the beginnings of formal organization in 1893. With some literary and linguistic skill, Zamenhof developed and tested his new language by translating a large number of works, including the Old Testament, *Hamlet,* Hans Christian Andersen's *Fairy Tales,* and plays of Molière, Goethe, and Nikolay Gogol. At the first international Esperanto congress at Boulogne, France (1905), and at successive annual congresses in various European cities, Zamenhof delivered a number of memorable addresses, but he renounced formal leadership of the Esperanto movement at Kraków, Pol., in 1912. His *Fundamento de Esperanto* (1905; 17th ed., 1979; "Basis of Esperanto") established the principles of Esperanto structure and formation. Marjorie Boulton's biography, *Zamenhof, Creator of Esperanto,* was published in 1960.

Zamia, a genus of 30 or more species of cycads (family Cycadaceae), small, stocky, fernlike plants native to tropical and subtropical America. They have a turniplike, mostly underground stem that in some species reaches 3 m (10 feet) or more in height. A starchy



Coontie (*Zamia floridana*)
Walter Dawn

food is obtained from the crushed roots and stems of certain species, among them coontie, or comfortroot (*Z. floridana*), found in the southeastern United States.

Zamiatin, Yevgeny Ivanovich: *see* Zamyatin, Yevgeny Ivanovich.

zamindar, in India, a holder or occupier (*dār*) of land (*zamīn*). The root words were Persian, and the resulting name was widely used wherever Persian influence was spread by the Mughals or other Indian Muslim dynasties. The meanings attached to it were various. In Bengal the word denoted a hereditary tax collector who could retain 10 percent of the revenue he collected. In the late 18th century the British government made these zamindars landowners, thus creating a landed aristocracy in Bengal and Bihār that lasted until Indian independence (1947).

In parts of North India (*e.g.,* Uttar Pradesh), a zamindar denoted a large landowner with full proprietary rights. More generally in North India, zamindar denoted the cultivator of the soil or joint proprietors holding village lands in common as joint heirs. In Marāthā territories, the name was generally applied to all local hereditary revenue officers.

Zamora, town, southeastern Ecuador. It lies in the forested jungles east of the main Andean ranges and is situated at the southeastern foot of the Andean Cordillera (mountains) de Zamora, just south of the Zamora River. The Roman Catholic church has established a Vicar Apostolic in Zamora, which is considered to be a missionary settlement; the population is almost entirely Indian. The economy is based on local Indian trade, with barter largely supplanting currency. Pop. (2001) 10,355.

Consult the INDEX *first*

Zamora, in full ZAMORA DE HIDALGO, city, northwestern Michoacán state, west-central Mexico. It lies at an elevation of 5,141 feet (1,567 m) above sea level in the Zamora valley, formed by the Duero River. It was founded in 1540 as an outpost to guard against Indians. Commerce, agriculture, and livestock raising are the principal sources of income. Corn (maize), wheat, beans, and numerous fruits and vegetables are grown in the surrounding area and flourish in the temperate climate. Dairy products and candy are manufactured in the city, as are various handicraft items, including rebozos (shawls), jewelry, pottery, and sandals. The Heroica Nogales–Guadalajara–Mexico City highway passes through Zamora, linking the city with Morelia, the state capital. Pop. (2000) 122,881.

Zamora, province, in the autonomous community (region) of Castile-León, northwestern Spain. It was formed in 1833 from part of the historic province of León and is bounded by Portugal and Orense (west), by León (north), by Valladolid (east), and by Salamanca (south). It has an area of 4,077 square miles (10,559 square km) and is traversed from east to west by the Duero (Portuguese Douro) River; the Tormes River skirts the southwestern boundary for about 25 miles (40 km). Except in the northwest, where it is entered by two outlying ridges of the Cantabrian Mountains, the surface is a level or slightly undulating plateau. Its plains, especially the Esla Valley, yield much grain and pulse; wine and flax also are produced, and on higher grounds merino sheep and goats are reared. The provincial capital, Zamora, is the main communications centre; other towns include Benavente and Toro. Pop. (2001) 199,090.

Zamora, capital of Zamora province, in the autonomous community (region) of Castile-León, northwestern Spain. It lies along the northern bank of the Duero (Portuguese Douro) River, northwest of Madrid. The city occupies a rocky height overlooking the Duero, a little below its confluence with the Valderaduey River. In the early period of the Christian reconquest (8th–11th century) the city was strategically important and passed between Christian and Moorish rule several times. It finally became subject to Alfonso VI of León and Castile in 1073. In the 15th century it was held for a time by the Portuguese supporters of Princess Juana, claimant to the Castilian throne, but was finally surrendered to Ferdinand II the Catholic in 1475.

Outstanding landmarks include a fine 14th-century bridge across the Duero, consisting of 16 pointed arches; the citadel of Zamora, dating from the 8th century; and the Romanesque cathedral, one of four 12th-century churches, completed *c.* 1174. The city is primarily an agricultural trade centre. Pop. (2001) 64,845.

Zamość, former (1975–98) *województwo* (province), southeastern Poland, now part of Lubelskie (*q.v.*) province.

Zamość, city, Lubelskie *województwo* (province), eastern Poland. One of the few large communities in the Lublin uplands, it was founded on the estates of Polish chancellor Jan Zamoyski (1542–1605) that lay on the trade route between the Black Sea and northern and western Europe. In 1578 the Paduan architect Bernardo Morando conceived and implemented the city's modern design, which remains a fine example of grid-based urban planning. Zamość today is, in its entirety, classified as a historical monument. The city was incorporated in 1580.



Town Hall, Zamość, Pol.
© Pawel Libera/Corbis

For a long period its academy made Zamość the scientific and cultural centre for the region. In 1821 the city was refortified and became Polish territory, but by 1866 it had been abandoned as a defense point and began to develop once again as a free city. During World War II, Zamość was occupied by the Germans and 8,000 of its inhabitants were slaughtered. Notable sites include the Town Hall (early 17th century, in the Mannerist style) and Morando's Collegiate Church of St. Thomas (1593–1628), one of the finest Renaissance churches in Poland. There is also a branch of the Maria Skłodowska-Curie University. Pop. (2002) 67,160.

Zamoyski FAMILY, great Polish family whose members influenced Polish politics and history for almost 400 years.

The family settled in the 15th century at Laznin in the Mazovia area of Poland. Tomasz Lazninski bought an estate there called Zamość, and his sons Florian (died 1510) and Maciej began to use the name Zamoyski. Florian's grandson Stanisław was the first member of the family to serve as a senator. The Zamoyskis' rise to power dates from the career of Stanisław's son Jan Zamoyski (*q.v.*), who was a major force in the royal politics of Poland throughout his life.

The next major member of the family, Andrzej Zamoyski (1716–92), was one of the authors of a plan for general reform of the nation offered to the Sejm (Diet) in May 1764. It called for improvements in the parliamentary system, a limitation of the power of the nobles, and the abolition of serfdom. On his own estates Zamoyski replaced serfdom. His proposals, however, were finally rejected by the Sejm in 1780.

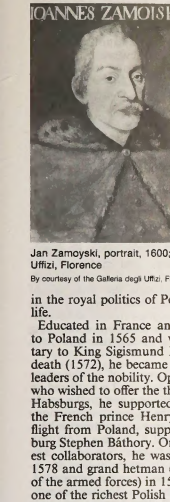
His son Stanisław Kostka Zamoyski (1775–1856) received the title of count. During the insurrection of 1830–31 against Russian rule Stanisław's son, the second Andrzej Zamoyski (1800–74), was sent to Austria to gain support for the revolt. The uprising failed, and the young Andrzej retired to his family estates. During the rising against Russian rule in 1861–

63, Andrzej took part in drafting a letter to the Russian tsar calling for Polish autonomy, and, although opposed to armed rebellion, he refused to collaborate with the Russian-controlled Polish government. Andrzej was exiled from Poland in September 1863.

Andrzej's brother Władysław Zamoyski (1803–68) served as an aide-de-camp to Grand Duke Constantine, viceroy of Poland, and then took part in the 1830–31 insurrection. He later emigrated to England, where he represented the interests of the Polish prince Adam Jerzy Czartorski. He organized Polish contingents serving with the Sardinian Army to fight against the Austrians (1848–49), and in 1855 during the Crimean War he commanded a Polish cavalry division in the Turkish Army.

Andrzej's second son, Franciszek Tomasz Zamoyski, obtained Russian recognition of his family's title of count in 1884. His son Maurycy Zamoyski (1871–1939) was minister of foreign affairs in the Polish Republic for seven months in 1924.

Zamoyski, Jan (b. March 19, 1542, Skokówka, Pol.—d. June 3, 1605, Zamość), Polish advisor to King Sigismund II Augustus and Stephen Báthory and later an opponent of Sigismund III Vasa. He was a major force



Jan Zamoyski, portrait, 1600; in the Uffizi, Florence
By courtesy of the Galleria degli Uffizi, Florence

in the royal politics of Poland throughout his life.

Educated in France and Italy, he returned to Poland in 1565 and was appointed secretary to King Sigismund II. After Sigismund's death (1572), he became one of the best-liked leaders of the nobility. Opposing the magnates who wished to offer the throne to the Austrian Habsburgs, he supported the candidature of the French prince Henry and, after Henry's flight from Poland, supported the anti-Habsburg Stephen Báthory. One of the latter's closest collaborators, he was made chancellor in 1578 and grand hetman (commander in chief of the armed forces) in 1581. He soon became one of the richest Polish magnates.

Zamoyski energetically helped Stephen Báthory in his efforts to strengthen the royal power. He also distinguished himself during the war of 1579–82 against Muscovy.

After Stephen Báthory's death, Zamoyski opposed the Habsburg candidature of the archduke Maximilian (brother of the Holy Roman emperor Rudolf II) and contributed to the election of Sigismund III Vasa. When Maximilian tried to seize Kraków by force, Zamoyski routed his forces at Byczyna (Jan. 14, 1588) and took him prisoner. Yet from the very beginning of Sigismund III's reign Zamoyski passed to opposition. The King feared the hetman's power, and Zamoyski in turn treated the King as a pawn. Open conflict broke out during the Sejm (Diet) of 1592, when Zamoyski knew that Sigismund was plotting to cede the Polish crown to the Habsburgs in exchange for their support of his right to the Swedish throne. Zamoyski failed to dethrone Sigismund but won for himself a free hand in Moldavia. He installed a hospodar dependent on Poland in Moldavia and temporarily subjected Walachia to Poland.

In 1600, during the war for Livonia, Zamoyski recaptured some strongholds from the Swedes. The rigours of the campaign, however, were too much for him, and he resigned the command in 1602.

Zampieri, Domenico: *see* Domenichino.

Zamyatin, Yevgeny Ivanovich, Zamyatin also spelled ZAMIATIN (b. Feb. 1 [Jan. 20, old style], 1884, Lebedyan, Tambov province, Russia—d. March 10, 1937, Paris), Russian novelist, playwright, and satirist, one of the most brilliant and cultured minds of the post-revolutionary period, and creator of a peculiarly modern genre—the anti-Utopian novel. His influence as an experimental stylist and as an exponent of the cosmopolitan–humanist traditions of the European intelligentsia was very great in the earliest and most creative period of Soviet literature.

Educated in St. Petersburg as a naval engineer (1908), he combined his scientific career with writing. His early works were *Uyezdnoye* (1913; "A Provincial Tale"), a trenchant satire of provincial life, and *Na kulichkakh* (1914; "At the World's End"), an attack on military life. The last named was condemned by tsarist censors, Zamyatin was brought to trial and, although acquitted, he stopped writing for some time. During World War I he was in England supervising the building of Russian icebreakers. There he wrote *Ostrovityane* (1918; "The Islanders"), satirizing the meanness and emotional repression of English life. He returned to Russia in 1917.

A chronic dissenter, Zamyatin was a Bolshevik before the Revolution but disassociated himself from the party afterward. His ironic criticism of literary politics kept him out of official favour, but he was influential as the mentor of the Serapion Brothers, a brilliant younger generation of writers whose artistic creed was to have no creeds. His essay *Ya boyus* (1921; "I Am Afraid"), a succinct survey of the state of post-Revolutionary literature, closed with the prophetic judgment: "I am afraid that the only future possible to Russian literature is its past." During this period Zamyatin wrote some of his best short stories. His most ambitious work, the novel *My* (1924; *We*), circulated in manuscript but was never published in the Soviet Union (an English translation appeared in the United States in 1924, and the original Russian text was published in Prague in 1927). It portrays life in the "Single State," where workers live in glass houses, have numbers rather than names, wear identical uniforms, eat chemical foods, and enjoy rationed sex. They are ruled by a "Benefactor" who is unanimously and perpetually reelected. *We* is the literary ancestor of Aldous Huxley's *Brave New World* (1932) and George Orwell's *Nineteen Eighty-four* (1949).

In 1923 Zamyatin turned to the theatre, and some of his plays were successfully produced; but the publication of *We* abroad and his continuous ridicule of artistic orthodoxy made him the victim of a press persecution that resulted in the banning of his works. In 1931, through Gorky's intervention, Stalin granted him permission to leave Russia. The few years that remained of his life were spent in Paris.

Zanardelli, Giuseppe (b. Oct. 29, 1826, Brescia, Lombardy, Austrian Empire—d. Dec. 26, 1903, Moderno, Italy), Italian prime minister from 1901 to 1903 and an associate of the early-20th-century liberal leader Giovanni Giolitti; Zanardelli was a champion of parliamentary rights and followed a conciliatory policy toward labour in a time of great unrest.

A combatant in the volunteer corps during the war of 1848, he returned to Brescia after the defeat of Novara, and for a time earned a livelihood by teaching law, but was molested by the Austrian police and forbidden to teach because of his refusal to contribute pro-Austrian articles to the press. Elected deputy in 1859, he received various administrative appointments, but attained a political office only in 1876 when the Left, of which he had been a prominent and influential member, came into power. For the next 20 years he served in various ministries, in the justice or the interior posts. He served in the Cabinet of the Marchese di Rudini from 1896, but resigned his position in protest when Rudini declared martial law in places where outbreaks of mob rioting occurred in 1898.

Asked to form a government in 1901 by King Victor Emmanuel III, Zanardelli chose Giolitti as his minister of the interior; although the period was marked by strikes, Zanardelli did ensure proper parliamentary practices, decreased excessive taxes on the poor, and put an end to strikebreaking by the army.

Extremely anticlerical, Zanardelli was forced to resign (1903) when opposition mounted to his attempts to pass divorce legislation.

Zand DYNASTY (1750–79), Iranian dynasty that ruled southern Iran.

Following the death of the Afshārid ruler Nāder Shāh (1747), Karīm Khān Zand became one of the major contenders for power. By 1750 he had sufficiently consolidated his power to proclaim himself as *vakīl* (regent) for the Ṣafavid Esmā'il III. Karīm Khān never claimed the title of *shāhanshāh* ("king of kings"); instead he maintained Esmā'il as a figurehead. Karīm Khān, with 30 years of benevolent rule, gave southern Iran a much needed respite from continual warfare. He encouraged agriculture and entered into trade relations with Great Britain. His death in 1779 was followed by internal dissensions and disputes over successions. Between 1779 and 1789 five Zand kings ruled briefly. In 1789 Lotf 'Alī Khān (ruled 1789–94) proclaimed himself as the new Zand king and took energetic action to put down a rebellion led by Āghā Moḥammad Khān Qājār that had begun at Karīm Khān's death. Outnumbered by the superior Qājār forces, Lotf 'Alī Khān was finally defeated and captured at Kermān in 1794. His defeat marked the final eclipse of the Zand dynasty, which was supplanted by that of the Qājārs.

Zand, Lotf 'Alī Khān: *see* Lotf 'Alī Khān Zand.

Zande (people): *see* Azande.

Zanesville, city, Muskingum county, east central Ohio, U.S., at the juncture of the Muskingum and Licking rivers (there spanned by the "Y" Bridge [1902]), 52 mi (84 km) east of Columbus. The town was founded (1797) by Ebenezer Zane on land awarded him by the U.S. Congress for clearing a road (Zane's Trace) through the forest to Limestone (now Maysville), Ky. Zane sold the land to his son-in-law, John McIntire, who laid out the village of Westbourne (1799; renamed Zanesville, 1801) and who was instrumental in making it the county seat (1804) and state capital (1810–12). Economic progress started with construction of the first "Y" Bridge (1814), the Ohio and Erie Canal (1829), and a series of locks and dams on the Muskingum (1841), opening transportation to Eastern markets. Abundant clay deposits spurred development of the pottery industry after 1890. Inundating floods (1913) led Congress to authorize a network of 14 reservoirs (completed 1938) in the Muskingum Valley.

The city of Zanesville is located amid abundant natural resources that include deposits of coal, gas, petroleum, clay, and limestone. The city's diversified industries include the manufacture of tile, glass, electrical equipment, sheet metal, alloy steel, batteries, farm machinery, and cement products. A branch (1947) of Ohio University and the Muskingum Area Technical College (1969) are in the city. Zanesville was the birthplace of the architect Cass Gilbert and of the novelist Zane Grey, a descendant of Ebenezer Zane. A museum east of the city commemorates the National (Cumberland) Road, which reached Zanesville in 1826, and displays Zane Grey memorabilia. The Ohio Ceramic Center is 11 miles (18 km) south of the city, near Roseville. Recreational facilities in the area include nearby Dillon Dam and Reservoir and Blue Rock State Park and Forest. Inc. village, 1814; city, 1850. Pop. (1990) 26,778.

Zangī, in full ʿIMĀD AD-DĪN ZANGĪ IBN AQ SONQUR, Zangī also spelled ZENGI (b. 1084—d. 1146, Mosul, Iraq), Iraqi ruler who founded the Zangid dynasty and led the first important counterattacks against the crusader kingdoms in the Middle East.

When Zangī's father, the governor of Aleppo, was killed in 1094, Zangī fled to Mosul. He served the Seljuq dynasty, and in 1126 the Seljuq sultan, Maḥmūd II, appointed Zangī governor of Basra. When the 'Abbasid dynasty caliph al-Mustarshid rebelled in 1127, Zangī supported the sultan, and the victorious Maḥmūd II rewarded Zangī by giving him the governorship of Mosul. Next, the key city of Aleppo submitted to Zangī's authority to secure military protection against a possible Frankish crusader conquest.

Zangī thus came to exercise authority over a considerable geographic area, but he wanted to create a kingdom that would also include Syria and Palestine. He was charged by the sultan with the duty of defeating the Christian crusaders, and he saw himself as the champion of Islām. He was opposed, however, by Muslim princes who refused to accept his authority as well as by the crusaders. To both, Zangī reacted with equal harshness. By diplomacy, treachery, and warfare he steadily extended his authority, with the immediate goal of securing control of Damascus—a goal he never achieved. He did, however, capture Edessa, an important focal point of Frankish authority, in 1144—the crusaders' first serious setback. Zangī could not press his advantage. Returning to Iraq to repress a revolt there, he was killed by a servant who bore him a personal grudge.

Zangid DYNASTY, Muslim Turkish dynasty that was founded by Zangī (*q.v.*) and which ruled northern Iraq (al-Jazīrah) and Syria in the period 1127–1222. After Zangī's death in 1146, his sons divided the state between them, Syria falling to Nureddin (Nūr ad-Dīn Maḥmūd; reigned 1146–74) and al-Jazīrah to Sayf ad-Dīn Ghāzī I (reigned 1146–49). Nureddin's expansionist policy led him to annex Damascus (1154), subjugate Egypt (1168), and present a broad and competent Muslim front against the crusaders, especially under such generals as Saladin, subsequent founder of the Ayyūbid dynasty of Egypt.

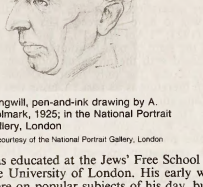
The Syrian branch of the Zangids was reunited with the Iraqi line in 1181 and was eventually absorbed into Saladin's new empire. The Zangids held on to al-Jazīrah and successfully repulsed several attempts made by Saladin to capture Mosul (1182 and 1185); they were, however, forced to accept his suzerainty. The rise to power of Badr ad-Dīn Lu'lu', a former slave, as regent for the last Zangid, Nāṣir ad-Dīn Maḥmūd (reigned 1219–22), marked the end of the dynasty. Lu'lu' ruled Mosul as *atabeg* from 1222 to 1259; soon afterward the city fell to the Mongols.

A third branch of the Zangids had established themselves in Sinjār, west of Mosul, in 1170 and ruled there for about 50 years. The Ayyūbids completed several architectural works begun by the Zangids. The most noteworthy is the Great Mosque in Aleppo, completed in 1190. The building, a perfect continuation of the Zangid artistic tradition, demonstrates simplicity in decorative architecture. It is built around a large, open, marble-floored court, with a polychrome mihrab (prayer niche facing Mecca) and a tall, square minaret. Large areas of wall are left undecorated in contrast to the expressive but delicately carved marble inlay ornaments.

The Zangids are famous for their patronage of the 13th-century Mosul schools of metalwork and painting. Mosul produced the finest metal inlay pieces (usually bronze with silver inlay) in the Islāmic world at that time. Their craftsmen carried the technique to Aleppo, Damascus, Baghdad, Cairo, and Iran, influencing the metalwork of those areas for centuries following. The Mosul school of painting was rivaled in Iraq only by the Baghdad school. Stylistically, Mosul miniatures were based heavily on Seljuq traditions, but they had an iconography of their own. Of somewhat less importance were knotted carpets made by Zangid craftsmen, two-coloured silks being the speciality.

Zangwill, Israel (b. Feb. 14, 1864, London, Eng.—d. Aug. 1, 1926, Midhurst, West Sussex), novelist, playwright, and Zionist leader, one of the earliest English interpreters of Jewish immigrant life.

The son of eastern European immigrants, Zangwill grew up in London's East End and



Zangwill, pen-and-ink drawing by A. Wolmark, 1925; in the National Portrait Gallery, London
By courtesy of the National Portrait Gallery, London

was educated at the Jews' Free School and at the University of London. His early writings were on popular subjects of his day, but with *Children of the Ghetto: A Study of a Peculiar People* (1892), he drew on his intimate knowledge of ghetto life to present a gallery of Dickensian portraits of Whitechapel immigrant Jews struggling to survive in a new environment. The novelty of the subject, enhanced by Zangwill's emphasis on the Jews' exotic traits and by his simulation in English of Yiddish sentence structure, aroused great interest. Other works of Jewish content include a picaresque novel, *The King of Schnorrers* (1894), concerning an 18th-century rogue, and *Dreamers of the Ghetto* (1898), essays on such famous Jews as Benedict de Spinoza, Heinrich Heine, and Ferdinand Lassalle. The image of America as a crucible wherein the European nationalities would be transformed into a new race owes its origin to the title and theme of Zangwill's play *The Melting Pot* (1908).

Zangwill became a spokesman for Zionism after meeting Theodor Herzl in 1896 but broke with the movement to form the Jewish Territorial Organization for the Settlement of the Jews Within the British Empire, of which he was president (1905–25).

Zanj rebellion (AD 869–883), a black-slave revolt against the 'Abbāsid caliphal empire. A number of Basran landowners had brought several thousand East African blacks (Zanj) into southern Iraq to drain the salt marshes east of Basra. The landowners subjected the Zanj, who generally spoke no Arabic, to heavy slave labour and provided them with only minimal subsistence. In September 869, 'Alī ibn Muḥammad, a Persian claiming descent from 'Alī, the fourth caliph, and Fāṭimah, Muḥammad's daughter, gained the support of several slave-work crews—which could number from 500 to 5,000 men—by pointing out the injustice of their social position and promising them freedom and wealth. 'Alī's offers became even more attractive with his subsequent adoption of a Khārijite religious stance: anyone, even a black slave, could be elected caliph, and all non-Khārijites were infidels threatened by a holy war.

Zanj forces grew rapidly in size and power, absorbing the well-trained black contingents that defected from the defeated caliphal armies, along with some disaffected local peasantry. In October 869 they defeated a Basran force, and soon afterward a Zanj capital, al-Mukhtārah (Arabic: the Chosen), was built on an inaccessible dry spot in the salt flats, surrounded by canals. The rebels gained control of southern Iraq by capturing al-Ubullah (June 870), a seaport on the Persian Gulf, and cutting communications to Basra, then seized Ahvāz in southwestern Iran. The caliphal armies, now entrusted to al-Muwaffaq, a brother of the new caliph, al-Muʿtamid (reigned 870–892), still could not cope with the rebels. The Zanj sacked Basra in September 871, and subsequently defeated al-Muwaffaq himself in April 872.

Between 872 and 879, while al-Muwaffaq was occupied in eastern Iran with the expansion of the Ṣaffārids, an independent Persian dynasty, the Zanj seized Wāsiṭ (878) and established themselves in Khuzistan, Iran. In 879, however, al-Muwaffaq organized a major offensive against the black slaves. Within a year, the second Zanj city, al-Manīʿah (The Impregnable), was taken. The rebels were next expelled from Khuzistan, and, in the spring of 881, al-Muwaffaq laid siege to al-Mukhtārah from a special city built on the other side of the Tigris River. Two years later, in August 883, reinforced by Egyptian troops, al-Muwaffaq finally crushed the rebellion, conquering the city and returning to Baghdad with 'Alī's head.

Zanjān, geographic region of northwestern Iran. It lies west of Tehrān and is bordered on the northwest by Azerbaijan and on the southwest by Kordestān. The region constitutes one of the uplands that frame central Iran and has an average elevation of 8,200 feet (2,500 m). It forms part of the Caspian Sea basin. The Zanjān River is the only major river in the region. Agriculture is the principal occupation, and crops include rice, corn (maize), oilseeds, fruits, and potatoes. Poultry, cattle, and sheep are raised. Manufactures include bricks, cement, milled rice, and carpets. Chromium, lead, and copper are mined. Roads and rail service link Zanjān, the principal city of the region, with Abhar and Mehrābād.

Zanjān, also spelled ZENJĀN, city, northwestern Iran. It lies in an open valley about halfway along the Tehrān–Tabriz railway line. It is the principal city of the Zanjān region. It was ravaged by Mongols in the 13th century. Once the seat of a lively caravan trade, the city is now the centre of an agricultural area with abundant harvests of grain. Prior to the Iranian Revolution, the city witnessed fighting between the local people and the Iranian army in 1978. Industries produce milled rice and flour, handwoven cloth, metalware, and coarse carpets.

About 20 miles (32 km) southeast of Zan-

jān city is the village of Soltāniyeh (Sulṭāniyah), once the capital of Ilkhanid Iran. It was founded in the late 13th century largely by Öljeitü (1304–16), who moved the capital there and whose magnificent mausoleum is practically the only remaining Ilkhan (a Mongol dynasty) architecture. Its dome, 168 feet (51 m) high, rests on an octagonal brick structure decorated with blue faience (earthenware ceramic). Pop. (1985 est.) 205,900.

Zankle (Sicily): *see* Messina.

zanni, plural ZANNI, or ZANNIS, stock servant character in the Italian improvisational theatre known as the commedia dell'arte. Zanni were valet buffoons, clowns, and knavish jacks-of-all-trades. All possessed common sense, intelligence, pride, and a love of practical jokes and intrigue; they were, however, often quarrelsome, cowardly, envious, spiteful, vindictive, and treacherous. The term is thought to be a diminutive form of Giovanni common to Bergamo, in Lombardy, where the zanni character originated, and it refers to male servants. *Dei Zanni* ("the zanni") was a generic term for the commedia dell'arte itself.

The zanni's costumes consisted of a wood or leather half mask with hair and beard glued to it, a loose blouse, wide trousers, and a wide-brimmed or tall conical hat with long feathers.

Zanni initiated the action of the play and produced comic impact based on repeated comic actions (*lazzi*), topical jokes, and practical jokes (*burle*), often directed against the



Zanni (Harlequin, left, and probably Scapin, right) with Pantaloon (centre), detail from "The Gelosi Company," 1580; in the Drottningholm Theatre Museum, Stockholm

By courtesy of the Drottningholms Teatermuseum, Stockholm

smug, the proud, and the pretentious. Zanni were also notable for their feats of acrobatics.

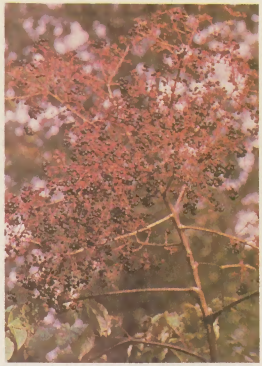
In some commedia performances there was only one zanni; in others there might be two to four. The principal character among them was often called simply Zanni, while his companion(s) had various names—Scapin, Scaramouche, Pedrolino, Harlequin (*qq.v.*), or Pulcinella (*see* Punch). Frequently two zanni played contrasting roles, the first clever and adept at confounding, the second a dull-witted foil.

Zānskār Range (China): *see* Zāskār Range.

Zante (Greece): *see* Zacynthus.

Zanthoxylum, the prickly ash genus of the rue family (Rutaceae), comprising about 200 species of aromatic trees and shrubs native to the middle latitudes of North America, South America, Africa, Asia, and Australia. There are both deciduous and evergreen species. They have small, greenish flowers and fruits that consist of groups of two-valved capsules, each containing a single shiny black seed.

Common prickly ash, or toothache tree (*Z. americanum*), is very hardy, appearing as far north as Quebec. Another well-known cultivated species is *Z. clava-herculis,* variously



Hercules'-club (*Zanthoxylum clava-herculis*)

Thase Daniel

called the Hercules'-club, the sea ash, or the pepperwood. West Indian satinwood, or yellowheart (*Z. flavum*), produces shiny, golden-brown timber for cabinetwork.

Zanuck, Darryl F(rancis) (b. Sept. 5, 1902, Wahoo, Neb., U.S.—d. Dec. 22, 1979, Palm Springs, Calif.), Hollywood producer, motion-picture executive for more than 30 years, and an innovator of many trends in film.

Zanuck began his film career in 1924 as a scriptwriter for Warner Brothers studio, but within three years he had advanced to executive producer. He promoted Warner Brothers' conversion to sound, producing *The Jazz Singer* (1927), the first feature with synchronized speech as well as music. With the production of *Little Caesar* (1930) and *The Public Enemy* (1931), he initiated the long series of gangster pictures popular during that decade.

In 1933 Zanuck cofounded Twentieth Century Pictures, the company that merged two years later with the Fox Film Corporation. As the controlling executive of Twentieth Century-Fox, Zanuck produced such memorable films as *The Grapes of Wrath* (1940), *How Green Was My Valley* (1941), *Winged Victory* (1944), *The Razor's Edge* (1946), *Gentlemen's Agreement* (1947), and *Viva Zapata!* (1952).

Zanuck resigned from Twentieth Century-Fox in 1956. He returned six years later as president of the corporation and engineered the financial recovery of the studio with two box-office hits: *The Longest Day* (1962) and *The Sound of Music* (1965). Later, *M*A*S*H** (1970) and *Patton* (1970) were critical and artistic successes. Zanuck announced his retirement in 1971 from the post of chairman and chief executive officer that he had held since 1969. On three occasions Zanuck was awarded the Irving Thalberg Memorial Award of the Motion Picture Academy of Arts and Sciences for outstanding contributions to the industry.

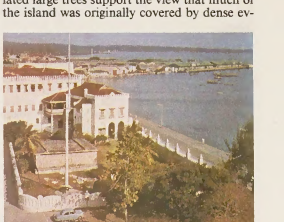
Zanzibar, island in the Indian Ocean 22 miles (35 km) off the coast of east-central Africa. In 1964 Zanzibar, together with Pemba Island (*q.v.*) and some other smaller islands, joined with Tanganyika on the mainland to form the United Republic of Tanzania. Zanzibar island covers 637 square miles (1,651 square km).

Both Zanzibar and Pemba are believed to have once formed part of the African continent, the separation of Pemba having occurred during the Miocene epoch (23.7 million to 5.3 million years ago) while Zanzibar dates from the Pliocene epoch (5.3 million to 1.6 million years ago) or even later. Various types of limestone form the base of both islands. Raised sands and sandstones also occur, together with varied residual deposits similar to alluvial strata on the adjacent mainland. Extensive weathering of the limestones combined with erosion and earth movements have resulted in a variety of soils including red earths, loams, clays, and sands. Flat areas of coral limestone occur to the east, south, and north of Zanzibar and on the western islands. In places the coral is overlain by shallow red earth or alluvium.

The general impression of Zanzibar when approached from the mainland is of a long, low island with small ridges along its central north–south axis. Coconut palms and other vegetation cover the land surface. It is 53 miles (85 km) at its greatest length and 24 miles (39 km) broad. The highest point of the central ridge system is Masingini, 390 feet (119 m) above sea level. Higher ground is gently undulating and gives rise to a few small rivers, which flow west to the sea or disappear in the coral country.

The climate is typically insular, tropical, and humid, with an average annual rainfall of 60 to 80 inches (1,500 to 2,000 mm). Rainfall is reliable and well-distributed in comparison with most of eastern Africa. Northeast trade winds blow from December to March and southeast trade winds from May to October. The "long rains" occur between March and May and the "short rains" between October and December.

Small patches of indigenous forest and isolated large trees support the view that much of the island was originally covered by dense ev-



The former sultan's palace, facing the harbour at Zanzibar, Tanzania

Paul Hufner—Shostal/EB Inc.

ergreen forest. The open coral-outcrop country supports a dense thicket vegetation. The flat clay plains are grass-covered. The major wild animals include leopard (a variety peculiar to Zanzibar), civet cat, mongoose, two species of monkey, lemur, the African pig, forest duiker, pigmy antelope, about 20 species of bats, and 30 forms of snakes. Mosquitoes breed freely during the rainy seasons. Insect pests such as the coreid bug (*Pseudotheraptus wayi*), which attacks coconuts, and animal pests and parasites, such as tsetse fly and ticks (which transmit east coast fever to cattle), have been the subject of research and control.

The southern and eastern portions of Zanzibar island have been mainly populated by a Bantu-speaking people known as the Hadimu; the northern portion of Zanzibar island and the adjacent Tumbatu island have been occupied by another Bantu-speaking people known as the Tumbatu. These two groups represent the earliest arrivals in Zanzibar. Throughout

the 19th century, and after, they were expropriated from the western and more fertile parts of the island by later arrivals, notably Arabs. The nationalization of land in 1964, however, was followed by economic reforms that redistributed the land. Fishing has traditionally been highly important in coastal villages and remains so.



Zanzibar

The language most widely spoken is a highly Arabicized form of Swahili (Kiswahili). Among the Arabs, the language of the home is usually Swahili, and use of pure Arabic is confined to scholars and recent arrivals from Arabia. Gujarati, Hindi, Urdu, and Konkani are spoken by the Asian communities, and English and Swahili are widely used and understood.

Before the development of eastern African mainland ports, Zanzibar was the trade focus of the region and enjoyed an important entrepôt trade. The island's economy now depends on agriculture and fishing.

Considerable areas of fertile soil and a favourable climate enable the production of a variety of tropical crops, especially cloves and coconuts. Local food crops, such as rice, cassava, yams, and tropical fruit, are also important. Fish is a significant part of the diet, and local fisheries employ perhaps about one-tenth of the population.

Zanzibar's history was greatly shaped by its geography, the prevailing winds of the region placing it directly on the Indian Ocean trade routes and making it accessible to both traders and colonists from Arabia, south Asia, and the African mainland. The first immigrants were the Africans; the next were the Persians, who began to land in Zanzibar in the 10th century and who, over a brief period, became absorbed into the local population and disappeared as a separate group. Their influence was left in the gradual consolidation of disparate villages and rural populations into what came to be recognized as two peoples, the Hadimu and the Tumbatu. This African-Persian population converted to Islām and adopted many Persian traditions. (Even today, most of Zanzibar's African population calls itself "Shirazi," in echo of the ancient Persian principality of Shīrāz, from which the earliest Persians came.)

Arabs had the deepest influence on Zanzibar, because the island's position made it a perfect entrepôt for Arabs mounting slave expeditions into Africa and conducting oceangoing commerce. Arabs from Oman began establishing colonies of merchants and landowners in Zanzibar. Eventually they became the aristocracy of the island.

The Portuguese then came in the 16th century and conquered all the seaports on the eastern African coast, including Mombasa, the richest and most powerful, as well as such islands as Zanzibar and parts of the Arabian coast, including the Omani capital of Muscat. The purpose of the Portuguese, however, was largely commercial rather than politically imperial, and, when their power dwindled in the course of the 17th century, they left few marks of their stay.

The Omani Arabs, who expelled the Portuguese from Muscat in 1650 and were the leading force against them in the entire region, gradually established at least nominal control over many settlements, including Zanzibar. After a lengthy turmoil of dynastic wars and losses and gains on the African coast, the ruling sultan of Oman, Sa'īd ibn Sulṭān, decided to relocate his capital from Muscat to Zanzibar. The rapid expansion of the slave trade in the late 18th and early 19th centuries, caused by the demand for plantation slaves in North and South America, made Zanzibar central to the slave (as well as the ivory) trade routes into the interior of Africa. Zanzibar itself also had significant resources of coconuts, cloves, and foodstuffs. The sultan of Oman made it his capital in 1840.

In 1861 Zanzibar was separated from Oman and became an independent sultanate, which controlled the vast African domains acquired by Sa'īd. Under the sultan Barghash (reigned 1870–88), however, Great Britain and Germany divided most of Zanzibar's territory on the African mainland between them and secured economic control over the remaining coastal strip. In 1890 the British proclaimed a protectorate over Zanzibar itself; the sultan's authority was reduced and the slave trade curtailed.

In 1963 the sultanate regained its independence, becoming a member of the British Commonwealth. In January 1964 a revolt by leftists overthrew the sultanate and established a republic. The revolution marked the overthrow of the island's long-established Arab ruling class by the Africans, who were the majority of the population. In April the presidents of Zanzibar and Tanganyika signed an act of union of their two countries, creating what later in the year was named Tanzania (*q.v.*). Pop. (2002) 622,459.

Zanzibar, city and port of the island of Zanzibar, Tanzania. The island's principal port and commercial centre, it is on the western side of the island behind a well-protected natural deepwater harbour. In 1840 Sultan Sa'īd ibn Sulṭān of Oman established his capital there, shifting it from Muscat on the Arabian Peninsula. During the remainder of the 19th century, the city flourished as the base for Arab and European activities in eastern Africa, becoming infamous for its trade in slaves. Zanzibar subsequently declined in importance as the ports of Dar es Salaam and Mombasa (on the coast of the eastern African mainland) took over much of its trade. Zanzibar's port is still a major exporter of cloves, coconuts, citrus fruits, and other tropical products. Pop. (2002) 391,002.

Zanzibar Treaty, also called HELGOLAND-ZANZIBAR TREATY (July 1, 1890), arrangement between Great Britain and Germany that defined their respective spheres of influence in eastern Africa and established German control of Helgoland, a North Sea island held by the British since 1814. The treaty was symptomatic of Germany's desire for a rapprochement with Great Britain after the abandonment of an entente with Russia.

The treaty provided for Germany's cession to Great Britain of its claims to the Zanzibar protectorate and to the eastern African coast between Witu and the Juba River; for Great Britain's acknowledgment of a German sphere of influence on the eastern African mainland, with a northern boundary extending from Lake Victoria to the Congo state and a southwestern boundary extending from Lake Nyasa to Lake Tanganyika; for British assent to Germany's acquiring the Caprivi Strip, a narrow strip belonging to present-day Namibia, north of what is now Botswana, which gave German South West Africa access to the Zambezi River; and for the British cession to Germany of the island of Helgoland in the North Sea—a prerequisite to German naval development.

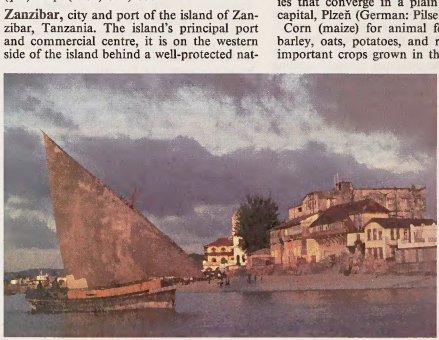
Zao Jun (Chinese mythological figure): *see* Tsao Chün.

Zao Shen (Chinese mythological figure): *see* Tsao Shen.

Zaozhuang (China): *see* Tsao-chuang.

Západočeský, also called ZÁPADNÍ ČECHY, English WESTERN BOHEMIA, *kraj* (region), western Czech Republic. It is bordered by Germany on the north and west and by Severočeský, Středočeský, and Jihočeský *kraje* on the east. It is surrounded by mountains on its external boundaries and contains a series of hilly ranges running southwest to northeast. The region's only lowland areas are the valleys of the Berounka River and its several tributaries that converge in a plain on the regional capital, Plzeň (German: Pilsen).

Corn (maize) for animal feed, hay, wheat, barley, oats, potatoes, and rye are the most important crops grown in the lower areas of


Dhow sailing into the harbour at Stone Town, Zanzibar, Tanz.
© Nik Wheeler/Corbis

the region. Apples, plums, pears, and cherries are the principal fruits; and hogs, cattle, and poultry constitute the main livestock. Forestry is important in the mountains. Coal is Západočeský *kraj*'s main mineral resource, but tin, tungsten, building stone, and kaolin are also extracted. The principal industrial centre is Plzeň, which is also the region's main cultural centre.

Západočeský *kraj* is renowned for its thermal and mineral water spas. The most famous is Karlovy Vary, founded 1347–58. Area 4,199 square miles (10,875 square km). Pop. (1991 prelim.) 860,311.

Zapata, Emiliano (b. Aug. 8, 1879, Anenecuilco, Mex.—d. April 10, 1919, Morelos), Mexican revolutionary, champion of agrarianism, who fought in guerrilla actions during and after the Mexican Revolution (1911–17).

Early career. Zapata was the son of a mestizo peasant who trained and sold horses. He was orphaned at the age of 17 and had to look after his brothers and sisters. In 1897 he was arrested because he took part in a protest by the peasants of his village against the hacienda that had appropriated their lands. After obtaining a pardon, he continued agitation among the peasants, and so he was drafted into the army. He served for six months, at which point he was discharged to a landowner to train his horses. In 1909 his neighbours elected him president of the board of defense for their village. After useless negotiations with the landowners, Zapata and a group of peasants occupied by force the land that had been appropriated by the haciendas and distributed it among themselves.



Zapata, 1912
Archivo Casasola

Francisco Madero, a landowner of the north, had lost the elections in 1910 to the dictator Porfirio Díaz and had fled to the United States, where he proclaimed himself president and then reentered Mexico, aided by many peasant guerrillas. Zapata and his friends decided to support Madero. In March 1911 Zapata's tiny force took the city of Cuautla and closed the road to the capital, Mexico City. A week later, Díaz resigned and left for Europe, appointing a provisional president. Zapata, with 5,000 men, entered Cuernavaca, capital of the state of Morelos.

Madero entered Mexico City in triumph. Zapata met Madero there and asked him to exert pressure on the provisional president to return the land to the ejidos (the former Indian communal system of landownership). Madero insisted on the disarmament of the guerrillas and offered Zapata a recompense so that he could buy land, an offer that Zapata rejected. Zapata began to disarm his forces but stopped when the provisional president sent the army against the guerrillas.

The Plan of Ayala. Madero was elected president in November 1911, and Zapata met with him again but without success. With the help of a teacher, Otilio Montaño, Zapata prepared the Plan of Ayala, which declared Madero incapable of fulfilling the goals of the revolution. The signers renewed the revolution and promised to appoint a provisional president until there could be elections. They also vowed to return the stolen land to the ejidos by expropriating, with payment, a third of the area of the haciendas; those haciendas that refused to accept this plan would have their lands expropriated without compensation. Zapata adopted the slogan "Tierra y Libertad" ("Land and Liberty").

In the course of his campaigns, Zapata distributed lands taken from the haciendas, which he frequently burned without compensation. He often ordered executions and expropriations, and his forces did not always abide by the laws of war. But underneath his picturesque appearance—drooping moustache, cold eyes, big sombrero—was a passionate man with simple ideals that he tried to put into practice. The Zapatistas avoided battle by adopting guerrilla tactics. They farmed their land with rifles on their shoulders, went when called to fight, and returned to their plows at the end of a battle or skirmish. Sometimes Zapata assembled thousands of men; he paid them by imposing taxes on the provincial cities and extorting from the rich. Their arms were captured from federal troops.

When General Victoriano Huerta deposed and assassinated Madero in February 1913, Zapata and his men arrived at the outskirts of Mexico City and rejected Huerta's offer to unite with him. This prevented Huerta from sending all his troops against the guerrillas of the north, who, under the direction of a moderate politician, Venustiano Carranza, had organized the Constitutionalist Army to defeat the new dictator. Huerta was forced to abandon the country in July 1914.

Zapata knew that Carranza's Constitutionalists feared him. He attracted some intellectuals from Mexico City, among them Antonio Díaz Soto y Gama, who became his theorist and later established an agrarian party. When Huerta fell, Zapata invited the Constitutionalists to accept his Plan of Ayala and warned them that he would continue fighting independently until the plan was put to practical use.

In October 1914 Carranza called an assembly of all the revolutionary forces. Pancho Villa, who commanded the most important part of the army of the north, refused to attend the meeting because he considered Mexico City as enemy ground. The assembly was moved to Aguascalientes, where both the Villistas and the Zapatistas attended. These two groups constituted a majority, and the convention agreed to appoint General Eulalio Gutiérrez as provisional president. Carranza rejected this decision and marched with his government to Veracruz.

War broke out between the moderates (Carrancistas) and the revolutionaries (Conventionists). On November 24, Zapata ordered his army (now called the Liberation Army of the South and numbering 25,000 men) to occupy Mexico City. The people of the capital watched in astonishment as the peasants went from door to door humbly asking for food and drink, instead of assaulting palaces and violating women.

Two weeks later, Zapata and Villa met on the outskirts of the capital and then visited the National Palace. The two leaders promised to fight together until they put a civilian president in the palace, and Villa accepted the Plan of Ayala.

Agrarian reforms. Zapata created agrarian commissions to distribute the land; he spent much time supervising their work to be sure they showed no favouritism and that the landowners did not corrupt its members. He established a Rural Loan Bank, the country's first agricultural credit organization; he also tried to reorganize the sugar industry of Morelos into cooperatives. In April 1915 U.S. President Woodrow Wilson's personal representative in Mexico met with Zapata; Zapata asked that Wilson receive his delegation, but Wilson had recognized the Carranza government (the convention's government under Gutiérrez had dispersed).

Meanwhile, the war continued. Zapata occupied the city of Puebla and won various battles, advised by some professional soldiers who had joined his side. In 1917 Carranza's generals defeated Villa and isolated Zapata. Carranza then called together a constitutional convention but did not invite Zapata; the convention approved and passed a constitution and elected Carranza as president of the republic.

A new U.S. envoy, William Gates, visited Zapata and then published a series of articles in the United States; he contrasted the order of the Zapata-controlled zone with the chaos of the constitutional zone and said that "the true social revolution can be found among the Zapatistas." When these articles were read to Zapata, he said, "Now I can die in peace. Finally they have done us justice."

Soon afterward General Pablo González, who directed the government operations against Zapata, had Colonel Jesús Guajardo pretend to want to join the agrarians and contrive a secret meeting with Zapata at the hacienda of Chinameca in Morelos. There, Zapata was ambushed and shot to death by Carrancista soldiers. His body was carried to Cuautla and buried there. (V.Al.)

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Zapolska, Gabriela, pseudonym of MARIA GABRIELA KORWIN-PIOTROWSKA (b. March 30, 1857, Podhajce, Galicia, Hungary—d. Dec. 17, 1921, Lwów, Pol.), Polish novelist and playwright of the naturalist school.

Having tried unsuccessfully to pursue an acting career in Paris, Zapolska started writing cheap, sensationalist novels, full of bitterness toward middle-class values, morality, and hypocrisy. Of her several novels written over a period of 20 years, only two have survived in terms of modern readability. *Zaszumi las* (1899; "The Forest Will Murmur") is a roman à clef about Polish revolutionaries in Paris. *Sezonowa miłość* (1905; "Love in the Season") is a novel about fashionable life among the middle class in the resort town of Zapotane. She also wrote plays, mostly melodramas, which had the same ephemeral quality as most of her novels, but one is remembered: *Moralność pani Dulskiej* (1906; "Mrs. Dulska's Morality"), a comedy-farce about a dominating matriarch of a bourgeois family.

Zápolya, János (king of Hungary): *see* John *under* John (Hungary).

Zapopan, city, north-central Jalisco *estado* ("state"), west-central Mexico. It is in the temperate Guadalajara Valley, at an elevation of 5,243 feet (1,598 m) above sea level, 4.5 miles (7 km) northwest of Guadalajara, the state capital. It is a commercial and manufacturing centre for the surrounding area that produces grain (principally corn [maize]), sugarcane,

cotton, and fruits and vegetables. Livestock (horses, pigs, and cattle) are raised. Apiculture, aviculture, and tourism are additional sources of income. The 17th-century Basilica of Zapopan is the site of annual pilgrimages. Because of its proximity to Guadalajara, it is easily accessible by highway, railroad, and air. Pop. (1990) 668,323.

Zaporizhzhya, Russian ZAPOROZHYE, also spelled ZAPOROZHE, or ZAPOROŽJE, *oblast* (province), southeastern Ukraine. It encompasses the northwestern shore of the Sea of Azov and stretches inland across the coastal plain, the Azov Upland, and the Dnieper Plain to the Dnieper River to include a very small part of that river's right-bank area. The entire *oblast* lies within the steppe zone, although much of the natural grass cover has been plowed and gully erosion is serious. The climate is dry, and many of the rivers are seasonal. Apart from the metallurgy of Zaporizhzhya city, the administrative centre, and engineering in Melitopol and Berdyansk, there is an iron-mining complex on the southwestern shore of the Kremenchuk Reservoir. Other industry is concerned chiefly with processing agricultural produce, for agriculture, although susceptible to drought, is highly developed, dominated by grains, notably wheat and corn (maize). Sunflowers, potatoes, melons, and other vegetables are also important, and there are a number of vineyards and orchards. Dairying predominates in the north of the *oblast,* and sheep raising in the Azov coastal plain. Area 10,500 square miles (27,200 square km). Pop. (1991 est.) 2,108,500.

Zaporizhzhya, Russian ZAPOROZHYE, also spelled ZAPOROZHE, or ZAPOROŽJE, formerly (until 1921) ALEKSANDROVSK, city and administrative centre of Zaporizhzhya *oblast* (province), southeastern Ukraine, on the Dnieper River just below its former rapids. In 1770 the fortress of Aleksandrovsk was established to ensure government control over the Zaporizhzhya Cossacks, whose headquarters were on nearby Khortitsa Island. The settlement became a town in 1806. The growth of the city dates from the construction in 1927–32 of the Dnieper hydroelectric station, then the largest in the world. In World War II the dam was destroyed, but it was subsequently reconstructed.

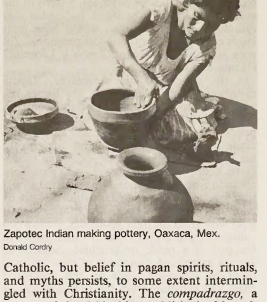
On the basis of the power, a large metallurgical industry developed, including a major iron and steel plant. Zaporizhzhya has one of the largest strip-rolling mills of Ukraine. Coke by-products supply an important chemical industry. A range of engineering and light industries includes the manufacture of automobiles and electrical apparatus. The city stretches for several miles along the Dnieper, with a greenbelt separating its industrial and residential sectors. There are teacher-training, pharmaceutical, and machine-building institutes. Pop. (1993 est.) 900,000.

zapote (fruit): *see* sapote.

Zapotec, Middle American Indian population living in eastern and southern Oaxaca in southern Mexico.

The Zapotec culture varies according to habitat—mountain, valley, or coastal—and according to economy—subsistence, cash crop, or urban; and the language varies from pueblo to pueblo, existing in several mutually unintelligible dialects, better called distinct languages. In general, however, Zapotec society is oriented around central villages or towns and has an agricultural base. Staple crops are corn, beans, and squash; market crops such as coffee, wheat, and sugarcane are grown where the climate allows. Some hunting, fishing, and gathering of wild foods is also practiced. Agriculture is based on slash-and-burn clearing of land, and plow and oxen are used in cultivation.

Crafts are still practiced in some areas; these are chiefly pottery, weaving, and palm-fibre weaving. Clothing ranges from traditional (particularly for women) to modern. Traditional dress for women consists of a long skirt, long overtunic (*huipil*), and a shawl or wraparound headpiece. Male dress, when not modern, consists of wide, loose trousers; loose shirt, sometimes with pleats; sandals; and straw or wool hat. The religion of the Zapotec is Roman



Zapotec Indian making pottery, Oaxaca, Mex.
Donald Cordry

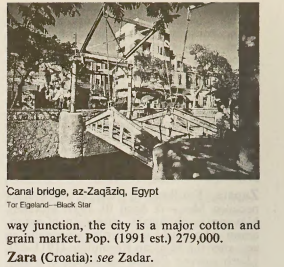
Catholic, but belief in pagan spirits, rituals, and myths persists, to some extent intermingled with Christianity. The *compadrazgo,* a system of ritual kinship established with godparents, is important.

Zápotocký, Antonín (b. Dec. 12, 1884, Zakolony, near Kladno, Bohemia, Austria-Hungary [now in Czech Republic]—d. Nov. 13, 1957, Prague, Czechoslovakia [now in Czech Republic]), political leader, cofounder of the Communist Party of Czechoslovakia, and the native Czech leader who probably contributed most to the successful Communist coup of 1948.

Zápotocký was a member of the Social Democratic Party for 20 years before the founding of the Communist Party in 1921; he engaged in Communist activities while he served in the democratic Czech Parliament. An able organizer and propagandist, he helped set up the party press, form party labour unions and cooperatives, and organize the party under the leadership of Klement Gottwald.

Zápotocký served as secretary-general of the Communist Trade Unions from 1929 to 1939, an association that gave him political strength and recognition. Thus, after World War II when the Revolutionary Trade Union Movement, composed of all of Czechoslovakia's organized labour, was formed in 1945, Zápotocký became its chairman. After the Communist takeover of the government in 1948, Zápotocký became a member of the political secretariat and premier of Czechoslovakia. He became president after the death of Gottwald in 1953 and held that position for the remainder of his life.

Zaqāziq, az-, also spelled ZAGAZIG, city and capital of ash-Sharqīyah *muḥāfaẓah* (governorate), Egypt, on the Nile River delta northnortheast of Cairo. The city dates from the 1820s, when cotton cultivation spread to the eastern delta. Located at the junction of two irrigation canals (Tur'at as-Suways al-Ḥulwah [Sweetwater Canal] and Tur'at al-Mu'iz), az-Zaqāziq is about 1 mile (2 km) north of mounds marking the site of the 4th-dynasty city of Bubastis. An important road and rail-



Canal bridge, az-Zaqāziq, Egypt
Tor Eigeland—Black Star

way junction, the city is a major cotton and grain market. Pop. (1991 est.) 279,000.

Zara (Croatia): *see* Zadar.

Zara, Siege of (1202), a major episode of the Fourth Crusade; the first attack on a Christian city by a crusading army, it foreshadowed the same army's assault on Constantinople, the Byzantine capital, in 1203–04. Zara (modern Zadar, Croatia), a vassal city of the Venetian republic, rebelled against Venice in 1186 and placed itself under the protection of King Béla III of Hungary. Anxious to reassert their claims over Zara, the Venetians diverted the Fourth Crusade from its original objectives, Palestine and Egypt, to attack the city.

Pope Innocent III (1198–1216) had learned of the proposed attack before the fleet set sail and sent letters to Venice forbidding the action. Even the threat of excommunication failed to deter the armies, although their reluctance to accede to the papal directive is doubtless a reflection of the severe financial problems that confronted them. The crusaders, who came from France, had agreed to pay the Venetians to transport them to the Holy Land, but they found themselves without sufficient funds. Faced with the threat of abandonment of the crusade and forfeiture of money already paid, they acquiesced to the Venetian proposal to lay siege to Zara.

The fleet sailed from Venice in early October 1202, arriving at Zara on November 10. The city surrendered after two weeks of siege and assault; the garrison and the inhabitants were spared. The expedition wintered in Zara, during which time the decision was made to attack Constantinople the following spring.

Zaradros River (Tibet-India-Pakistan): *see* Sutlej River.

Zaragoza, also spelled SARAGOSSA, *provincia,* in the *comunidad autônoma* ("autonomous community") of Aragon, northeastern Spain. Together with the provinces of Huesca and Teruel, it formed the old kingdom of Aragon. It extends north and south of the middle course of the Ebro River; it reaches the foot of the Pyrenees (north) and is bounded west by the provinces of Navarra, Logroño, and Soria, south by Guadalajara and Teruel, and east and northeast by Tarragona, Lérida, and Huesca. The relief is mostly gently rolling tableland drained by the Ebro and its tributaries. Scarce annual rainfall of less than 15–18 inches (380–460 mm) makes irrigation important. All the main settlements are in the irrigated valleys, the Ebro being the chief link, with the Jalón Valley ranking next in importance.

Cereals, especially wheat and barley, are the mainstay of the economy, followed by alfalfa, stock raising, industrial crops such as sugar beets, and horticulture. From Daroca down the Jiloca Valley into the Jalón Valley is an important fruit-growing district. Industry is largely concentrated in the provincial capital, Zaragoza (*q.v.*) city. Apart from the latter, the main population centres are Calatayud, Tarazona de Aragón, Caspe, Ejea de los Caballeros, and Tauste. Area 6,661 square miles (17,252 square km). Pop. (1992 est.) 842,722.

Zaragoza, English SARAGOSSA, capital of Zaragoza province, in the autonomous community (region) of Aragon, northeastern Spain, lying on the south bank of the Río Ebro (there



Catedral Nuestra Señora del Pilar on the Río Ebro, Zaragoza city, Spain
Eric Carle—Shostal

bridged). Toward the end of the 1st century BC, the Celtiberian town of Salduba at the site was taken by the Romans, who made it a colony under Emperor Augustus with the name of Caesaraugusta (from which its Arabic name Saraqusṭah and its present name were derived). The chief commercial and military station in the Ebro valley, it was one of the first towns in Spain to be Christianized, and it had a bishop by the middle of the 3rd century AD. In 380 a church synod at Zaragoza condemned the Priscillianist heresy of absolute renunciation of all sense pleasures. After falling to the Germanic Suebi and then to the Visigoths in the 5th century, the town was taken by the Moors *c.* 714. In 778 it was besieged by the Frankish king Charlemagne, who had to withdraw because of a Saxon rebellion in his domain. After being captured by the Almoravids in 1110, Zaragoza was taken by King Alfonso I of Aragon in 1118 and thereafter enjoyed three and a half centuries of prosperity as capital of Aragon. In the Peninsular War it was famed for the heroic resistance of its citizens under Gen. José de Palafox y Melzi during a protracted siege (1808–09) by the French, who finally took the city. Among the defenders was María Agustín, the "Maid of Saragossa," whose exploits are described in Lord Byron's poem *Childe Harold.*

The seat of an archbishop, Zaragoza has two cathedrals, the older of which is the Catedral de La Seo (Latin *sedes*), or Catedral del Salvador, chiefly a Gothic building (1119–1520) but showing some traces of the earlier Romanesque church built on the site of the first mosque erected in Spain. The Catedral Nuestra Señora del Pilar, dedicated to the Virgin of the Pillar who is patron of all Spain, commemorates the traditional appearance on Jan. 2, AD 40, of the Virgin Mary standing on a pillar erected in honour of Saint James the Great, whose shrine is at Santiago de Compostela. The cathedral was begun in 1681 to a design by Francisco Herrera the Younger (El Mozo) and contains some frescos by Goya. The 14th-century Gothic churches of San Pablo and the Magdalena and the Renaissance church of Santa Engracia are also notable. Outstanding secular buildings include La Lonja, or The Exchange, in Plateresque Gothic style; the Palace of the Counts of Luna (1537), in which the Court of Justice sits; and the 17th-century Palace of the Condes de Sástago y Argillo. The Aljafería Palace, to the west of the city, contains an oratory dome and tower that are among Spain's best examples of Islāmic civil architecture. The University of Zaragoza was founded in 1474, the medical school being its most famous faculty, but the buildings date from later periods.

Zaragoza is an industrial centre and the site of the annual National Trade Fair, which begins October 12. Its industries have expanded with the supply of hydroelectric power from the dams in the Aragonese Pyrenees and of oil from the pipeline from Rota (near Cádiz). It is also a busy railway junction and a trade centre for the agricultural products of the surrounding fertile river basin watered by the Canal Imperial and the Ebro, Huerta, and Gállego rivers. Pop. (1998 est.) 603,400.

Zaramo, also spelled DZALAMO, or SARAMO, a people who reside in the area surrounding Dar es-Salaam, Tanzania, and comprise the major ethnic component in the city. The Zaramo are considered to be part of the cluster of Swahili peoples on the coast of East Africa who have incorporated elements from many diverse ethnic backgrounds but who are unified in the Islāmic faith and in the use of the Swahili language.

Swahili–Arab cultural contributions appear in dress and other practices, but longer standing traditions are maintained in such areas as kinship. The Zaramo are organized into 200 to 300 matrilineal clans. Traditional religious beliefs are evident in the *kolelo* fertility cult and in the worship of the deity Mulungu. The Zaramo are not politically centralized traditionally, but they often live in clusters of palisaded villages (*pangone*) led by a headman (*phazi*).

Although they keep some livestock the Zaramo concentrate mainly on agriculture, producing rice, millet, sorghum, corn (maize), peas, cassava, coconuts, and a number of other crops. The proximity of the sea permits fishing by a variety of techniques. In former times the Zaramo fashioned iron implements and even copied European firearms. More recently, Zaramo skill at woodcarving has been displayed in ornamental doors, musical instruments, and other functional creations, as well as in wares prepared for tourists.

The Zaramo, according to traditional explanations, originated as the Kutu in what is today the Morogoro administrative region of Tanzania. Their coastal location close to Dar es-Salaam has exposed them to many contacts, especially to trading groups. By means of an arrangement called *utani*, the Zaramo and neighbouring groups are permitted to travel through neighbouring territories; individuals can also claim emergency assistance from their neighbours.

Zárate, city, northeastern Buenos Aires province, Argentina, on the Río Paraná de las Palmas, a channel of the lower Paraná delta emptying into the Río de la Plata northwest of Buenos Aires. Founded in 1825 as Rincón de Zárate, the settlement was given city status in 1909. From 1932 to 1946 it was known as General Uriburu. Although wheat, alfalfa, flax, and potatoes are cultivated and livestock are raised in the hinterland, Zárate is primarily a manufacturing and transportation centre, with meat-packing plants, paper mills, and dairies. A 20-mi (33-km)-long system of bridges, roadways, and railways was completed in the late 1970s extending north from Zárate across the Paraná delta; for the first time, direct transportation links between the Argentine Mesopotamia and Buenos Aires regions were established. A free trade zone for Paraguayan commerce was under construction near Zárate in the early 1980s, but the port of Zárate itself is not navigable to ocean-going vessels. Pop. (1991 est.) 77,900.

Zarathushtra, also spelled ZARATHUSTRA (Iranian religious reformer): *see* Zoroaster.

Zarcillo, Francisco: *see* Salzillo (y Alcaraz), Francisco.

Zaria, formerly ZAZZAU, or ZEGZEG, historic kingdom, traditional emirate, and local government council in Kaduna State, northern Nigeria, with its headquarters at Zaria (*q.v.*) city. The kingdom is traditionally said to date from the 11th century, when King Gunguma founded it as one of the original Hausa Bakwai (Seven True Hausa States). As the southernmost state of the seven, it had the function of capturing slaves for all Hausa Bakwai, especially for the northern markets of Kano and Katsina. Camel caravans from the Sahara travelled south to Zazzau to exchange salt for slaves, cloth, leather, and grain. Islām was introduced about 1456, and there were Muslim Hausa rulers in the early 16th century. Muḥammad I Askia, a warrior leader of the Songhai Empire, conquered Zazzau *c.* 1512; the results of that conquest were recorded by the traveller Leo Africanus.

Later in the century, Zazzau's ruler Queen Amina enlarged her domain by numerous conquests, including those of the Nupe and the Jukun kingdoms; even the powerful states of Kano and Katsina were required to pay tribute. By the end of the century, however, Zazzau—renamed Zaria—came under the control of Kororofa (Kwararafa), the Jukun kingdom centred near Ibi to the southeast. Shortly after the decline of Kororofa, Zaria was forced to become a tributary state (*c.* 1734–1804) of the Bornu kingdom to the northeast.

In 1804 the Muslim Hausa ruler of Zaria pledged allegiance to Usman dan Fodio, the Fulani Muslim leader who was conducting the great *jihād* ("holy war") in northern Nigeria. This resulted in a Fulani becoming ruler of Zaria in 1808. Zaria emirate was created in 1835, retaining some of its old vassal states (including Keffi, Nasarawa, Jemaa, and Lapai to the south); it was governed by a representative of the sultan at Sokoto (216 mi northwest of Zaria city), as well as the local emir.

Zaria's fortunes declined in the late 19th century; the critical blow was the loss in 1899 of Birnin Gwari (a town and Hausa chiefdom 63 mi west of Zaria city) to Kontagora (an emirate to the southwest). In 1901 Zaria sought British protection against slave raids by Kontagora. After the murder in 1902 of Captain Moloney, the British resident at Keffi (154 mi south), by the Zaria *magaji* ("representative"), the British stripped the emirate of most of its vassal states.

Zaria remains, however, one of Nigeria's largest (about 12,750 sq mi [33,000 sq km]) traditional emirates. A savanna area, it is one of the nation's leading producers of cotton for export. Other significant cash crops include tobacco, peanuts (groundnuts), shea nuts, soybeans, sugarcane (which is processed locally into brown sugar), and ginger. Sorghum, millet, and cowpeas are the staple foods; cattle, chickens, goats, guinea fowl, and sheep are raised for meat. Tin mining has long been important in the south, at the western edge of the Jos Plateau. The population is an ethnic mix in which Muslim Hausa and Fulani people predominate.

Zaria, city, Kaduna State, north central Nigeria, on the Kubanni River (a tributary of the Kaduna). Headquarters of the Zaria Local Government Council and the traditional Zaria (*q.v.*) emirate, it is served by road and rail and by an airport 3½ mi (5½ km) northwest.

Zaria is an old walled town. Probably founded *c.* 1536, later in the century it became the capital of the Hausa state of Zazzau. Both town and state were named for Queen Zaria (late 16th century), younger sister and successor of Zazzau's ruler Queen Amina.

Modern Zaria has four main areas: the old walled town, inhabited by Hausa and Fulani peoples, which has numerous Islāmic schools; the residential areas of Tudun Wada (which handles the old section's overflow) and Sabon Gari (the "African strangers' settlement"), which were established early in the colonial period; and the township for the non-African

community. The old walls, the combined length of which is 15 miles (24 km), have eight gates, and a large market is still held on an ancient site.

Zaria is a major collecting point for cotton, tobacco, peanuts (groundnuts), shea nuts, and hides and skins. Cotton, peanuts, and shea nuts are processed locally and sent by rail to Lagos (430 miles [690 km] southwest) for export. There is an important market for sorghum, millet, soybeans, brown sugar, onions, locust beans, baobab leaves and fruit, cowpeas, kola nuts, cloth, cattle, sheep, and goats. Cotton ginning became Zaria's chief economic activity after the opening of the railway in 1910, but leather tanning and cotton weaving and dyeing are traditional crafts of its Hausa and Gbari inhabitants. Other significant industries include railway repairing, furniture making, cloth printing, cigarette and cosmetics manufacturing, and basket making. The first northern Nigerian newspaper, written in Hausa, *Gaskiya Ta Fi Kwabo* ("Truth Is Worth More than a Penny"), was launched in Zaria in 1939.

Zaria is the educational centre of the northern states. Located at Samaru, 7 miles (11 km) west-northwest, is Ahmadu Bello University (1962), with its associated institutes of education, economic and social studies, administration, and health. Samaru is also the site of the Institute for Agricultural Research and Special Services (1924) and the Leather Research Institute of Nigeria. At Zaria are the Nigerian Civil Aviation Training Centre and a branch of the Katsina College of Arts, Science, and Technology. Zaria also has a commercial institute, a fine-arts school, and a school of pharmacy. There are several hospitals and a nursing school. Pop. (1996 est.) 379,200.

Zariadres, one of the satraps (governors) of the Seleucid king Antiochus III, who is credited, with Artaxias (*q.v.*), as a founder of ancient Armenia.

Zariaspa (ancient Asian country): *see* Bactria.

Zarlino, Gioseffo (b. March 22, 1517, Chioggia, Rep. of Venice [Italy]—d. February 14, 1590, Venice), Venetian composer and writer on music, the most celebrated music theorist of the mid-16th century.

Zarlino took deacon's orders in 1541 and studied music under Adriaan Willaert at St. Mark's in Venice, where in 1565 he became music director. Although he was esteemed as a composer, few of his works survive. He was offered the bishopric of Chioggia in 1583, but the Venetian senate persuaded him to remain in Venice.

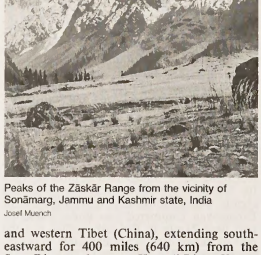
Zarlino's first treatise, *Istituioni harmoniche* (1558), brought him rapid fame. It gives a shrewd account of musical thinking during the first half of the 16th century, and Zarlino's thoughts on tuning, chords, and modes anticipate 17th- and 18th-century developments. He discussed the tuning of the first four intervals of the scale (tetrachord), espousing a system that proved reliable in subsequent practice. He stressed the importance of the major and minor third and discussed the nature of the major and minor triads, anticipating the theories of later writers such as Jean-Philippe Rameau. He renumbered the medieval modes, placing the Ionian mode (corresponding to the modern major scale) first. He also gave one of the two earliest accounts of double counterpoint and offered detailed advice on the setting of words to music. His *Dimostrationi harmoniche* (1571) consists of five dialogues between Willaert and four friends; it amplifies much of the material he had set forth in the *Istituioni*.

Zarlino's theories were violently attacked by Vincenzo Galilei, his former pupil and a member of the Florentine Camerata, a group influential in the evolution of opera. Zarlino replied with *Sopplimenti musicali* (1588) and collected his works into a complete edition in 1589. The *Sopplimenti* reinforces and develops his previous theories. One passage suggests equally tempered tuning for the lute (in advance of 18th-century experiments with equal temperament on keyboard instruments); another gives valuable descriptions of early organs. Zarlino strongly decried the monodic recitative of the Camerata, insisting that music has its own laws and should not abandon them in order to imitate the spoken word.

Żarnowiec, city, Gdańsk *województwo* (province), north-central Poland. The city is located near picturesque Lake Żarnowieckie, 30 miles (48 km) northwest of Gdańsk, the provincial capital. Żarnowiec is the site of a hydroelectric-power plant and a Benedictine monastery founded in the early 12th century. In a forest outside Żarnowiec, 12,000 Poles were executed and buried in mass graves by German troops in World War II.

zarzuela, Spanish musical play consisting of spoken passages, songs, choruses, and dances. It originated in the 17th century as an aristocratic entertainment dealing with mythological or heroic subject matter. The first performances were at the royal residence of La Zarzuela, near Madrid. Writers of zarzuelas included the playwrights Lope de Vega (1562–1635) and Pedro Calderón de la Barca (1600–81) and the composer Juan Hidalgo (*c.* 1600–85). The form declined in the late 17th and the 18th centuries as Italian opera rose in popularity. In the mid-19th century the zarzuela was revived as a popular musical play, an expanded version of the similar 18th-century *tonadilla*. Witty and satirical, it dealt with characters from everyday life and included folk music, dance, and improvisation. Two definite varieties evolved: the *género chico,* a one-act comic zarzuela, and the *grande,* a serious musical play in two to four acts.

Zāskār Range, also spelled ZĀNSKĀR, group of Himalayan mountains in northern India



Peaks of the Zāskār Range from the vicinity of Sonāmarg, Jammu and Kashmir state, India
Josef Muench

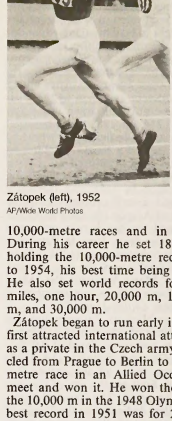
and western Tibet (China), extending southeastward for 400 miles (640 km) from the Suru River to the upper Karnali River. Kāmet Peak (25,446 feet [7,756 m]) is the highest point, and the most important passes are Shipki, Lipulek, and Mana.

Zasulich, Vera Ivanovna (b. Aug. 8 [July 27, Old Style], 1849, Mikhailovka, Russia—d. May 8, 1919, Petrograd [now St. Petersburg]), Russian revolutionary who shot and wounded General Fyodor F. Trepov, the governor of St. Petersburg, and who was acquitted by the jury in a much-publicized trial (1878).

The daughter of a nobleman, Zasulich became a revolutionary in 1868, spending many of the succeeding years in prison, in hiding, or in exile. In 1883 she was a founding member of the first Russian Marxist organization, the Liberation of Labour, and corresponded with Karl Marx and Friedrich Engels. Having joined the Russian Social Democratic Workers' Party, she sided with the Menshevik faction when the party split in 1903 and became a leader of those Marxists who favoured legal political activities over underground tactics after 1908. She opposed the Bolshevik seizure of power in 1917.

Zatishye (Russia): *see* Elektrostal.

Zátopek, Emil (b. Sept. 19, 1922, Kopřivnice, Czech.—d. Nov. 21/22, 2000, Prague, Czech Rep.), Czech long-distance runner who won three gold medals in the 1952 Olympic Games at Helsinki: in the 5,000- and



Zátopek (left), 1952
AP/Wide World Photos

10,000-metre races and in the marathon. During his career he set 18 world records, holding the 10,000-metre record from 1949 to 1954, his best time being 28 min 54.2 s. He also set world records for 5,000 m, 10 miles, one hour, 20,000 m, 15 miles, 25,000 m, and 30,000 m.

Zátopek began to run early in the 1940s and first attracted international attention in 1946, as a private in the Czech army, when he bicycled from Prague to Berlin to enter the 5,000-metre race in an Allied Occupation Forces meet and won it. He won the gold medal in the 10,000 m in the 1948 Olympic Games. His best record in 1951 was for 20,000 m in 59 min 51.8 s. In the 1952 Olympic Games at Helsinki, he set Olympic records for the 5,000- and 10,000-metre races and ran the fastest marathon ever run to that time.

Zátopek retired as a runner in 1958. In 1969 he was deprived of his colonelcy in the Czech army and of his Communist Party membership when he spoke out against the Soviet takeover of Czechoslovakia of the previous year, but from 1970 he worked with the Czechoslovak Physical Training Association and by the late 1970s was associated with the Czech national sports institute.

Zauffely, Johann Joseph, Zauffely also spelled ZAUPHALY (painter): *see* Zoffany, John.

Zavadsky, Yury Alexandrovich (b. June 30, 1894, Moscow, Russia—d. April 5, 1977, Moscow), Soviet actor, director, and teacher whose eclectic vision ranged from foreign classics to modern heroic drama.

Zavadsky made his acting debut while studying with Eugene Vakhtangov, at whose theatre he played Anthony in Maurice Maeterlinck's

The Miracle of St. Anthony (1915). He continued with Vakhtangov and was a principal in his final and most acclaimed production, *Turandot* (1922). Zavadsky made his directorial debut with Nikolay Gogol's *The Marriage* (1924), and the conscious theatricality of his staging demonstrated his debt to his teacher. He worked with the Moscow Art Theatre (1924–31) and became head of the Central Theatre of the Red Army (1932). While at the Central Theatre, Zavadsky began to meld the avant-garde lessons of Vakhtangov with the precepts of Konstantin Stanislavsky; his productions of patriotic dramas, such as Aleksandr Korniychuk's *The Destruction of the Squadron*, revealed a new emphasis on clarity of form and ensemble acting.

After directing the Gorky Theatre in Rostov from 1936 to 1940, Zavadsky returned to Moscow to begin teaching at the State Institute of Theatre Arts and to become chief director of the Mossovet Theatre. He joined the Communist Party in 1944 and was made a full professor at the State Institute in 1947. He continued a series of foreign classics at the Mossovet, including *The Merry Wives of Windsor* (1957), and he produced works on patriotic themes, such as A. Surov's *Dawn Over Moscow* (1950). He revived plays by 19th-century Russian playwrights; his *Masquerade* by Mikhail Lermontov won him a Lenin Prize (1965). In all his later productions, special music elaborately employed and meticulous ensemble acting were hallmarks.

zāwiyah (Arabic), Persian KHĀNQĀH, Turkish TEKKE, generally, in the Muslim world, a monastic complex, usually the centre or a settlement of a Ṣūfī (mystical) brotherhood. In some Arabic countries the term *zāwiyah* is also used for any small, private oratory.

The first North African *zāwiyah*, dating from about the 13th century, was akin to a hermitage (*rābiṭah*), housing an ascetic holy man and his disciples. Linked as it was to the immensely popular Ṣūfī movement that was making its way westward across North Africa at the same time, the *zāwiyah* seems to have proliferated rapidly. Eventually it became an extensive centre of religious and paramilitary power. The essential structure of the medieval *zāwiyah* has survived into the 21st century. It may include an area reserved for prayer, a shrine, a religious school, and residential quarters for students, guests, pilgrims, and travelers.

In the mid-19th century the Sānusīyah, a religious brotherhood of Cyrenaica (modern Libya), by establishing a network of *zāwiyah*s in areas remote from central authority, attained political, as well as religious, control of the province. In World War I the Sānusīyah was able to marshal members of the *zāwiyah*s into war against the Italians. In their subsequent occupation of Libya, the Italians wiped out most of the *zāwiyah*s in that country.

Zāwiyah, Al-, town, situated on the Mediterranean coast about 30 miles (50 km) west of Tripoli, northwestern Libya. Lying on Al-Jifārah plain, it is near the site of an important oil field and has the country's first oil refinery. Agriculture is prominent in the area because of the ample groundwater resources. The main crops are potatoes, onions, and tomatoes; livestock are also raised. The coastal highway passes through the town. Pop. (latest est.) 89,338.

Zāwiyat al-Bayḍāʾ, also spelled ZĀWIYAT EL-BĒḌĀ, also called BAIDA, town, northeastern Libya. It is a new town lying on a high ridge 20 miles (32 km) from the Mediterranean Sea. Built in the late 1950s on the site of the tomb of Rawayfī ibn Thābit (a Companion of the Prophet Muḥammad), it was planned as the future national capital. Although Zāwiyat al-Bayḍāʾ contains a parliament building, ministerial offices, a branch campus of Gar Younis University, and a centre for Islāmic studies, Tripoli remains Libya's capital. The town is served by a modern airfield and has highway links to Banghāzī, about 110 miles (170 km) west-southwest. The ruined ancient Greek city of Cyrene is nearby. Pop. (latest est.) 67,120.

Zayas y Sotomayor, María de (b. Sept. 12, 1590, Madrid [Spain]—d. *c.* 1661), the most important of the minor 17th-century Spanish novelists and one of the first women to publish prose fiction in the Castilian dialect.

Little is known of Zayas' life except that she was born into a noble family in Madrid and may have lived in Zaragoza, where her work was published. It is not known whether she married or when and where she died.

Her novels about love and intrigue, which used melodramatic and frequently horrific elements, were widely read and very popular. *Novelas amorosas y ejemplares* (1637; "Novels of Romance and Exemplary Tales") is a collection of short novels about the romantic complications of married life, ostensibly told one evening to amuse a sick woman. The stories are mostly about women who are mistreated by husbands or seducers. *Novelas y saraos* (1647; "Novels and Soirees") and *Parte segunda del sarao y entretenimientos honestos* (1649; "Soiree Part Two and Decorous Amusements") are sequels. In many of her stories Zayas accused Spanish society of leaving women without the information or emotional strength to resist seduction and abuse.

Zaydīyah, also spelled ZAIDIYA, or ZAIDĪS, English ZAYDIS, a sect of Shīʿite Muslims owing allegiance to Zayd ibn ʿAlī, grandson of Ḥusayn ibn ʿAlī. Doctrinally the Zaydīyah are closer to the majority Sunnites than are the other Shīʿites. Early in the 10th century the Zaydīyah became dominant in Yemen, and thereafter Zaydī *imāms* were the spiritual rulers of the area. From the departure of the Turks in 1917 until 1962, they were also the temporal rulers of Yemen.

Zaysan, Lake, also spelled ZAISAN, or ZAJSAN, Russian OZERO ZAYSAN, freshwater body in eastern Kazakhstan, in a hollow between the Altai and Tarbagatay mountains at an elevation of 1,266 feet (386 m). Formed by the Irtysh River, which enters the lake in the east, it was originally 60 miles (100 km) long, 20 miles (32 km) wide, and 26 feet (8 m) deep, with a surface area of about 718 square miles (about 1,860 square km). Its level has been raised 20 feet (6 m) since it became part of the Bukhtarma Reservoir downstream, which is 375 miles (603 km) long and has a total area of 2,125 square miles (5,500 square km). Fishing—sturgeon, sterlet, carp, and others—is important, and there are shipping services.

zazen, in Zen Buddhist meditation, sitting; this form of spiritual exercise is most characteristic of the Sōtō sect. The instructions for *zazen* direct the disciple to sit in a quiet room, breathing rhythmically and easily, with legs fully or half crossed, spine and head erect, hands folded one palm above the other, and eyes open. Logical, analytic thinking should be suspended, as should all desires, attachments, and judgments, leaving the mind in a state of relaxed attention.

The most outstanding advocate of *zazen* was the 13th-century Zen master and founder of the Sōtō sect in Japan, Dōgen (*q.v.*). He considered *zazen* not only to be a method of moving toward enlightenment but also, if properly experienced, to constitute enlightenment itself. *See also* koan.

Zazzerino, Il (composer): *see* Peri, Jacopo.

Zdarsky, Matthias (b. Feb. 25, 1856, Trebitsch, Moravia, Austrian Empire [now in Czech Republic]—d. June 20, 1940, Sankt Pölten, Austria), ski instructor, considered the father of Alpine skiing, who was probably the first regular ski instructor in Austria.

Zdarsky became interested in skiing after reading Fridtjof Nansen's *Auf Schneeschuhen durch Grönland* (1891; *Across Greenland on Snowshoes*) and taught himself to ski as the easiest way to reach the market village of Lilienfeld in winter from his mountain pastures of Habernreith, which he had bought in 1889. He had to adapt the Nordic skiing techniques used on relatively flat ground to the Alpine terrain. In 1897 he published *Die alpine Lilienfelder Skifahrtechnik*, the first ski instruction book. In it he publicized the technique of requiring one ski to be extended at an acute angle to the fall line, a line from an upper point to a lower directly below on a slope. He first used a single pole to help in steering and turning but soon changed to two poles, which became standard. Stemming, as his steering moves were called, was performed by turning one ski to the side, in whichever direction the turn was intended, and quickly bringing the other ski into parallel position, a maneuver known as the stem Christiania. Zdarsky also improved ski design and ski bindings and organized downhill races. He was a ski instructor for the Austrian Army during World War I and survived an avalanche that caused 80 fractures and dislocations. He invented devices that allowed him to ski again.

Zea, genus of large grasses of the family Poaceae, order Cyperales. The two best-known species are *Zea mays* (*see* corn) and *Z. mexicana* (*see* teosinte).

Zealand, Danish SJÆLLAND, largest and most populous island of Denmark, between the Kattegat strait and the Baltic Sea, separated from Sweden by The Sound (Øresund) and from Funen (Fyn) Island by the Great Belt (strait). Zealand is divided into seven major administrative units: the municipalities of Copenhagen and Frederiksberg; and the *amtskommuner* (county communes) of København, Frederiksborg, Vestsjælland, Roskilde, and the northern part of Storstrøm. Zealand's area is 2,715 square miles (7,031 square km).

Zealand's basal rock platform is exposed in the chalk and limestone cliffs at Stevns Klint but is generally obscured by thick morainic deposits forming a gently undulating landscape. Its irregular coastline is broken by Ise Fjord and Roskilde Fjord. The northern part of the island is well-wooded and lake-strewn, with fine resort beaches on the coast. This area was once a royal hunting ground, and many fine castles survive. Fertile clay loams support agriculture (grains), dairy farming, and cattle breeding, especially in the south. Fishing and tourism are also economically important.

There are many Stone Age and Viking relics on the island, particularly the Viking fortress of Trælleborg (*c.* AD 1000), as well as medieval churches, castles, and manor houses. Besides Copenhagen and its suburbs, urban settlements include Roskilde, Helsingør (Elsinore), Næstved, Korsør, Slagelse, Sorø, Holbæk, Ringsted, Vordingborg, Køge, Kalundborg, and Hillerød. In the late 1990s Zealand became connected to Funen by the Great Belt Fixed Link, a bridge and tunnel system, and in 2000 the Øresund Link opened, connecting Copenhagen and Malmö, Swed. Pop. (2003 est.) 2,096,449.

Zealot, member of a Jewish sect noted for its uncompromising opposition to pagan Rome and the polytheism it professed. The Zealots were an aggressive political party whose concern for the national and religious life of the Jewish people led them to despise even Jews who sought peace and conciliation with the Roman authorities. A census of Galilee ordered by Rome in AD 6 spurred the Zealots to rally the populace to noncompliance on the

grounds that agreement was an implicit acknowledgment by Jews of the right of pagans to rule their nation.

Extremists among the Zealots turned to terrorism and assassination and became known as Sicarii (Greek *sikarioi*, "dagger men"). They frequented public places with hidden daggers to strike down persons friendly to Rome. In the first revolt against Rome (AD 66–70) the Zealots played a leading role, and at Masada in 73 they committed suicide rather than surrender the fortress, but they were still a force to be reckoned with in the first part of the following century. A few scholars see a possible relationship between the Zealots and the Jewish religious community mentioned in the Dead Sea Scrolls. *See also* Masada.

Zeami, also spelled SEAMI, also called KANZE MOTOKIYO (b. 1363/64, Japan—d. Sept. 1, 1443, Kyōto?), the greatest playwright and theorist of the Japanese nō theatre. He and his father, Kan'ami (1333–84), were the creators of the nō drama in its present form.

Under the patronage of the shogun Ashikaga Yoshimitsu, whose favour Zeami enjoyed after performing before him in 1374, the nō was able to shake off the crudities of its past and to develop as a complex and aristocratic theatre. After his father's death, Zeami became the chief figure in the nō. He directed the Kanze school of nō that his father had established and that had profound and lasting influence. Zeami not only continued to perform brilliantly but also wrote and revised plays prolifically. He is credited with about 90 (and most of the greatest) of the approximately 230 plays in the present repertoire. In 1422 he became a Zen monk, and his son Motomasa succeeded him. But Ashikaga Yoshinori, who became shogun in 1429, favoured On'ami (Zeami's nephew) and refused to allow the son to perform before him. Motomasa died in 1432, and Yoshinori exiled Zeami to the island of Sado in 1434. After the shogun died in 1441, Zeami returned to Kyōto.

In his treatises—of which the most important is the collection *Fūshi kaden* (1400–18; "The Transmission of the Flower of Acting Style"), "flower" representing the freshness and appropriateness of fine acting—written as manuals for his pupils, Zeami said the actor must master three basic roles: the warrior, the woman, and the old person, including the singing and dancing appropriate to each. The two main elements in nō acting were *monomane,* "an imitation of things," or the representational aspect, and *yūgen,* the symbolic aspect and spiritual core of the nō, which took precedence and which became the touchstone of excellence in the nō. Zeami wrote, "The essence of *yūgen* is true beauty and gentleness," but not mere outward beauty: it had to suggest behind the text of the plays and the noble gestures of the actors a world impossible to define yet ultimately real. Such plays as *Matsukaze* ("Wind in the Pines"), written by Kan'ami and adapted by Zeami, have a mysterious stillness that seems to envelop the visible or audible parts of the work. In other of Zeami's dramas there is less *yūgen* and more action and, occasionally, even realism.

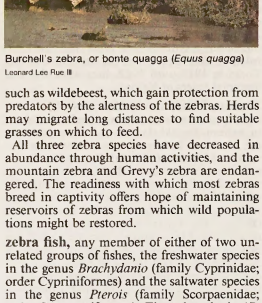
Zebi, Sabbatai (Jewish false messiah): *see* Shabbetai Tzevi.

Zebid (Yemen): *see* Zabid.

zebra, any of three species of strikingly black-and-white-striped mammals of the horse family Equidae and genus *Equus:* Burchell's zebra, or bonte quagga (*E. quagga*), found in rich grasslands over much of eastern and southern Africa; Grevy's zebra (*E. grevyi*), of arid, sparsely wooded areas in parts of Kenya, Ethiopia, and Somalia; and the mountain zebra (*E. zebra*), of dry upland plains in Namibia and a few scattered areas in western South Africa.

Zebras are horselike animals, standing about 120 to 140 cm (47 to 55 inches) at the shoulder. The species are easily distinguished by the pattern of stripes. These are individually wide and widely spaced in Burchell's zebra, some races of which have lighter "shadow stripes" between the main stripes. The northern races of this species are more fully striped than the southern ones, in which the striping of the lower legs tends to give way to white. In the extinct quagga (*E. q. quagga*), the striping was confined to the head, neck, and forequarters, the back being solid brown. The stripes of Grevy's zebra are narrow and closely spaced, and the belly is white. The mountain zebra is small and has a peculiar gridlike pattern of stripes on the rump.

Zebras live in small family groups consisting of a stallion and several mares with their foals. In Grevy's zebra the mares may form separate groups from the stallions. With plentiful food, small groups may coalesce into large herds, but the smaller groups retain their identities. Zebras often form mixed herds with antelopes,



Burchell's zebra, or bonte quagga (*Equus quagga*)
Leonard Lee Rue III

such as wildebeest, which gain protection from predators by the alertness of the zebras. Herds may migrate long distances to find suitable grasses on which to feed.

All three zebra species have decreased in abundance through human activities, and the mountain zebra and Grevy's zebra are endangered. The readiness with which most zebras breed in captivity offers hope of maintaining reservoirs of zebras from which wild populations might be restored.

zebra fish, any member of either of two unrelated groups of fishes, the freshwater species in the genus *Brachydanio* (family Cyprinidae; order Cypriniformes) and the saltwater species in the genus *Pterois* (family Scorpaenidae; order Scorpaeniformes). The zebra danio (*B. rerio*), a popular freshwater aquarium fish originally from Asia, is small (up to about 4 cm [1.5 inches] long) and has dark-blue and silvery longitudinal stripes.

The distinctive saltwater zebra fishes (*Pterois*), used in marine aquariums, have extremely large pectoral fins, numerous extremely poisonous spines, and colourful vertical stripes. Some species are more commonly known by the names lion-fish (*q.v.*) and turkeyfish.

zebra swallowtail butterfly (*Iphiclides marcellus, Graphium marcellus,* or *Papilio marcellus*), large, familiar North American swallowtail butterfly of the family Papilionidae (order Lepidoptera), similar to the related European scarce swallowtail (*I. podalirius*). Wing patterns of both species are reminiscent of a zebra's stripes, with a series of longitudinal black bands forming a pattern on a greenish white or white background. There are several generations in a single year, spring broods being rather smaller than summer broods. Adult forms that emerge at different seasons vary considerably in their markings. The span



Zebra swallowtail butterfly (*Iphiclides marcellus, Graphium marcellus,* or *Papilio marcellus*)
E.R. Degginger

of the forewings is 6 to 9 cm (2.5 to 3.5 inches); the hindwings bear streamers 15 to 25 mm (0.6 to 1 inch) long. The principal food plant of the larvae is the pawpaw.

Zebrina, genus of trailing herbaceous plants in the spiderwort family (Commelinaceae) native to Mexico and Guatemala but widely grown as indoor foliage plants in baskets.

Authorities disagree over the number of species, but several distinct kinds are used in the florist trade. One of the so-called wandering Jews, or inch plants, is *Z. pendula,* with an array of colourful-leaved varieties including *Z. pendula* 'Purpusii,' with dark red or bronzy leaves, and *Z. pendula* 'Quadricolor,' with metallic-green leaves striped with green, red, and white. They are often grown as ground cover in warm climates.

Zebrinas are often confused with members of the genus *Tradescantia.*

Zebrzydowski Rebellion (1606–07), armed uprising of Polish nobles led by Mikołaj Zebrzydowski against their king Sigismund III (ruled 1587–1632). Despite its failure to overthrow the king, the rebellion firmly established the dominance of the Roman Catholic gentry over the monarch in the Polish political system.

After Louis I (king of Poland, 1370–82, and of Hungary, 1342–82) concluded the Pact of Koszyce with the Polish nobility and gentry (1374), guaranteeing them broad rights and privileges, the Polish gentry gradually acquired an increasing degree of political power, culminating in the Henrician Articles (1573), which effectively converted the already limited monarchy of Poland into a republic of the gentry with an elective chief magistrate (*i.e.,* the king).

When Sigismund, son of John III of Sweden, was elected to the Polish throne (1587), however, he tried to increase the power of the monarchy. His efforts to reduce the nobles' parliamentary prerogatives became identified with his particularly unpopular policies—*e.g.,* the involvement of Poland in his personal dynastic struggle in Sweden, the establishment of close relations with the Habsburgs of Austria, and his hostile attitude toward non-Catholics. Opposition to Sigismund thus was mounting when, while he was fighting his uncle Charles IX, who had seized the Swedish throne, he requested that the Polish Sejm (legislature) authorize a permanent army as well as funds to maintain it (March 1606). The members of the Sejm interpreted his request as an attempt to usurp their authority and reduce their control over his actions. Mikołaj Zebrzydowski, the palatine (the king's governor) of Kraków, accused the king of breaking the basic laws of Poland and claimed that in doing so Sigismund had forfeited his monarchial right to

demand obedience and loyalty from the nobility.

Gathering a following of both political and religious dissidents, Zebrzydowski held a series of conventions during 1606 and formulated a set of demands. When the king failed to satisfy them, Zebrzydowski led his 60,000 supporters into armed rebellion. The insurgents, who declared the king deposed in 1607, presented a sufficient threat to Sigismund to compel him to reduce his military activities against Sweden and to prevent him from pursuing the advantage he had gained in that war. Although the king's forces were of questionable loyalty, the rebels went into a panic as the royal troops advanced at Guzów and were decisively defeated (July 6, 1607). Despite that defeat and the decline of the political influence of the religious dissidents, the Sejm of 1609 granted a general amnesty and also guaranteed the constitution of Poland, forcing Sigismund to abandon his efforts to make the Polish monarchy more absolute.

zebu (cattle): *see* Brahman.

Zebulun, one of the 12 tribes of Israel that in biblical times constituted the people of Israel who later became the Jewish people. The tribe was named for the sixth son born of Jacob and his first wife, Leah. After the Israelites took possession of the Promised Land, Joshua divided the territory among the 12 tribes, assigning to the tribe of Zebulun a fertile section of land roughly northeast of the Plain of Jezreel. After the death of King Solomon (922 BC), the Israelites separated into the northern Kingdom of Israel (representing 10 tribes) and the Kingdom of Judah in the south. The northern kingdom was conquered by the Assyrians in 721 BC, and its tribes dispersed. Jewish legends thus consider the tribe of Zebulun as one of the Ten Lost Tribes of Israel.

Zechariah, Book of, also spelled ZACHARIAS, the 11th of 12 Old Testament books that bear the names of the Minor Prophets, collected in the Jewish canon in one book, The Twelve. Only chapters 1–8 contain the prophecies of Zechariah; chapters 9–14 must be attributed to at least two other, unknown authors. Scholars thus refer to a "second" and "third" Zechariah: Deutero-Zechariah (chapters 9–11) and Trito-Zechariah (chapters 12–14).

According to dates mentioned in chapters 1–8, Zechariah was active from 520 to 518 BC. A contemporary of the prophet Haggai in the early years of the Persian period, Zechariah shared Haggai's concern that the Temple of Jerusalem be rebuilt. Unlike Haggai, however, Zechariah thought that the rebuilding of the Temple was the necessary prelude to the eschatological age, the arrival of which was imminent. Accordingly, Zechariah's book, and in particular his eight night visions (1:7–6:8), depict the arrival of the eschatological age (the end of the world) and the organization of life in the eschatological community. Among Zechariah's visions was one that described four apocalyptic horsemen who presaged God's revival of Jerusalem after its desolation during the Babylonian Exile. Other visions announced the rebuilding of the Temple and the world's recognition of Yahweh, Israel's God.

Deutero- and Trito-Zechariah, each of which has an introduction setting it apart from the rest (9:1 and 12:1), are separate collections of sayings usually dated to the 4th and 3rd centuries BC, respectively. They further develop Zechariah's eschatological themes and provide many images of a messianic figure that were borrowed by New Testament writers and applied to the figure of Jesus (*e.g.*, Matthew 21:5 and 13:7, Mark 14:27, and Matthew 26:31).

Zechariah, Song of (hymn): *see* Benedictus.

Zedekiah, original name MATTANIAH (fl. early 6th century BC), king of Judah (597–587/586 BC) whose reign ended in the Babylonian destruction of Jerusalem and the deportation of most of the Jews to Babylon.

Mattaniah was the son of Josiah and the uncle of Jehoiachin, the reigning king of Judah. In 597 BC the Babylonians under King Nebuchadrezzar besieged and captured Jerusalem. They deported Jehoiachin to Babylon and made Mattaniah regent under the name Zedekiah. Zedekiah thus held his throne as a vassal under an oath of allegiance to Nebuchadrezzar, but under local pressure he began to intrigue against the latter in concert with the neighbouring states of Moab, Edom, Ammon, Tyre, and Sidon.

In the ninth year of Zedekiah's rule a Babylonian army laid siege to Jerusalem after he had conspired to revolt against the Babylonians with Egypt's help. During the siege the prophet Jeremiah (*q.v.*) urged patient submission to the dominion of the Babylonians, which he regarded as the will of God, but royal officials and Jewish notables denounced him and he was accused of desertion and imprisoned.

In the sixth month of the siege a breach was made in the city walls. Zedekiah and his men fled by night toward the Jordan River, but they were soon captured. He and his leaders were taken before King Nebuchadrezzar at Riblah, in Syria, where Zedekiah's sons were slain in his presence and he, a disloyal vassal, was blinded and carried in chains to Babylon, where he was imprisoned until his death. The walls and houses of Jerusalem were destroyed, its temple was sacked and burned, and the people of Judah, except for the poorest of the land, were deported to Babylon. Thus began the Babylonian Exile. Judah lost its status as a kingdom and became a Babylonian province.

The story of Zedekiah is told in the Old Testament in the Second Book of Kings, chapters 24 and 25, in the Second Book of Chronicles, chapter 36, and in various passages in the Book of Jeremiah.

Zedhor (king of Egypt): *see* Tachos.

Zedī (religious sect): *see* Yazīdī.

Zedillo, Ernesto, in full ERNESTO ZEDILLO PONCE DE LEÓN (b. Dec. 27, 1951, Mexico City, Mex.), president of Mexico (1994–2000).

Raised in a working-class family in Mexicali, just south of the California border, Zedillo returned to Mexico City in 1965 to study at the National Polytechnic Institute. In 1971 he joined the Institutional Revolutionary Party (PRI), the dominant political party in Mexico since 1929. After receiving his doctorate in economics from Yale University in 1981, Zedillo worked for Mexico's central bank and at the Ministry of Programming and Budget, becoming secretary in 1988. As such, he successfully controlled Mexico's immense foreign debt, reduced the inflation rate, and helped balance the budget. Appointed secretary of education in 1992, he decentralized the public school system and attempted to revise textbooks and raise the literacy rate. In 1993 he became campaign manager for PRI presidential candidate Luis Donaldo Colosio, and when Colosio was assassinated on March 23, 1994, Zedillo was named the party's candidate. He won by a comfortable margin, although the election was the closest in the PRI's history.

Zedillo faced an economic crisis soon after taking office, but in 1995 he agreed to a U.S. plan that stabilized the currency. However, he failed to calm civil unrest in the southern state of Chiapas. Zedillo initiated political reforms that effectively loosened the PRI's grip on power at federal and state levels and permitted freer elections. In 1999 he caused the PRI to hold its first presidential primary, and the party's candidate was defeated in 2000 by Vicente Fox (*q.v.*) of the National Action Party. Zedillo left office later that year, ending the PRI's 71 years of uninterrupted rule.

Zeebrugge (Flemish), French BRUGES-SUR-MER, port, West Flanders province, northwestern Belgium. It lies along the North Sea, 10 miles (16 km) north of Brugge (Bruges), for which it is the port. The 1.5-mile- (2.5-kilometre-) long mole around Zeebrugge's harbour was constructed between 1895 and 1907. A 7-mile- (12-kilometre-) long canal was also built about that time to connect Zeebrugge with Brugge. In April 1918, during World War I, British naval forces sank blockships in Zeebrugge's harbour and canal to deny the use of the port to German submarines. The port was again blocked by the Allies in May 1940, and Zeebrugge itself was destroyed by retreating Germans in 1944. The harbour was reopened in 1957 after the last of the old Allied blockships had been removed, and Zeebrugge again grew into a bustling port.

Zeeland, maritime *provincie* (province), southwestern Netherlands. It occupies the delta lands of the Scheldt (Schelde) and Maas (Meuse) rivers. The *provincie* comprises Zeeuwsch-Vlaanderen, a strip of the Flanders mainland between the Westerschelde (Western Scheldt) and Belgium, plus six former islands: Schouwen en Duiveland, Tholen, Noord-Beveland, Walcheren, Zuid-Beveland, and Sint Philipsland. None of these has preserved a true insular character, all being connected to each other or to Noord-Brabant province inland by dams or bridges.

Zeeland was disputed between the counts of Flanders and Holland until it was annexed by the latter in 1323. It was finally joined to the United Provinces under Stadtholder Wijnand III (1672–1702). Its history has been marked by a permanent struggle against the sea, indicated by its name, meaning "sea land," and by its heraldic device, *Luctor et emergo* ("I struggle and emerge"). The coastline of Zeeland has changed continually as islands have been enlarged by alluvial deposition, united and protected by dikes, or washed away by floods. The province was severely damaged by the flood of Feb. 1, 1953, which killed more than 1,800 persons. As a result the Dutch government started the implementation of the Delta Project (*q.v.*), to dam the major sea channels and further connect the islands with one another and with the mainland.

After repair to the dikes following the 1953 flood, extensive rural reconstruction was carried out, and the resettlement of many Zeeland farmers in the Northeast Polder of the IJsselmeer allowed the land they had left to be used to enlarge other farms. Most of Zeeland's marine clay soil is arable, supporting cereals, potatoes, sugar beets, and other cash crops. Dairy cattle and horticulture (onions, vegetables, and fruit) are also important. Zeeland also has traditional oyster culture and shrimp and mussel fisheries, as well as seaside resorts.

One of the less-populous Dutch provinces, Zeeland has few industries and no large towns. Vlissingen, Middelburg (the capital), Goes, Terneuzen, and Sas van Gent are the main towns. Area 692 square miles (1,792 square km). Pop. (1999 est.) 370,600.

Zeeman, Pieter (b. May 25, 1865, Zonnemaire, Neth.—d. Oct. 9, 1943, Amsterdam), Dutch physicist, joint winner, with Hendrik A. Lorentz (*q.v.*), of the Nobel Prize for Physics in 1902 for his discovery of the Zeeman effect (*q.v.*).

Zeeman, who had been a student of Lorentz at the University of Leiden, began lecturing at Leiden in 1890. Six years later, at the suggestion of Lorentz, he investigated the effect of magnetic fields on a source of light and found that each of the lines in the spectrum of emitted light split into several lines; this became known as the Zeeman effect. Zeeman was appointed professor of physics at the Uni-

versity of Amsterdam in 1900 and director of its Physical Institute in 1908. Remaining there until his death, he conducted research on the propagation of light in moving media, such as water, quartz, and flint.

Zeeman effect, in physics and astronomy, the splitting of a spectral line into two or more components of slightly different frequency when the light source is placed in a magnetic field. It was first observed in 1896 by the Dutch physicist Pieter Zeeman as a broadening of the yellow D-lines of sodium in a flame held between strong magnetic poles. Later the broadening was found to be a distinct splitting of spectral lines into as many as 15 components.

Zeeman's discovery earned him the 1902 Nobel Prize for Physics, which he shared with a former teacher, Hendrik Antoon Lorentz, another Dutch physicist. Lorentz, who had earlier developed a theory concerning the effect of magnetism on light, hypothesized that the oscillations of electrons inside an atom produce light and that a magnetic field would affect the oscillations and thereby the frequency of the light emitted. This theory was confirmed by Zeeman's research and later modified by quantum mechanics, according to which spectral lines of light are emitted when electrons change from one discrete energy level to another. Each of the levels, characterized by an angular momentum (quantity related to mass and spin), is split in a magnetic field into substates of equal energy. These substates of energy are revealed by the resulting patterns of spectral line components.

The Zeeman effect has helped physicists determine the energy levels in atoms and identify them in terms of angular momenta. It also provides an effective means of studying atomic nuclei and such phenomena as electron paramagnetic resonance. In astronomy, the Zeeman effect is used in measuring the magnetic field of the Sun and of other stars. *See also* Stark effect.

Zefat, also spelled SAFAD, or SAFED, city of Upper Galilee, Israel; one of the four holy cities of Judaism (Jerusalem, Hebron, Tiberias, Zefat).

First mentioned at the time of the Jewish revolt against Rome (AD 66–70), it is thereafter frequently referred to in rabbinic literature. Strategically situated in scenic hill country, Zefat passed from hand to hand during the Crusades until captured by Baybars I, who razed its citadel (1266). Zefat achieved renown in the 16th century as the principal centre of the Kabbala, the occult theosophy and interpretation of the Scriptures forming the principal mystical system of Judaism. Important Kabbalists such as Isaac ben Solomon Luria and Joseph Karo lived in the city, and the doctrines expounded there spread throughout the Jewish world. The Hebrew printing press established in Zefat in 1577 was the first in all Asia to use movable type. In the 18th and 19th centuries the city suffered from wars and insurrections on the part of the Druzes and local Bedouin tribes, as well as from the destructive earthquake of 1837.

Just before the proclamation of the State of Israel (May 1948), the population of Zefat was predominantly Arab. The British, evacuating the area, gave the Arabs the fortified police post on nearby Mount Canaan (Har Kena'an), 3,149 feet (960 m) above sea level and 500 feet (150 m) above the old Jewish section. The city was nevertheless taken on May 12, 1948, by the Haganah, the Jewish defense forces, and the Arab population fled. Subsequently, mountainous Upper Galilee attracted painters and other artists, many of whom now live in Zefat. Four ancient synagogues, associated with past masters of the Kabbala, survive. The city's economy is based on light industry and tourism. Pop. (1993 est.) 20,900.

Zeffirelli, Franco, original name GIANFRANCO CORSI (b. Feb. 12, 1923, Florence, Italy), Italian director, designer, and producer of opera, theatre, motion pictures, and television, particularly noted for the authentic details and grand scale of his opera productions.

Zeffirelli attended the University of Florence to study architecture, but while there he became involved with the university's theatre company. His studies were interrupted by Germany's occupation of Italy; he became a Partisan and served as an interpreter for the Scots Guard. When the war was over, he went to Rome to pursue a career in theatre. In 1946 he joined Luchino Visconti's Morelli-Stoppa Company as an actor and stage director. After working with Visconti on *La terra trema* (1948; *The Earth Trembles*) and other films, Zeffirelli began to concentrate on stage design. His first major design for opera was a production (1952–53) of Gioacchino Rossini's *L'Italiana in Algeri* for La Scala, Milan. He worked on a number of other opera and theatre productions from the 1950s, notably the operas *La traviata* (1958), *Lucia di Lammermoor* (1959), and *La Bohème* (1963 and 1981). He also began to direct films. These included *The Taming of the Shrew* (1967; with Richard Burton and Elizabeth Taylor), *Romeo and Juliet* (1968), *Endless Love* (1981), and *Hamlet* (1990), as well as films of operas such as *I Pagliacci* (1981), *La traviata* (1982), and *Otello* (1986). He also produced the television epic *Jesus of Nazareth* (1977).

Zehlendorf, *Bezirk* (district) of Berlin, Ger., in the southwestern corner of the city. It is a prosperous residential district. The Free University (1948), parts of the Berlin Technical University, several branches of the Max Planck Institute, and the Dahlem art museums occupy the grounds of the former Dahlem manorial estate, broken up in 1901. More than half the district is preserved as parkland or water. Along its northwestern boundary runs the Havel River, with a southward bay called the Grosser Wannsee, which is popular with boaters and swimmers. Area 27 square miles (71 square km). Pop. (1986 est.) 85,161.

Zeila (Somalia): *see* Seylac.

Zeiss, Carl (b. Sept. 11, 1816, Weimar, Thuringian States [Germany]—d. Dec. 3, 1888, Jena), German industrialist who gained a worldwide reputation as a manufacturer of fine optical instruments.

In 1846 Zeiss opened a workshop in Jena for producing microscopes and other optical instruments. Realizing that improvements in optical instruments depended on advances in optical theory, he engaged as research worker Ernst Abbe, a physics and mathematics lecturer (later professor) at the University of Jena, who in 1866 became Zeiss's partner. They engaged Otto Schott, a chemist, who developed about 100 new kinds of optical glass and numerous types of heat-resistant glass. After the death of Zeiss, Abbe donated the Zeiss firm and his share in the glassworks to the Carl Zeiss Foundation. In 1923 Schott added his share in the glassworks to the foundation. In 1945 U.S. forces evacuated the board of management and about 100 scientists and technicians of the Carl Zeiss firm (Jena) to West Germany, where it was firmly reestablished.

Zeist, *gemeente* (commune), Utrecht *provincie,* central Netherlands. Since 1746 it has been the headquarters of the Dutch Province of the Moravian Church, a Protestant refugee group from Herrnhut (Saxony), which bought the 17th-century Zeist castle. Zeist is mainly a residential and resort town in a wooded region; it has some industry, producing optical instruments and gold and silverware. Pop. (1993 est.) 59,096.

Zeit, Die (German: "The Times"), weekly newspaper published in Hamburg, a review of the week in politics and public affairs as they affect Europe and especially Germany. *Die Zeit* includes a weekly newsmagazine that gives extended treatment to major economic, political, and cultural topics beyond the coverage of related subjects in the newspaper itself. The paper's editorial position is moderate, and its contributors are drawn from the first ranks of German journalists and authors. It is generally regarded as one of the leading weekly reviews in Germany.

Zela (Turkey): *see* Zile.

Zelaya, José Santos (b. Nov. 1, 1853, Managua, Nicaragua—d. May 17, 1919, New York, N.Y., U.S.), Nicaraguan politician and dictator from 1893 to 1910, noted for his hostility toward the United States and for his effort to unify Central America in 1907. During his rule he all but monopolized his country's economic resources.



Zelaya
By courtesy of the Library of Congress, Washington, D.C.

In 1893 Zelaya came to power through a successful Liberal revolt that ended 30 years of Conservative dominance. In 1906 he refused to send delegates to the San José conference convened for the purpose of maintaining peace in Central America; instead he invaded Honduras, overthrowing its government, and then tried to start a revolution in El Salvador. His efforts brought the area to the verge of war, prompting both Mexico and the United States to intervene. The Washington Conference of 1907 ensued, at which all five Central American states signed an agreement pledging to maintain peace among themselves. Zelaya, however, quickly broke the treaty.

Zelaya's attitude was based on his fear of U.S. economic domination and of the alleged U.S. intention to separate Nicaragua's eastern coast from the rest of the country. In 1909 the U.S. government supported a Conservative effort to unseat Zelaya; and when, in December of that year, the dictator executed U.S. soldiers of fortune for serving in the revolutionary army, the United States broke off diplomatic relations. Early in 1910 Zelaya was finally forced to flee to Mexico.

Zelenodolsk, city, Tatarstan, western Russia. It is a port on the Volga River. The milling of grain from the surrounding agricultural area and woodworking based on the forests to the north are the city's main economic activities. Food processing and the manufacture of agricultural machinery are also important. Two technical colleges are located in the city, which was incorporated in 1932. Pop. (1993 est.) 99,900.

Zelkova, genus of about five species of trees and shrubs in the elm family (Ulmaceae) native to Asia. The Japanese zelkova, or keaki (*Z. serrata*), up to 30 m (100 feet) tall and with sharply toothed deep green leaves, is an important timber tree and bonsai subject in Japan. It is widely planted elsewhere as a shade tree substitute for the disease-ravaged

American elm, and, while not as cold-hardy as the latter, it is more resistant to Dutch elm disease. *Z. carpinifolia,* from the Caucasus, and *Z. sinica,* from China, are somewhat shorter trees with wavy-toothed leaves.

Zell, Matthew (b. Sept. 21, 1477, Kaysersberg, Alsace [France]—d. Jan. 9, 1548, Strassburg [now Strasbourg]), German author and religious leader who was responsible for initiating the Protestant Reformation at Strassburg.

He became a lecturer (1511) and rector (1517) at Freiburg im Breisgau, moving to Strassburg in 1518 to become minister of the Roman Catholic cathedral there. In 1521, however, he accepted the Reformation doctrines of Martin Luther and began to preach in an evangelical manner to his congregation. Although condemned by the Roman Catholic clergy, he continued as cathedral minister with the protection of the magistrates and parishioners. He replied to the attacks by his bishop in his *Christliche Verantwortung* (1523; "Christian Responsibility"), a discussion of the scriptural basis for the Reformation. He also assembled a number of his writings in the form of a catechism, *Frag und Antwort* (1536; "Question and Answer").

Zelten (Libya): *see* Zaltan.

Zemlinsky, Alexander (von) (b. Oct. 14, 1871, Vienna, Austria—d. March 15, 1942, Larchmont, N.Y., U.S.), Austrian composer and conductor whose craftsmanship in both areas was and is highly regarded.

Zemlinsky was a student at the Vienna Conservatory from 1887 to 1892. He wrote several chamber pieces in 1893 that attracted the notice of Johannes Brahms, among others. In 1895, while playing in an amateur orchestra, he met Arnold Schoenberg, who became his lifelong friend (and, later, brother-in-law). A number of Zemlinsky's works were introduced in the late 1890s. He conducted operas at the Vienna Volksoper from 1904 and (except for the 1907–08 season, when he conducted the Hofoper) served as Kapellmeister there from 1906 to 1911. With Schoenberg he founded (1904) an organization to introduce and encourage the appreciation of new music in Vienna. From 1911 to 1927 he was opera conductor for the Deutsches Landestheater in Prague, Czech., and from 1927 to 1930 he was Kapellmeister at the Kroll Opera in Berlin. Until 1933 he taught at the Berlin Musikhochschule. During this time he was a guest conductor with many European orchestras. In 1933 events in Germany compelled him to move to Vienna, and in 1938, after the Anschluss, he left Vienna and immigrated to the United States.

Among his 10 operas, *Eine florentinische Tragödie* (1915–16) and *Der Zwerg* (1920–21; also called *Der Geburtstag de Infantin*), both adapted from works by Oscar Wilde, are probably best known. *Lyrische Symphonie* (1923) for soprano, baritone, and orchestra is chief among his six symphonies, and *Gesänge* ("Songs") to poems by Maurice Maeterlinck (1910–13) the best known of his songs. He also wrote five choral works and several popular instrumental and chamber pieces.

Zemlya i Volya, English LAND AND FREEDOM, first Russian political party to openly advocate a policy of revolution; it had been preceded only by conspiratorial groups. Founded in 1876, the party two years later took its name from an earlier (1861–64) secret society. A product of the Narodnik (Populist) movement, the party maintained that the peasantry would be the source of social revolution. Its members, especially doctors and teachers, settled among the peasants and encouraged them to improve their condition by changing the social system. The party also had groups operating among the intelligentsia and urban workers and had administrative and "disorganizing" sections; all its activities were coordinated by a central "basic circle."

By 1878–79 many of those working among the peasantry had become frustrated by police repression, which convinced them of the need for political as well as social reform. They favoured emphasis on the party's "disorganizing" activities (*i.e.,* terrorism) to bring about reforms that would in the end result in revolution. The reforms first would provide the political freedom to conduct agitation leading to the undermining of the state structure, and thus publicly exposing the state's vulnerability and encouraging revolution. Disagreeing over tactics, the members of Zemlya i Volya split into two groups in 1879. Those favouring terror formed the Narodnaya Volya ("People's Will"), which was effectively crushed by the police after it assassinated Alexander II (1881). The others, preferring to emphasize direct agitation among the people, became the Chorny Peredel ("Black Repartition"), which operated until several of its leaders left it (1883) to form a Social-Democratic organization abroad.

zemsky sobor ("assembly of the land"), in 16th- and 17th-century Russia, an advisory assembly convened by the tsar or the highest civil authority in power whenever necessary. It was generally composed of representatives from the ecclesiastical and monastic authorities, the boyar council, the landowning classes, and the urban freemen; elections for representatives and the sessions of each group were held separately.

Zemskie sobory were first called by Ivan IV the Terrible, and the assemblies met often during his reign; the most important one (1566) considered the Livonian War against Poland. After a *zemsky sobor* confirmed the accession of Fyodor I in 1584, none was called until the assembly that elected Boris Godunov tsar in 1598. During the Time of Troubles (1598–1613), the assemblies were again convened frequently and were highly influential; the *zemsky sobor* that assembled in 1613 elected Michael Romanov tsar. Several others subsequently assisted with internal reforms, but after 1622 the *zemsky sobor* declined in importance; the last one was convened in 1653.

In the 19th century the Slavophiles revived the concept of the *zemsky sobor,* considering it a reflection of the ideal union between the tsar and the Russian people; a proposal to reestablish the institution resulted in the dismissal of the minister who suggested it, N.P. Ignatiev.

zemstvo, plural ZEMSTVA, organ of rural self-government in the Russian Empire and the Ukraine; established in 1864 to provide social and economic services, it became a significant liberal influence within imperial Russia. *Zemstva* assemblies existed on two levels, the *uyezd* (district) and the province; the *uyezd* assemblies, composed of delegates representing the individual landed proprietors and the peasant village communes, elected the provincial assemblies. Each assembly appointed an executive board and hired professional experts to carry out its functions.

Generally dominated by the nobility, the *zemstva* suffered after 1890 from legislation that restricted their authority, from insufficient revenue, and from administrative controls of a hostile bureaucracy. Nevertheless, they expanded the network of elementary schools, constructed roads, provided health care, and instructed the peasantry in agricultural techniques. From the late 1890s onward they also agitated for constitutional reform and, through a union organized by the *zemstva* and their professional employees, stimulated revolutionary activity in 1904–05 and 1917. Reorganized on a democratic basis in 1917, the *zemstva* were abolished after the Bolshevik party came to power later that year.

The term *zemstvo* also referred to a 16th-century institution for tax collection.

Zen, Chinese CH'AN (from Sanskrit *dhyāna,* "meditation"), important school of Buddhism in Japan that claims to transmit the spirit or essence of Buddhism, which consists in experiencing the enlightenment (bodhi) achieved by Gautama the Buddha. The school arose in the 6th century in China as Ch'an, a form of Mahāyāna Buddhism; though introduced centuries earlier, Zen did not fully develop in Japan until the 12th century. In its secondary developments of mental tranquillity, fearlessness, and spontaneity—all faculties of the enlightened mind—the school of Zen has had lasting influence on the cultural life of Japan.

Zen teaches that the Buddha-nature, or potential to achieve enlightenment, is inherent in everyone but lies dormant because of ignorance. It is best awakened not by the study of scriptures, the practice of good deeds, rites and ceremonies, or worship of images but by a sudden breaking through of the boundaries of common, everyday, logical thought. Training in the methods leading to such an enlightenment (Chinese *wu;* Japanese Satori, *q.v.*) is best transmitted personally from master to disciple. The methods recommended, however, differ among the various sects of Zen.

The Rinzai (Chinese: Lin-chi) sect, introduced to Japan from China by the priest Ensai in 1191, emphasizes sudden shock and meditation on the paradoxical statements called *kōan.* The Sōtō (Chinese: Ts'ao-tung) sect, transmitted to Japan by Dōgen on his return from China in 1227, prefers the method of sitting in meditation (*zazen*). A third sect, the Ōbaku (Chinese: Huang-po), was established in 1654 by the Chinese monk Yin-yüan (Japanese: Ingen). It employs the methods of Rinzai and also practices *nembutsu,* the continual invocation of Amida (the Japanese name for the Buddha Amitābha), with the devotional formula *namu Amida Butsu* (Japanese: "homage to Amida Buddha").

During the 16th-century period of political unrest, Zen priests not only contributed their talents as diplomats and administrators but also preserved the cultural life; it was under their inspiration that art, literature, the tea cult, and the nō theatre, for example, developed and prospered. Neo-Confucianism, which became the guiding principle of the Tokugawa feudal regime (1603–1867), also was originally introduced and propagated by Japanese Zen masters.

In modern Japan, Zen sects and subsects claim some 9,600,000 adherents. Considerable interest in various aspects of Zen thought has developed also in Western countries in the latter half of the 20th century, and a number of Zen groups have been formed in North America and Europe.

Zend-Avesta (Zoroastrian scripture): *see* Avesta.

Zend language: *see* Avestan language.

zen'ei ikebana, also called ZEN'EIBANA (Japanese: "avant-garde flower arranging"), in Japanese floral art, modern style in which freedom of expression takes precedence over classic rules. *Zen'ei ikebana* was established in 1930 by a group of art critics and floral masters led by Teshigahara Sōfū, founder of the Sōgetsu school (1927). In the spirit of the less-formal *nageire* and *moribana* styles, it broke established rules governing the natural placement of materials and the choice of vases harmonious with the arrangement. *Zen'ei ikebana* masters crossed stems, used even numbers of branches rather than the odd numbers prescribed by tradition, cut leaves into artificial shapes, applied paint to the arrangement, visibly wired the arrangement together, and



Zen'ei ikebana arrangement of the Ohara school using anthurium, Japanese yew, and aluminum-sheathed wood

By courtesy of the International Society for Educational Information, Tokyo

often included such materials as plastic, glass, and feathers.

Zeng Guofan (Chinese leader): *see* Tseng Kuo-fan.

Zenger, John Peter (b. 1697, Germany—d. July 28, 1746, New York City), New York printer and journalist whose famous acquittal in a libel suit (1735) established the first important victory for freedom of the press in the English colonies of North America.

Emigrating to New York City at 13, Zenger was indentured for eight years as an apprentice to William Bradford, pioneer printer of the middle colonies, and established his own printing business in 1726.

On Nov. 5, 1733, Zenger published his first issue of the *New York Weekly Journal*—the political organ of a group of residents who opposed the policies of the colonial governor William Cosby. Although many of the articles were contributed by his more learned colleagues, Zenger was still legally responsible for their content as publisher. For a year the paper continued its scathing attacks on Cosby until, on Nov. 17, 1734, Zenger was arrested for libel. Remaining in prison for nearly 10 months, he was finally brought to trial in August of the following year. Disregarding the judge's admonition, his brilliant Philadelphia defense attorney, Andrew Hamilton, argued that the jury itself was competent to decide the truth of Zenger's printed statements. To the acclaim of the general public and the spectators, the colonial jury acquitted Zenger on the ground that his charges were based on fact—a key consideration in libel cases since that time.

Zenger subsequently served as public printer in both New York and New Jersey. His account of the trial was published in 1736 in the *Journal* and was widely circulated in both the United States and England.

Zengi (Iraqi ruler): *see* Zangī.

Zengzi (Confucianist philosopher): *see* Tseng-tzu.

zenith, point on the celestial sphere directly above an observer on the Earth. The point 180° opposite the zenith, directly underfoot, is the nadir. Astronomical zenith is defined by gravity; *i.e.*, by sighting up a plumb line. If the line were not deflected by such local irregularities in the Earth's mass as mountains, it would point to the geographic zenith. Because the Earth rotates and is not a perfect sphere, the geocentric zenith is slightly different from the geographic zenith except at the Equator and the poles. Geocentric zenith is the intersection with the celestial sphere of a straight line drawn through the observer's position from the geometric centre of the Earth.

Zenjān (Iran): *see* Zanjān.

Zenjirli Hüyük (Turkey): *see* Zincirli Hüyük.

Zennichi (Buddhist prophet): *see* Nichiren.

Zeno (b. Isauria, Diocese of the East—d. April 9, 491), Eastern Roman emperor whose reign (474–491) was troubled by revolts and religious dissension.

Until he married the Eastern emperor Leo I's daughter Ariadne (in 466 or 467), Zeno had been known as Tarasicodissa. As such he led an Isaurian army that the Emperor relied upon to offset the influence of German troops under the powerful patrician Aspar. In 469 Zeno was appointed consul and master of the soldiers. On the death of Leo I early in 474, Zeno's seven-year-old son reigned as Leo II; the child died before the end of the year, after having appointed his father co-emperor.

Zeno made a lasting peace with the Vandals in Africa but soon encountered difficulties at home when his most trusted adviser, the Isaurian Illus, plotted a coup d'etat with Leo I's brother-in-law Basiliscus. The Emperor, with many of his followers, was forced to flee to Isauria. Basiliscus reigned at Constantinople for 20 months, but his religious beliefs made him highly unpopular.

With the help of Illus, who changed his allegiance, Zeno returned to Constantinople in August 476. Illus, who had gained great influence in the government, raised a rebellion in Asia Minor (484), and, though severely defeated, held out against the Emperor until captured and beheaded in 488. During those years Zeno also had to deal with revolts of the Ostrogoths under Theodoric. By appointing Theodoric to replace Odoacer as king of Italy (489), Zeno was able to persuade the Ostrogoths to leave the Eastern Empire.

Although the rest of Zeno's reign was free from revolts and invasions, there were bitter disputes between the orthodox Christians and Monophysites, a heretical faction that believed the divine and human natures of Christ were one. The Emperor sought to reconcile the two groups with his letter, the *Henotikon*, addressed to the church in Egypt (482). The doctrines expressed in this document were acceptable to the Monophysites and brought a measure of religious peace to the East, but they resulted in a schism with the church at Rome that lasted from 484 to 518.

Zeno OF CITIUM (b. *c.* 335 BC, Citium, Cyprus—d. *c.* 263, Athens), Greek thinker who founded the Stoic school of philosophy, which influenced the development of philosophical and ethical thought in Hellenistic and Roman times.

He went to Athens *c.* 312 BC and attended lectures by the Cynic philosophers Crates of Thebes and Stilpon of Megara, in addition to lectures at the Academy. Arriving at his own philosophy, he began to teach in the Stoa Poikile (Painted Colonnade), whence the name of his philosophy. Zeno's philosophical system included logic and theory of knowledge, physics, and ethics—the latter being central. He taught that happiness lay in conforming the will to the divine reason, which governs the universe. In logic and the theory of knowledge he was influenced by Antisthenes and Diodorus Cronus, in physics by Heracleitus. None of his many treatises, written in harsh but forceful Greek, has survived save in fragmentary quotations.

Zeno OF ELEA (*c.* 495 BC–*c.* 430 BC), Greek philosopher and mathematician, whom Aristotle called the inventor of dialectic. He is especially known for his paradoxes that contributed to the development of logical and mathematical rigour and that were insoluble until the development of precise concepts of continuity and infinity.

Zeno was famous for the paradoxes whereby, in order to recommend the Parmenidean doctrine of the existence of "the one" (*i.e.*, indivisible reality), he sought to controvert the common-sense belief in the existence of "the many" (*i.e.*, distinguishable qualities and things capable of motion). Zeno was the son of a certain Teleutagoras and the pupil and friend of Parmenides. In Plato's *Parmenides*, Socrates, "then very young," converses with Parmenides and Zeno, "a man of about forty"; but it may be doubted whether such a meeting was chronologically possible. Plato's account of Zeno's purpose (*Parmenides*), however, is presumably accurate. In reply to those who thought that Parmenides' theory of the existence of "the one" involved inconsistencies, Zeno tried to show that the assumption of the existence of a plurality of things in time and space carried with it more serious inconsistencies. In early youth he collected his arguments in a book, which, according to Plato, was put into circulation without his knowledge.

Zeno made use of three premises: first, that any unit has magnitude; second, that it is infinitely divisible; and third, that it is indivisible. Yet he incorporated arguments for each: for the first premise, he argued that that which, added to or subtracted from something else, does not increase or decrease the second unit is nothing; for the second, that a unit, being one, is homogeneous and that therefore, if divisible, it cannot be divisible at one point rather than another; for the third, that a unit, if divisible, is divisible either into extended minima, which contradicts the second premise or, because of the first premise, into nothing. He had in his hands a very powerful complex argument in the form of a dilemma, one horn of which supposed indivisibility, the other infinite divisibility, both leading to a contradiction of the original hypothesis. His method had great influence and may be summarized as follows: he continued Parmenides' abstract, analytic manner but started from his opponents' theses and refuted them by *reductio ad absurdum*. It was probably the two latter characteristics which Aristotle had in mind when he called him the inventor of dialectic.

That Zeno was arguing against actual opponents, Pythagoreans who believed in a plurality composed of numbers that were thought of as extended units, is a matter of controversy. It is not likely that any mathematical implications received attention in his lifetime. But in fact the logical problems which his paradoxes raise about a mathematical continuum are serious, fundamental, and inadequately solved by Aristotle. *See also* paradoxes of Zeno.

Zeno, Carlo (b. 1334, Venice—d. March 8, 1418, Venice), Venetian admiral whose victory over the Genoese at Chioggia, near Venice, in 1380 was a turning point in the struggle between the two great maritime republics.

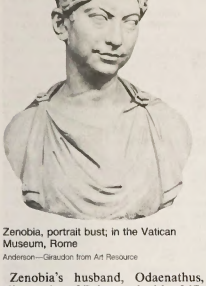
Briefly a student at the University of Padua, Zeno was forced by poverty to become a soldier, but later he became a merchant. During commercial voyages to Constantinople and Crete, he acted as envoy for his native city in negotiations with the Byzantine emperor John V Palеologus. In 1378, when the War of Chioggia broke out, he was sent to defend Treviso (north of Venice); and, after the defeat of a Venetian fleet at Pola (across the Adriatic from Venice), he harassed the Genoese in the Ligurian Sea and the Aegean. His ships were off Cyprus when he learned that a Genoese fleet under Adm. Pietro Doria had

taken Chioggia and was threatening Venice. Hastening home, he found that the Venetians, commanded by Vettor Pisani, had managed to blockade the port of Chioggia by sinking ships in the channel. In the ensuing battle, Doria was killed, and the Genoese were encircled. On June 24, 1380, the Genoese, reduced to starvation, surrendered. When Pisani died in August, Zeno became grand admiral.

On retiring to civilian life, Zeno served in embassies to France and England and in the Venetian government. In 1403 he was once more called to military service, first against a French fleet off Genoa and then fighting on land against Francesco I Carrara, lord of Padua. Accused of having taken part in the sack of Carrara's palace, he was imprisoned for two years. After his release he went to the Holy Land and, visiting Cyprus, took over command of its army against the Genoese, whom he expelled from the island. In 1410 he returned to Venice.

Zeno, paradoxes of: *see* paradoxes of Zeno.

Zenobia, in full SEPTIMIA ZENOBIA, Aramaic ZNWBYĀ BAT ZABBAI (d. after 274), queen of the Roman colony of Palmyra, in present-day Syria, from 267 or 268 to 272. She conquered several of Rome's eastern provinces before she was subjugated by the emperor Aurelian (ruled 270–275).



Zenobia, portrait bust; in the Vatican Museum, Rome
Anderson—Giraudon from Art Resource

Zenobia's husband, Odaenathus, Rome's client ruler of Palmyra, had by 267 recovered the Roman East from Persian conquerors. After Odaenathus and his eldest son (by his former wife), Herodes (or Herodianus), were assassinated in 267 or 268, Zenobia became regent for her own young son Wahballat (called Vaballathus in Latin, Athenodorus in Greek). Styling herself queen of Palmyra, she had Vaballathus adopt his father's titles of "king of kings" and *corrector totius Orientis* ("governor of all the East").

Nevertheless, unlike Odaenathus, Zenobia was not content to remain a Roman client. In 269 she seized Egypt, then conquered much of Asia Minor and declared her independence from Rome. Marching east, Aurelian defeated her armies at Antioch (now Antakya, Turkey) and at Emesa (now Homs, Syria) and besieged Palmyra. Zenobia and Vaballathus tried to flee from the city, but they were captured and taken to Rome (272). The Palmyrenes soon surrendered. When they revolted again in 273, the Romans recaptured and destroyed the city. Zenobia and two of her sons, Herennianus and Timolaus, graced the triumphal procession that Aurelian celebrated at Rome in 274. Vaballathus' fate is unknown, but Zenobia married a Roman senator and presumably spent the rest of her life at his villa near Tibur (now Tivoli, Italy).

Zenodotus OF EPHESUS (fl. late 3rd century BC), Greek grammarian and first superintendent (from *c.* 284 BC) of the library at Alexandria, noted for editions of Greek poets and especially for producing the first critical edition of Homer.

Zenodotus lived during the reigns of the first two Ptolemies and was a pupil of Philetas of Cos. While serving as superintendent of the library at Alexandria, he directed the work of editing the Greek epic and perhaps the lyric poets. After comparing different manuscripts of Homer, he deleted doubtful lines, transposed others, made emendations, and divided the *Iliad* and the *Odyssey* into 24 books each.

Zenodotus' edition—known only of which is derived almost entirely from later scholia on Homer—was severely attacked for its subjectivity by later scholars, notably one of his successors at the library, Aristarchus of Samothrace (*c.* 217–*c.* 145 BC) who modified Zenodotus' work.

Zenodotus also compiled a Homeric glossary, edited the *Theogony* of Hesiod, and published studies of Pindar and Anacreon, traces of which survive in a papyrus from Oxyrhynchus. He is also said to have written epic poetry.

Zenshin (Buddhist reformer): *see* Shinran.

Zenshōbō Renchō (Buddhist prophet): *see* Nichiren.

Zenta, Battle of (Sept. 11, 1697), decisive military victory of Austrian forces over an Ottoman army at Zenta (now Senta, Yugos.) on the Tisa River during war (1683–99) between the Ottoman Empire and the Holy League (Austria–Poland–Venice–Russia), a victory that made Austria the foremost power in central Europe.

In September 1697 the Ottoman army, led by Sultan Mustafa II, was overtaken by the Austrians under Prince Eugene of Savoy as it was crossing the river at Zenta. The Ottomans were panic stricken, and the grand vizier was killed on the battlefield by mutinous Janissaries; the Ottomans lost all their artillery as well as the sultan's treasure box to the Austrians. Mustafa II, who faced desertion by his ally France and had lost Azov to Russia (1696), was compelled to sue for peace (Treaty of Carlowitz, 1699).

zeolite, any member of a family of hydrated aluminosilicate minerals that contain alkali and alkaline-earth metals. The zeolites are noted for their lability toward ion-exchange and reversible dehydration. They have a framework structure that encloses interconnected cavities occupied by large metal cations (positively charged ions) and water molecules.

The essential structural feature of a zeolite is a three-dimensional tetrahedral framework in which each oxygen atom is shared by two tetrahedra. If all tetrahedra contained silicon the framework would be neutral; substitution of aluminum for silicon creates a charge imbalance and requires other metal ions to be present in relatively large cavities of the framework. In naturally occurring zeolites these metal ions are typically mono- or divalent ions such as sodium, potassium, magnesium, calcium, and barium. Zeolites are similar to feldspar minerals except that cavities are larger in zeolites and water is generally present. Structurally, zeolites are classified by the types of structural units that compose the framework, such as rings or polyhedra types. The cavities formed by the framework units have diameters ranging from about 2 to 8 angstroms, which permits relatively easy movement of ions between cavities.

This ease of movement of ions and water within the framework allows reversible dehydration and cation exchange, properties which vary considerably with chemical and structural differences. Dehydration character varies with the way water is bound in the structure. For those zeolites in which water is tightly bound, dehydration occurs at relatively high temperatures; by contrast, in certain zeolites with large cavities, some of the water can be released at low temperatures. The rate of ion exchange depends on the size and connections between cavities. Some ions are excluded because of specific structural properties.

Zeolite properties are exploited through commercial production of zeolites with particular structural and chemical features. Some commercial uses include separation of hydrocarbons, such as in petroleum refining; drying of gases and liquids; and pollution control by selective molecular adsorption.

Natural zeolites occur in basic volcanic rocks as cavity fillings, probably as a result of deposition by fluids or vapours. In sedimentary rocks zeolites occur as alteration products of volcanic glass and serve as cementing material in detrital rocks; they also are found in chemical sedimentary rocks of marine origin. Extensive deposits of zeolites occur in all oceans. Metamorphic rocks contain a sequence of zeolite minerals useful for assigning relative metamorphic grade; these minerals form at the expense of feldspars and volcanic glass. For a table of zeolites, *see* page 908.

zeolitic facies, one of the major divisions of the mineral facies classification of metamorphic rocks, the rocks of which formed at the lowest temperatures and pressures associated with regional metamorphism. It represents the transition between the sedimentary processes of diagenesis and the distinct regional metamorphism exhibited by the greenschist facies. This facies was first proposed for rocks that were buried at depths of 6 to 9 km (approximately 10 to 14 miles), where they are subject to a load pressure of about one-fifth of a kilobar (about 3,000 pounds per square inch) and temperatures of 200° to 300° C (400° to 575° F). Minerals typically found under these conditions include the zeolites, albite, quartz, and prehnite. Volatile components are very important in the chemistry of this facies because, under zeolitic facies, the temperature and pressure can change the chemical potentials of water and carbon dioxide so as to produce the mineralogy of the greenschist facies.

Consult the INDEX *first*

zeon, in the Eastern Orthodox church, a part of the Eucharistic liturgy in which the deacon pours a few drops of hot water (known as the *zeon,* or "living water") into the chalice. The origin of the rite is not known, though it is clearly very ancient. It is explained as symbolizing the fervour (*i.e.,* heat) of faith or the descent of the Holy Spirit.

Zephaniah, also spelled SOPHONIAS (fl. 7th century BC), Israelite prophet, said to be the author of one of the shorter Old Testament prophetical books, who proclaimed the approaching divine judgment. The first verse of the Book of Zephaniah makes him a contemporary of Josiah, king of Judah (reigned *c.* 640–609 BC). The prophet's activity, however, probably occurred during the early part of Josiah's reign, for his criticism of the worship of certain gods in Jerusalem (Baal, Milcom, and the host of the heavens) would have been meaningless after Josiah's reform, which took place about 623/622 BC.

Zephaniah, Book of, also called SOPHONIAS, the ninth of 12 Old Testament books that bear the names of the Minor Prophets, collected in one book, The Twelve, in the Jewish canon. The book consists of a series of independent sayings, many of which are rightly attributed to Zephaniah, written probably about 640–630 BC. The actual compilation and the ex-

Zeolites

name formula	colour	lustre	Mohs hardness	specific gravity	habit or form	cleavage	refractive indices	crystal system space group	remarks
analcime $NaAlSi_2O_6 \cdot H_2O$	colourless, white, gray, pink	vitreous	5–5½	2.2–2.3	transparent to nearly opaque, brittle, well-formed crystals; radiating aggregates	very poor cleavage	$n = 1.479–1.493$	isometric Ia3d	classified as a zeolite because of its exchange and dehydration properties and as a feldspathoid because of its structure
brewsterite $(Sr, Ba, Ca)Al_2Si_6O_{16} \cdot 5H_2O$	white; yellow, gray		5	2.5	prismatic crystals	platy cleavage	$\alpha = 1.510$ $\beta = 1.512$ $\gamma = 1.523$	monoclinic $P\frac{2_1}{m}$	
chabazite $(Ca, Na_2)Al_2Si_4O_{12} \cdot 6H_2O$	white, flesh-red	vitreous	4½	2.0–2.1	brittle, transparent or translucent, single, cube-like rhombohedrons	poor cleavage	$\omega \atop \varepsilon$ } $= 1.470–1.494$	hexagonal R3m	
clinoptilolite $(Na, K)_6CaAl_6Si_{30}O_{72} \cdot 24H_2O$	variable, but usually colourless or white	vitreous	3½–4	2.1	transparent, brittle, coffin-shaped crystals	one perfect cleavage	$\alpha = 1.476–1.488$ $\gamma = 1.479–1.489$	monoclinic $\frac{I2}{m}$	
dachiardite $(K_2, Na_2, Ca)_3Al_6Si_{18}O_{48} \cdot 18H_2O$	colourless		4–4½	2.2	prismatic twinned crystals	one platy cleavage	$\alpha = 1.491$ $\beta = 1.496$ $\gamma = 1.499$	monoclinic $C\frac{2}{m}$	
edingtonite $BaAl_2Si_3O_{10} \cdot 3H_2O$	colourless, white, pink, brown	vitreous	4–4½	2.7–2.8	pyramidal crystals; massive	two cleavages	$\alpha = 1.541$ $\beta = 1.553$ $\gamma = 1.557$	orthorhombic (pseudo-tetragonal) $P2_12_12$	pyroelectric
epistilbite $CaAl_2Si_6O_{16} \cdot 5H_2O$	colourless, white, pale pink	vitreous	4	2.2	sheaflike aggregates	one very good cleavage	$\alpha = 1.485–1.505$ $\beta = 1.497–1.515$ $\gamma = 1.497–1.519$	monoclinic $C\frac{2}{m}$	piezoelectric
erionite $(Na_2, K_2, Ca)_{4.5}Al_9Si_{27}O_{72} \cdot 27H_2O$	white			2.0–2.1	wool-like fibres; radiating crystal groups		$\omega = 1.468–1.472$ $\varepsilon = 1.473–1.476$	hexagonal $P\frac{6_3}{m}mc$	
faujasite $(Na_2, Ca)_{3.5}Al_7Si_{17}O_{48} \cdot 32H_2O$	colourless; yellowish		5	1.9	transparent or opaque rounded octahedrons	one distinct cleavage	$n = 1.471–1.480$	isometric Fd3m	has the most open structure of all the zeolites
ferrierite $(Na, K)_4Mg_2Al_6Si_{30}O_{72}(OH)_2 \cdot 18H_2O$	colourless, white	vitreous to pearly	3	2.2	radiating groups of bladed crystals	one perfect cleavage	$\alpha = 1.478$ $\beta = 1.479$ $\gamma = 1.482$	orthorhombic Immm	
gismondine $CaAl_2Si_2O_8 \cdot 4H_2O$	colourless or white, bluish, grayish, reddish		4½	2.2–2.3	bipyramidal crystals	one distinct cleavage	$\alpha = 1.531–1.538$ $\beta = 1.539–1.543$ $\gamma = 1.548$	monoclinic $P\frac{2_1}{c}$	
gmelinite $(Na_2, Ca)Al_2Si_4O_{12} \cdot 6H_2O$	colourless, white; yellowish, greenish, reddish-white	vitreous	4½	2.1	well-formed crystals	one good cleavage	$\varepsilon = 1.474–1.480$ $\omega = 1.476–1.494$	hexagonal $P\frac{6_3}{m}mc$	
gonnardite $Na_2CaAl_4Si_6O_{20} \cdot 5H_2O$	colourless, white, pink, brown	vitreous	5	2.3	spherules		$\alpha = 1.497–1.506$ $\gamma = 1.499–1.508$	orthorhombic	
harmotome $BaAl_2Si_6O_{16} \cdot 6H_2O$	white to gray, yellow, red, brown	vitreous	4½	2.4–2.5	crosslike penetration; twinned crystals	one distinct cleavage	$\alpha = 1.503–1.508$ $\beta = 1.505–1.509$ $\gamma = 1.508–1.514$	monoclinic $P\frac{2_1}{m}$	
heulandite $(Ca, Na_2)Al_2Si_7O_{18} \cdot 6H_2O$	white to red, gray, brown	vitreous to pearly	3½–4	2.1–2.2	transparent, brittle, coffin-shaped crystals	one perfect cleavage	$\alpha = 1.491–1.505$ $\beta = 1.493–1.503$ $\gamma = 1.500–1.512$	monoclinic $\frac{I2}{m}$	
laumontite $CaAl_2Si_4O_{12} \cdot 4H_2O$	white to yellow or gray; sometimes red	vitreous	3–4	2.2–2.3	prismatic crystals	two good cleavages	$\alpha = 1.502–1.514$ $\beta = 1.512–1.522$ $\gamma = 1.514–1.525$	monoclinic C2 or Cm	
levynite $CaAl_2Si_4O_{12} \cdot 6H_2O$	colourless, white, grayish, reddish, yellowish	vitreous	4–4½	2.1	rhombohedral crystals		$\varepsilon = 1.491–1.500$ $\omega = 1.496–1.505$	hexagonal R3m	
mesolite $Na_2Ca_2Al_6Si_9O_{30} \cdot 8H_2O$	colourless to white; yellow, gray, pink, red	vitreous to pearly	5	2.3	needlelike crystal masses; almost invariably twinned crystals	one perfect cleavage	$\alpha = 1.505–1.507$ $\beta = 1.505–1.507$ $\gamma = 1.506–1.508$	monoclinic C2	chemically intermediate between natrolite and scolecite
mordenite $(Na_2, K_2, Ca)Al_2Si_{10}O_{24} \cdot 7H_2O$	colourless, white; red, brown, yellow	vitreous	3–4	2.1–2.2	minute, transparent, brittle, coffin-shaped crystals; rosettes	one perfect, one good cleavage	$\alpha = 1.472–1.483$ $\beta = 1.475–1.485$ $\gamma = 1.477–1.487$	orthorhombic Cmcm or Cmc2	
natrolite $Na_2(Al_2Si_3O_{10}) \cdot 2H_2O$	colourless, white, gray, yellow, red, pink	vitreous to pearly	5	2.2–2.3	slender, prismatic crystals; fibrous radiating aggregates	one perfect cleavage	$\alpha = 1.473–1.483$ $\beta = 1.476–1.486$ $\gamma = 1.485–1.496$	orthorhombic Fdd2	pyroelectric
phillipsite $(K_2, Na_2, Ca)_3Al_6Si_{10}O_{32} \cdot 12H_2O$	colourless, white, pink, yellow, gray	vitreous	4–4½	2.2	brittle crystals, usually penetration twins	two distinct cleavages	$\alpha = 1.483–1.504$ $\beta = 1.484–1.509$ $\gamma = 1.486–1.514$	monoclinic $P\frac{2_1}{m}$ or $P2_1$	
scolecite $CaAl_2Si_3O_{10} \cdot 3H_2O$	colourless to white; gray, pink, red, yellow	vitreous to silky	5	2.2–2.3	slender prismatic crystals, frequently twinned; radiating crystal masses; fibrous massive	one nearly perfect cleavage	$\alpha = 1.507–1.513$ $\beta = 1.516–1.520$ $\gamma = 1.517–1.521$	monoclinic Cc	
stilbite $(Ca, Na_2, K_2)_4Al_8Si_{28}O_{72} \cdot 28H_2O$	white; yellow, red, brown	vitreous	3½–4	2.1–2.2	sheaflike crystal aggregates; crosslike penetration twins	one very good cleavage	$\alpha = 1.484–1.500$ $\beta = 1.492–1.507$ $\gamma = 1.494–1.513$	monoclinic $C\frac{2}{m}$	
thomsonite $NaCa_2Al_5Si_5O_{20} \cdot 6H_2O$	colourless, white; pink, brown	vitreous to pearly	5–5½	2.1–2.4	radiating spherical concretions; compact massive; columnar	one perfect, one good cleavage	$\alpha = 1.497–1.530$ $\beta = 1.513–1.533$ $\gamma = 1.518–1.544$	orthorhombic Pnma	pyroelectric
wairakite $CaAl_2Si_4O_{12} \cdot 2H_2O$	colourless to white	vitreous	5½–6	2.3	usually twinned		$\alpha = 1.498$ $\gamma = 1.502$	monoclinic $I\frac{2}{a}$	
yugawaralite $CaAl_2Si_6O_{16} \cdot 4H_2O$	colourless to white	vitreous	4½	2.2	flat crystals	poor cleavage	$\alpha = 1.495$ $\beta = 1.497$ $\gamma = 1.504$	monoclinic Pc	

pansion of the sayings is the work of a later editor.

The dominant theme of the book is the "day of the Lord," which the prophet sees approaching as a consequence of the sins of Judah. A remnant will be saved (the "humble and lowly") through purification by judgment. It is not clear whether the day of judgment is conceived of as historical or eschatological. In any case, the conception was originally developed by Amos and Isaiah, and Zephaniah's resumption of the theme may have influenced his younger contemporary Jeremiah. His description of the "day of the Lord," however, has entered deeply into the popular conception of the judgment day through the great medieval hymn *Dies irae* ("Day of Wrath"), which apparently was inspired by the selections from Zephaniah employed in the responses of the Office of the Dead.

Zephyrinus, SAINT (b. Rome?—d. *c.* 217, Rome?; feast day August 26), pope from *c.* 199 to 217.

Of humble birth, he succeeded Pope St. Victor I and is believed to have appointed his own successor St. Calixtus I (Callistus) as his chief deacon. During Zephyrinus' pontificate, the Roman priest St. Hippolytus vigorously opposed the spread of Monarchianism, a Trinitarian heresy that affirmed the sole deity of God the Father. Zephyrinus failed to condemn Monarchianism or favour the Logos doctrine (emphasizing the distinction of the Persons of the Trinity), of which Hippolytus was the passionate champion. Opposing Zephyrinus, Hippolytus thus started the first schism in the history of the Christian Church.

Unfortunately, the primary source of information on Zephyrinus is Hippolytus' *Philosophoumena,* in which he describes the Pope as a weak man "unskilled in the church's rule" and dominated by Calixtus. Hippolytus considered both men culpable for being unwilling to enter the theological debate on the Trinity. Zephyrinus died during the persecution of Christians that was instigated by the Roman emperor Lucius Septimius Severus.

zeppelin, rigid airship of a type originally manufactured by Luftschiffsbau-Zeppelin and consisting of a cigar-shaped, trussed, and covered frame supported by internal gas cells. The first Zeppelin airship was designed by Ferdinand, Graf von Zeppelin, a retired German army officer, and made its initial flight from a floating hangar on Lake Constance, near Friedrichshafen, (Ger., on July 2, 1900. Beneath the 420-foot (128-metre) craft a keel-like structure connected two external cars, each of which contained a 16-horsepower engine geared to two propellers. A sliding weight secured to the keel afforded vertical control by raising or lowering the nose, while rudders were provided for horizontal control. The craft attained speeds approaching 20 miles per hour (32 km/h).

During World War I the Germans achieved moderate success in long-range bombing operations with the zeppelin-type rigid airship, which could attain higher altitudes than the airplanes then available. On two occasions during 1917, German Zeppelins made flights of almost 100 hours' duration. Such performances led many people to believe that large airships would play a prominent part in aviation development. A number of Zeppelins were distributed to the Allied countries as a part of postwar reparations by Germany.

Of many subsequent zeppelins, the two most famous were the *Graf Zeppelin,* completed in September 1928, and the giant *Hindenburg,* first flown in 1936. The *Graf Zeppelin* inaugurated transatlantic flight service, and by the time of its decommissioning in 1937 had made 590 flights, including 144 ocean crossings, and had flown more than 1,000,000 miles (1,600,000 km). In 1929 the craft covered about 21,500 miles (34,600 km) in a world flight that was completed in an elapsed time of approximately 21 days. The *Hindenburg,* 804 feet (245 metres) long, was powered by four 1,100-horsepower diesel engines, giving it a maximum speed of 84 miles per hour (135 km/h). In 1936 this airship carried a total of 1,002 passengers on 10 scheduled round trips between Germany and the United States. On May 6, 1937, while landing at Lakehurst, N.J., the hydrogen-inflated craft burst into flames and was completely destroyed, with a loss of 36 lives. The Zeppelin airship works were destroyed by Allied bombing during World War II, and building of the huge rigid airships was never resumed.

Zeppelin, Ferdinand (Adolf August Heinrich), Graf von (count of) (b. July 8, 1838, Konstanz, Baden—d. March 8, 1917, Charlottenburg, near Berlin), first notable builder of rigid dirigible airships, for which his surname is still a popular generic term.

Zeppelin received a military commission in 1858. He made the first of several balloon ascensions at St. Paul, Minn., while acting as a military observer (1863) for the Union Army during the American Civil War. He saw military action in 1866 during the Seven Weeks' War and in 1870–71 during the Franco-German War, serving successively in the armies of Württemberg, Prussia, and imperial Germany. He retired in 1890 and devoted the rest of his life to the creation of the rigid airship for which he is known.

Zeppelin struggled for 10 years to produce his lighter-than-air craft. The initial flight (July 2, 1900) of the LZ-1 from a floating hangar on Lake Constance, near Friedrichshafen, Ger., was not entirely successful, but it had the effect of promoting the airship to the degree that public subscriptions and donations thereafter funded the count's work. The German government was quick to perceive the advantage of airships over the as yet poorly developed airplanes, and when Zeppelin achieved 24-hour flight in 1906, he received commissions for an entire fleet. More than 100 zeppelins were used for military operations in World War I. A passenger service known as Delag (Deutsche-Luftschiffahrts AG) was established in 1910, but Zeppelin died before attaining his goal of transcontinental flight.

Zera'im (Hebrew: "Seeds"), the first of the six major divisions, or orders (*sedarim*), of the Mishna (codification of Jewish oral laws), which was completed early in the 3rd century AD by Judah ha-Nasi. *Zera'im* contains 11 tractates (treatises), the first of which (*Berakhot,* "Blessings") deals with public worship and private prayer. The other 10 tractates all deal with laws regarding agriculture and are called: *Pe'a* ("Corner"), *Demai* ("Dubiously Tithed Produce"), *Kilayim* ("Mixed Kinds"), *Shevi'it* ("Seventh Year"), *Terumot* ("Heave Offerings"), *Ma'aserot* ("Tithes"), *Ma'aser sheni* ("Second Tithe"), *Ḥalla* ("Dough Offering"), *'Orla* ("Uncircumcision"—applied to restricted fruit), and *Bikkurim* ("Firstfruits"). The Palestinian Talmud has Gemara (critical commentaries) on all 11 tractates of *Zera'im,* but the Babylonian Talmud has Gemara only on *Berakhot.*

Zeravshan Range, Russian ZERAVSHANSKY KHREBET, also spelled ZERAVŠANSKIJ CHREBET, mountain range in Tajikistan and Uzbekistan, forming a part of the Gissar–Alay system. It extends for more than 230 miles (370 km) east–west parallel to the Turkistan Range between the Zeravshan Valley on the north and the Yagnob and Iskanderdarya valleys on the south. The range is split into four parts by the Fandarya, Kshtut, and Magian rivers. Many peaks rise more than 16,500 feet (5,000 m), the highest being Chimtorga, at 18,009 ft (5,489 m).

Zeravshan River, also spelled ZERAVŠAN, river rising in the eastern Turkistan Range and flowing 545 miles (877 km) west through Tajikistan and southeastern Uzbekistan to disappear in the desert north of Chardzhou near the Amu Darya, of which it was at one time a tributary. The river supplies water to a vast irrigation district, including the Karshi Steppe to the south (which receives water from the Zeravshan by a canal). The Zeravshan Valley is densely populated, particularly within Uzbekistan.

Zerma, also spelled DJERMA, or DYERMA, also called ZABERMA, a people of westernmost Niger, including also a few who live in neighbouring areas of Burkina Faso (formerly Upper Volta) and Nigeria. Zerma speak a dialect of Songhai, one of the languages of the Nilo-Sarahan family, and are considered to be a branch of the Songhai (*q.v.*) people.

The Zerma live in the arid lands of the Sahel. Many live in the Niger River Valley and exploit the river for irrigation. They grow millet, sorghum, rice, corn (maize), and tobacco and raise cotton and peanuts (groundnuts) as cash crops. Cattle are owned but are given to Fulani (Fulbe) or Tuareg to tend; milk is an important element of the daily diet. Horses are kept by important persons, and in the past the Zerma were skilled cavalrymen. Horses and especially cattle are an important source of wealth for the Zerma, and there has long been a trade pattern whereby cattle are driven south for sale in coastal countries.

Niamey, the capital of Niger, and the towns of Dosso and Tillabéry are in Zerma territory. For a long time Zerma have migrated to coastal countries, especially to Ghana, in search of work. The Zerma numbered 850,000 in Niger in the late 20th century.

Zermatt, town, Valais canton, southern Switzerland. It lies at the head of the Mattervisp Valley and at the foot of the Matterhorn (14,692 feet [4,478 m]), 23 miles (37 km) southeast of Sion. Its name is derived from its position *Zur Matte* ("in the Alpine meadow") at an elevation of 5,302 feet (1,616 m). A year-round resort surrounded by mountains and glaciers, it commands some of the finest views in Switzerland and is also a popular centre



Zermatt village and church, Switz., with the Matterhorn in the background
J. Allan Cash—Ostman Agency

for Alpine mountaineering and winter sports. Cableways are numerous, and the highest in Europe leads up the Klein-Matterhorn. Zermatt is reached by rail from Brig. Automobiles are not permitted in Zermatt and the valley road stops at Sankt Niklaus. The population is German speaking and Roman Catholic. Pop. (1980) 3,548.

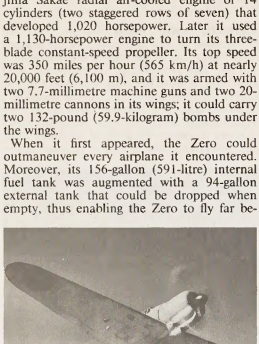
Zernike, Frits (b. July 16, 1888, Amsterdam—d. March 10, 1966, Groningen, Neth.), Dutch scientist, winner of the Nobel Prize for Physics in 1953 for his invention of the phase-contrast microscope, an instrument that permits the study of internal cell structure without the need to stain and thus kill the cells.

Zernike joined the faculty of the State University of Groningen as professor of mathematical physics and theoretical mechanics in 1915 and served as a full professor from 1920 to 1958. His earliest work in optics was concerned with astronomical telescopes. While studying the flaws that occur in some diffraction gratings because of the imperfect spacing of engraved lines, he discovered the phase-contrast principle. He noted that he could distinguish the light rays that passed through different transparent materials. He built a microscope using that principle in 1938. In 1952 Zernike was awarded the Rumford medal of the Royal Society of London.

Zero, also called MITSUBISHI A6M, or NAVY TYPE 0, fighter aircraft, a single-seat, low-wing monoplane used with great effect by the Japanese during World War II. The Zero was made in two conformations: as a land-based fighter and, with folding wingtips for stowage, for carrier use. It was designed to specifications written in 1937, was first tested in 1939, and was placed in production and in operation in China in 1940. Although Allied forces codenamed the aircraft "Zeke," it was generally known as the Zero, a term derived from one of its Japanese names—*Reisen Kanjikisen* (Zero Celebration Carrier-based Fighter Airplane), abbreviated *Reisen.* The year its production began, 1940, was the 2,600th anniversary of the ascension to the throne of Japan's legendary first emperor, Jimmu, hence the "zero-year" celebration.

The Zero was made by Mitsubishi Heavy Industries and was first powered by a Nakajima Sakae radial air-cooled engine of 14 cylinders (two staggered rows of seven) that developed 1,020 horsepower. Later it used a 1,130-horsepower engine to turn its three-blade constant-speed propeller. Its top speed was 350 miles per hour (565 km/h) at nearly 20,000 feet (6,100 m), and it was armed with two 7.7-millimetre machine guns and two 20-millimetre cannons in its wings; it could carry two 132-pound (59.9-kilogram) bombs under the wings.

When it first appeared, the Zero could outmaneuver every airplane it encountered. Moreover, its 156-gallon (591-litre) internal fuel tank was augmented with a 94-gallon external tank that could be dropped when empty, thus enabling the Zero to fly far be-



Japanese Zero, also called Mitsubishi A6M
By courtesy of the National Air and Space Museum, Smithsonian Institution, Washington, D.C.

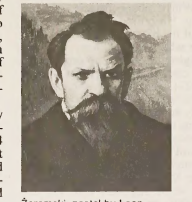
yond its expected range. The Allies did not field fighters that could defeat it in aerial combat until 1943. Many Zeros were converted to kamikaze craft in the closing months of the war. In all, nearly 10,430 of them were built.

zero-point energy, vibrational energy that molecules retain even at the absolute zero of temperature. Temperature in physics has been found to be a measure of the intensity of random molecular motion, and it might be expected that, as temperature is reduced to absolute zero, all motion ceases and molecules come to rest. In fact, however, the motion corresponding to zero-point energy never vanishes.

Zero-point energy results from principles of quantum mechanics, the physics of subatomic phenomena. Should the molecules ever come completely to rest, their component atoms would be precisely located and would simultaneously have precisely specified velocities, namely, of value zero. But it is an axiom of quantum mechanics that no object can ever have precise values of position and velocity simultaneously (*see* uncertainty principle); thus molecules can never come completely to rest.

Żeromski, Stefan (b. Nov. 1, 1864, Strawczyn, Pol., Russian Empire—d. Nov. 20, 1925, Warsaw), Polish novelist admired for his naturalistic and lyrical style.

After attending the Gymnasium at Kielce and the veterinary college in Warsaw, Żeromski worked at first as a resident tutor in country houses and then as an assistant librarian in Switzerland and at the Zamoyski Library in Warsaw (1897–1903). From 1905, while living at Nałęczów, he furthered the cause of education for the masses and was arrested by the Russian authorities in 1908 for these ac-



Żeromski, pastel by Leon Wyczółkowski, 1904; in the Muzeum Narodowe, Kraków, Pol.
By courtesy of the Muzeum Narodowe, Krakow, Pol.

tivities. Żeromski subsequently lived in Paris (1909–12) and in Warsaw. Żeromski's first short stories were published in 1889. His first novel, *Syzyfowe Prace* ("Sisyphean Labours"), appeared in 1897. *Popioły,* 3 vol. (1904; *The Ashes*) finally established his reputation. His last novel, *Przedwiośnie* (1925; "Springtime"), is about the first fruits of Polish national independence.

Zerubbabel, also spelled ZOROBABEL (fl. 6th century BC), governor of Judaea under whom the rebuilding of the Jewish Temple at Jerusalem took place. Of Davidic origin, Zerubbabel is thought to have originally been a Babylonian Jew who returned to Jerusalem at the head of a band of Jewish exiles and became governor of Judaea under the Persians. Influenced by the prophets Haggai and Zechariah, he rebuilt the Temple. As a descendant of the House of David, Zerubbabel rekindled Jewish messianic hopes.

Zervanism (Persian religion): *see* Zurvanism.

Zeta Ursae Majoris (star): *see* Mizar.

Zetes (Greek mythology): *see* Calais and Zetes.

Zethus (Greek mythology): *see* Amphion and Zethus.

Zetkin, Clara, *née* EISSNER (b. July 5, 1857, Wiederau, Saxony—d. June 20, 1933, Arkhangelskoye, Russian S.F.S.R.), German feminist, Socialist, and Communist leader, who after World War I played a leading role in the new Communist Party of Germany (Kommunistische Partei Deutschlands; KPD) and the Comintern (Third International).

Clara Eissner was educated at the Leipzig Teachers' College for Women, and while at school she established contacts with the infant Sozialdemokratische Partei Deutschlands (SPD; Social Democratic Party). Her association with Russian revolutionaries led to her marriage with an exile, Ossip Zetkin (1848–89). She spent most of the 1880s in self-imposed exile in Switzerland and Paris, writing and distributing illegal literature and meeting many leading international Socialists.



Clara Zetkin
By courtesy of the Portratsammlung Deutsche Staatsbibliothek, East Berlin

After participating in the founding congress of the Second Socialist International (1889), she returned to Germany and from Stuttgart edited the Socialist women's paper *Die Gleichheit* ("Equality") from 1892 to 1917. In 1907 she was a cofounder of the International Socialist Women's Congress.

A personal friend of Lenin and of the revolutionary writer and activist Rosa Luxemburg, Clara Zetkin organized the first international women's conference against World War I (Bern, 1915), was a cofounder in 1916 of the radical Spartacus League (Spartakusbund), and joined the new Communist Party of Germany in 1919, becoming a member of the party's central committee and serving in the Reichstag (federal lower house) from 1920.

Elected to the presidium of the Third International (1921), she spent more and more of her time in Moscow. After Lenin's death in 1924, she began to lose much of her influence. Three volumes of collected works, *Ausgewählte Reden und Schriften* ("Selected Speeches and Writings"), were published in East Berlin from 1957 to 1960.

Zeuglodon (extinct whale): *see* Basilosaurus.

Zeus, in ancient Greek religion, chief deity of the pantheon, a sky and weather god who was identical with the Roman god Jupiter (*q.v.*). Zeus was regarded as the sender of thunder and lightning, rain, and winds, and his traditional weapon was the thunderbolt. He was called the father (*i.e.,* the ruler and protector) of both gods and men.

According to a Cretan myth that was later adopted by the Greeks, Cronus, king of the Titans, upon learning that one of his children was fated to dethrone him, swallowed his children as soon as they were born. But Rhea, his wife, saved the infant Zeus by substituting a stone wrapped in swaddling clothes for Cronus to swallow and hiding Zeus in a cave on Crete. There he was nursed by the nymph (or female goat) Amalthaea and guarded by the Curetes (young warriors), who clashed their weapons to disguise the baby's cries. After Zeus grew to manhood he led a revolt against the Titans and succeeded in dethroning Cronus, perhaps with the assistance of his brothers Hades and Poseidon, with whom he then divided dominion over the world.

As ruler of heaven Zeus led the gods to victory against the Giants (offspring of Gaea and Tartarus) and successfully crushed several revolts against him by his fellow gods. According to the Greek poet Homer, heaven was located on the summit of Olympus, the highest mountain in Greece and the logical

home for a weather god. The other members of the pantheon resided there with Zeus and were subject to his will. From his exalted position atop Mount Olympus Zeus was thought to omniscient observe the affairs of men, seeing everything, governing all, and rewarding good conduct and punishing evil. Besides dispensing justice, Zeus was the protector of cities, the home, property, strangers, guests, and supplicants.

Zeus was well known for his amorousness—a source of perpetual discord with his wife, Hera—and he had many love affairs with both mortal and immortal women. In order to achieve his amorous designs, Zeus frequently assumed animal forms. Among his offspring were the twins Apollo and Artemis, by the Titaness Leto; Helen and the Dioscuri, by Leda of Sparta; Persephone, by the goddess Demeter; Athena, born from his head after he had swallowed the Titaness Metis; Hephaestus, Hebe, Ares, and Eileithyia, by his wife, Hera; Dionysus, by the goddess Semele; and many others.



Zeus hurling a thunderbolt, bronze statuette, early 5th century BC; in the Staatliche Museen zu Berlin, Germany

By courtesy of the Staatliche Museen zu Berlin, Antikenabteilung

Though regarded by Greek religionists everywhere as omnipotent and the head of the pantheon, Zeus's very universality tended to reduce his importance compared with that of powerful local divinities such as Athena and Hera. Though his mountaintop shrines were visited by pilgrims, Zeus did not have a temple at Athens until the late 6th century BC, and even his temple at Olympia postdated that of Hera.

In art Zeus was represented as a bearded, dignified, and mature man of stalwart build; his most prominent symbols were the thunderbolt and the eagle.

Zeus, Statue of, at Olympia, Greece, one of the Seven Wonders of the World. The statue was one of two masterpieces by the Greek sculptor Phidias (the other being the statue of Athena in the Parthenon) and was placed in the huge Temple of Zeus at Olympia in western Greece. The statue, almost 12 m (40 feet) high and plated with gold and ivory, represented the god sitting on an elaborate cedarwood throne ornamented with ebony, ivory, gold, and precious stones. On his outstretched right hand was a statue of Nike (Victory), and in the god's left hand was a sceptre on which an eagle was perched. The statue, which took eight years to construct, was noted for the divine majesty and goodness it expressed. The discovery in the 1950s of the remains of Phidias' workshop at Olympia confirmed the statue's date of about 430 BC. The temple was destroyed in AD 426, and the statue, of which no accurate copies survive, may have been destroyed then or in a fire at Constantinople (now Istanbul) about 50 years later.

Zeuxis (fl. late 5th century BC, Heraclea, Magna Graecia [Italy]), one of the best-known painters of ancient Greece, who seems to have carried a trend toward illusionism to an unprecedented level.

Zeuxis seems to have been a panel painter rather than a wall painter; he preferred small compositions, often a single figure, and broke with a lofty tradition by introducing genre subjects into monumental painting. Although none of his works survives, the subject matter of several have been recorded by ancient writers: they include pictures of the gods, such as Zeus surrounded by other deities, Eros crowned with roses, and Pan; pictures of other mythological figures, such as Marsyas bound, and a centaur family; portraits of the Homeric figures Helen, Menelaus, and Penelope; and genre pictures: an athlete, an old woman, a boy with grapes, and a still life of grapes. There are also references to his monochrome paintings and to works in clay.

Ancient records also describe his technique. Following the initiative of his Athenian contemporary Apollodorus, Zeuxis used shading to produce a rudimentary form of chiaroscuro, as opposed to the older method of merely filling in the outlined figures with flat washes of colour. The interior modeling of Zeuxis' figures would appear strongly realistic as compared with the flat volumes of the older method, and this revolutionary illusionism was probably the basis of such stories as that of Zeuxis painting a bunch of grapes so realistic that birds flew toward it to take a nibble.

Zewail, Ahmed H. (b. Feb. 26, 1946, Damanhur, Egypt), Egyptian-born chemist who won the Nobel Prize for Chemistry in 1999 for developing a rapid laser technique that enabled scientists to study the action of atoms during chemical reactions. The breakthrough created a new field of physical chemistry known as femtochemistry.

After graduating from the University of Alexandria (B.A., 1967; M.S., 1969), Zewail attended the University of Pennsylvania, where he earned a doctorate in 1974. Two years later he joined the faculty at the California Institute of Technology and in 1990 was selected as the school's first Linus Pauling professor of chemical physics.

Because chemical reactions last only 10 to 100 femtoseconds (fs)—one femtosecond is 0.000000000000001 second, or 10^{-15}—many believed it would be impossible to study the events during a reaction. In the late 1980s, however, Zewail was able to view the motion of atoms and molecules using a method based on new laser technology capable of producing light flashes just tens of femtoseconds in duration. During the process, known as femtosecond spectroscopy, molecules were mixed together in a vacuum tube in which an ultrafast laser beamed two pulses. The first pulse supplied the energy for the reaction and the second examined the ongoing action. The characteristic spectra, or light patterns, from the molecules were then studied to determine the structural changes of the molecules. Zewail's discovery enabled scientists to gain more control over the outcome of the chemical reaction, and it was expected to have many applications.

Zeyārid DYNASTY, also spelled ZIYĀRID (927–*c.* 1090), Iranian dynasty that ruled in the Caspian provinces of Gurgān and Māzandarān. The founder of the dynasty was Mardāvīz ebn Zeyār (reigned 927–935), who took advantage of a rebellion in the Sāmānid army of Iran to seize power in northern Iran. He soon expanded his domains and captured the cities of Hamadān and Esfahān. Mardāvīz was murdered in 935, and Zeyārid power thereupon disintegrated.

During subsequent hostilities between the Sāmānid and the Būyid dynasties, the Zeyārids changed their allegiance several times and thus were able to maintain their autonomy. But with the consolidation of Ghaznavid power, the Zeyārids acknowledged that dynasty's suzerainty and entered into various marriage alliances with it. When the Seljuqs occupied Māzandarān in the mid-11th century, the Zeyārids were forced to withdraw into the mountainous territory on the southern Caspian shores, where they ruled until about 1090. The Zeyārids were distinguished patrons of the arts.

Zhang (Chinese surname): *see under* Chang, except as below.

Zhang Jun-xiang, Wade-Giles CHANG CHÜN-HSIANG (b. 1909, Chenchiang, Kiangsu province, China), leading playwright and motion-picture director in Nationalist China and later in the People's Republic.

Zhang was educated at Tsinghua University, Peking, and at Yale University and then studied film technique in Hollywood. Returning to China during the Sino-Japanese War (1937–45), he directed several successful plays in Chungking and rose to preeminence in the Chinese film industry. After the establishment of the communist regime in 1949, Zhang became a director of the governmental Central Motion Picture Company. His film *Red Banner on the Emerald Ridge* won acclaim throughout China. Zhang's first published play, *Tales of a Small Town* (1941), is a comedy about the psychological conflicts of a woman in love. *Model Teacher of Myriad Generations* is considered his best play.

Zhang Tianyi, Wade-Giles CHANG T'IEN-I (b. Sept. 10, 1906, Chiang-ning [now Nanking], Kiangsu province, China—d. April 28, 1985), Chinese writer whose brilliant, socially realistic short stories achieved considerable renown in the 1930s.

Zhang received his education while wandering with his family throughout China, learning the various dialects of the country and meeting people of all social backgrounds. In 1924 he moved to Peking, where he began to write and produced his first short story, the quite successful "San-jih-pan chih meng" ("A Dream of Three-and-a-Half Days"). This story, like the many others he was to create over the next 15 years, was written in a realistic and direct manner, reproducing flawlessly the dialects and social patterns that he had observed.

Zhang's career as a short-story writer was curtailed in 1943, when tuberculosis forced him to retire. After recuperating, he was assigned to a trusted position in the new communist regime as a writer of children's plays. He also served as editor in chief of the magazine *Jenmin wen-xue* ("People's Literature") from 1957.

Zhao (Chinese surname): *see under* Chao, except as below.

Zhao Ziyang, Wade-Giles CHAO TZU-YANG, original name ZHAO XIUSHENG, Wade-Giles CHAO HSIU-SHENG (b. Oct. 17, 1919, Hua county, Honan province, China), premier of China from 1980 to 1987 and general secretary of the Chinese Communist Party from 1987 until he was dismissed in 1989.

Born into a landlord family in Honan province, Zhao joined the Young Communist League in 1932 and became a member of the Chinese Communist Party in 1938. During World War II he served in local party organizations in northern China. After the establishment of the People's Republic in 1949, he was moved to Kwangtung province, where he became provincial first party secretary in 1965. Purged in 1967 during the Cultural Revolution, he was later rehabilitated and sent as first party secretary in 1975 to Szechwan, China's most populous province, where he greatly increased industrial and agricultural production. These results were achieved through such innovative policies as rewarding workers on the

basis of work performance rather than need and relying on material incentives that encouraged individual initiative rather than on quotas set by central authorities. In addition, factory managers were given much greater autonomy, and peasants were allowed to expand their private plots of land. Such achievements caught the attention of Deng Xiaoping, the de facto leader of the Chinese Communist Party, and Zhao was quickly made a Politburo alternate in 1977 and a full member in 1979, becoming a member of that body's powerful Standing Committee in February 1980.

Early in 1980 he was appointed vice premier and then, in September, premier, replacing Hua Guofeng. An economic experimenter, Zhao advocated "any structure, system, policy, or measure" that might stimulate the forces of production. As premier he extended his Szechwan policies to the whole of China. Thousands of industrial enterprises were given limited self-management, and peasants achieved increased control over and responsibility for their production and profits. Throughout the 1980s Zhao's pragmatic measures led to rapid increases in both agricultural and light-industrial production, and his policies became the guiding principles for China's future economic development. Zhao was appointed acting general secretary of the Communist Party upon Hu Yaobang's forced resignation from that office in January 1987. In November he officially became general secretary, with Li Peng taking over the premiership.

As general secretary, Zhao continued to favour the loosening of government controls over industry and to advocate the creation of special free-enterprise zones in China's coastal regions as a means of hastening economic development. Premier Li, on the other hand, favoured a cautious approach that relied more on government planning and guidance.

In April 1989 massive student demonstrations calling for more democratic government broke out in Peking. As the protests continued and grew in size, a serious split developed in the Chinese Communist leadership between those who, like Zhao, were somewhat sympathetic to the protesters' demands and those who, like Li, favoured using force to suppress the demonstrations. As the protest movement spread to other cities and threatened to immobilize the central government, Deng Xiaoping, China's paramount leader, threw his support to Li, who thereupon imposed martial law and used the armed forces to crush the protests. On June 24, 1989, Zhao was formally dismissed from his top party and government posts and was replaced as general secretary by Jiang Zemin.

Zhaoqing (China): *see* Chao-ch'ing.

Zhdanov (Ukraine): *see* Mariupol.

Zhdanov, Andrey Aleksandrovich (b. Feb. 26 [Feb. 14, Old Style], 1896, Mariupol, Ukraine, Russian Empire—d. Aug. 31, 1948, Moscow, Russian S.F.S.R.), Soviet government and Communist Party official.

A member of the Bolsheviks from 1915, Zhdanov rose through the party ranks after the October Revolution of 1917 and eventually became political boss of Leningrad (St. Petersburg), leading the city's defense during the 1941–44 siege by the Germans. He was a close associate of Joseph Stalin and reached the peak of his career after World War II, when as a full member of the Politburo (from 1939) he severely tightened the ideological guidelines for postwar cultural activities (*see* Zhdanovshchina). In 1947 he oversaw the founding of the international Soviet propaganda arm, the Cominform (Communist Information Bureau). Zhdanov's death in 1948 is shrouded in mystery, but it seems to have been inopportune for his allies and followers, since it was followed by the notorious Leningrad Affair (*q.v.*), in which as many as 2,000 persons, many of them Zhdanov's associates and subordinates, were purged, probably through the efforts of his enemies Georgy Malenkov and Lavrenty Beria.

Zhdanovshchina, English ZHDANOVISM, cultural policy of the Soviet Union during the Cold War period following World War II, calling for stricter government control of art and promoting an extreme anti-Western bias. Originally applied to literature, it spread to other arts and gradually affected all spheres of intellectual activity in the Soviet Union, including philosophy, biology, medicine, and other sciences. Initiated by a resolution (1946) of the Central Committee of the Communist Party of the Soviet Union that was formulated by the party secretary and cultural boss Andrey Aleksandrovich Zhdanov, it was directed against two literary magazines, *Zvezda* and *Leningrad,* which had published supposedly apolitical, bourgeois, individualistic works of the satirist Mikhail Zoshchenko and the poet Anna Akhmatova, who were expelled from the Union of Soviet Writers. The union itself underwent reorganization, but the aims of the resolution were more far-reaching: to free Soviet culture from "servility before the West."

As the campaign accelerated, all vestiges of Westernism, or cosmopolitanism, in Soviet life were ferreted out. Earlier critics and literary historians were denounced for suggesting that Russian classics had been influenced by Jean-Jacques Rousseau, Molière, Lord Byron, or Charles Dickens. Western inventions and scientific theories were claimed to be of Russian origin. Although Zhdanov died in 1948, the campaign against "cosmopolites" continued until the death of Joseph Stalin in 1953, acquiring increasingly anti-Semitic overtones.

This period (1946–53) is generally regarded as the lowest ebb of Soviet literature, and, short though it was, it created a barrier in Soviet-Western cultural interchange that was difficult to overcome.

Zhe school (painters): *see* Che school.

Zhejiang (China): *see* Chekiang.

Zheleznogorsk, city, Kursk *oblast* (province), western Russia. It is located 80 miles (130 km) northwest of Kursk city and was founded in 1958 in connection with the development of the KMA (Kursk Magnetic Anomaly), one of the Soviet Union's largest iron-ore-mining basins. It is now one of the leading KMA mining centres and has some light industries and a metallurgical institute. Zheleznogorsk achieved city status in 1962. Pop. (1993 est.) 91,300.

Zhelyabov, Andrey Ivanovich (b. Aug. 17 [Aug. 29, New Style], 1851, Nikolayevka, Crimea, Russian Empire [now in Ukraine]—d. April 3 [April 15], 1881, St. Petersburg, Russia), Russian revolutionary and a leading Narodnik.

Born to a family of serfs shortly before emancipation, Zhelyabov entered the law school at Novorossiysk University in Odessa but was expelled for his part in student disturbances of October 1871. He continued to be a member of revolutionary circles in Kiev and Odessa, being arrested for his activities but acquitted.

In June 1879 he took part in a congress of political terrorists and became an advocate of such a policy. He helped found the worker, student, and military arms of the extremist organization People's Will and the newspaper of that organization in 1880 and wrote several of the organization's manifestos. One of the organizers of the assassination of Alexander II (March 1 [March 13], 1881), he was arrested on February 27 (March 11), demanded to be tried together with his subsequently captured compatriots, and was found guilty and executed.

Zhen Zong (Chinese emperor): *see* Chen Tsung.

Zheng (Chinese surname): *see under* Cheng.

Zhengzhou (China): *see* Cheng-chou.

Zhenjiang (China): *see* Chen-chiang.

Zhitomir (Ukraine): *see* Zhytomyr.

Zhivkov, Todor, in full TODOR KHRISTOV ZHIVKOV (b. Sept. 7, 1911, Pravets, near Botevgrad, Bulg.—d. Aug. 5, 1998, Sofia), first secretary of the Bulgarian Communist Party's Central Committee (1954–89) and president of Bulgaria (1971–89).

The son of a poor peasant family, Zhivkov drifted to the Bulgarian capital of Sofia in his youth and, in the late 1920s, joined the Komsomol, the youth league of the outlawed Communist Party. He rose in the party and during World War II helped organize the resistance movement known as the People's Liberation Insurgent Army. After the war and the institution of a Soviet-sponsored communist government in Bulgaria, Zhivkov held increasingly important posts, including the command of the People's Militia, which arrested thousands of political opponents. He became a full member of the Politburo in 1951. In March 1954 he was made first secretary of the Central Committee—the youngest leader of any nation in the Soviet bloc—and, as a protégé of the Soviet leader Nikita S. Khrushchev, emerged as the strongman in the internal party struggles that followed.

From 1962 to 1971 Zhivkov served as premier of Bulgaria and in the latter year was elected president of the State Council formed by Bulgaria's new constitution. In 1965 he survived an attempted coup d'état by dissident party members and military officers—the first ever within a communist regime.

Zhivkov hewed closely to the Soviet line in both domestic and foreign affairs. He proved to be a competent economic manager, and under his leadership industrialization proceeded steadily in Bulgaria and the living standards of its people rose substantially.

But when a wave of democratization swept across the Soviet-bloc nations of eastern Europe in 1989, the aged Zhivkov resigned all his posts in November of that year in order to make way for a more moderate communist leadership. He was subsequently expelled from the Bulgarian Communist Party in December and was placed under arrest in January 1990. Zhivkov was convicted of embezzlement in 1992 and served his sentence under house arrest until his death.

Zhob, formerly FORT SANDEMAN, town, Balochistān province, western Pakistan. The town lies on an open plain just east of the Zhob River. Originally called Apozai (the name is still used locally), it was renamed Fort Sandeman for Sir Robert Sandeman in 1889 and was so called until the 1970s. To the north is a ridge rising 150 feet (45 m) above the plain; on it stands the Castle, the political agent's residence during the time of British rule. A communications centre, Zhob is connected by road with Quetta, Bannu, and Peshāwar. Pop. (1998) 44,248.

zhong (Chinese bell): *see* chung.

Zhong Yong (Confucian text): *see* Chung yung.

Zhongli Quan (in Chinese mythology): *see* Chung-li Ch'üan.

Zhongshan (China): *see* Chung-shan.

Zhou (Chinese surname): *see under* Chou, except as below.

Zhou DYNASTY (China): *see* Chou dynasty.

Zhou Enlai, Wade-Giles CHOU EN-LAI (b. 1898, Huaian, Kiangsu province, China—d. Jan. 8, 1976, Peking), leading figure in the Chinese Communist Party, premier (1949–76) and foreign minister (1949–58) of the People's Republic of China who played a major role in the Chinese revolution and later in the conduct of China's foreign relations. He played a leading role in the Chinese Communist Party (CCP) from its beginnings in 1921 and became one of the great negotiators of the 20th century and a master of policy implementation, with infinite capacity for details. He survived internecine purges, always managing to retain his position in the party leadership. Renowned for his charm and subtlety, Zhou was described as affable, pragmatic, and persuasive.

Zhou was born to a gentry family and was reared by his uncle in Shao-hsing, Chekiang province, where he received his elementary education. He graduated from a well-known middle school in Tientsin and went to Japan in 1917 for further studies. He returned to Tientsin in the wake of the student demonstrations in Peking that became known as the May Fourth Movement of 1919. He was active in student publications and agitation until being arrested in 1920. After his release from jail that fall, he left for France under a work-and-study program. It was in France that Zhou made a lifelong commitment to the Communist cause. He became an organizer for the CCP in Europe after its founding in Shanghai in July 1921.

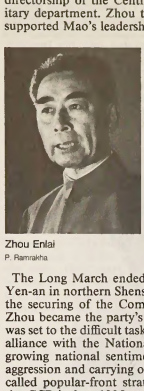
In the summer of 1924 Zhou returned to China and took part in the National Revolution, led by Sun Yat-sen's Nationalist Party (Kuomintang) in Canton with CCP collaboration and Russian assistance. It was at this time, in 1925, that he married Deng Yingchao, a student activist who later became a prominent member of the CCP. Zhou was appointed deputy director of the political department of the Whampoa Military Academy, where Chiang Kai-shek was the commandant. Early in 1927 Zhou became director of the military department of the CCP Central Committee.

When Chiang's troops were on the outskirts of Shanghai in March 1927, Zhou organized the workers' seizure of that city for the Nationalists. But Chiang soon afterward purged his former Communist allies, and Zhou barely escaped with his life to Wu-han, the new centre of Communist power, where the CCP was still working closely with the left-wing branch of the Nationalist Party. There, in April 1927, during the party's Fifth National Congress, Zhou was elected to the CCP Central Committee and to its Politburo.

Following the left-Nationalist split with the Communists, Zhou took a major role in organizing the Communist insurrection known as the Nan-ch'ang Uprising (August 1927). Upon the Nationalists' recapture of the city of Nan-ch'ang, Zhou retreated to eastern Kwangtung and then escaped to Shanghai via Hong Kong.

Zhou was confirmed in his party leadership posts during a visit to Moscow in 1928 for the Sixth National Congress of the CCP, after which he returned to China to help rebuild the battered CCP organization. In the late 1920s the CCP centre, operating underground in Shanghai, continued to stress urban uprisings, but Communist attempts to seize major cities failed repeatedly, with great losses. Zhou left Shanghai in 1931 for Kiangsi province, where Zhu De and Mao Zedong had been developing Communist rural bases (soviets) since 1928. In 1932 the party centre, under increasingly heavy police pressure in Shanghai, also moved to Kiangsi, and Zhou succeeded Mao as the political commissar of the Red Army, which was commanded by Zhu De.

Although Zhou initially allied himself with the CCP leaders who wrested control of policy making in the Kiangsi soviet from Mao's hands, the two men eventually entered into a close association that would last unbroken until Zhou's death. Chiang Kai-shek's campaigns finally forced the Communists to retreat from Kiangsi and other soviet areas in south-central China in October 1934 and begin the Long March to a new base in northern China. Mao gained control of the party apparatus during the Long March; he also took over Zhou's directorship of the Central Committee's military department. Zhou thenceforth faithfully supported Mao's leadership in the party.



Zhou Enlai
P. Ramrakha

The Long March ended in October 1935 at Yen-an in northern Shensi province, and, with the securing of the Communists' base there, Zhou became the party's chief negotiator and was set to the difficult task of forming a tactical alliance with the Nationalists. Exploiting the growing national sentiment against Japanese aggression and carrying out Moscow's new so-called popular-front strategy against fascism, the CCP in late 1935 proposed to unite with the Nationalists and all patriotic Chinese in order to resist Japan. When in December 1936 Chiang Kai-shek was arrested in Sian (in Shensi) by his generals, who wanted to stop the CCP-Nationalist civil war, Zhou immediately flew to that city. He persuaded the dissident commanders not to kill Chiang and helped obtain the Nationalist leader's release on condition that he cease military attacks against the Communists and cooperate with them in the United Front against Japan.

Zhou helped negotiate the formation of the United Front after the outbreak of the Sino-Japanese War in July 1937, and from then until 1943 he was the CCP's chief representative to the Nationalist government. Two weeks after the Japanese surrender in August 1945, Zhou accompanied Mao Zedong to Chungking for peace talks with Chiang Kai-shek. When Mao returned to Yen-an six weeks later, Zhou remained in Chungking to continue the negotiations. Zhou was also a leading participant in the unsuccessful peace negotiations with the Nationalists in 1946 that were sponsored by the United States and held under General George C. Marshall. Zhou's skillful cultivation of the Communists' image among liberal politicians and intellectuals who had become disenchanted with the Nationalists at this time became an important factor in Chiang's eventual downfall after the resumption of full-scale civil war in 1947.

As premier of the People's Republic of China from its inception in October 1949, Zhou became the chief administrator of that country's huge civil bureaucracy. Serving concurrently as foreign minister, he also bore heavy responsibilities in foreign affairs and continued to play a key role in diplomacy after relinquishing the post of foreign minister. On Feb. 14, 1950, Zhou signed in Moscow a 30-year Chinese-Soviet treaty of alliance, and at the 1955 Afro-Asian conference that convened at Bandung, Indonesia, he offered China's support to Asian nonaligned nations. Between 1956 and 1964 Zhou traveled widely throughout Europe, Asia, and Africa, proclaiming the latter continent "ripe for revolution." Though Zhou visited Moscow in 1964, he was unable to resolve the fundamental differences that had arisen between China and that country. After the American envoy Henry A. Kissinger made a dramatic visit to him in Peking in July 1971, Zhou's reputation as a diplomat and negotiator was widely noted by the American press. The historic meeting between Mao Zedong and U.S. President Richard M. Nixon that took place in Peking in February 1972 was, to a great extent, arranged and implemented by Zhou Enlai.

Zhou meanwhile maintained his leading position in the CCP. In 1956 he was elected one of the party's four vice chairmen. Although Lin Piao emerged after the Cultural Revolution of the late 1960s as the only vice chairman of the party, Zhou remained the third-ranking member of the Standing Committee of the Politburo. During the Cultural Revolution he played a key role in exercising restraints on the Maoist extremists and was probably the single most important stabilizing factor during that chaotic period. During the waning of the Cultural Revolution in the early 1970s, Zhou sought to restore Deng Xiaoping and other former moderate leaders to positions of power.

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Zhoukou (China): *see* Chou-k'ou.

Zhoushan Qundao (China): *see* Chou-shan Archipelago.

Zhu (Chinese surname): *see under* Chu, except as below.

Zhu De, Wade-Giles CHU TEH (b. Dec. 18, 1886, I-lung, Szechwan province, China—d. July 6, 1976, Peking), one of China's greatest military leaders and the founder of the Chinese Communist army.

Born into a peasant family, Zhu was initially a physical education instructor. In 1911 he graduated from the Yunnan Military Academy and took part in the revolution that overthrew the Ch'ing dynasty. For the next 10 years Zhu served as a middle-ranking officer and then a brigade commander in the armies of warlords in Szechwan and Yunnan provinces in southern China. In 1922, disillusioned with warlordism and the chaotic politics of republican China in general, he went to Europe and studied in Berlin and at the University of Göttingen. While in Germany he joined the Chinese Communist Party.

Expelled from Germany for his political activities, Zhu returned in 1926 to China, where, concealing his Communist affiliation, he became an officer in the Nationalist (Kuomintang) Army. In August 1927 he took part in the Communist-led Nan-ch'ang Uprising against the Nationalists, an event that is regarded by Communists as marking the birth of the Chinese Red Army. When the Nan-ch'ang Uprising was crushed by the Nationalists, Zhu led his remaining troops south to Hunan province, where they linked up with Mao Zedong's small guerrilla forces. The two formed the 4th Red Army, with Zhu De as commander and Mao Zedong as political commissar. They established a base, or soviet, in Kiangsi province, and Zhu built up the Red Army from 5,000 troops in 1929 to 200,000 in 1933. He commanded the Red Army's successful defense of the Kiangsi soviet against the Nationalists' first four campaigns (1931–33) to annihilate it. Zhu then served as commander in chief of the Red Army

throughout the Communists' 6,000-mile-long retreat (1934–35) to Shensi province, a journey known as the Long March.

Upon the Communists' alliance with the Nationalists to resist the Japanese invasion of China in 1937, Zhu directly commanded the Red Army's northern forces, renamed the Eighth Route Army. He retained overall command of all Communist military operations against the Japanese from 1937 to 1945. Upon the Japanese surrender in 1945 and the resumption of the civil war between the Nationalists and the Communists, Zhu commanded the renamed People's Liberation Army (PLA), which defeated the Nationalists and drove them from the mainland. He retained command of the PLA of the new People's Republic of China until 1954. Although a Politburo member from 1934, Zhu was never regarded as a contender for political power. When ranks were initiated in the army he was made a marshal, and from 1959 he served as chairman of the Standing Committee of the National People's Congress, the nominal legislature.

Zhu De, along with Mao Zedong, was primarily responsible for the Chinese Red Army's major contribution to modern warfare—the elevation of guerrilla warfare from a minor supplement of conventional forces to a major strategic concept, particularly for revolutionary armies. Under Zhu, the Red Army developed as a highly mobile, flexible, and self-sufficient force that operated throughout the countryside and won the support of the rural population through its discipline, courage, and responsiveness. Zhu's strategy was customarily to destroy the enemy's forces piecemeal and by attrition rather than by fighting pitched battles with massed troops. Control of the countryside was regarded as more important in the long run than costly attempts to overrun and hold large cities. Zhu's perfection of virtually all aspects of large-scale guerrilla warfare was a major factor in the Red Army's crushing defeat of the Nationalist forces in the period from 1946 to 1949.

Zhu Rongji, Wades-Giles CHU JUNG-CHI (b. Oct. 1, 1928, Changsha, Hunan province, China), a leading economic reformer in the Chinese Communist Party (CCP). He was premier of China from 1998 to 2003.

Zhu joined the CCP in 1949 and in 1951 became a deputy division chief with the state planning commission. He eventually earned the favour of paramount leader Deng Xiaoping and by 1988 had been appointed deputy party secretary of Shanghai. He was appointed mayor of Shanghai later that year and improved the city's economy by opening its doors to foreign investment. In 1989 he became Shanghai's party secretary, and in 1991 Deng appointed him deputy premier. In 1993 he emerged as a leader of economic reform after putting himself in charge of the People's Bank of China and creating a program that reduced the country's inflation. Zhu became premier in March 1998 and embarked on a plan to reduce the size of government and reform the heavily indebted banking system and state-owned enterprises, as well as the housing and health care systems. He succeeded in cutting the size of government and the military by nearly one million people. Zhu made his first official visit to the United States in April 1999 hoping to improve bilateral relations and gain U.S. support for China's effort to join the World Trade Organization (WTO). In 2000 the U.S. Congress voted to eliminate the annual congressional review of China's most-favoured-nation status, a move that helped China become a member of the WTO in 2001. Zhu, whose economic policies were widely praised, stepped down as premier in 2003 and was replaced by Wen Jia-bao.

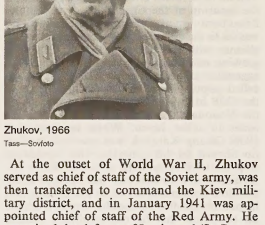
Zhuang (people): *see* Chuang.

Zhuangzi (Taoist teacher): *see* Chuang-tzu.

Zhuge Liang (Chinese sage): *see* Chu-ko Liang.

Zhukov, Georgy Konstantinovich (b. Dec. 1 [Nov. 19, Old Style], 1896, Kaluga province, Russia—d. June 18, 1974, Moscow), marshal of the Soviet Union, the most important Soviet military commander during World War II.

Having been conscripted into the Imperial Russian Army during World War I, Zhukov joined the Red Army in 1918, served as a cavalry commander during the Russian Civil War. In 1939, as head of Soviet forces in the Manchurian border region, he directed a successful counteroffensive against Japanese forces.



Zhukov, 1966
Tass—Sovfoto

At the outset of World War II, Zhukov served as chief of staff of the Soviet army, was then transferred to command the Kiev military district, and in January 1941 was appointed chief of staff of the Red Army. He organized the defense of Leningrad (St. Petersburg) and was then appointed commander in chief of the western front. He directed the defense of Moscow (autumn 1941) as well as the counteroffensive (December 1941) that drove German forces back from central Russia.

In August 1942 Zhukov was named deputy commissar of defense and first deputy commander in chief of Soviet armed forces. He became the chief member of Joseph Stalin's supreme headquarters and figured prominently in the planning or execution of almost every major engagement in the war. He oversaw the defense of Stalingrad (late 1942) and the counteroffensive that encircled the German Sixth Army in that city (January 1943). He was named a marshal of the Soviet Union soon afterward. Zhukov was involved in the Battle of Kursk (July 1943) and directed the Soviet sweep across Ukraine in the winter and spring of 1944. He commanded the Soviet offensive through Belorussia (summer–autumn 1944), which resulted in the collapse of German resistance and the end of the German occupation of Poland and Czechoslovakia. In April 1945 he commanded the final assault on Berlin and then remained in Germany as commander of the Soviet occupation force. On May 8, 1945, he represented the Soviet Union at Germany's formal surrender. He then served as the Soviet representative on the Allied Control Commission for Germany.

Upon Zhukov's return to Moscow in 1946, however, Stalin felt threatened by Zhukov's popularity and assigned him to a series of relatively obscure regional commands. After Stalin died (March 1953) the new political leaders, to secure the support of the army, appointed Zhukov a deputy minister of defense (1953). He supported Nikita Khrushchev against the chairman of the Council of Ministers, Georgy Malenkov, who favoured a reduction in military expenditures. When Khrushchev forced Malenkov to resign and replaced him with Nikolay Bulganin (February 1955), Zhukov succeeded Bulganin as minister of defense; at that time he was also elected an alternate member of the Presidium.

Zhukov's efforts to improve the professionalism of the armed forces by reducing the role of the party's political advisers and the party's control of the army brought him into conflict with Khrushchev. Zhukov protected Khrushchev from the Presidium when it tried to oust him in 1957 and was rewarded with full membership in the Presidium, but Khrushchev could not tolerate the marshal's efforts to make the army more autonomous, and in late 1957 he formally dismissed Zhukov as minister of defense and removed him from his party posts. After Khrushchev fell from power (October 1964), Zhukov was awarded the Order of Lenin (1966) and allowed to publish his autobiography in 1969.

Zhukovsky, Vasily Andreyevich (b. Jan. 29 [Feb. 9, New Style], 1783, Tula province, Russia—d. April 12 [April 24], 1852, Baden-Baden, Baden [Germany]), Russian poet and translator, one of Aleksandr Pushkin's most important precursors in forming Russian verse style and language.

Zhukovsky, the illegitimate son of a landowner and a Turkish slave girl, was educated in Moscow. He served in the Napoleonic War of 1812 and in 1815 joined the tsar's entourage, becoming tutor to the heir to the throne in 1826. In 1841 he retired to Germany.

Zhukovsky was a follower of Nikolay Karamzin, the head of a Romantic literary movement that countered the classical emphasis on reason with the belief that poetry should be an expression of feeling. Zhukovsky was a founder of the Arzamas society, a semi-humorous, pro-Karamzin literary group established to oppose the classicists. Like Pushkin, Zhukovsky was interested especially in personal experience, Romantic conceptions of landscape, and folk ballads. His first publication was a translation of Thomas Gray's *An Elegy Written in a Country Church Yard* (1802), and the bulk of his work consists of free translations. He introduced into Russia the works of such German and English contemporaries as Gottfried Bürger, Friedrich von Schiller, Johann Wolfgang von Goethe, Sir Walter Scott, Lord Byron, and Robert Southey, as well as such classic works as Homer's *Odyssey* (1849). His collected works were published in four volumes in 1959–60.

Zhuzhou (China): *see* Chu-chou.

Zhytomyr, Russian ZHITOMIR, city and administrative centre of Zhytomyr *oblast* (province), northern Ukraine. It lies along the Teteriv River where it runs between high, rocky banks. Zhytomyr is believed to date from the 9th century, but the first record is from 1240, when it was sacked by the Tatars.

For long a major trade focus and a seat of provincial government, Zhytomyr today is an important junction where the main rail and road routes westward from Kiev are crossed by north-south routes. Its light industries chiefly process wood for furniture and flax for linen. Synthetic fibres are a recent extension of the city's textile industry. Musical instruments, notably accordions, are a specialty. Zhytomyr has agricultural and teacher-training institutes. Pop. (2001) 284,236.

Zi Si (Confucian philosopher): *see* Tzu Ssu.

Zia-ul-Haq, Mohammad (b. Aug. 12, 1924, Jullundur, Punjab [now in India]—d. Aug. 17, 1988, near Bahāwalpur, Pakistan), Pakistani chief of Army staff, chief martial-law administrator, and president of Pakistan (1978–88).

Zia was commissioned in 1945 from the Royal Indian Military Academy in Dehra Dun and served with the British armoured forces in Southeast Asia at the end of World War II. After 19 years in various staff and command appointments, he was made an instructor at the Command and Staff College in Quetta. He successively commanded a regiment, brigade, division, and a corps during 1966–72. A major general from 1972, he was president of the military courts that tried several army and air force officers alleged to have plotted against the government of Prime Minister Zulfikar Ali Bhutto in 1972. Bhutto promoted him to lieutenant general in 1975 and made him chief of Army staff in 1976.

Zia seized power from Bhutto in a bloodless coup on July 5, 1977, and became chief martial-law administrator while retaining his position as Army chief of staff. He assumed the presidency after Fazal Elahi Chaudhry resigned. Zia tightened his hold on the government after having the charismatic and still-popular Bhutto executed on charges of attempted murder in 1979. Zia suspended political parties in that year, banned labour strikes, imposed strict censorship on the press, and declared martial law in the country (nominally lifted 1985). He responded to the Soviet Union's invasion of neighbouring Afghanistan in 1979 by embarking on a U.S.-financed military buildup. He also tried to broaden his base of support and worked for the Islāmization of Pakistan's political and cultural life. He died in an airplane crash.

Zia ur-Rahman, Begum Khaleda, *née* KHALEDA MAJUMDAR (b. Aug. 15, 1945, Dināj pur, East Bengal, India [Bangladesh]), politician who served as prime minister of Bangladesh from 1991 to 1996 and from 2001.

In 1959 she married Zia ur-Rahman, a leader in the fight for the independence of Bangladesh, then part of India. During the struggle in 1971 she was kept under house arrest, though she was largely uninterested in politics, even after her husband became president of Bangladesh in 1977. After his assassination by military officers in 1981, she became politically active, and in 1984 she assumed leadership of the Bangladesh Nationalist Party. Arrested repeatedly during the dictatorship of Hossain Mohammad Ershad in the 1980s, in 1991 she led the opposition to victory and became prime minister.

The first woman to serve as prime minister of Bangladesh, Zia governed during a period of natural disasters, economic distress, and civil unrest. Her reelection victory in February 1996 was tainted by an opposition-led boycott; after a wave of strikes and protests, she resigned. Zia was again elected prime minister in 2001.

Ziba (people): *see* Haya.

Zibo (China): *see* Tzu-po.

Ziegfeld, Florenz (b. March 21, 1869, Chicago—d. July 22, 1932, Hollywood), American theatrical producer who brought the revue to spectacular heights under the slogan "Glorifying the American Girl."

During the World's Columbian Exposition in Chicago in 1893, Ziegfeld managed Sandow, the strong man. In 1896 he turned to theatrical management. His promotion of a French beauty, Anna Held, with press releases about her milk baths brought her fame and set a pattern of star making through publicity. In 1907 he produced in New York City his first revue, *The Follies of 1907*, modeled on the Folies-Bergère of Paris but less risqué. The revue's combination of seminudity, pageantry, and comedy was repeated successfully for 23 more years, until the advent of the Great Depression ended the annual spectacles. Four other editions appeared after his death, the last in 1957.

Among the stars developed by Ziegfeld were Marilyn Miller, Will Rogers, Leon Errol, Bert



Ziegfeld
EB Inc.

Williams, Fanny Brice, and Eddie Cantor. In addition to the *Follies*, Ziegfeld also produced the stage successes *Sally* (1920), *Show Boat* (1927), *Rio Rita* (1927), and *Bitter Sweet* (1929).

Ziegler, Karl (b. Nov. 26, 1898, Helsa, near Kassel, Ger.—d. Aug. 12, 1973, Mülheim, W.Ger.), German chemist who in 1963 shared the Nobel Prize for Chemistry with Giulio Natta for research that greatly improved the quality of plastics.

After receiving his doctorate (1923) from the University of Marburg, Ziegler held academic appointments at the universities of Frankfurt am Main, Heidelberg, and Halle. In 1943 he became director of the Kaiser Wilhelm (later Max Planck) Institute for Coal Research at Mülheim an der Ruhr.



Ziegler
Bavaria-Verlag

Ziegler was the first to explain the reactions involved in the synthesis of rubber (*c.* 1928). His researches with lithium in organic chemistry produced compounds more reactive than the Grignard reagents on which they were modeled. His work on cyclic carbon compounds found use in synthesizing the aroma of musk for perfumes.

After World War II he concentrated on organoaluminum compounds. Ziegler's most important discovery was made in 1953. He and a student, E. Holzkamp, set out to repeat a preparation of higher aluminum alkyls by heating ethylene and aluminum triethyl; unexpectedly they obtained a complete conversion of the ethylene monomer ($CH_2 = CH_2$) to the dimer, 1-butene ($CH_3CH_2CH = CH_2$). The explanation was found in the presence of a trace of colloidal nickel derived from the catalyst used previously in the autoclave for hydrogenation experiments. This led to the discovery that substances made by mixing organometallic compounds with compounds of certain heavy metals permitted the fast polymerization of ethylene at atmospheric pressure to a linear polymer of high molecular weight having valuable plastic properties (other processes used high pressure and produced a partly branched polymer). The catalyst derived from aluminum alkyl and titanium tetrachloride proved especially useful. It formed the basis of nearly all later developments in the production of long-chain polymers of hydrocarbons from such olefins as ethylene and butadiene; the resulting products came into widespread use as plastics, fibres, rubbers, and films.

Ziegler–Natta catalyst, any of an important class of mixtures of chemical compounds remarkable for their ability to effect the polymerization of olefins (hydrocarbons containing a double carbon–carbon bond) to polymers of high molecular weights and highly ordered (stereoregular) structures.

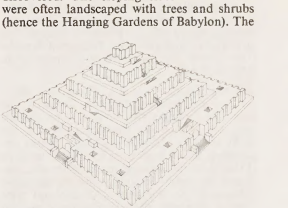
These catalysts were originated in the 1950s by the German chemist Karl Ziegler for the polymerization of ethylene at atmospheric pressure. Ziegler employed a catalyst consisting of a mixture of titanium tetrachloride and an alkyl derivative of aluminum. Giulio Natta, an Italian chemist, extended the method to other olefins and developed further variations of the Ziegler catalyst based on his findings on the mechanism of the polymerization reaction. The Ziegler–Natta catalysts include many mixtures of halides of transition metals, especially titanium, chromium, vanadium, and zirconium, with organic derivatives of nontransition metals, particularly alkyl aluminum compounds.

Zielona Góra, German GRÜNBERG, city, capital of Zielona Góra *województwo* (province), west-central Poland. It is an important industrial (textile and metal production) and cultural centre, having for centuries nurtured the theatre arts and a lively folk culture. Beginning with the coming of Flemish weavers in the 13th century, the city prospered as a textile centre, its economic development reaching its zenith in the 15th century. Thereafter, it was devastated several times by fires and wars, and during World War II about 30 percent of the city was damaged by the Germans.

Zielona Góra lies in a hollow surrounded by vineyards—which are rare in the region—winding across the hills. A vintners' festival is held annually in the fall. The city was the birthplace of the painter Tadeusz Konicz in 1733. Zielona Góra's medieval town hall includes an 18th-century addition (housing a museum) and a 15th-century tower. Pop. (1999 est.) 118,182.

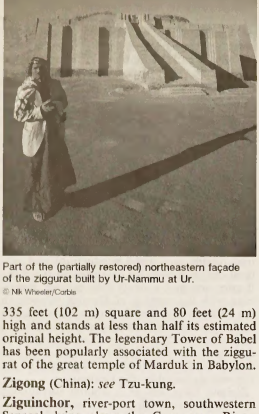
ziggurat, pyramidal, stepped temple tower that is an architectural and religious structure characteristic of the major cities of Mesopotamia (now in Iraq) from about 2200 until 500 BC. The ziggurat was always built with a core of mud brick and an exterior covered with baked brick. It had no internal chambers and was usually square or rectangular, averaging either 170 feet square or 125 × 170 feet (40 × 50 metres) at the base. Approximately 25 ziggurats are known, being equally divided in number among Sumer, Babylonia, and Assyria.

No ziggurat is preserved to its original height. Ascent was by an exterior triple stairway or by a spiral ramp, but for almost half of the known ziggurats, no means of ascent has been discovered. The sloping sides and terraces were often landscaped with trees and shrubs (hence the Hanging Gardens of Babylon). The



Ziggurat
From E. Porada and R. Dyson, *Art of Ancient Iran: Pre-Islamic Cultures*; Crown Publishers, Inc.

best-preserved ziggurat is at Ur (modern Tall al-Muqayyar, Iraq). The largest, at Choghā Zanbīl in Elam (now in southwestern Iran), is



Part of the (partially restored) northeastern façade of the ziggurat built by Ur-Nammu at Ur.
© Nik Wheeler/Corbis

335 feet (102 m) square and 80 feet (24 m) high and stands at less than half its estimated original height. The legendary Tower of Babel has been popularly associated with the ziggurat of the great temple of Marduk in Babylon.

Zigong (China): *see* Tzu-kung.

Ziguinchor, river-port town, southwestern Senegal, lying along the Casamance River. Ziguinchor has long been known and visited by European mariners. In 1457 the Venetian navigator Alvise Ca' da Mosto (Cadamosto), envoy of the Portuguese prince Henry the Navigator, reconnoitred the harbour. In 1886 the Portuguese ceded Ziguinchor to the French. The town's industries include a peanut- (groundnut-) oil-processing plant. East of Ziguinchor is the Basse-Casamance National Park. Pop. (2001 est.) 216,971.

Zikmund (Czech personal name): *see under* Sigismund.

zikr (Muslim ritual prayer): *see* dhikr.

Zile, historically ZELA, town, east-central Turkey. Lying in a fertile plain crossed by the Yeşil River, the town is at the foot of a hill crowned by a ruined citadel. Zela, the ancient temple state of Pontus, was famous as the site where Julius Caesar defeated Pharnaces II, son of Mithradates VI of Pontus, and said of his victory, "Veni, vidi, vici" ("I came, I saw, I conquered").

The town is an important local commercial and agricultural market for such regional products as cereals and sugar beets. The latter are sent to the refinery at nearby Turhal. Zile is linked by highways with Tokat and Amasya and is near the Sivas-Samsun railway. Pop. (2000) 52,640.

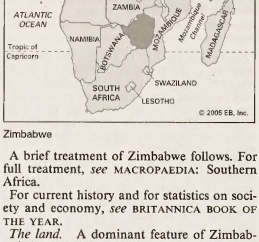
Žilina, German SILLEIN, Hungarian ZSOLNA, town, Žilina *kraj* (region), Slovakia. The town lies along the Váh River at its confluence with the Kysuca and Rajčianka rivers. Originally an early 13th-century Slavic trading settlement, Žilina became a free royal town in 1312. It has an arcaded marketplace and medieval buildings, including the Romanesque Church of St. Stephen (13th century) with Gothic elements, the parish church, and an isolated Renaissance tower. Budatín Castle lies just north of the city.

Žilina is now a busy rail junction where the branch line from Ostrava (Czech Republic) joins the main east-west electrified line; it is also a road intersection on the state highway. The University of Žilina (established in 1953 as the University of Railway Transport in Prague) is there, as are a conservatory of music and a centre for the treatment of eye diseases. Industries include wood processing, engineering, and the manufacture of cellulose and plastics. Pop. (2001 est.) 85,400.

Ziller, Tuiskon (b. Dec. 22, 1817, Wasungen, near Meiningen, Saxe-Meiningen [Germany]—d. April 20, 1882, Leipzig), German educator noted for his application of Johann Friedrich Herbart's educational precepts to the German elementary school.

Ziller attended the University of Leipzig, where he came under the influence of followers of Herbart, and in 1853 became a lecturer there. In 1862 he opened his own pedagogical seminary, and in 1869 he established the Association for Scientific Pedagogy—a centre for German Herbartians. Ziller was a strong proponent of Herbart's emphasis on the moral end of education, and Ziller attempted to show how every part of elementary instruction could contribute to the forming of a strong character.

Zimbabwe, officially REPUBLIC OF ZIMBABWE, formerly (1911–64) SOUTHERN RHODESIA, (1964–79) RHODESIA, or (1979–80) ZIMBABWE RHODESIA, landlocked country of southern Africa. It is bordered on the north by Zambia, on the northeast and east by Mozambique, on the south by South Africa, and on the southwest and west by Botswana, and its extreme western corner touches Namibia. The capital is Harare. Area 150,872 square miles (390,757 square km). Pop. (2003 est.) 11,719,000.



Zimbabwe

A brief treatment of Zimbabwe follows. For full treatment, *see* MACROPAEDIA: Southern Africa.

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

The land. A dominant feature of Zimbabwe's landscape is the Highveld, a broad ridge lying between 4,000 and 5,000 feet (1,200 and 1,500 m) above sea level, which covers about a fourth of the country. The Highveld begins in the southwest and extends the length of the country, joining the Inyanga Mountains in the northeast. On each side of this central spine lies the wider plateau of the Middleveld, which, at an elevation between 3,000 and 4,000 feet (900 and 1,200 m), accounts for about two-fifths of Zimbabwe's land area. Farther northwest and southeast lies the Lowveld, which covers about a fourth of the country and lies mostly above 1,000 feet (300 m) in elevation.

The Zambezi River forms the country's northwestern boundary with Zambia along a trough formed by major faulting. In 1959 a major dam was completed on the Zambezi that created Lake Kariba, which, at more than 2,000 square miles (5,200 square km), is one of the world's largest man-made lakes. The Highveld forms the divide separating the Zambezi basin in the northwest from the Limpopo and Sabi river basins in the southeast. Much of the country's total runoff is carried by these three rivers, eastward through Mozambique, to the Indian Ocean.

Although it lies within the tropics, Zimbabwe has a subtropical climate because of its high average elevation. Mean monthly temperatures range from 52° F (11° C) in July to 65° F (18° C) in October at Inyanga to 57° F (14° C) in July to 70° F (21° C) in October at Harare. An extended winter dry season occurs throughout the west from May through August; average annual precipitation increases generally from southwest to northeast, averaging less than 16 inches (400 mm) in the Limpopo valley along the border with South Africa to more than 40 inches (1,000 mm) in the eastern highlands.

Zimbabwe is mostly savanna (tropical grassland) country, with a generous tree growth encouraged by the wet summers. Hwange National Park has much of its area devoted to game reserves. The country's rich and diverse animal life includes lions and other cats, hyenas, jackals, elephants, hippopotamuses, giraffes, gorillas, chimpanzees, baboons, many antelope species, crocodiles, lizards, and snakes.

The people. The predominant ethnolinguistic groups in Zimbabwe are the Shona, who make up about two-thirds of the population, and the much less populous Ndebele and Chewa. Europeans, chiefly British, constitute a small and diminishing proportion of the population. English, the official language, is the lingua franca, though the Bantu languages of the Shona and Ndebele are much more widely spoken. Nearly half of the population is Christian, many allied with indigenous African churches, while an almost equal number follow animist beliefs. About two-thirds of the population live in rural areas.

Zimbabwe's rate of natural increase is below the world average and is one of the lowest in Africa. Its birth and death rates, while high by world standards, are relatively low for Africa. By the turn of the 21st century, the country's life expectancy had fallen from one of the highest in sub-Saharan Africa in the 1990s (an average of about 60 years) to an average of 40 years. About one-fourth of the adult population is infected with HIV/AIDS.

The economy. After independence in 1980, the government began a program to settle more black farmers on land bought from emigrating white farmers. Even after emigration slowed, it had avoided forcible expropriation. In 2000, however, with the encouragement of President Robert Mugabe, the often violent occupation of white-owned farms began in earnest. Zimbabwe's once semideveloped mixed economy continued its downward spiral and was only marginally functional in the first decade of the early 21st century.

Its gross national product (GNP) was very low, and the GNP per capita was the lowest of any country of southern Africa and well below the average for Africa. Although Zimbabwe's economy was more diversified than most in sub-Saharan Africa, the virtual collapse of the agricultural sector—attributable in large part to the government's land confiscation scheme, as well as to cyclical droughts—hastened the decline of other economic sectors, such as manufacturing, tourism, and services. By 2004 the country was facing widespread famine.

Zimbabwe has abundant mineral reserves, though mining produces only a small amount of the GDP. Gold is the leading mineral (by value), followed by nickel and asbestos.

Manufacturing is fairly well diversified, largely because economic sanctions that were in effect against Rhodesia until 1980 compelled the country to become virtually self-sufficient. About one-third of the country's electrical power is generated by hydroelectric plants and the remainder by thermal plants.

Tourism suffered from sporadic bouts of civil disorder and ethnic violence during the final decades of the 20th century. The Zimbabwe Congress of Trade Unions, located in Harare, is the principal labour federation, to which all unions organized by industry are affiliated.

Since independence, the government has gradually assumed a larger role in controlling industry. A government-controlled agency was created to market mine production (except gold), and all new mining ventures require government participation. In agriculture a plan was adopted to settle farmers on better land and give them technical assistance, seed, and fertilizer. Purchase prices for crops have been raised, and wage rates and working conditions have been equalized for blacks and whites. A major goal was to disarm the former guerrillas and settle them as farmers, but the Mugabe government's policy of forcibly purchasing white-owned farms for redistribution to poor blacks has been controversial.

Zimbabwe's railway network, one of the densest in sub-Saharan Africa, is government-operated and covers some 1,700 miles (2,700 km). About one-tenth of it is electrified. Almost half of the country's extensive road network is paved; most rural areas, however, suffer from poor roads. There is an international airport at Harare, and there is domestic air service between the principal cities.

Trade deficits after independence were worsened by sharply rising consumer demand and a worldwide recession, but by the mid-1980s the nation's trade balance had become favourable. Major exports include tobacco; gold, iron, steel, and ferroalloy products; corn; and cotton—mainly shipped to the United Kingdom, South Africa, Germany, Botswana, and Japan. Imports consist mainly of machinery and transport equipment, petroleum products, chemicals, and basic manufactures, which are obtained mostly from the same trading partners.

Government and social conditions. Zimbabwe is a multiparty state—an independent republic with the president as head of state. The legislature consists of a unicameral, 150-member House of Assembly, in which 120 seats are elective, 10 members are chosen by traditional chiefs, 8 are appointed by provincial governors, and 12 are appointed by the president. A cabinet, led by the prime minister, is chosen from the parliament. The president is elected by the parliament for a term of six years, and the members of the House of Assembly serve for six years. The judiciary is appointed by the president on the advice of the Judicial Service Commission.

Medical and public-health facilities compare well to other African countries and include mother and child care, disease control, school health, environmental sanitation, and rural health immunization programs, provided through hospitals and district and rural health centres. Malaria, schistosomiasis, and tuberculosis remain chronic problems, however, and measles and pneumonia are major causes of death. By 2000, AIDS had become the greatest health threat in Zimbabwe, with one-fourth of the adult population infected. Life expectancy had dropped to 40 years for men and 37 years for women.

There is a severe housing shortage in urban areas, and many new houses have been constructed for lower-paid workers to alleviate the shortage. The three-tiered system of education comprises primary (which is free, and, since 1987, compulsory), secondary, and university education. The University of Zimbabwe, originally chartered in 1955 as the University College of Rhodesia and Nyasaland, is located in Harare. The news media are strictly controlled by the government. Radio Zimbabwe broadcasts are in English, Shona, and several other local languages.

Cultural life. The architectural heritage of the country is evident in the Great Zimbabwe, the ancient stone citadel, located in south-central Zimbabwe, that has given the country its name. Handicraft items are made of woven or plaited fibres, grasses, and reeds. The tradition of oral literature in Zimbabwe, especially poetry, is rich. Novels centre on the conflict between traditional, rural culture and modernizing urban life. There is a National Gallery of Zimbabwe, and museums are at Harare, Mutare (formerly Umtali), Nyanda (formerly Fort Victoria), and Bulawayo. The National Archives is one of the major sources for historical material.

History. Remains of Stone Age cultures dating to 500,000 years ago have been found in present-day Zimbabwe. The first Bantu-speaking peoples reached the region between the 5th and 10th centuries AD, driving the San (Bushmen) inhabitants into the desert. A second migration of Bantu-speakers, began about 1830. One tribe, called the Ndebele, carved out a kingdom in the Zulu pastoralist tradition, in the process mastering the Shona tribes. During this period British and Afrikaner hunters, traders, and prospectors moved up from the southern boundaries.

In 1889 the British South Africa Company was formed by Cecil Rhodes to colonize and promote trade in the region. During the 1890s additional European settlers began to arrive and lay claim to prospecting rights. This caused armed uprisings by the Ndebele and the Shona, but by 1897 the region had been pacified. The country was governed by the company until 1923. In a referendum in 1922, the 34,000 Europeans chose to become a self-governing British colony instead of joining the Union of South Africa. In 1923 Southern Rhodesia was annexed by the British crown.

The interwar period was one of material progress and a reasonably prosperous economy under white domination. In 1953 the colony united with Nyasaland (Malawi) and Northern Rhodesia (Zambia) to form the Central African Federation of Rhodesia. During the 10 years of the federation, the black African nationalist movement, led by the National Democratic Party (NDP), intensified. The NDP was subsequently banned and split into the Zimbabwe African People's Union (ZAPU), led by Joshua Nkomo, and the Zimbabwe African National Union (ZANU), led by Ndabaningi Sithole and later by Robert Mugabe. The federation dissolved in 1963, and Southern Rhodesia reverted to its former colonial status.

In 1965 the conservative white Rhodesian Front government, led by Ian Smith, unilaterally declared independence from Britain for the country. This act led to the installation of economic sanctions against Rhodesia, first by the United Kingdom and later by the United Nations. The economy suffered from these sanctions during the 1960s and '70s but survived with the help of South Africa.

ZAPU and ZANU guerrilla organizations were formed in Zambia and Mozambique, respectively, from which they launched numerous attacks on Rhodesian security forces. Sporadic warfare over nearly a decade caused thousands to die and almost a million persons to be uprooted. The white minority finally consented to hold multiracial elections supervised by the British in 1980, and Robert Mugabe of the Shona-based ZANU won a landslide victory. Mugabe assumed the duties of prime minister and defense minister and briefly established a Marxist-oriented state, before the decline of communism in eastern Europe rendered such a government unfeasible. A multiparty system was established in 1990, but Mugabe's regime held tightly to the reigns of power into the 21st century and tolerated little dissent.

Zimbabwe (Bantu: "Stone Dwelling"), also called GREAT ZIMBABWE, extensive stone ruin in southeastern Africa situated southeast of Masuingo (formerly Fort Victoria), Zimbabwe. The Zimbabwe is the largest of many stone ruins scattered across the countries of Zimbabwe and Mozambique. Its oldest parts date from the 8th century AD, although the site had been occupied for about 600 years before that. In the 11th to 15th century it was a centre (possibly religious) of a great inland empire ruled by the Karanga people. They smelted gold there and traded it on the shores of the Indian Ocean for glass beads and porcelain from China. Copper coins and birds carved in soapstone were also among their treasures. The centre remained in use at least until the 17th century. The rediscovery of the ruins in 1867 attracted much archaeological research.

The Zimbabwe ruin extends over more than 60 acres (24 hectares). A large defensive hilltop fortification has many rooms and a mazelike pattern of passageways. In the valley below, a thick wall of large stone blocks forms an elliptical enclosure around a conical tower. Both inside and outside the enclosure there are foundations of smaller stone buildings. The stones of the entire complex stay in place without mortar. Great Zimbabwe became a national monument and was designated a World Heritage site in 1986.

Zimmermann, Arthur (b. Oct. 5, 1864, Marggrabowa, East Prussia [now Olecko, Pol.]—d. June 6, 1940, Berlin, Ger.), German foreign secretary during part of World War I (1916–17), the author of a sensational proposal to Mexico to enter into an alliance against the United States.

After a career in the consular service, Zimmermann won transfer to the diplomatic branch in 1901. Because of the retiring nature of Gottlieb von Jagow, who became foreign secretary in 1913, Zimmermann conducted a large share of the relations with foreign envoys. As acting secretary in Jagow's absence, he participated with Emperor William II and Chancellor Theobald von Bethmann Hollweg, in Germany's decision of July 5, 1914, to support Austria-Hungary when, after the assassination of Archduke Francis Ferdinand at Sarajevo, Austria-Hungary put pressure on Serbia, thus angering Russia. Zimmermann drafted the telegram to Vienna embodying Germany's decision, which precipitated the crisis that culminated in the outbreak of war.

When, in 1916, the German High Command insisted on the resumption of unrestricted submarine warfare as the only remaining weapon to defeat the Allies, even at the risk of provoking the United States into belligerency, Jagow resigned; and, on November 25, Zimmermann, who was regarded as "pro-U-boat," was appointed to succeed him. In an effort to nullify or at least to reduce U.S. intervention in Europe by engaging U.S. arms and energies elsewhere, Zimmermann planned to embroil the United States in war with Mexico and Japan. In pursuit of this goal, on Jan. 16, 1917, he sent a secret telegram in code (through the German ambassador in Washington, D.C.) to the German minister in Mexico, authorizing him to propose an alliance to Mexico's President Venustiano Carranza. The offer included "an understanding on our part that Mexico is to reconquer her lost territory in Texas, New Mexico, and Arizona." Carranza was also asked to "invite the immediate adherence of Japan." Intercepted and decoded by British Admiralty intelligence, the telegram was made available to President Woodrow Wilson, who caused it to be published on March 1, 1917. In convincing Americans of German hostility toward the United States, the "Zimmermann Note" became one of the principal factors leading to the U.S. declaration of war against Germany five weeks later.

Zimmermann lost office just after the fall of Bethmann Hollweg's government in the summer of 1917 and never held it again.

Zimmermann, Dominikus (b. June 30, 1685, Gaispoint, near Wessobrunn, Bavaria [Germany]—d. Nov. 16, 1766, Wies), Bavarian Baroque architect and stuccoist whose church at Wies (now in Baden-Württemberg) is considered one of the finest accomplishments of Baroque architecture.

Zimmermann was taught stucco work by Johann Schmutzer and initially worked as a stuccoist. His earliest independent building design is the Dominican convent church at Mödingen (1716–21), in which he was aided by his brother Johann Baptist Zimmermann (1680–1758), a notable Bavarian court stuccoist and a fresco painter.

A considerable portion of Zimmermann's career was spent in the building of two *Gesamtkunstwerke* ("total art works") for which he and his brother designed and executed nearly every aspect of construction and decoration. Both are pilgrimage churches. The first, in Steinhausen, was begun in 1727. The floor plan is an oval, with 10 slender, freestanding piers supporting a vault painted in exemplary style by Zimmermann's brother. This structure has been regarded by some as the first truly Rococo church because of its light, airy structure and its delicately coloured, flowing, undulating decorations in coloured stucco and painted frescoes.

The second church, at Wies (1746–54), has a rather drab and demure exterior but an even richer interior. The plan is again oval, with eight piers supporting a sumptuous entablature and vault, decorated this time with unmistakably Rococo motifs and a delicate ceiling fresco by Johann Baptist. The interior is remarkable for the rich colour harmonies and the swirling, controlled movement of its decoration, which obliterates the previously clearly demarcated zones of pillar, capital, entablature, and vault.

Upon his retirement in 1752, Zimmermann chose the town of Wies as his home.

Zimorowic, Józef Bartłomiej, Zimorowic also spelled ZIMOROWICZ, original name JÓZEF BARTŁOMIEJ OZIMEK (b. Aug. 20, 1597, Lwów, Pol. [now Lviv, Ukraine]—d. Oct. 14, 1677, Lwów), Polish-Latin Baroque writer, prolific author of satirical and erotic epigrams.

When well-advanced in years, Zimorowic published a series of descriptions of Ukrainian peasant life, *Sielanki nowe ruskie* (1663; "New Ruthenian Idylls"), under the name of his more gifted younger brother Szymon (1608–29). As burgomaster of Lwów for many years, he witnessed the Cossack rebellion against Polish rule in the Ukraine (1648–49) and wrote two versified narratives of the event: *Kozaczyzna* ("The Cossacks") and *Burda Ruska* ("The Ruthenian Affray").

zinc (Zn), chemical element, low-melting metal of Group IIb (zinc group) of the periodic table, essential to life, and one of the most widely used metals. Zinc was known in Roman times only in combination with copper as the alloy brass. The metallurgists of India seem to have isolated the individual metal as early as the 13th century, and those of China had achieved large-scale production of zinc by the 16th century. In the West, commercial zinc production got under way by the middle of the 18th century in England under the leadership of William Champion.

Occurrence, uses, and properties. A little more abundant than copper, zinc makes up an average of 65 grams (2.3 ounces) of every ton of the Earth's crust. The chief zinc mineral is the sulfide sphalerite (zincblende), which, together with its oxidation products smithsonite and hemimorphite, constitute nearly all of the world's zinc ore. Native zinc has been reported from Australia, New Zealand, and the United States, but no occurrence is well authenticated. For its mineralogical properties, *see* native element (table).

Zinc is an essential trace element in the human body, where it is found in high concentration in the red blood cells as an essential part of the enzyme carbonic anhydrase, which promotes many reactions relating to carbon dioxide metabolism. The zinc present in the pancreas may aid in the storage of insulin. Zinc is a component of some enzymes that digest protein in the gastrointestinal tract. Zinc deficiency in nut-bearing and fruit trees causes such diseases as pecan rosette, little leaf, and mottle leaf. Zinc functions in the hemosycotypsin of snails' blood to transport oxygen in a way analogous to iron in the hemoglobin of human blood.

Metallic zinc is produced by roasting the sulfide ores and then either leaching the oxidized product in sulfuric acid or smelting it in a blast furnace. Zinc is won from the leach solution by electrolysis or is condensed from the blast furnace gas and then distilled of impurities. For specific information on the mining, recovery, and refining of zinc, *see* MACROPAEDIA: Industries, Extraction and Processing.

For statistical data on mine production of ore, refining of metal, and reserves (or production capacity), *see* mining (table).

The major uses of zinc metal are in galvanizing iron and steel and in making brasses and alloys for die-casting. The negative electrode (outside can) in one common type of electric dry cell is composed of zinc.

Freshly cast zinc has a bluish silver surface but slowly oxidizes in air to form a grayish protective oxide film. Highly pure zinc (99.99 percent) is ductile; the so-called prime western grade (99.8 percent pure) is brittle when cold but above 100° C (212° F) can be rolled into sheets that remain flexible. Zinc crystallizes in the hexagonal close-packed structure. When iron and zinc together are exposed to a corrosive medium, they constitute an electrolytic cell, and the zinc is attacked (oxidized to the Zn^{2+} ion) preferentially because of its higher electrode potential. This so-called sacrificial protection, coupled with the much greater corrosion resistance of zinc under atmospheric conditions, is the basis for galvanizing.

Natural zinc is a mixture of five stable isotopes: ^{64}Zn (48.6 percent), ^{66}Zn (27.9 percent), ^{67}Zn (4.1 percent), ^{68}Zn (18.8 percent), and ^{70}Zn (0.6 percent).

Compounds. In chemical compounds, zinc exhibits almost exclusively a +2 oxidation state. A few zinc(I) compounds have been reported, but never any compounds of zinc(III) or higher.

Zinc oxide, ZnO, is one of the most important zinc compounds. It can be prepared in a state of high purity and in a variety of crystal shapes and sizes by burning zinc vapour in air. Because of its high heat conductivity and capacity, zinc oxide is frequently incorporated into rubber as a heat dissipater. In the crystal of zinc oxide, the lattice (*i.e.*, the orderly structure formed by the ions) is an open one in which the zinc and oxygen ions occupy only 44 percent of the volume. Defects can be created in the lattice by specific treatments such as the introduction of foreign atoms or of zinc atoms in the vacancies of the lattice. Such treatment of zinc oxide crystals produces various electrical, photoelectrical, and catalytic properties. As a result, zinc oxide is used as a semiconductor in the production of phosphors for television tubes and fluorescent lamps. Its effects on the reactivity of many compounds make it useful as a catalyst in such operations as the manufacture of synthetic rubber and methanol. It is also used in paints, cosmetics, plastics, pharmaceuticals, and printing inks. Because under the influence of light the electrical conductivity of zinc oxide can be increased many times, it is employed in certain photocopying processes.

Zinc sulfate, $ZnSO_4$, is an intermediate compound in the production of zinc from its ores by the electrolytic process. It is used as a weed killer, in the manufacture of viscose rayon, and in dyeing, in which it functions as a mordant. Zinc chloride, $ZnCl_2$, can be prepared by a direct reaction or by evaporating the aqueous solution formed in various reactions. It is strongly deliquescent (water-absorbing) and is utilized as a drying agent and as a flux. In aqueous form it is used as a wood preservative. Zinc sulfide, ZnS, occurs in nature as the mineral sphalerite and may be prepared by treating solutions of zinc salts with hydrogen sulfide. It was long used as a white pigment but has been gradually replaced by titanium dioxide. Zinc sulfide has luminescent properties when activated by the addition of small quantities of copper, manganese, silver, or arsenic and so has been used in X-ray screens, in luminous dials for clocks and watches, and in fluorescent lights.

atomic number	30
atomic weight	65.39
melting point	420° C (788° F)
boiling point	907° C (1,665° F)
density	7.133 (25° C)
valence	2
electronic config.	2-8-18-2 or $(Ar)3d^{10}4s^2$

zinc-group element, any of three metals that comprise Group IIb of the periodic table of elements—namely, zinc (Zn), cadmium (Cd), and mercury (Hg).

A brief treatment of the zinc-group elements follows. For full treatment, *see* MACROPAEDIA: Chemical Elements. *See also* MICROPAEDIA for entries on each member of this element family.

All three zinc-group elements are found in the Earth's crust, but they are never in the free state (uncombined). They are silvery white in colour and have comparatively low melting points and boiling points. The boiling point of mercury—the only common metal that is liquid at room temperature—is lower than that of any other metal.

The zinc elements exhibit similar chemical behaviour because of certain affinities in their atomic structure. The atoms of these elements are able to lose two electrons in their outermost shells to form divalent positive ions, thereby exposing the next innermost shell with a stable configuration of 18 electrons in each case. Ordinary chemical reactions cannot supply enough energy to remove more than two electrons and thus increase the valency above 2. The zinc-group elements tend to utilize their two outer electrons for covalent bonding. This tendency is most distinct in the case of mercury, less so in that of zinc, and least with cadmium.

zincblende (mineral): *see* sphalerite.

Zincirli Höyük, Zincirli also spelled ZENJIRLI, SENJIRLI, or ZINJERLI, ancient SAMAL, archaeological site in the foothills of the Anti-Taurus Mountains, south-central Turkey. Samal was one of the late Hittite city-states that perpetuated the more or less Semitized southern Anatolian culture for centuries after the downfall of the Hittite empire (*c.* 1190 BC).

The oval-shaped mound, excavated (1888–1902) by the German Oriental Society, was found to be occupied by a walled citadel, divided into different sections and containing several important buildings, including the upper and lower palaces, showing the characteristic *bit hilani* (or "pillared porch") architectural type. Immediately surrounding the citadel was the city itself, enclosed by a circular fortification wall topped by 100 towers. The identity with ancient Samal was confirmed by the discovery of a victory inscription of the Assyrian king Esarhaddon from 670 BC. The importance of Zincirli as a settled community came to an end with the downfall of Assyria in the late 7th century BC.

zincite, mineral consisting of zinc oxide (ZnO), usually found in platy or granular masses. Its blood-red colour and orange-yellow streak are characteristic, as is also its common



Zincite in white calcite from Franklin, N.J.
B.M. Shaub

association with black franklinite and white calcite. Notable specimens have been found at Franklin and Sterling Hill, near Ogdensburg, N.J. Zincite crystallizes in the hexagonal system. Distinct crystals are rare; they are hemimorphic and consist of a single basal plane and a hexagonal pyramid. Manganese may partially replace zinc in some specimens.

Zinder, city, south-central Niger. The country's second largest city, it was the capital of a Muslim dynasty established in the 18th century, which freed itself from the sovereignty of Bornu in the mid-19th century. The city was occupied by French troops in 1899, and it served as the capital of the former French colony of Niger (in French West Africa) from 1922 to 1926.

Zinder lies in the centre of an important peanut- (groundnut-) producing region and is a major processing centre and market, with a peanut-processing mill, a millet-flour mill, a tannery, and a thermoelectric-power plant. The city is situated at the border of regions populated by sedentary Hausa farmers and nomadic Fulani. Zinder lies at the crossroads



Watering hole, Zinder, Niger
Dominique Darbois

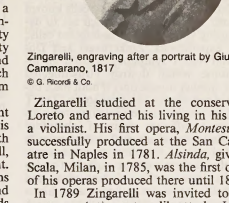
of the main east-west road through Niger and the north-south route from Agadez to Kano, Nigeria. It has an airport. Pop. (1988 prelim.) 120,892.

Zinder, Norton David (b. Nov. 7, 1928, New York, N.Y., U.S.), American biologist who discovered the occurrence of genetic transduction—the carrying of hereditary material from one strain of microorganisms to another by a filterable agent such as a bacteriophage, or bacterial virus—in species of the *Salmonella* bacteria.

After attending Columbia University, Zinder studied under Joshua Lederberg at the University of Wisconsin (Ph.D., 1952) and then joined the staff at the Rockefeller Institute for Medical Research (now Rockefeller University) in New York City, where he became a professor in 1964.

Zinder hoped to go beyond Lederberg's 1946 discovery of mating in the bacterium *Escherichia coli.* By allowing species of *Salmonella* to conjugate (to exchange genetic material in a kind of reproduction) in a special nutritional medium, Zinder hoped to obtain a large number of mutant bacteria to use in his experiments. Instead of conjugating, however, the bacteria exhibited another form of genetic exchange, genetic transduction. Using bacterial transduction, later experimenters were able to show that bacterial genes affecting selected physiological processes were clustered together in what are now known as operons. Zinder's experiments also led to the discovery of the only known phage containing ribonucleic acid (RNA) as its genetic material.

Zingarelli, Nicola Antonio (b. April 4, 1752, Naples [Italy]—d. May 5, 1837, Torre del Greco, near Naples), one of the principal Italian composers of operas and religious music of his time.



Zingarelli, engraving after a portrait by Giuseppe Cammarano, 1817
© G. Ricordi & Co.

Zingarelli studied at the conservatory at Loreto and earned his living in his youth as a violinist. His first opera, *Montesuma,* was successfully produced at the San Carlo Theatre in Naples in 1781. *Alsinda,* given at La Scala, Milan, in 1785, was the first of a series of his operas produced there until 1803.

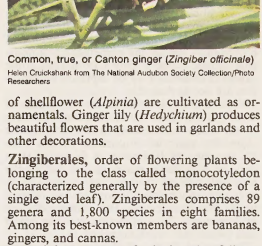
In 1789 Zingarelli was invited to Paris to compose *Antigone* to a libretto by Jean-François Marmontel for the Opéra. The French Revolution drove him to Switzerland, and from there he returned to Milan, where in 1792 he was appointed music director of the cathedral. His later works for La Scala included the comic opera *Il mercato di Monfregoso* (1792), based on a play by Carlo Goldoni, which became popular in the German states, and *Giulietta e Romeo* (1796), after William Shakespeare, held to be his finest work. From 1794 to 1804 he was music director at Loreto, where he composed a large number of sacred works (still in manuscript) and continued to write operas for production in Milan and other Italian cities. In 1804 he was music director at the Sistine Chapel in Rome, where he composed cantatas on poems by Torquato Tasso and Dante. He also wrote two operas for production in Rome; the second of these, *Berenice* (1811), achieved great popularity. This was the last of his 37 operas.

In 1811, for patriotic reasons, Zingarelli refused to conduct a *Te Deum* in honor of Napoleon's son, the "King of Rome." He was arrested and taken to Paris, where the emperor, an admirer of his music, released him with a pension. In 1813 he was appointed director of the Naples Conservatory and in 1816 succeeded Giovanni Paisiello as music director of the cathedral in that city. Among his pupils were Michele (later Sir Michael) Costa, Vincenzo Bellini, and Saverio Mercadante.

Zingiberaceae, largest family of the order Zingiberales, containing about 53 genera and more than 1,200 species. These aromatic herbs grow chiefly in moist, swampy areas of the tropics and subtropics.

Members of the family are perennials that frequently have sympodial (forked) fleshy rhizomes (underground stems). They may grow to 6 m (20 feet) in height. A few species are epiphytic; *i.e.,* supported by other plants and having aerial roots exposed to the humid atmosphere. The rolled-up sheathing bases of the leaves sometimes form an apparent short aerial stem. The commonly green sepals differ in texture and colour from the petals. Bracts (leaflike structures) are spirally arranged, and the flower clusters are spiral and conelike. The Zingiberaceae flower resembles an orchid because of its labellum (two or three fused stamens) joined with a pair of petallike sterile stamens. Nectar is present in the slender flower tubes. The brightly coloured flowers may bloom for only a few hours and are thought to be pollinated by butterflies. One genus, *Achasma,* exhibits an unusual growth pattern. The floral parts grow below ground except for a circle of bright red, petallike structures that emerge from the ground, yet the leafy shoots rise to 5 m.

Many species are economically valuable for their spices and perfume. The dried, thick rhizome of *Curcuma longa* is turmeric. The seeds of *Elettaria cardamomum* are the source of cardamom. Ginger is obtained from the rhizomes of *Zingiber officinale.* Several species



Common, true, or Canton ginger (*Zingiber officinale*)
Helen Cruickshank from The National Audubon Society Collection/Photo Researchers

of shellflower (*Alpinia*) are cultivated as ornamentals. Ginger lily (*Hedychium*) produces beautiful flowers that are used in garlands and other decorations.

Zingiberales, order of flowering plants belonging to the class called monocotyledon (characterized generally by the presence of a single seed leaf). Zingiberales comprises 89 genera and 1,800 species in eight families. Among its best-known members are bananas, gingers, and cannas.

A brief treatment of Zingiberales follows. For full treatment, *see* MACROPAEDIA: Angiosperms.

Like other monocots, members of this order lack a cambium. Even though plants in this group are very diverse in gross aspect, one nearly universal feature exists: cross sections of leaf stalks of most members display vascular bundles (conducting strands) in prominent arcs, interspersed with air canals.

Plants assigned to the Zingiberales range in size from herbs a few centimetres in height to the traveler's tree (*Ravenala madagascariensis*), which grows to a height of 8 m (26 feet), displaying a fan-shaped array of 20 or more leaves which are 4 to 5 m long.

Zingiberales are widely distributed in the tropics, but individual families are limited in range. Several genera belonging to the Zingiberales are of major economic importance. Foremost are the hybrids of banana (*Musa paradisiaca*), which yield the edible banana and plantain fruits. Manila hemp is the name given to the strong fibres of the leaf stalks of *Musa textilis,* an inedible banana native to the Philippine Islands. These fibres are made into ropes and twine. Arrowroot starch, used in special diets and in fine baking, is extracted from the rhizomes (stocky underground stems) of *Marantz arundinacea,* cultivated mainly in the West Indies. The rhizomes of *Canna* are

also edible, but many cultivars in this genus are most noted for their showy flowers. Most plants in the large ginger family (Zingiberaceae) have aromatic leaves and flowers. *Zingiber officinale* yields true ginger; other genera are the source of additional spices, medicinal products, dyes, and condiments. Most *Zingiber* members are native to tropical Asia, though several species are grown as ornamentals in greenhouses and can survive winters in mild temperate regions.

The traveler's tree and related plants develop thin stems surmounted by the current crop of leaves. Encircling scars indicate the position of leaf sheaths already shed by the mature stems. The most common type of stem in this order is short and below ground. In many gingers, all leaves arise at ground level, their clasping sheaths and leaf bases hiding the stem. In the bananas, the vegetative stem is a stocky, subterranean structure that extends above the level of the soil for a short distance; it is surrounded by massive leaves and is never visible. Each new leaf grows inside the sheath of the preceding one. One edge of the leaf overlaps the other resulting in a slight dwarfing of the edge that is lowermost. What appears to be the stem of the banana plant is, in reality, a false trunk consisting of many leaf sheaths that are rolled up longitudinally to form a cylinder.

In Zingiberales, branches arise from underground stems and are known as rhizomes (when elongate) or suckers (when short and bulky); they produce leaves and eventually emerge above the surface of the soil. When separated from their parents, such units reproduce the species vegetatively. This method of propagation assures the perpetuation of desirable genetic traits; if grown from seed, some expected qualities may be replaced by others that are not as desirable.

When mature enough to flower, plants of some genera (such as the banana), produce flower stalks (inflorescences) at the tip of the vegetative stem; lower portions of this stem are sheathed by leaf bases. A flowering stem may be very long, emerging just below the terminal tuft of current leaf blades. Typically, the inflorescence is an erect axis bearing bracts (bladeless leaves). The ultimate clusters of flowers arise in conjunction with the bracts and usually are much-branched.

The typical flower of this order has three petals, three sepals, six stamens (male), and a pistil consisting of three carpels (and differentiated into a basal ovary); many variations occur. In some species of the banana family, flowers are functionally unisexual (male or female), thus ensuring cross-pollination. Even though cultivated bananas produce flowers with a rank odour and much nectar, fruits develop without pollination; seeds do not develop even if flowers are pollinated. Flowers of wild bananas and those of *Strelitzia* are birdpollinated. In the ginger family, butterflies are the pollinators.

Zingiberidae, subclass of monocotyledonous flowering plants. Its members are herbaceous and may be either terrestrial or epiphytic (*i.e.,* supported by other plants and having aerial roots exposed to the humid atmosphere).

A brief treatment of the Zingiberidae follows. For full treatment, *see* MACROPAEDIA: Angiosperms.

The subclass contains two orders, Zingiberales and Bromeliales, the former divided into eight families, and the latter into only a single family (Bromeliaceae). The flowers of plants in the subclass are perfect (*i.e.,* both stamens and pistils are present in the same flower), and they are sometimes reduced to functionally unisexual flowers. The flower parts are organized in multiples of three and are adapted to being pollinated by insects or, less commonly, by the wind. The petals are usually distinct, and the six stamens are arranged into two series of three each, with some stamens reduced to petaloid staminoids.

Zinjanthropus boisei, species of fossil hominid that was subsequently renamed *Australopithecus boisei. See* Australopithecus.

Zinjerli Hüyük (Turkey): *see* Zincirli Höyük.

Zinkernagel, Rolf M. (b. Jan. 6, 1944, Basel, Switz.), Swiss immunologist and pathologist who, along with Peter C. Doherty of Australia, received the Nobel Prize for Physiology or Medicine in 1996 for their discovery of how the immune system distinguishes virus-infected cells from normal cells.

Zinkernagel received an M.D. degree (1970) from the University of Basel and a Ph.D. (1975) from the Australian National University, Canberra. He joined the John Curtin School of Medical Research in Canberra in 1973 as a research fellow and began collaborating with Doherty on a study of the role the immune system plays in protecting mice against infection by the lymphocytic choriomeningitis virus, which can cause meningitis. Their research centered on the white blood cells known as cytotoxic T lymphocytes, which act to destroy invading viruses and virus-infected cells.

In their experiments, Zinkernagel and Doherty found that T lymphocytes from an infected mouse would destroy virus-infected cells from another mouse only if both mice belonged to a genetically identical strain. The T lymphocytes would ignore virus-infected cells taken from a different strain of laboratory mice. Further research showed that in order to kill infected cells, T lymphocytes must recognize two major signals on the surface of an infected cell: those of the infecting virus and certain "self" molecules called major histocompatibility complex (MHC) antigens, which tell the immune system that a particular cell belongs to one's own body. In the experiment, the T lymphocytes from one mouse strain could not recognize MHC antigens from another on the infected cells, so no immune response occurred. The discovery that T lymphocytes must simultaneously recognize both self and foreign molecules on a cell in order to react against it formed the basis for a new understanding of the general mechanisms of cellular immunity.

After leaving the Curtin School in 1975, Zinkernagel served as an associate professor (1979–88) and full professor (1988–92) at the University of Zürich and became head of the university's Institute of Experimental Immunology in 1992.

Zinn, Walter Henry (b. Dec. 10, 1906, Kitchener, Ont., Can.—d. Feb. 14, 2000, Clearwater, Fla., U.S.), Canadian-born nuclear physicist who contributed to the U.S. atomic bomb project during World War II and to the development of the nuclear reactor.

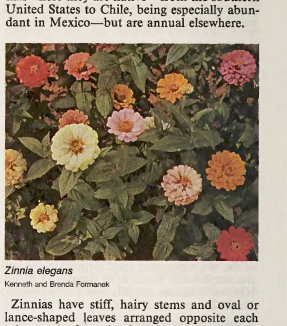
Zinn received a Ph.D. at Columbia University in 1934. He was recruited by Enrico Fermi for the Manhattan Project, and it was he who, at the University of Chicago, withdrew a control rod from the atomic pile that released the world's first self-sustaining nuclear reaction. He later supervised the dismantling of the pile and its removal to the Argonne National Laboratory (near Chicago), of which he was director (1946–56) before entering private business. In Idaho in 1951 he designed the first experimental breeder reactor. He also served as chief scientific adviser in the design of the U.S.S. *Nautilus,* the first nuclear-powered submarine. Zinn received numerous honours, including the Atoms for Peace Award (1960) and the Enrico Fermi Award (1969).

Zinnemann, Fred (b. April 29, 1907, Vienna, Austria—d. March 14, 1997, London, Eng.), Austrian-born American motion-picture director whose films are distinguished by realism of atmosphere and characterization.

Zinnemann studied law at the University of Vienna (1925–27) and then decided he wanted to make movies. In pursuit of this career, he studied cinematography in Paris (1927–28). In 1929 he immigrated to the United States, becoming a citizen in 1937. In Hollywood he became an assistant to Robert Flaherty, a pioneer in documentary filmmaking. This experience influenced all of Zinnemann's subsequent feature films, which show a rigorous authenticity in subject matter and style. He spent the next decade making documentaries, earning two Academy Awards for them.

He also began directing feature films, such as *The Search* (1947), an account of refugee children in Europe, which introduced the actor Montgomery Clift. In *The Men* (1950), Zinnemann employed paraplegic war veterans as actors and gave Marlon Brando his screen debut. His classic *High Noon* (1952) was one of the first westerns in which the protagonist did not assume the epic proportions usual to this genre. Zinnemann's other films include *The Member of the Wedding* (1953); *From Here to Eternity* (1953), for which he received an Academy Award as best director; *Oklahoma* (1955); *A Man for All Seasons* (1966), for which he received an Academy Award; *The Day of the Jackal* (1973); and *Five Days One Summer* (1982). A recurrent theme in Zinnemann's movies is the crisis of moral courage, requiring an individual to face his conscience and choose between maintaining his personal integrity or conforming to external demands.

zinnia, any of about 22 species of herbs and shrubs constituting the genus *Zinnia* of the family Compositae (Asteraceae), and native primarily to North America. They are perennial where they are native—from the southern United States to Chile, being especially abundant in Mexico—but are annual elsewhere.



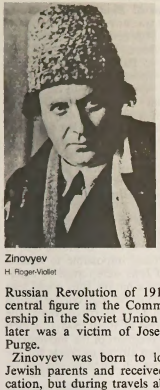
Zinnia elegans
Kenneth and Brenda Formanek

Zinnias have stiff, hairy stems and oval or lance-shaped leaves arranged opposite each other and often clasping the stem. The numerous garden varieties grown for their showy flowers are derived from the species *Zinnia elegans.* The solitary flower heads are borne at the ends of branches, growing at the junction of a bract (leaflike structure) and the receptacle. The flowers occur in a wide range of colours except blue. Different types of garden zinnias range from dwarf compact plants less than 0.3 m (1 foot) tall with flowers 2.5 cm (1 inch) in diameter to giant forms up to 1 m tall, with flowers up to 15 cm (6 inches) across. A less well-known species of zinnia is *Z. angustifolia,* which grows 0.5 m tall and has small yellow or orange blossoms.

Some zinnias may appear ungainly and coarse in habit, but they flower freely and long and bear up under full sun, drought, and neglect as do few other garden plants.

Zinovyev, Grigory Yevseyevich, Zinovyev also spelled ZINOVIEV, original name OVSEL

GERSHON ARONOV RADOMYSLSKY (b. Sept. 11 [Sept. 23, New Style], 1883, Yelizavetgrad, Ukraine, Russian Empire [now Kirovohrad, Ukraine]—d. Aug. 25, 1936, Moscow, Russia, U.S.S.R.), revolutionary who worked closely with Lenin in the Bolshevik Party before the



Zinovyev
H. Roger-Viollet

Russian Revolution of 1917 and became a central figure in the Communist Party leadership in the Soviet Union in the 1920s. He later was a victim of Joseph Stalin's Great Purge.

Zinovyev was born to lower middle-class Jewish parents and received no formal education, but during travels abroad in 1902–05 he attended lectures on law at Bern University. In 1901 he joined the Social Democratic Workers' Party and Lenin's radical Iskra organization within that party. After the party split in 1903, he adhered to the Bolsheviks. He was an agitator among the St. Petersburg workers during the Russian Revolution of 1905 and became a member of the party's Central Committee after the London Congress in 1907. He was arrested in 1908 but shortly released because of ill health.

Zinovyev was Lenin's principal collaborator in the period 1909–17, living in France, Austria, or Switzerland. He took part in the struggles against the militant Bolsheviks who opposed Lenin's leadership and also against the Mensheviks and Leon Trotsky. He was active in directing Bolshevik organizations in Russia and the activities of the Bolshevik deputies in the Duma. During World War I he tried to organize the "internationalists" among the European socialists.

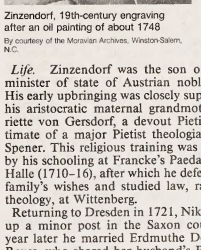
In April 1917, after the February Revolution had overthrown the monarchy, Zinovyev accompanied Lenin on his return to Russia. But in October, when Lenin insisted that the Bolsheviks seize power, Zinovyev and his close associate Lev B. Kamenev opposed him and even leaked information about the proposed coup d'état to the press. Immediately after the October Revolution he again dissented, vainly demanding that his colleagues include members from other socialist parties in the government. To symbolize his protest, he resigned from the Bolshevik Central Committee (November 1917).

Nevertheless, Zinovyev was soon restored to his position as a principal Bolshevik leader. An outstanding orator, he helped win public support for the new regime, and by 1921 he had become head of the Petrograd (later Leningrad) party organization, chairman of the Petrograd Soviet, and a full member of the party's Politburo. In 1919 he also became chairman of the executive committee of the newly established Communist International (Comintern), which, dominated by the Russian Communists, formulated socialist policies and coordinated the activities of its member parties. (In conjunction with that post he achieved international notoriety when in 1924 the London press published a letter, allegedly written by him, instructing British communists to conduct subversive activities. The publication of the letter was considered to be the cause of the downfall of Britain's first Labour government.)

In the early 1920s Zinovyev formed a coalition in the Politburo with Kamenev and Stalin to prevent Leon Trotsky from succeeding Lenin, who had become seriously ill and died in January 1924. But after the triumvirate had eliminated Trotsky as a serious contender in the power struggle (by early 1925), Stalin turned against his former allies. Neither Zinovyev's control over the Leningrad party organization and the Comintern nor his belated political alliance with Trotsky (1926) proved sufficient to preserve his position of authority and influence in the party. By the end of 1926 he had been forced out of the Politburo and the Comintern, and in 1927 he was expelled from the Communist Party.

Although he was subsequently readmitted to the party, he never recovered his former prestige and was expelled again on two other occasions (1932 and 1934). In 1935 he was arrested, secretly tried for "moral complicity" in the assassination of the party leader Sergey Mironovich Kirov (December 1934), and sentenced to 10 years' imprisonment. The following year, however, he was retried at the first Great Purge trial, found guilty on the fabricated charge of forming a terrorist organization to assassinate Kirov and other Soviet leaders, and executed. In 1988 the Soviet Supreme Court annulled the sentence posthumously.

Zinzendorf, Nikolaus Ludwig, Graf (Count) **von** (b. 1700, Dresden, Saxony [Germany]—d. May 9, 1760, Herrnhut), religious and social reformer of the German Pietist movement who, as leader of the Moravian church (Unitas Fratrum), sought to create an ecumenical Protestant movement.



Zinzendorf, 19th-century engraving after an oil painting of about 1748
By courtesy of the Moravian Archives, Winston-Salem, N.C.

Life. Zinzendorf was the son of a Saxon minister of state of Austrian noble descent. His early upbringing was closely supervised by his aristocratic maternal grandmother, Henriette von Gersdorf, a devout Pietist and intimate of a major Pietist theologian, Philipp Spener. This religious training was reinforced by his schooling at Francke's Paedagogium in Halle (1710–16), after which he deferred to his family's wishes and studied law, rather than theology, at Wittenberg.

Returning to Dresden in 1721, Nikolaus took up a minor post in the Saxon court, and a year later he married Erdmuthe Dorothea of Reuss, who shared her husband's Pietist convictions. His government service was shortlived; having inherited part of his grandmother's estate of Berthelsdorf, he became increasingly absorbed in the affairs of his tenants, especially a group of refugees from Bohemia and Moravia. With his assistance, these remnants of the persecuted Unitas Fratrum developed their own Moravian church settlement of Herrnhut in Saxony. Zinzendorf's initial purpose had been strictly ecumenical: following Spenerian precepts, he had sought to develop *ecclesiolae in ecclesia*—"little churches within the church"—to act as a leaven, revitalizing and ultimately unifying churches into a single Lutheran communion.

But in the process of remolding the structure of the Moravian church, he found his own views recast along communal lines: "There can be no Christianity without community." The statutes of the Brotherly Agreement of Herrnhut (1727) embodied the count's ideal of a Christian settlement in which all aspects of daily life were subordinated to the imperative of attaining a joyous fellowship with Christ.

In Herrnhut and succeeding Moravian settlements, family loyalties gradually were superseded by allegiance to one's choir—communal groupings rigidly stratified by age, sex, and marital status. These choirs usually provided their members with communal living quarters, food, clothing, and employment; they also accepted full responsibility for child care and education, following Zinzendorf's innovative and effective pedagogical theories. The communitarian ideal, in some instances, led to a communal sharing in production as well as consumption: the community took care of a member's needs in return for his labour.

The very success of Herrnhut in attracting new members intensified the antagonism of the establishment—the aristocracy, the town guilds, and the Lutheran church. Zinzendorf had sought to placate those who saw him as a sectarian and who doubted his allegiance to the Augsburg Confession by having himself ordained in 1734 as an orthodox Lutheran pastor. Nevertheless, two years later, he was banished from his estate by order of the Saxon government. In exile the count, in order to represent the missionary interests of the Moravians abroad more authoritatively, was consecrated a bishop of the Unitas Fratrum (1773). After establishing Moravian settlements at Herrnhaag and Marienborn in Wetteravia and forming new congregations in the Netherlands and the Baltics, he spent time in the West Indies and, subsequently, laid the groundwork for Moravian congregations in England. From 1741 to 1743 he traveled in America, setting up Moravian congregations in New York and Pennsylvania (including the major settlement of Bethlehem, Pa.).

On his return to Europe, Zinzendorf's ecumenical passion led him to develop the idea of *Tropen* (methods of training), according to which the different Protestant churches each represented valid concrete expressions of the one true Church of Christ, differing only in their modes of apprehending and communicating a shared set of religious truths. In 1747 the Saxon authorities rescinded the count's banishment; two years later they formally recognized the Church of the Unity of the Brethren. The English Parliament bestowed a similar recognition in 1749. But the excesses of the Sifting Time (1740s), a period in which the antirational, emotional, and sensuous elements inherent in Zinzendorfian theology were greatly intensified and which led, particularly in Herrnhaag, to an erotically tinged preoccupation with Christ's wounds, provided new ammunition to his opponents. The last decade of his life was trouble-laden. Debts incurred in pursuit of his worldwide missionary program continued to mount; his son Christian Renatus, whom he hoped would succeed him as leader of the Moravian church, succumbed to a lung ailment at the age of 25; and his wife, Erdmuthe, died in 1756. In the following year he married his lifelong collab-

orator Anna Nitschmann, who had formerly headed the Single Sisters' Choir in Bethlehem. Three years later, in 1760, Zinzendorf died in Herrnhut and was buried there.

Significance. Zinzendorf's influence on church history was felt far beyond the boundaries of the Pietistic "heart religion" he had preached so fervently. Opposed equally to the atheistic rationalism of the Enlightenment and the lifeless Protestant dogma of his own day, Zinzendorf emphasized the manifestation of religious feelings and emotions in a communalistic context. His ecumenicism, search for a Christian communitarian brotherhood, and founding of a worldwide missionary network were imperatives repeatedly stressed in his sermons, hymns, litanies, and religious tracts. For all their baroque extravagance, Zinzendorf's religious doctrines and expressive style are more attuned to the contemporary scene than they were to the climate of his own day.

(G.Li.)

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Zion, city, Lake county, northeastern Illinois, U.S. It lies along Lake Michigan, near the Wisconsin border. Zion was founded in 1901 by John Alexander Dowie as the headquarters of his Christian Catholic Church. Until 1935 it was theocratically governed, and the church controlled all business activities. The church schools were closed in 1939, after which a modern educational system was developed. Zion is now basically residential with expanding industrial development, including a nuclear power plant (1973). Illinois Beach State Park is adjacent to the south. Inc. 1902. Pop. (1990) 19,775.

Zion, in the Old Testament, the easternmost of the two hills of ancient Jerusalem. It was the site of the Jebusite city captured by David, king of Israel and Judah, in the 10th century BC (2 Samuel 5:6–9) and established by him as his royal capital. Some scholars believe that the name also belonged to the "stronghold of Zion" taken by David (2 Samuel 5:7), which may have been the fortress of the city. The Jewish historian Josephus, in the 1st century AD, identified Zion with the western hill of Jerusalem, where most of the city lay in his day. This incorrect identification of the site was retained until the late 19th or early 20th century, when the site of Zion was identified as the eastern hill (modern Ophel). The site was not included in the walls of Jerusalem's 16th-century fortifications.

The etymology and meaning of the name are obscure. It appears to be a pre-Israelite Canaanite name of the hill upon which Jerusalem was built; the name "mountain of Zion" is common. In biblical usage, however, "Mount Zion" often means the city rather than the hill itself. *Zion* appears in the Old Testament 152 times as a title of Jerusalem; over half of these occurrences appear in two books, the Book of Isaiah (46 times) and that of Psalms (38 times). It appears seven times in the New Testament and five times in quotations from the Old Testament.

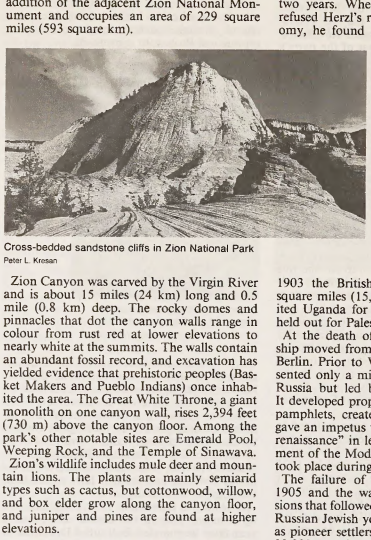
In the Old Testament, *Zion* is overwhelmingly a poetic and prophetic designation and is infrequently used in ordinary prose. It usually has emotional and religious overtones, but it is not clear why the name Zion rather than the name Jerusalem should carry these overtones. The religious and emotional qualities of the name arise from the importance of Jerusalem as the royal city and the city of the Temple. Mount Zion is the place where Yahweh, the God of Israel, dwells (Isaiah 8:18; Psalm 74:2), the place where he is king (Isaiah 24:23) and where he has installed his king, David (Psalm 2:6). It is thus the seat of the action of Yahweh in history.

In the Old Testament the city of Jerusalem is personified as a woman and addressed or spoken of as "the daughter of Zion," always in a context charged with feeling aroused by either of two ideas that stand in opposition to each other: the destruction of Jerusalem or its deliverance. After Jerusalem was destroyed by the Babylonians in 586 BC, the Israelites could not forget Zion (Psalm 137), and, in the prophecy after the Babylonian Exile of the Jews, Zion is the scene of Yahweh's messianic salvation. It is to Zion that the exiles will be restored (Jeremiah 3:14), and there they will find Yahweh (Jeremiah 31). Bearing all these connotations, Zion came to mean the Jewish homeland, symbolic of Judaism or Jewish national aspirations (whence the name Zionism for the 19th–20th-century movement to establish a Jewish national centre or state in Palestine).

Although the name of Zion is rare in the New Testament, it has been frequently used in Christian literature and hymns as a designation for the heavenly city or for the earthly city of Christian faith and fraternity.

Zion National Park, national park of deep canyons, high cliffs, and mesas in southwestern Utah, U.S. It lies northeast of the city of St. George.

The park's principal feature is Zion Canyon, which received its name from the Mormons who discovered it (1858) and settled there in the early 1860s. A portion of the area was first set aside as the Mukuntuweap National Monument in 1909. The monument was enlarged and renamed Zion National Monument in 1918 and was established as a national park in 1919. The park was enlarged in 1956 by the addition of the adjacent Zion National Monument and occupies an area of 229 square miles (593 square km).



Cross-bedded sandstone cliffs in Zion National Park
Peter L. Kresan

Zion Canyon was carved by the Virgin River and is about 15 miles (24 km) long and 0.5 mile (0.8 km) deep. The rocky domes and pinnacles that dot the canyon walls range in colour from rust red at lower elevations to nearly white at the summits. The walls contain an abundant fossil record, and excavation has yielded evidence that prehistoric peoples (Basket Makers and Pueblo Indians) once inhabited the area. The Great White Throne, a giant monolith on one canyon wall, rises 2,394 feet (730 m) above the canyon floor. Among the park's other notable sites are Emerald Pool, Weeping Rock, and the Temple of Sinawava.

Zion's wildlife includes mule deer and mountain lions. The plants are mainly semiarid types such as cactus, but cottonwood, willow, and box elder grow along the canyon floor, and juniper and pines are found at higher elevations.

Zionism, Jewish nationalist movement that has had as its goal the creation and support of a Jewish national state in Palestine, the ancient homeland of the Jews (Hebrew: Eretz Yisra'el, "the Land of Israel"). Though Zionism originated in eastern and central Europe in the latter part of the 19th century, it is in many ways a continuation of the ancient nationalist attachment of the Jews and of the Jewish religion to the historical region of Palestine, where one of the hills of ancient Jerusalem was called Zion.

A brief treatment of Zionism follows. For full treatment, *see* MACROPAEDIA: Israel.

In the 16th and 17th centuries a number of "messiahs" came forward trying to persuade Jews to "return" to Palestine. The Haskala ("Enlightenment") movement of the late 18th century, however, urged Jews to assimilate into Western secular culture. In the early 19th century interest in a return of the Jews to Palestine was kept alive mostly by Christian millennarians. Despite the Haskala, eastern European Jews did not assimilate and in reaction to tsarist pogroms formed the Ḥovevei Ziyyon ("Lovers of Zion") to promote the settlement of Jewish farmers and artisans in Palestine.

A political turn was given to Zionism by Theodor Herzl, an Austrian journalist who regarded assimilation as most desirable but, in view of anti-Semitism, impossible to realize. Thus, he argued, if Jews were forced by external pressure to form a nation, they could lead a normal existence only through concentration in one territory. In 1897 Herzl convened the first Zionist Congress at Basel, Switz., which drew up the Basel program of the movement, stating that "Zionism strives to create for the Jewish people a home in Palestine secured by public law."

The centre of the movement was established in Vienna, where Herzl published the official weekly *Die Welt* ("The World"). Zionist congresses met yearly until 1901 and then every two years. When the Ottoman government refused Herzl's request for Palestinian autonomy, he found support in Great Britain. In 1903 the British government offered 6,000 square miles (15,500 square km) of uninhabited Uganda for settlement, but the Zionists held out for Palestine.

At the death of Herzl in 1904, the leadership moved from Vienna to Cologne, then to Berlin. Prior to World War I Zionism represented only a minority of Jews, mostly from Russia but led by Austrians and Germans. It developed propaganda through orators and pamphlets, created its own newspapers, and gave an impetus to what was called a "Jewish renaissance" in letters and arts. The development of the Modern Hebrew language largely took place during this period.

The failure of the Russian Revolution of 1905 and the wave of pogroms and repressions that followed caused growing numbers of Russian Jewish youth to emigrate to Palestine as pioneer settlers. By 1914 there were about 90,000 Jews in Palestine; 13,000 settlers lived in 43 Jewish agricultural settlements, many of them supported by the French Jewish philanthropist Baron Edmond de Rothschild.

Upon the outbreak of World War I political Zionism reasserted itself, and its leadership

passed to Russian Jews living in England. Two such Zionists, Chaim Weizmann and Nahum Sokolow, were instrumental in obtaining the Balfour Declaration from Great Britain (Nov. 2, 1917), which promised British support for the creation of a Jewish national home in Palestine. The declaration was included in Britain's League of Nations mandate over Palestine (1922).

In the following years the Zionists built up the Jewish urban and rural settlements in Palestine, perfecting autonomous organizations and solidifying Jewish cultural life and Hebrew education. In March 1925 the Jewish population in Palestine was officially estimated at 108,000, and it had risen to about 238,000 (20 percent of the population) by 1933. Jewish immigration remained relatively slow, however, until the rise of Hitlerism in Europe. Nevertheless, the Arab population feared Palestine eventually would become a Jewish state and bitterly resisted Zionism and the British policy supporting it. Several Arab revolts, especially in 1929 and 1936–39, caused the British to devise schemes to reconcile the Arab and Zionist demands.

Hitlerism and the large-scale extermination of European Jews led many Jews to seek refuge in Palestine and many others, especially in the United States, to embrace Zionism. As tensions grew among Arabs and Zionists, Britain submitted the Palestine problem first to Anglo-U.S. discussion for solution and later to the United Nations, which on Nov. 29, 1947, proposed partition of the country into separate Arab and Jewish states and the internationalization of Jerusalem. The creation of the State of Israel on May 14, 1948, brought about the Arab–Israeli war of 1948–49, in the course of which Israel obtained more land than had been provided by the UN resolution, and drove out 800,000 Arabs who became displaced persons known as Palestinians. Thus 50 years after the first Zionist congress and 30 years after the Balfour Declaration, Zionism achieved its aim of establishing a Jewish state in Palestine, but at the same time it became an armed camp surrounded by hostile Arab nations and Palestinian "liberation" organizations engaged in terrorism in and outside of Israel.

During the next two decades Zionist organizations in many countries continued to raise financial support for Israel and to encourage Jews to immigrate there. Most Jews, however, reject the view propagated by many very Orthodox Jews in Israel that the Jews outside Israel were living in "exile" and could live a full life only in Israel.

Zionist church, any of several prophet-healing groups in southern Africa; they correspond to the independent churches known as Aladura (*q.v.*) in Nigeria, "spiritual" in Ghana, and "prophet-healing churches" in most other parts of Africa.

The use of the term Zion derives from the Christian Catholic Apostolic Church in Zion, founded in Chicago in 1896 and having missionaries in South Africa by 1904. That church emphasized divine healing, baptism by threefold immersion, and the imminent Second Coming of Christ. Its African members encountered U.S. missionaries of the Apostolic Faith Pentecostal church in 1908 and learned that the Zion church lacked the second baptism of the Spirit (recognition of extra powers or character); they therefore founded their own Pentecostal Zion Apostolic Church. The vast range of independent churches that stem from the original Zion Apostolic Church use in their names the words Zion (or Jerusalem), Apostolic, Pentecostal, Faith, or Holy Spirit to represent their biblical charter, as, for example, the Christian Catholic Apostolic Holy Spirit Church in Zion of South Africa. These are known in general as Zionist or Spirit churches.

The churches were introduced into Rhodesia (Zimbabwe) in the 1920s by migrant workers returning from South Africa; endless schisms and new foundations followed. In the mid-1990s one of the larger groups was the African Apostolic Church of Johane Maranke, which claimed about 935,000 adherents in Zimbabwe and many others in surrounding countries.

Since the 1920s the racial and political concerns shared with Ethiopianism (an earlier movement toward religious and political autonomy) have declined, especially in South Africa; the better-established Zionists have become Ethiopian in type, or more like white Evangelical or revivalist churches. These tendencies are apparent in the two largest South African groups—the Zion Christian Church (founded 1925), whose adherents were estimated at about 8,200,000 in 1995, and Limba's austere Church of Christ (founded 1910), which had about 250,000 adherents in 1995.

Zionist churches include the following features: (1) origination from a mandate received by a prophet in a dream, vision, or death-resurrection experience, (2) a chieflike head, often called a bishop, who is succeeded by his son and who is occasionally regarded as a messiah (women also figure as founders and leaders), (3) security received by the church's possession of its own holy place, such as a New Jerusalem, Zion, or Moriah City as headquarters, by ownership of land, and by organization of farms and other economic activities, (4) healing, through confession, repeated baptisms, purification rites, and exorcisms, especially at "Bethesda pools" and "Jordan rivers," (5) revelation and power from the Holy Spirit through prophetic utterances and Pentecostal phenomena, (6) ritualistic and Africanized worship, with special garments and innovative festivals, characterized by singing, dancing, clapping, and drumming, (7) a legalistic and Sabbatarian ethic, which includes taboos against certain foods, beer, and tobacco and which does not admit Western medicines and which tolerates polygamy, and (8) repudiation of traditional magic, medicines, divination, and ancestor cults, though Christian replacements for these traditional practices are sometimes similarly used and interpreted.

ZIP Code, in full ZONE IMPROVEMENT PLAN CODE, system of zone coding introduced by the U.S. Post Office Department (now the U.S. Postal Service) in 1963 to facilitate the sorting and delivery of mail. After an extensive publicity campaign, the department finally succeeded in eliciting from the public a widespread acceptance of the ZIP Code. Users of the mail were requested to include in all addresses a five-number code, of which the first three digits identified the section of the country to which the item was destined and the last two digits the specific post office or zone of the addressee. The primary purpose of the zone coding system was to fully exploit the capabilities of electronic reading and sorting equipment.

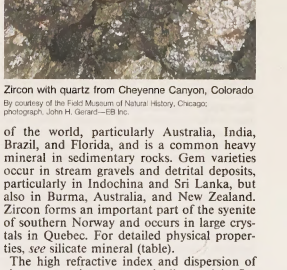
The U.S. Postal Service introduced a nine-digit ZIP Code in 1983. The new code, composed of the original five digits plus a hyphen and four additional numbers, was designed to speed up automated sorting operations. The first two of the four extra digits specify a particular sector, such as a group of streets or cluster of large buildings. The last two digits of the expanded code represent an even smaller area called a segment, which may consist of one side of a city block, a single floor in a large building, or a group of post office boxes.

zipper, also called SLIDE FASTENER, device for binding the edges of an opening such as on a garment or a bag. A zipper consists of two strips of material with metal or plastic teeth along the edges, and a sliding piece that draws the teeth into interlocking position when moved in one direction and separates them again when moved in the opposite direction.

An early idea of a zipper was exhibited by Whitcomb L. Judson at the World's Columbian Exposition of 1893 in Chicago. Judson's fastener, called a clasp locker, was an arrangement of hooks and eyes with a slide clasp for closing and opening. Gideon Sundback, a Swedish engineer working in the United States, substituted spring clips in place of hooks and eyes and in 1912 produced his Hookless #2. In the same year a similar device was patented in Europe by Catharina Kuhn-Moos.

In 1917 the U.S. Navy equipped windproof flying suits with zippers. In the late 1920s and early 1930s they appeared on clothing for both men and women. In 1923 B.G. Work of the B.F. Goodrich Company gave the name zipper to the slide fastener that had just been adopted for closing overshoes.

zircon, silicate mineral, zirconium silicate, $ZrSiO_4$, the principal source of zirconium. Zircon is widespread as an accessory mineral in acid igneous rocks; it also occurs in metamorphic rocks and, fairly often, in detrital deposits. It occurs in beach sands in many parts



Zircon with quartz from Cheyenne Canyon, Colorado
By courtesy of the Field Museum of Natural History, Chicago; photograph, John H. Gerard—EB Inc.

of the world, particularly Australia, India, Brazil, and Florida, and is a common heavy mineral in sedimentary rocks. Gem varieties occur in stream gravels and detrital deposits, particularly in Indochina and Sri Lanka, but also in Burma, Australia, and New Zealand. Zircon forms an important part of the syenite of southern Norway and occurs in large crystals in Quebec. For detailed physical properties, *see* silicate mineral (table).

The high refractive index and dispersion of zircon cause it to approach diamond in fire and brilliancy. Several varietal names have been applied to coloured gems. Hyacinth (jacinth) includes the clear, transparent red, orange, and yellow varieties. Matura diamond, from Sri Lanka, is clear and colourless, either naturally or made so through heat treatment under oxidizing conditions. The name jargon, like zircon derived from Arabic *zargūn,* applies to all other colours. A lovely blue stone may be made by heat treatment under reducing conditions.

zirconia, zirconium dioxide, an industrially important compound of zirconium and oxygen usually derived from the mineral zircon (*see* zirconium).

zirconium (Zr), chemical element, metal of Group IVb of the periodic table, used as a structural material for nuclear reactors.

Properties, occurrence, and uses. Zirconium, obscure before the late 1940s, became a signif-

icant engineering material for nuclear energy applications because it is highly transparent to neutrons. The element was identified (1789) in zircon from its oxide by the German chemist Martin Heinrich Klaproth, and the metal was isolated (1824) in impure form by the Swedish chemist Jöns Jacob Berzelius. The impure metal, even when 99 percent pure, is hard and brittle. The white, soft, malleable, and ductile metal of higher purity was first produced in quantity (1925) by the Dutch chemists Anton E. van Arkel and J.H. de Boer by the thermal decomposition of zirconium tetraiodide, ZrI_4. In the early 1940s, William Justin Kroll of Luxembourg developed his cheaper process of making the metal based on the reduction of zirconium tetrachloride, $ZrCl_4$, by magnesium. It is relatively abundant in the Earth's crust and is characteristically observed in S-type stars. Zirconium is commercially obtained principally from the minerals zircon and baddeleyite.

The most important use of zirconium is in nuclear reactors for cladding fuel rods, for alloying with uranium, and for reactor-core structures because of its unique combination of properties. Zirconium has good strength at elevated temperatures, resists corrosion from the rapidly circulating coolants, does not form highly radioactive isotopes, and withstands mechanical damage from neutron bombardment. Hafnium, chemically similar to zirconium and present in all zirconium ores, must be scrupulously removed from the metal intended for reactor uses because hafnium strongly absorbs thermal neutrons.

Zirconium absorbs oxygen, nitrogen, and hydrogen in astonishing amounts. At about 800° C it combines chemically with oxygen to yield the oxide, ZrO_2. Zirconium reduces such refractory crucible materials as the oxides of magnesium, beryllium, and thorium. This strong affinity for oxygen and other gases accounts for its use as a getter for removing residual gases in electron tubes. At normal temperatures in air, zirconium is passive because of the formation of a protective film of oxide or nitride. Even without this film, the metal is resistant to the action of weak acids and acidic salts. Because of its high corrosion resistance, zirconium has found widespread use in the fabrication of pumps, valves, and heat exchangers. Zirconium is also used as an alloying agent in the production of some magnesium alloys and as an additive in the manufacture of certain steels.

Natural zirconium is a mixture of five stable isotopes: zirconium-90 (51.46 percent), zirconium-91 (11.23 percent), zirconium-92 (17.11 percent), zirconium-94 (17.40 percent), zirconium-96 (2.80 percent). Two allotropes exist: below 862° C (1,584° F) a hexagonal close-packed structure, above that temperature a body-centred cubic.

Compounds. Zirconium is predominantly tetravalent in its compounds. Some less stable trivalent compounds, however, are known.

Various zirconium compounds have important applications in industry. Among these are zirconium dioxide (also called zirconia), ZrO_2, a hard, white or yellow-brown solid with a high melting point—about 2,700° C (4,892° F). It is commonly used as an abrasive, a refractory material, and a component of acid- and alkali-resistant glasses and of ceramics employed in fuel cells. Zirconium dioxide occurs in nature as baddeleyite, but the commercial product is more cheaply recovered from zircon.

Other important industrial compounds of zirconium include the tetrachloride $ZrCl_4$ and the sulfate $Zr(SO_4)_2 \cdot 4H_2O$. Prepared by the chlorination of zirconium carbide or oxide, zirconium tetrachloride is used to produce organic zirconium compounds and as a catalyst in such reactions as the cracking of petroleum and polymerization of ethylene. Zirconium sulfate, produced by the action of sulfuric acid on zirconium hydoxide $[Zr(OH)_4]$, is useful as a lubricant, a chemical reagent, and in the tanning of white leather.

atomic number	40
atomic weight	91.22
melting point	1,852° C (3,366° F)
boiling point	3,578° C (6,472° F)
specific gravity	6.49 (20° C)
valence	4
electronic config.	2-8-18-10-2 or $(Kr)4d^2 5s^2$

Zirid DYNASTY, also called BANŪ ZĪRĪ, Muslim dynasty of Ṣanhājah Berbers whose various branches ruled in Ifriqīyah (Tunisia and eastern Algeria) and Granada (972–1152). Rising to prominence in the mountains of Kabylie, Algeria, where they established their first capital, Ashīr, the Zirids became allies of the Fāṭimids of al-Qayrawān. Their loyal support prompted the Fāṭimid caliph al-Muʿizz, when moving to his new capital of Cairo (972), to appoint Yūsuf Buluggīn I ibn Zīrī governor of al-Qayrawān and any other territory the Zīrīds might reclaim from their enemies, the Zanātah tribesmen. The Zirid state under Buluggīn accordingly expanded its boundaries westward as far as Sabtah (now Ceuta, a Spanish exclave in Morocco) on the Strait of Gibraltar; in the reign of Bādīs ibn al-Manṣūr (995–1016) it was divided between the Zirids at al-Qayrawān in the east and their kinsmen, the Ḥammādids, at Qalʿah (in Algeria). In 1048, encouraged by economic prosperity, the Zirids under al-Muʿizz (1016–62) declared themselves independent of the Fāṭimids and their Shīʿi doctrine. The Fāṭimids responded (1052) by sending the Banū Hilāl and Banū Sulaym Bedouins into the Maghrib. Cut off from traditional routes to the east, North Africa fell into a state of anarchy—the countryside was devastated, the peasant economy was ruined, and many settled communities reverted to nomadism. The Zirids, forced to abandon al-Qayrawān, retreated to Mahdīyah, but their shattered state was not long able to survive coastal attacks by Sicilian Normans and finally fell in 1148. In 1067 the Ḥammādids managed to relocate in Bejaïa (Bougie), where they carried on a lively trade until conquered by the Almohads in 1152.

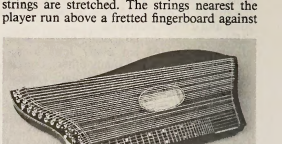
Another group of Zirīds, who had gone to Spain to serve in the Berber army of the Umayyad al-Muẓaffar (1002–08), established themselves as an independent dynasty (1012–90) in Granada under Zāwī ibn Zīrī. At the beginning of the 11th century the Zirids were given the province of Ilbīra by the Spanish Umayyad caliph Sulaymān al-Mustaʿīn and by 1038 had extended this kingdom to include Jaën and Cabra. Málaga was taken from the Ḥammūdids *c.* 1058 by Bādis ibn Ḥabbūs and became the second centre of Zirid rule in Spain. Despite their support of the Almohad Yūsuf ibn Tāshufīn at the Battle of Zallāqah in 1086, these Zirids were overthrown by the Almohads in 1090.

Zirkel, Ferdinand (b. May 20, 1838, Bonn—d. June 12, 1912, Bonn), German geologist and pioneer in microscopic petrography, the study of rock minerals by viewing thin slices of rock under a microscope and noting their optical characteristics.

Zirkel became professor of mineralogy at Lemberg University in 1863. The first edition of his famous *Lehrbuch der Petrographie* (1866; "Manual of Petrography") was written before he had learned the technique of microscopic petrography, which the geologist Henry C. Sorby was developing in England. After visiting the British Isles in 1868 and becoming acquainted with Sorby, he adopted Sorby's new technique and in 1870 published *Untersuchungen über die mikroskopische Zusammensetzung und Struktur der Basaltgesteine* ("Inquiry into the Microscopic Composition and Structure of Basaltic Minerals").

Zirkel accepted the chair of mineralogy at the University of Leipzig in 1870 and continued his studies. His *Mikroskopische Beschaffenheit der Mineralien und Gesteine* (1873; "The Microscopic Nature of Minerals and Rocks") made the new method of study widely available. In the 1870s Zirkel was engaged by the noted U.S. geologist Clarence King to study the rocks collected during the survey of the 40th parallel in the western United States. In 1876 Zirkel wrote the fourth volume of the survey report and thus introduced microscopic petrography into the United States. During his long tenure at Leipzig, he rewrote his *Lehrbuch* completely, and it became one of the classics of geology, reappearing in three large volumes in 1894. At that time it was the only complete handbook of petrography.

zither, any of several stringed musical instruments. The European zither consists of a flat, shallow sound box across which gut or metal strings are stretched. The strings nearest the player run above a fretted fingerboard against



Zither made in Vienna

By courtesy of A.V. Ebblewhite, London; photograph, Behr Photography—EB inc.

which they are stopped by the left hand to provide melody notes; they are plucked by a plectrum worn on the right thumb. At the same time, the right-hand fingers pluck an accompaniment on the farther strings, which remain unstopped. The zither is placed across the player's knees or on a table.

In the late 18th century two principal varieties developed: the Salzburg zither, with a rounded side away from the player; and the Mittenwald zither, with both sides rounded. Tunings vary; a common tuning for the Salzburg zither is 5 melody strings tuned a′, d′, g′, a, and c; and 29 accompanying strings tuned in a cycle of fifths (C, G, D, A, etc.) through the 12 notes of the chromatic scale.

Older zithers, such as the Alpine *Scheitholt,* have narrow rectangular sound boxes and fewer melody strings, their three or more bass strings providing merely a dronelike accompaniment on the tonic and dominant (first and fifth notes of the scale). Their age is unknown; the *Scheitholt* was described by the German composer Michael Praetorius (1571–1621). They are found from Romania to Scandinavia and Iceland (*e.g.,* the Swedish *hummel*) and were eventually influenced by the Austrian zither and the Norwegian *langleik,* in which the pitch of the drone strings is determined by movable bridges. A French form that died out in the 19th century is the miniature *épinette des Vosges.* With some of these instruments the melody strings are stopped by pressing them against the frets with a short metal bar, a way of playing preserved on the U.S. variety, the Appalachian, or mountain, dulcimer. In Europe and the United States there are also zithers that are bowed rather than plucked.

"Zither" is also a generic term for stringed instruments the strings of which are fastened across a frame that lacks any projecting neck or arms. The resonator may be part of the body or may be attached to it.

Zither-family instruments assume a variety of forms. The body may be a flexible stick, as in the musical bow, or may be a rigid

bar, as in many Indian and Southeast Asian and some African zithers. Bar zithers often have high frets; one-stringed varieties may be called monochords. The resonators of bar and stick zithers are usually gourds or the player's mouth. A zither body may be a tube, as in the *valiha* of Madagascar and parts of Africa, or a tube halved lengthwise or a trough across which strings are laced. On tube zithers the strings may be sliced from the bamboo of the tube and, remaining undetached at the ends, be given tension by bridges inserted under them at each end (idiochord zither); on most zithers, however, strings and body are of separate material (heterochord zither).

Other important forms are a frame with a glued-on soundboard, as in psalteries, dulcimers, and their descendants, the stringed keyboard instruments; and a box, as with the *Scheitholt* and other European fretted zithers. Large East Asian zithers, such as the Chinese *ch'in* and the Japanese koto, are called long zithers; their body shape is midway between a board and a half-tube.

The prototypes of zithers may be such primitive instruments as the ground bow, or earth bow, and ground zither. In both, a piece of bark fastened across a hole in the earth serves as a resonator. In the earth bow a flexible stick is inserted in the ground near the resonator. To its free end is attached a string, which runs to the resonator. The player beats the string rhythmically with a stick or sometimes plucks it, varying pitch by bending the stick or stopping the string with his fingers. Ground zithers consist of a string run between two sticks, one situated on either side of the hole; from that string a second string runs vertically down to the resonator. The horizontal string is struck with a stick.

Žitomir (city and *oblast*, Ukraine): *see* Zhitomir.

Zittau, city, Saxony *Land* (state), eastern Germany, on the Lausitzer Neisse River, near the frontiers of Poland and the Czech Republic. Originating as the Slav settlement of Sitowir, it was mentioned in 1230 and chartered in 1255, when it belonged to Bohemia. Zittau joined the federation of Lusatian towns in 1346 and fell to Saxony in 1635. Four 13th- and 15th-century churches still remain. There are training schools for the building trade, electric-power management, and agriculture. A railway and road junction, Zittau is a centre of the textile industry. Lignite (brown coal) is mined nearby, and machinery, chemicals, and vehicles are manufactured. Pop. (1991 est.) 34,465.

Zittel, Karl Alfred, Ritter (Knight) **von** (b. Sept. 25, 1839, Bahlingen, Baden [Germany]—d. Jan. 5, 1904, Munich, Ger.), paleontologist who proved that the Sahara had not been under water during the Pleistocene Ice Age.

In 1863 Zittel became an assistant to the royal mineral cabinet of Vienna and professor of mineralogy, geognosy, and paleontology at the Karlsruhe Polytechnic. In 1866 he became professor of geology and paleontology at the University of Munich. His early research was in minerals and petrography. As the geologist of an expedition to Libya in 1873–74, Zittel collected the evidence leading to his conclusion about the Sahara. He later accepted evolution and led in applying the theory to paleontology, especially in his studies of ammonites. In 1876 he began his work on fossil sponges, which established their classification and laid a basis for the classification of modern forms. His principal contributions to vertebrate paleontology dealt with turtle and pterodactyl fossils found in the Bavarian limestones.

Zittel's best-known works include *Geschichte der Geologie und Paläontologie* (1899; *History of Geology and Palaeontology*) and *Handbuch der Palaeontologie* (1880–93), a comprehensive survey of paleobiology.

Živković, Petar (b. Jan. 1, 1879, Negotin, Serbia [now in Yugoslavia]—d. Feb. 3, 1947, Paris, France), dictatorial premier of Yugoslavia from 1929 to 1932.

As a young soldier at the Serbian court, Živković was involved in 1903 in the assassination of King Alexander, the overthrow of the Obrenović dynasty, and the restoration of the house of Karageorgević in the person of King Peter I. Later he joined the so-called White Hand (Bela Ruka), a group of officers that opposed the Black Hand, an officer group of extreme nationalists.

King Alexander I of the Serbs, Croats, and Slovenes appointed Živković commander of the Palace Guards in 1921 and prime minister in 1929. He invoked anticommunism to justify the dissolution of political parties and elective local governments, the persecution of the national regime's opponents, and the "reform" of the electoral process to assure a one-party system (all candidates in the 1931 election were approved by the government at Belgrade). His resignation in 1932, though voluntary, may have been a consequence of his inability to solve economic problems.

Founder of the Yugoslav National Party, Živković became its president in 1936. After the Nazi invasion in 1941, he left the country and was in 1943 a member of the Yugoslav government-in-exile.

Ziya, Mehmed: *see* Gökalp, Ziya.

Ziyādid DYNASTY, Muslim dynasty that ruled Yemen in the period 819–1018 from its capital at Zabīd.

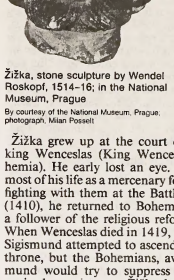
The 'Abbāsid caliph al-Ma'mūn transferred the rule of Yemen to the Ziyād family to offset the intrigues of the 'Alids—the Shī'ite opponents of the 'Abbāsids—who had made southern Arabia their headquarters. The first Ziyādid, Muḥammad ibn Ziyād, firmly established himself along the Yemeni coast (Tihāmah) with the support of a Khorāsānian army and cavalry; he was also recognized by the tribal chiefs along the edges of the highlands, Ṣan'ā' in the interior, however, remained under 'Abbāsid control, and, when the Banū Ya'fur—the pre-Islāmic nobility—set up an independent dynasty there in 859, they soon forced the Ziyādī ruler Ibrāhīm ibn Muḥammad (859–902) to cede territory in return for tribute. More territory, including Zabīd itself, was lost to the sectarian Qarmaṭians after Ibrāhīm's death, and records of his successor have been obscured. Abū al-Jaysh Isḥāq, however, restored Ziyādid power and territory in a celebrated reign (904–981).

In 989 the Ziyādid capital was seized and burned by the Banū Ya'fur, and effective power passed from the Ziyādids to their Ethiopian slave-viziers. The Mamlūk (slave) al-Husayn ibn Salāmah, who had preserved the kingdom from collapse after the Ya'furid attack, was succeeded by his slave Marjān, who divided the government of the kingdom between two other Mamlūks, the northern provinces falling to Najāḥ, the capital and southern regions coming under the rule of Nafīs. In 1018 the last Ziyādid ruler was murdered by Nafīs. Control of Zabīd finally fell to Najāḥ, however, and in 1022 the Najāḥids began their rule in Yemen.

ziyārah (Arabic: "visit"), in Islām, a visit to the tomb of the Prophet Muḥammad in the mosque at Medina, Saudi Arabia; also a visit to the tomb of a saint or a holy person. The legitimacy of these latter visits has been questioned by many Muslim religious authorities, particularly by the Wahhābīyah, who consider *ziyārah* a *bid'ah* (innovation) that should be condemned by all true believers. The Wahhābīyah maintain, in fact, that such visits to the tombs of saints and the invocation of the names of saints in times of trouble is a form of polytheism, for God alone can grant salvation to a troubled person.

Such objections notwithstanding, Muslims continue to make such visits in the hope of obtaining cures or the blessings of the saint. Because saints generally have the reputation for curing a specific disease, visits correspond to personal needs. Thus during some *ziyārahs* animals are slaughtered as sacrifices and fed to the poor in the name of the visited saint, especially Aḥmad al-Badawī and as-Sayyidah Zaynab in Egypt, 'Abd al-Qādir al-Jilānī in Tunisia, and 'Abd as-Salām al-Asmar in Libya. Almost every Arab town has its own saint, whose tomb is visited by the local inhabitants.

Žižka, Jan, Count (Hrabě) (b. *c.* 1376—d. Oct. 11, 1424, Přibyslav, Bohemia [now in Czech Republic]), military commander and national hero of Bohemia who led the victorious Hussite Protestant armies against the German king Sigismund, foreshadowing the revolution of military tactics two centuries later in his introduction of mobile artillery.



Žižka, stone sculpture by Wendel Roskopf, 1514–16; in the National Museum, Prague
By courtesy of the National Museum, Prague. photograph, Milan Posselt

Žižka grew up at the court of the German king Wenceslas (King Wenceslas IV of Bohemia). He early lost an eye. After spending most of his life as a mercenary for the Poles and fighting with them at the Battle of Grunwald (1410), he returned to Bohemia and became a follower of the religious reformer Jan Hus. When Wenceslas died in 1419, his half-brother Sigismund attempted to ascend the Bohemian throne, but the Bohemians, aware that Sigismund would try to suppress Hussitism, organized a resistance. Žižka became a leader of the Taborites, one of the newly formed peasant military communities that, with their tight discipline and religious and nationalist zeal, were vastly superior to the undisciplined feudal levies that they opposed.

Žižka revolutionized warfare through the introduction of cannon mounted on mobile, armoured farm wagons. He was one of the first commanders to handle infantry, cavalry, and artillery as one tactical body. Reduced to the tactical defensive by his cumbersome wagons, he became a master at forcing his enemies to attack at a disadvantage. Žižka's system proved practically unbeatable. He crushed Sigismund near Prague in 1420. Losing the sight of his remaining eye shortly thereafter, he continued to lead his forces to victory against both Roman Catholics and rival Hussite elements, finally dying of plague in 1424. Hussite armies continued to defeat foreign invaders, finally succumbing after a decade and a half as a result of internal rivalries.

Despite his obvious success, Europe failed to heed Žižka's military system for 200 years. Lingering feudalism and relatively weak cen-

tral governmental authority partly explain this lapse. Only with the advent of the Swedish king Gustav II Adolf and his reintroduction of mobile artillery in the 17th century did Žižka's system become incorporated into European tactics.

Zlatoust, city, Chelyabinsk *oblast* (province), western Russia. It lies on both banks of the Ay River and on the Ufa-Chelyabinsk trunk railway, where river and rail cut through the Urenga Range of the Ural Mountains. In 1754 the Kosotur Iron and Copper Works were established there, and city status was granted in 1865. A major pre-revolutionary steel city noted for its engraved steel and swords, Zlatoust remains one of the most important metallurgical centres of the Urals, specializing in high-grade and stainless steels. Clocks and instruments are also made. Constricted by the narrow Ay River valley, Zlatoust developed a new centre during World War II, some 7 miles (11 km) from the old city. Pop. (1991 est.) 210,700.

Zlín, formerly (1948–90) GOTTWALDOV, city, Jihomoravský *kraj* (region), Czech Republic, on the Dřevnice River, near its confluence with the Morava River. Gottwaldov was created in 1948 through a merger of several communities surrounding Zlín, a 14th-century village that had grown rapidly after World War I. The consolidated town was named for Klement Gottwald, the first communist president of Czechoslovakia. In 1990 Gottwaldov as a whole was renamed Zlín.

Zlín is a cultural centre, with a resident orchestra and several film studios. The planning and design of its new sections are, in part, the work of Le Corbusier, the Swiss-French architect. Known internationally as the home of the Bát'a shoemaking enterprise, Zlín also produces knitting machines, leather and rubber goods, and animated films. It is organized as an almost self-sufficient factory community, with workers' educational facilities. At nearby Otrokovice are large tanneries. Pop. (1991 prelim.) 84,634.

Znaim (Czech Republic): *see* Znojmo.

Znaniecki, Florian (Witold) (b. Jan. 15, 1882, Świętniki, Prussia [now in Poland]—d. March 23, 1958, Champaign, Ill., U.S.), Polish-American sociologist whose theoretical and methodological work helped make sociology a distinct academic discipline. He was a pioneer in the field of empirical investigation and was noted as an authority on Polish peasant culture.

Znaniecki's earliest work was as a poet. After being expelled from the University of Warsaw for his active support of Polish nationalism, he studied at various universities in France and Switzerland and received his doctorate in philosophy from the University of Kraków in 1909. Under the influence of the American sociologist W.I. Thomas, he turned to sociology, joining Thomas at the University of Chicago (1914), where they began their joint work, *The Polish Peasant in Europe and America,* 5 vol. (1918–20). This work made significant advances in methodology (notably in the use of intensive life histories) as well as in substance (a framework for the sociological view of personality and a study of immigrant social disorganization).

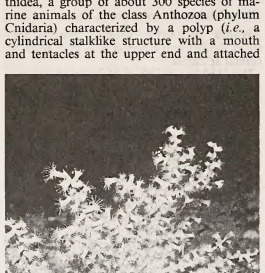
Znaniecki returned to Poland in 1920 and became professor of sociology at Poznań, where in 1922 he founded a sociological institute. He wrote several books in Polish, including an introduction to sociology and a work on the sociology of education; *The Laws of Social Psychology* (1925); *The Method of Sociology* (1934); and *Social Actions* (1936). A series of lectures delivered at Columbia University was published as *The Social Role of the Man of Knowledge* (1940). The outbreak of World War II prevented Znaniecki's return to Poland, and he joined the faculty at the University of Illinois, Champaign-Urbana, where he wrote *Cultural Sciences, Their Origin and Development* (1952) and *Modern Nationalities* (1952).

Consult the INDEX *first*

Znojmo, German ZNAIM, city, Jihomoravský *kraj* (region), Czech Republic, on the Dyje River, southwest of Brno, near the Austrian border. It originated in the 11th century as a fortified residence and was the stronghold of the Přemyslid princes until the mid-13th century. Many medieval buildings, as well as houses of the Renaissance and Baroque periods, are preserved in the old town, which is designated an ancient monument. Archduke Charles of Austria and Napoleon met at Znojmo after the Battle of Wagram (1809) to arrange an armistice. The modern town has tanneries and factories producing ceramics, footwear, and sports equipment. Winemaking and food processing, notably the canning of fruit, vegetables, and pickles, are significant traditional industries. Pop. (1991 prelim.) 39,910.

Zoan (ancient Egyptian city): *see* Tanis.

zoanthid, any member of the order Zoanthidea, a group of about 300 species of marine animals of the class Anthozoa (phylum Cnidaria) characterized by a polyp (*i.e.,* a cylindrical stalklike structure with a mouth and tentacles at the upper end and attached



Zoanthid colony (*Parazoanthus*)
Douglas Faulkner

to a surface at the lower end). The zoanthid closely resembles the sea anemone, differing from it chiefly in being generally smaller and in having a mucous coat to which sand and other materials adhere.

The largest species, *Isozoanthus giganteus,* grows to about 19 cm (about 7.5 inches) in length and 2 cm in width. Many species live on or in close association with sponges or other animals. *Epizoanthus americanus,* occurring in Atlantic coastal temperate waters off North America, attaches to the seashell inhabited by a hermit crab, dissolves the shell, and eventually encloses the crab.

zodiac, in astronomy and astrology, a belt around the heavens extending 9° on either side of the ecliptic, the plane of the earth's orbit and of the sun's apparent annual path. The orbits of the moon and of the principal planets (except Pluto) also lie entirely within the zodiac. The 12 astrological signs of the zodiac are each considered to occupy $^1/_{12}$ (or 30°) of its great circle. These signs no longer correspond to the astronomical constellations in which the sun actually appears. The constellations are irregular in size and shape, and the sun regularly passes through one constellation (Ophiuchus) that is not considered a member of the zodiac.

Because most of the constellations through which the ecliptic passes represent animals, the ancient Greeks called its zone *zōdiakos kyklos,* "circle of animals," or *ta zōdia,* "the little animals." The size and number of zodiacal constellations varied in antiquity and became fixed only with the development of mathematical astronomy. The list below gives the constellations of the zodiac, with the dates of the sun's passage through them in the era when their boundaries were fixed. These dates are still used for the astrological signs, though precession of the equinoxes has shifted the constellations eastward; *e.g.,* on January 1 the direction of the sun is now in Sagittarius instead of Capricornus. The history of the symbols is unknown; they seem to appear first in Greek manuscripts of the late Middle Ages.

♈ Aries (Ram): March 21–April 19
♉ Taurus (Bull): April 20–May 20
♊ Gemini (Twins): May 21–June 21
♋ Cancer (Crab): June 22–July 22
♌ Leo (Lion): July 23–Aug. 22
♍ Virgo (Virgin): Aug. 23–Sept. 22
♎ Libra (Balance): Sept. 23–Oct. 23
♏ Scorpius (Scorpion): Oct. 24–Nov. 21
♐ Sagittarius (Archer): Nov. 22–Dec. 21
♑ Capricornus (Goat): Dec. 22–Jan. 19
♒ Aquarius (Water Bearer): Jan. 20–Feb. 18
♓ Pisces (Fish): Feb. 19–March 20

zodiacal light, band of light in the night sky, thought to be sunlight reflected from meteoroids concentrated in the plane of the zodiac, or ecliptic. The light is seen in the west after twilight and in the east before dawn, being easily visible in the tropics where the ecliptic is approximately vertical. In mid-northern latitudes it is best seen in the evening in February and March and in the morning in September and October.

The zodiacal light can be followed visually along the ecliptic from a point 30° from the sun to about 90°. Photometric measurements indicate that the band continues to the region opposite the sun where a slight enhancement called the gegenschein, or counterglow, is visible. There is some zodiacal light in all parts of the sky; it can be considered an extension of the *F*-corona of the sun.

Zoe, also spelled ZOË (b. *c.* 978, Constantinople [now Istanbul, Turkey]—d. 1050, Constantinople), Byzantine empress, by marriage from 1028 and in her own right from 1042.

The daughter of the emperor Constantine VIII, Zoe was married to the heir presumptive, Romanus III Argyrus, in 1028 and became empress consort upon his elevation to the throne the same year. She became self-assertive and jealous, exiling her sister Theodora to a monastery; and, neglected by her husband, became enamoured of Michael, her young Paphlagonian chamberlain. In 1034 the emperor became ill, allegedly poisoned by Zoe; and, upon his death on April 11, she at once took control and married Michael, who was proclaimed Emperor Michael IV. Michael IV died in 1041 and was succeeded by Michael V Calaphates.

When Michael V was deposed by a Byzantine mob, then blinded and exiled to a monastery (April 1042), Zoe and her sister Theodora were proclaimed coempresses on Easter Tuesday, 1042. Quarrels, however, broke out between the sisters; and, in order to secure her position, Zoe married Constantine IX Monomachus, a man of good family, with whom she shared the throne until her death.

Zoe, also called BROTHERHOOD OF THEOLOGIANS, in Eastern Orthodoxy, a semimonastic Greek association patterned on Western religious orders. Founded in 1907 by Eusebius Matthopoulos, Zoe (Greek: "Life") brought together groups of more than 100 unmarried and highly disciplined members, bound by the monastic vows of poverty, chastity, and obedience; approximately half of the brothers were ordained priests, and the rest were laymen. With the exception of one month spent yearly in a common retreat, they were engaged in various religious activities throughout Greece, including teaching, preaching, administration of schools and youth organizations, and publishing. In the years following World War II, Zoe publications numbered hundreds of thousands of copies a year, but its influence has since diminished, especially after several of its members left the brotherhood and created a competing association (Soter).

The Zoe movement initiated a remarkable revival of the liturgy and sacramental practice throughout Greece. It was originally frowned upon by the episcopate, which resented its strong independent organization. Its authority and influence were compromised by its close connections with the dictatorship established in Greece in 1967.

Zoetermeer, *gemeente* (commune), Zuidholland *provincie,* western Netherlands. Zoetermeer is located about 10 miles (16 km) north of Rotterdam and is situated on a polder created during the 17th century. Industries in the town produce machinery, tobacco products, and foodstuffs, the latter using cereals and livestock raised in the vicinity. Oil and gas fields are exploited nearby. Zoetermeer lies on a railway line connecting Amsterdam and The Hague and on a highway between The Hague and Arnhem. Pop. (1992 est.) 100,623.

Zoffany, John, also spelled JOHANN ZOFFANI, original name probably JOHANN JOSEPH ZAUFFELY, also spelled ZAUPHALY (b. *c.* 1733, Frankfurt am Main [Germany]—d. Nov. 11, 1810, Strand-on-the-Green, Middlesex, Eng.), German-born portrait painter who in late 18th-century England made his reputation with paintings depicting episodes from contemporary theatre and with portraits and conversation pieces (*i.e.,* paintings of groups of people in their customary surroundings).

Zoffany, after studying in Germany and Italy, went to England about 1758. Following the lead of William Hogarth, he painted scenes from London's theatrical productions. Notable in this genre are his paintings of the famed actor David Garrick in his many West End successes—*e.g.,* "The Farmer's Return" (1762). His portraits were popular with George III, who became his patron and for whom he produced "Queen Charlotte with Her Sons, the Prince of Wales and the Duke of York."

In 1772 Zoffany went to Italy with the king's financial help and there, during a seven-year stay, executed "The Tribuna of the Uffizi" (1780) for the royal family. This celebrated work shows a group of connoisseurs admiring paintings and sculptures in the Uffizi Gallery in Florence. He worked as a portraitist in India from 1783 to 1789, and when he returned to England he painted such notable portraits as "Charles Towneley Among His Marbles" (1790). Zoffany was a founder-member of the Royal Academy (1768). He possessed brilliant technical skills and introduced greater liveliness and personal anecdote into English conversation pieces.



Zog I
BBC Hulton Picture Library

Zog I, Albanian in full AHMED BEY ZOGU (b. Oct. 8, 1895, Castle Burgajet, Albania—d. April 9, 1961, Suresnes, France), president of Albania from 1925 to 1928 and king from 1928 to 1939. Though able to manipulate Albania's internal affairs to his own advantage, he came to depend heavily on Benito Mussolini's Italy and was eventually ousted by the Italian dictator on the eve of World War II.

Siding with Austria during World War I, Zog thereafter became a leader of the reformist Popular Party. He held ministerial posts from 1920 until he was forced into exile in June 1924, but he returned with Yugoslav assistance in December, was elected president on Feb. 1, 1925, and was proclaimed king on Sept. 1, 1928. Zog ended a period of postwar political turbulence, and Albania enjoyed relative tranquility under his regime. He began a fateful association with Italy in 1925; a loan in that year was followed in 1926 by a treaty of friendship and security and in 1927 by a 20-year defensive military alliance between the two countries. Mussolini made Albania his bridgehead to the Balkans, and by 1939 Italy controlled the country's finances and army. Zog tried but failed to break that hold from 1932 onward. On April 7, 1939, Mussolini finally made Albania into a protectorate; Victor Emmanuel III became king, and Zog went into exile. His hopes of returning after the war were disappointed by the establishment of a communist republic under Enver Hoxha in 1945. He formally abdicated on Jan. 2, 1946.

Zohar, Sefer ha- (Jewish mystical text): *see* Sefer ha-zohar.

Zoigê Zhaoze (China): *see* Jo-erh-kai Marsh.

zoisite, silicate mineral, calcium and aluminum silicate, $Ca_2Al_3(SiO_4)_3OH$, characteristic of regional metamorphism and of hydrothermal alteration of igneous rocks. A member of the epidote (*q.v.*) group of nesosilicates, zoisite occurs as white, green-brown, or gray crystals or masses in crystalline schists, often with amphibole minerals; in metamorphosed calcareous shales; very commonly in argillaceous (clayey) calcareous sandstones; and less commonly in thermally metamorphosed limestone. Occurrences include Italy, Germany, Switzerland, Mexico, Scotland, and the United States (Massachusetts). Thulite, a manganous variety from Telemark, Nor., and Piedmont, Italy, is pink; tanzanite, a gem variety from Tanzania, is vivid blue. Zoisite has the same chemical formula as clinozoisite but has a different crystal structure. For detailed physical properties, *see* silicate mineral (table).



Zoisite from Norway
By courtesy of Illinois State Museum, Springfield; photograph, John H. Gerard



"The Tribuna of the Uffizi," detail, oil on canvas by John Zoffany, 1780; in the Royal Collection, Windsor Castle, England
The Royal Collection © 1994 Her Majesty Queen Elizabeth II, photograph, A.C. Cooper

Zoji, pass across the Himalayas in the Indian-held part of Jammu and Kashmir state, in the northern part of the Indian subcontinent. Situated at an elevation of 11,580 feet (3,529 m), Zoji Pass carries the only road leading from the Vale of Kashmir eastward to Leh, in Ladākh district, and on to Tibet. Heavily forested, the pass is the lowest in the western axis of the Himalayas but is extremely precipitous on the south side.

Zola, Émile, in full ÉMILE-ÉDOUARD-CHARLES-ANTOINE ZOLA (b. April 2, 1840, Paris, France—d. Sept. 28, 1902, Paris), French novelist, critic, and political activist who was the most prominent French novelist of the late 19th century. He was noted for his theories of naturalism, which underlie his monumental 20-novel series *Les Rougon-Macquart,* and for his intervention in the Dreyfus Affair through his famous open letter, "J'accuse."

Life. Though born in Paris in 1840, Zola spent his youth in Aix-en-Provence in southern France, where his father, a civil engineer of Italian descent, was involved in the construc-

tion of a municipal water system. The senior Zola died in 1847, leaving Madame Zola and her young son in dire financial straits. In Aix, Zola was a schoolmate of the painter Paul Cézanne, who would later join him in Paris and introduce him to Édouard Manet and the Impressionist painters.

Although Zola completed his schooling at the Lycée Saint-Louis in Paris, he twice failed the *baccalauréat* exam, which was a prerequisite to further studies, and in 1859 he was forced to seek gainful employment. Zola spent most of the next two years unemployed and living in abject poverty. He subsisted by pawning his few belongings and, according to legend, by eating sparrows trapped outside his attic window. Finally, in 1862 he was hired as a clerk at the publishing firm of L.-C.-F. Hachette, where he was later promoted to the advertising department. To supplement his income and make his mark in the world of letters, Zola began to write articles on subjects of current interest for various periodicals; he also continued to write fiction, a pastime he had enjoyed since boyhood. In 1865 Zola published his first novel, *La Confession de Claude* (*Claude's Confession*), a sordid, semiautobiographical tale that drew the attention of the public and the police and incurred the disapproval of Zola's employer. Having sufficiently established his reputation as a writer to support himself and his mother, albeit meagerly, as a freelance journalist, Zola left his job at Hachette to pursue his literary interests.



"Portrait d'Émile Zola," detail of an oil painting by Édouard Manet, 1868; in the Louvre, Paris
Cliché Musées Nationaux, Paris

In the following years Zola continued his career in journalism while publishing two novels: *Thérèse Raquin* (1867), a grisly tale of murder and its aftermath that is still widely read, and *Madeleine Férat* (1868), a rather unsuccessful attempt at applying the principles of heredity to the novel. It was this interest in science that led Zola, in the fall of 1868, to conceive the idea of a large-scale series of novels similar to Honoré de Balzac's *La Comédie humaine* (*The Human Comedy*), which had appeared earlier in the century. Zola's project, originally involving 10 novels, each featuring a different member of the same family, was gradually expanded to comprise the 20 volumes of the *Rougon-Macquart* series.

La Fortune des Rougon (*The Rougon Family Fortune*), the first novel in the series, began to appear in serial form in 1870, was interrupted by the outbreak of the Franco-German War in July, and was eventually published in book form in October 1871. Zola went on to produce these 20 novels—most of which are of substantial length—at the rate of nearly one per year, completing the series in 1893.

In the 1860s and '70s Zola also defended the art of Cézanne, Manet, and the Impressionists Claude Monet, Edgar Degas, and Pierre-Auguste Renoir in newspaper articles. During this period he was a constant presence at weekly gatherings of the painters at various studios and cafés, where theories about the arts and their potential interrelationships were vociferously debated. Zola's friendship with Cézanne and the other artists was, however, irreparably damaged by the publication of his novel *L'Oeuvre* (1886; *The Masterpiece*), which depicts the life of an innovative painter who, unable to realize his creative potential, ends up hanging himself in front of his final painting. Cézanne, in particular, chose to see the novel as a thinly disguised commentary on his own temperament and talent.

In 1870 Zola married Gabrielle-Alexandrine Meley, who had been his companion and lover for almost five years, and the young couple assumed the care of Zola's mother. In the early '70s Zola expanded his literary contacts, meeting frequently with Gustave Flaubert, Edmond Goncourt, Alphonse Daudet, and Ivan Turgenev, all successful novelists whose failures in the theatre led them to humorously refer to themselves as *auteurs sifflés* ("hissed authors"). Beginning in 1878 the Zola home in Médan, on the Seine River not far from Paris, served as a gathering spot for a group of the novelist's disciples, the best-known of whom were Guy de Maupassant and Joris-Karl Huysmans, and together they published a collection of short stories, *Les Soirées de Médan* (1880; *Evenings at Médan*).

As the founder and most celebrated member of the naturalist movement, Zola published several treatises to explain his theories on art, including *Le Roman expérimental* (1880; *The Experimental Novel*) and *Les Romanciers naturalistes* (1881; *The Naturalist Novelists*). Naturalism involves the application to literature of two scientific principles: determinism, or the belief that character, temperament, and, ultimately, behaviour are determined by the forces of heredity, environment, and historical moment; and the experimental method, which entails the objective recording of precise data in controlled conditions.

If Zola's penchant for polemics and publicity led him to exaggerate his naturalist principles in his early writings, in later years, it can be said, rather, that controversy sought out the reluctant novelist. His publication of a particularly grim and sordid portrait of peasant life in *La Terre* in 1887 led a group of five so-called disciples to repudiate Zola in a manifesto published in the important newspaper *Le Figaro*. His novel *La Débâcle* (1892), which was openly critical of the French army and government actions during the Franco-German War (1870–71), drew virulent criticism from French and Germans alike. Despite Zola's undisputed prominence, he was never elected to the French Academy, although he was nominated on no fewer than 19 occasions.

Although Zola's marriage to Alexandrine endured until his death, the author had a fourteen-year affair with Jeanne Rozerot, one of his wife's housemaids, beginning in 1888. Jeanne bore him his only children—Denise and Jacques—who were "recognized" by Madame Zola after her husband's death.

In 1898 Zola intervened in the Dreyfus Affair—that of a Jewish French army officer whose wrongful conviction for treason in 1894 sparked a 12-year controversy that deeply divided French society. At an early stage in the proceedings Zola had decided rightly that Alfred Dreyfus was innocent. On Jan. 13, 1898, in the newspaper *L'Aurore*, Zola published a fierce denunciation of the French general staff in an open letter beginning with the words "J'accuse" ("I accuse"). He charged various high-ranking military officers and, indeed, the War Office itself of concealing the truth in the wrongful conviction of Dreyfus for espionage. Zola was prosecuted for libel and found guilty. In July 1899, when his appeal appeared certain to fail, he fled to England. He returned to France the following June when he learned that the Dreyfus case was to be reopened with a possible reversal of the original verdict. Zola's intervention in the controversy helped to undermine anti-Semitism and rabid militarism in France.

Zola's final series of novels, *Les Trois Villes* (1894–98; *The Three Cities*) and *Les Quatre Évangiles* (1899–1903; *The Four Gospels*) are generally conceded to be far less forceful than his earlier work. However, the titles of the novels in the latter series reveal the values that underlay his entire life and work: *Fécondité* (1899; *Fecundity*), *Travail* (1901; *Work*), *Vérité* (1903; *Truth*), and *Justice* (which, ironically, remained incomplete).

Zola died unexpectedly in September 1902, the victim of coal gas asphyxiation resulting from a blocked chimney flue. Officially, the event was determined to be a tragic accident, but there were—and still are—those who believe that fanatical anti-Dreyfusards arranged to have the chimney blocked.

At the time of his death, Zola was recognized not only as one of the greatest novelists in Europe but also as a man of action—a defender of truth and justice, a champion of the poor and the persecuted. At his funeral he was eulogized by Anatole France as having been not just a great man, but "a moment in the human conscience," and crowds of mourners, prominent and poor alike, lined the streets to salute the passing casket. In 1908 Zola's remains were transferred to the Panthéon and placed alongside those of Voltaire, Jean-Jacques Rousseau, and Victor Hugo, other French authors whose works and deeds, like those of Zola, had changed the course of French history.

Les Rougon-Macquart. Although he produced some 60 volumes of fiction, theory, and criticism, in addition to numerous pieces of journalism, during his 40-year career, Zola is best known for his 20-volume series *Les Rougon-Macquart*, which is "the natural and social history of a family under the Second Empire." As the subtitle suggests, the naturalist goal of demonstrating the deterministic influence of heredity is fulfilled by tracing the lives of various members of the three branches of the Rougon-Macquart family. At the same time, the weight of historical moment is shown by limiting the action of the novels to one historical period, that of the Second Empire (1852–70), which was the reign of Napoleon III, the nephew and pale imitation of Napoleon Bonaparte. Finally, Zola examines the impact of environment by varying the social, economic, and professional milieu in which each novel takes place.

La Curée (1872; *The Kill*), for example, explores the land speculation and financial dealings that accompanied the renovation of Paris during the Second Empire. *Le Ventre de Paris* (1873; *The Belly of Paris*) examines the structure of the Halles, the vast central marketplace of Paris, and its influence on the lives of its workers. The 10 steel pavilions that make up the market are compared alternately to a machine, a palace, and an entire city, thereby situating the market within a broader social framework. *Son Excellence Eugène Rougon* (1876; *His Excellency Eugène Rougon*) traces the machinations and maneuverings of cabinet officials in Napoleon III's government.

L'Assommoir (1877; "The Club"; Eng. trans. *The Drunkard*), which is among the most successful and enduringly popular of Zola's

novels, shows the effects of alcoholism in a working-class neighbourhood by focusing on the rise and decline of a laundress, Gervaise Macquart. Zola's use of slang, not only by the characters but by the narrator, and his vivid paintings of crowds in motion lend authenticity and power to his portrait of the working class. *Nana* (1880) follows the life of Gervaise's daughter as her economic circumstances and hereditary penchants lead her to a career as an actress, then a courtesan, professions underscored by a theatrical metaphor that extends throughout the novel, revealing the ceremonial falseness of the Second Empire. *Au Bonheur des Dames* (1883; *Ladies' Delight*) depicts the mechanisms of the economic entity, the department store, and its impact on smaller merchants. The sweeping descriptions of crowds and dry-goods displays justify Zola's characterization of the novel as "a poem of modern activity."

Germinal (1885), which is generally acknowledged to be Zola's masterpiece, depicts life in a mining community by highlighting relations between the bourgeoisie and the working class. At the same time, the novel weighs the events of a miners' strike and its aftermath in terms of those contemporary political movements (Marxism, anarchism, trade unionism) that purport to deal with the problems of the proletariat. Zola's comparison of the coal mine to a devouring monster and his use of animal and botanical imagery to characterize the workers create a novel of epic scope that replicates, in modern terms, ancient myths of damnation and resurrection. A quite different work, *L'Oeuvre* (1886), explores the milieu of the art world and the interrelationship of the arts by means of the friendship between an Impressionist painter, Claude Lantier, and a naturalist novelist, Pierre Sandoz. Zola's verbal style mirrors the visual techniques of Impressionism in word-pictures of Paris transformed by varying effects of colour, light, and atmosphere.

In *La Terre* (1887; *Earth*) Zola breaks with the tradition of rustic, pastoral depictions of peasant life to show what he considered to be the sordid lust for land among the French peasantry. In *La Bête humaine* (1890; *The Human Beast*) he analyzes the hereditary urge to kill that haunts the Lantier branch of the family, set against the background of the French railway system, with its powerful machinery and rapid movement. *La Débâcle* (1892; *The Debacle*) traces both the defeat of the French army by the Germans at the Battle of Sedan in 1870 and the anarchist uprising of the Paris Commune. Zola superimposes the viewpoints of numerous characters to capture the vividness of individual vision while at the same time obtaining an overall strategic sense of the war. Finally, in *Le Docteur Pascal* (1893) he uses the main character, the doctor Pascal Rougon, armed with a genealogical tree of the Rougon-Macquart family published with the novel, to expound the theories of heredity underlying the entire series.

The *Rougon-Macquart* series thus constitutes a family saga, not unlike those of today's television miniseries, while providing a valuable sociological document of the events, institutions, and ideas that marked the rise of modern industrialism and the cultural changes it entailed. However, if the novels continue to be widely read today, it is largely due to Zola's unique artistry, a poetry of machine and motion, vitalized by the individual viewpoint, yet structured by vast networks of imagery that capture the intense activity and alienation of modern industrial society. Zola's novels have had an immense impact on modern literature, from the existentialist novel and the "new novel" in France to the works of the "muckrakers" in the United States. In their striking combination of visuality and movement, Zola's novels can even be said to foreshadow the motion picture, for which they have proved admirably suited for adaptation, from the pioneering version of *La Bête humaine* by Jean Renoir in 1938 to the big-budget rendition of *Germinal* by Claude Berri in 1993. Above all, Zola's writings endure on account of his forthright portrayal of social injustice, his staunch defence of the downtrodden, and his unwavering belief in the betterment of the human condition through individual and collective action. (Wi.J.B.)

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Żółkowski, Alojzy Fortunat, also called FORTUNAT ALOJZY (b. Nov. 2, 1777, near Nowogrodek, Pol.—d. Sept. 11, 1822, Warsaw, Russian Poland), actor, writer, translator, and head of a Polish theatrical family.

Żółkowski was born into a noble family and served in the army during the revolt of 1794. He made his acting debut in Warsaw in 1798, toured the country for four years, and then joined the National Theatre (Teatr Narodowy), where he was admired for his comedy roles, including Don Bartholo in *The Barber of Seville* by Pierre Beaumarchais and Arnolphe in Molière's *School for Wives*. He also wrote several original comedies, translated English and French plays, and edited humorous periodicals, including "Momus" and "Potpourri." His wife, Maria Ludwika Żółkowska (1790–1853), was a popular classical actress with the National Theatre.

Three of Żółkowski's children went on the stage, the most notable being his son Alojzy Gonzaga Żółkowski (1814–89), a highly respected actor and opera singer who spent most of his career at the State Theatres of Warsaw; his rich baritone voice and brilliant acting technique made him a success in such varied roles as Dulcamara in Gaetano Donizetti's *L'elisir d'amore* and Polonius in *Hamlet*. His daughter, the actress Alojza Żółkowska (1850–1921), continued the family tradition and married into another Polish theatrical family, the Ostrowskis.

Zolli: *see* Basel Zoological Garden.

Zollinger, Albin (b. Jan. 24, 1895, Zürich, Switz.—d. Nov. 7, 1941, Zürich), poet and novelist, the leading figure in the revival of Swiss poetry between World Wars I and II.

Zollinger was a primary school teacher who lived in or near Zürich all his life except for four years (1903–07) in Argentina. Three-quarters of his work was written in the last 10 years of his life, during which he consumed himself in creative activity. Following Impressionist trends, he became a master of landscape description, inspired by a refined sensuous delight. He was also preoccupied with the burning aspiration to reach beyond the narrow limits imposed by the nature of man. For these themes, and encouraged by the examples of Friedrich Hölderlin, Rainer Maria Rilke, and Thomas Wolfe, he created an effusive lyrical imagery. His volumes of verse included *Gedichte* (1933; "Poems"), *Sternfrühe* (1936; "Starlit Early Morning"), *Stille des Herbstes* (1939; "Autumn Tranquility"), and *Haus des Lebens* (1939; "House of Life"). His novels *Der halbe Mensch* (1929; "Half A Human Being"), *Die grosse Unruhe* (1939; "The Great Restlessness"), and *Pfannenstiel* (1940; "Panhandle") and his novella *Das Gewitter* (1943; "The Thunderstorm") are confrontations with the great movements of his epoch; and while his plots suffer from looseness, his language is rich and evocative.

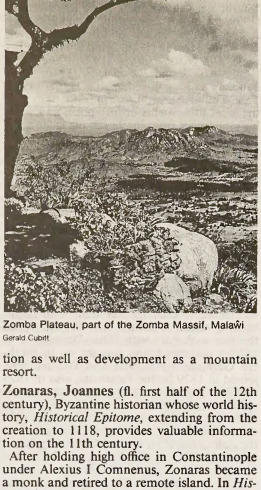
Zollverein (German: "Customs Union"), German customs union established in 1834 under Prussian leadership. It created a free-trade area throughout much of Germany and was an important step in German reunification.

The free-trade movement in Germany received great impetus from laissez-faire economists such as Friedrich List, its most active advocate in early 19th-century Germany. In 1818 Prussia enacted a tariff law abolishing all internal customs dues and announced its willingness to establish free trade with neighbouring states. A decade later Prussia signed the first such pact with Hesse-Darmstadt. In 1828 a customs union was set up in southern Germany by Bavaria and Württemberg, joined in 1829 by the Palatinate; also in 1828 the central German states established a similar union, which included Saxony, the Thuringian states, electoral Hesse, and Nassau. In 1834 these were among the 18 states that joined in the Zollverein. Hanover and Oldenburg joined in 1854; the two Mecklenburgs, Schleswig-Holstein, Lauenburg, and Lübeck joined in 1867; and thereby all Germany outside Austria was included except Hamburg and Bremen, which adhered in 1888, 17 years after the establishment of the German Empire.

Zomba, city, southern Malawi. It lies on the lower slopes of Zomba Mountain in the Shire Highlands, 37 miles (60 km) northeast of Blantyre. Established in 1885 as a planters' settlement, from 1891 it was the centre for the administration of the British Central African Protectorate (later Nyasaland) and the capital of independent Malawi from 1966 until 1974, when the new capital was opened at Lilongwe. The former residency (1887), designed to provide protection from slave traders, still stands by the Mulunguzi River and is now used as a government rest house. A new residence was later built at State House, which is now the seat of Malawi's president. The town still houses the Parliament Building (1957), where the Parliament met until 1994, and various government offices. Since the establishment in 1974 of Chancellor College, a new campus of the University of Malawi, Zomba has changed in character from a government centre to a university town. The town is the centre for the tobacco and dairy farms of the surrounding area, which also produces rice, corn (maize), fish, and softwoods. Pop. (1987) 43,250.

Zomba Massif, isolated mass of syenite (igneous rock composed chiefly of feldspar) rising from the Shire Highlands, southern Malawi. Occupying an area of about 50 square miles (130 square km), it reaches an elevation of 6,846 feet (2,087 m) in Zomba Peak. Sheer scarps to the east and south drop 2,500 feet (750 m) to the surrounding plains, and the western wall (4,000 feet [1,200 m]) bounds part of the Shire rift valley. The massif is divided by the deep valley of the Domasi River into two sections—the Zomba Plateau (south)

and Malosa Mountain (north). The tabular surface at 6,000 ft is under softwood afforesta-



Zomba Plateau, part of the Zomba Massif, Malawi
Gerald Cubitt

tion as well as development as a mountain resort.

Zonaras, Joannes (fl. first half of the 12th century), Byzantine historian whose world history, *Historical Epitome*, extending from the creation to 1118, provides valuable information on the 11th century.

After holding high office in Constantinople under Alexius I Comnenus, Zonaras became a monk and retired to a remote island. In *Historical Epitome* he drew on a rich collection of sources, some of which, notably several books of Dio Cassius' *Romaika*, are preserved only through him. A *Lexicon* and theological writings are also attributed to him.

Zond, any of a series of eight unmanned Soviet lunar and interplanetary probes. Zond 1 (launched April 1964) and Zond 2 (November 1964) were aimed at Venus and Mars respectively, but failed to send back data on the planets. Zond 3 (July 1965) transmitted closeup photographs of 3,000,000 square miles (7,800,000 square kilometres) of the lunar surface, including the hidden side, before going into solar orbit. Zond 5 (September 1968) became the first spacecraft to orbit the Moon and return to a soft landing on the Earth. Zond 6 through 8 (November 1968–October 1970) also made circumlunar flights; they carried biological specimens and transmitted photography of the Moon's surface.

zonda, winter foehn (*q.v.*; a warm, dry wind blowing down the side of a mountain) in Argentina, where it blows from the west across the Andes Mountains.

The name zonda in Argentina also refers to a hot, humid wind that blows from the north over the plains and precedes a low-pressure centre.

zone, submarine: *see* submarine fracture zone.

zone melting, any of a group of techniques used to purify an element or a compound or control its composition by melting a short region (*i.e.*, zone) and causing this liquid zone to travel slowly through a relatively long ingot, or charge, of the solid. As the zone travels, it redistributes impurities along the charge. The final distribution of the impurity depends on its distribution in the starting charge of material; its distribution between the liquid and solid phase of the material (called its distribution coefficient, k, which is a characteristic of the particular impurity); and on the size, number, and travel direction of the zones.

Zone melting is a means of using the freezing process to manipulate impurities. It combines the fact that a freezing crystal differs in composition from the liquid from which it crystallizes with the idea of passing a short liquid zone along a lengthy solid.

Zone refining is the most important of the zone-melting techniques. In zone refining, a solid is refined by passing a number of molten zones through it in one direction. Each zone carries a fraction of the impurities to the end of the solid charge, thereby purifying the remainder. Zone refining was first described by the U.S. scientist W.G. Pfann and was first used in the early 1950s to purify germanium for transistors. The purity achieved was hitherto unheard of—less than one part of detectable impurity in 10,000,000,000 parts of germanium. The method was adopted in transistor manufacture around the world.

The principles of zone refining are quite general, and so the method has been applied to many substances. More than one-third of the elements and hundreds of inorganic and organic compounds have been raised to their highest purity by zone refining. Many of these were, for the first time, made pure enough for their intrinsic properties to be determined.

Principles of zone refining. When a cylinder of a substance A containing an impurity B is melted and then slowly frozen from one end to the other, as in Figure 1A, the impurity is usually concentrated in the last-to-freeze region of the cylinder. This procedure is normal freezing. Component B is redistributed in this example because the atoms (or molecules) of B at the liquid-solid interface prefer the liquid phase to the solid phase. A measure of this preference is the distribution coefficient, k, defined as the ratio of the concentration of B in the just-forming solid A to that in liquid A. At very slow freezing rates an equilibrium exists; the distribution coefficient under these equilibrium conditions is termed k_0. At moderate freezing rates, about 1 to 30 centimetres per hour (0.4 to 12 inches per hour), the effective distribution coefficient, k, will lie somewhere between k_0 and unity. This is because, for k less than unity, the rejected impurity B accumulates in the liquid just ahead of the advancing solid, so that the just-forming solid "sees" a liquid more impure than the bulk liquid. If freezing is rapid enough, k_0 may approach unity; that is, the impurity concentration would be the same in the liquid and solid phases. Under these conditions, there would be no zone refining, and the interface probably would become dendritic or branching in shape.

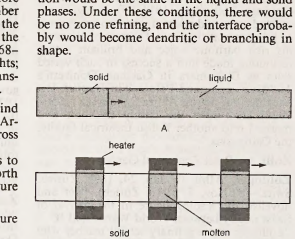


Figure 1: Schematic representation of (A) normal freezing, (B) zone refining

The normal freezing operation is the basis of the long-known technique of repeated fractional crystallizations. Although this technique was employed by the Curies to isolate radium it never became widely used because it entailed a lengthy and troublesome sequence of operations: partial freezing, separation of the crystals from the unfrozen liquid, remelting, and recombining with other fractions.

Zone refining achieves the same result very simply. A series of molten zones traverse the ingot in the same direction, usually through a series of heaters, as suggested in Figure 1B. Each zone takes in impurity at its melting interface and freezes out solid purer than the liquid at its freezing interface. There is no need to separate and recombine fractions, or even to touch or move the charge at all.

The distribution of impurity B after successive zone passes for an ingot 10 zones long and for a distribution coefficient k equal to 0.5 (a value neither especially favourable nor especially unfavourable) is shown in Figure 2.

As more zone passes are made the impurity concentration at the beginning of the ingot drops lower and lower until it eventually reaches a limit called the ultimate distribution. The lowest concentration of impurity B is extremely small, less than 0.0001.

Techniques of zone refining. The liquid zones are formed by heating (and by cooling the adjacent solids). Many practical heating methods have been used: electrical resistance coils, induction heating, electric arc, and electron beam, radiant energy, plasmas (ionized gases), solar heating, lasers, and Peltier heating and cooling (produced by an electric current flowing across the junction between two different materials). For organic compounds resistance-heated coils of wire are most common, although radiant heating has been used. If a compound or element is liquid at room temperature, the operation is conventionally done in a refrigerator.

The usual container is one that will not contaminate the material. Glass, Vycor (heat- and chemical-resistant glass), fused silica, molybdenum, tantalum, and graphite have all been used. If zone refining is done vertically, a transparent container is helpful, but good work has been done using opaque containers such as stainless steel. If the container is a horizontal, semicircular cross-section boat, it can be opaque, because the liquid zone is readily distinguished from the solid. If a filled container, horizontal or vertical, is used, care must be taken to prevent cracking either by change in volume during freezing (or melting) or by differential thermal contraction (if the charge sticks to the containing wall). Various solutions have been found for these problems.

Contamination of the charge by the container is a problem in all purification work, but a unique solution was found for zone refining, namely, float zoning, invented by a U.S. scientist to produce ultrapure silicon. This semiconducting element is even more useful than germanium for most transistor applications. In float zoning, a vertical silicon rod is held by end clamps, and a short molten zone is produced by inductive heating (producing heat from electric currents induced by an alternative magnetic field) and moved along the rod. The liquid is held in place by its surface tension, which theoretically limits the stable zone height. Various ingenious induction-heating procedures have been devised for stabilizing zones of greater height. Nearly perfect single crystals of ultrapure silicon have been produced commercially by such means.

Substances that melt at high temperatures also have high surface tension, enabling them to be ultrapurified by float zoning. Examples are tungsten, molybdenum, tantalum, and beryllium. A half-inch bar of beryllium, normally a very hard and brittle metal, has been easily bent 360° by hand after float zoning in a high vacuum using an electron beam to produce the molten zone. Other important factors, however, must be considered in applying zone-melting techniques. These include stirring, natural convection, and the handling of vaporous substances.

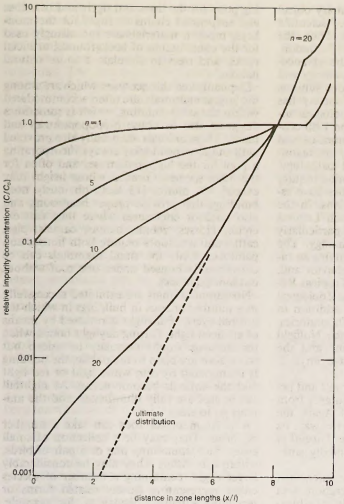


Figure 2: Semilogarithmic plots of relative impurity content along ingot for various numbers (*n*) of zone passes for a distribution coefficient of 0.5 in an ingot 10 zone lengths long

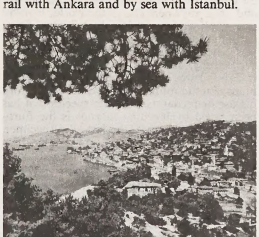
Practical applications. As a physical separation method, zone refining depends for its success on the difference in concentration of one component between two phases. In distillation if the separation in boiling points is not favourable, the still is made longer; in zone refining if the distribution coefficient is close to unity, the ratio of ingot length to zone length is made larger.

Zone refining has been utilized as the ultimate purification technique for hundreds of substances, but it has the disadvantage of being a relatively slow process. Typical freezing rates are 0.1–2.0 cm/hr (0.04–0.8 in./hr) for organic substances and 0.5–30 cm/hr (0.2–12 in./hr) for inorganic substances. The method has unique advantages of simplicity and of freedom from contamination by the container and by such chemical reagents as the solvents customarily used in crystallization.

Commercially, zone refining is important in the manufacture of semiconductors. Experimental applications of the technique are many and varied, but are particularly useful for preparing very pure materials in limited quantities. Large-scale purification of metals (of the order of tons per day) is not likely to be practical because of the excessive loss of heat due to high thermal conductivity. But zone refining of organic compounds on a tonnage scale is considered feasible, because of their very low thermal conductivity.

The liquid-solid transformation will probably continue as the main thrust of zone melting, but successful zone refining has been demonstrated in vapour-solid and solid-solid transformations. Vapour-solid transformations are restricted practically by the large change in volume on vaporization (as a result of which the charge must move along the containing tube). Solid-solid transformations are restricted by the slow rates of diffusion in solids.

Zonguldak, city, capital of Zonguldak *il* (province), northwestern Turkey, on the Black Sea coast. The well-equipped port is the main outlet for coal extracted from the basin between Zonguldak and Ereğli. The city's development and rapid rise in population were associated with the growth of this coal industry after the mid-19th century. Mining was extensively developed by the government after 1940, and about 80 percent of the city's labour force is engaged in work related to coal. The Zonguldak Technical School of Mining is in the city. There are also chemical plants and coke ovens. Zonguldak is connected by rail with Ankara and by sea with Istanbul.



Zonguldak, Tur.
By courtesy of Turkish Press Broadcasting and Tourist Dept

Zonguldak *il,* with an area of 3,490 sq mi (9,038 sq km), is well forested and mountainous. It is drained by the Araç, Devrek, Filyos, and Ova rivers, along which are small but fertile lowlands producing corn (maize), flax, and vegetables. It is the centre of Turkish heavy industry, containing the nation's largest iron and steel complexes at Karabük and Ereğli and the largest coalfields near Zonguldak city. A generating plant at Çatalağzı serves a large part of western Turkey. The building of small sailing craft is a tradition at Bartın. Pop. (1997) city, 106,176; *il,* 612,722.

Zonheboto, town, administrative headquarters of Zonheboto district, Nāgāland state, northeastern India. Formerly in the Mokokchūng subdivision, it is situated 41 mi (66 km) northeast of Kohīma town. The town has some cottage industries.

Zonheboto district (about 500 sq mi [1,300 sq km]) was separated from Mokokchūng district in 1973 and is located in the central part of the state. It is bounded by Mokokchūng district on the north, Tuensang district on the east, Phek district on the south, and Kohīma and Wokha districts on the west. The region is crisscrossed by several faults and is subject to earthquakes. It is hilly and rugged, with an average elevation of from 2,000 ft (600 m) to 3,000 ft. The hills are covered with dense forests of oak, chestnut, birch, and bamboo. The Laniye and the Dikhu, the major rivers, are aligned in a north–south direction and flow through narrow valleys. Agriculture is the mainstay of the economy; shifting cultivation is practiced, and crops include rice, ginger, yams, cotton, corn (maize), potatoes, fruits, sesame, and sugarcane. Pigs and poultry are raised. Cottage industries consist of weaving and dyeing; working of cane, bamboo, and wood; and pottery making. Timber is seasoned, and there are tufa lime and coal deposits in the district. Its ethnic people are mentioned in Sanskrit literature as the Kirāt; today the Angāmi, Rengma, Chakhesang, and Zeliang peoples inhabit the district. Transportation by road is difficult because of the terrain. Pop. (1991) town, 11,473; district, 96,218.

zoning, the legislative method of controlling land use by regulating such considerations as the type of buildings (*e.g.,* commercial or residential) that may be erected and the population density. Applied primarily to urban areas, it is accomplished by dividing land area into zoning districts, each having specific conditions under which land and buildings may be legally developed and used. In combination with other city-planning techniques, zoning is a major instrument for gaining greater physical order in cities.

The earliest form of zoning was inspired by architectural and urban-design controls introduced in European cities toward the end of the 19th century. In accordance with long-established municipal powers, German and Swedish cities applied zoning regulations about 1875 to new land being urbanized around the older city cores as a way of controlling the heights and concentrations of buildings and avoiding problems of congestion. Much of the orderliness of German and Swedish cities and the consistent quality of building line and height is due to the early establishment of detailed zoning regulations and their widespread application at the time of major building activity growing out of the Industrial Revolution.

Zoning in the United States, in contrast, has been more concerned with the social and economic function for which land is used rather than with architectural and site-planning criteria. The earliest U.S. zoning ordinances—around the turn of the 20th century—were motivated by the need for regulating the location of commercial and industrial activities.

zoo, also called ZOOLOGICAL GARDEN, or ZOOLOGICAL PARK, place where wild animals and, in some instances, domesticated animals are exhibited in captivity. In such an establishment animals can generally be given more intensive care than is possible in nature reserves or sanctuaries. Most long-established zoos exhibit general collections of animals, but some formed more recently specialize in par-

ticular groups—*e.g.,* primates, big cats, tropical birds, or waterfowl. Marine invertebrates, fishes, and marine mammals often are kept in separate establishments known as aquariums (*see* aquarium). The word zoo was first used in the late 19th century as a popular abbreviation for the zoological gardens in London.

For information on particular zoos, *see* articles at their specific names, *e.g.* Basel Zoo, Lincoln Park Zoological Garden, Prague Zoo.

It is not known when the earliest zoos were established, but it is possible that they were associated with the first attempts at animal domestication. Pigeons were kept in captivity as early as 4500 BC in what is now Iraq, and 2,000 years later elephants were semi-domesticated in India. Antelopes, including the addax, ibex, oryx, and gazelle, are depicted wearing collars on Egyptian tomb pictures at Saqqara, dating from 2500 BC. In China, the Empress Tanki, who probably lived about 1150 BC, built a great marble "house of deer"; and Wen Wang, who apparently reigned just before 1000 BC, established a zoo of 1,500 acres in extent, which he named the Ling-Yu, or Garden of Intelligence.

The biblical king Solomon, who also reigned about 1000 BC, was a farmer-zoologist, and he was followed, for at least the next 600 years, by other royal zookeepers, including Semiramis and Ashurbanipal of Assyria and King Nebuchadrezzar of Babylonia.

Collections of captive animals were in existence in Greece by the 7th century BC, and by the 4th century BC it is probable that such collections existed in most, if not all, of the Greek city-states. Aristotle (384–322 BC) was obviously well acquainted with zoos; his most famous pupil, Alexander the Great, sent back to Greece many animals that were caught on his military expeditions.

The earlier Egyptian and Asian zoos were kept mainly as public spectacles and only secondarily for study, but the Greeks of Aristotle's time were more concerned with study and experiment. The Romans had two types of animal collections: those destined for the arena and those kept as private zoos and aviaries.

With the end of the Roman Empire, zoos went into a decline, but animal collections were maintained by the emperor Charlemagne in the 8th century AD and by Henry I in the 12th century. In Europe Philip VI had a menagerie in the Louvre, Paris, in 1333, and many members of the House of Bourbon kept collections of animals at Versailles.

In the New World Hernán Cortés discovered a magnificent zoo in Mexico in 1519. The collection, which included birds of prey, mammals, and reptiles, was so large that it needed a staff of 300 keepers.

Modern zookeeping may be said to have started in 1752 with the founding of the Imperial Menagerie at the Schönbrunn Palace in Vienna. This menagerie, which still flourishes, was opened to the public in 1765. In 1775 a zoo was founded in a Royal Park in Madrid, and 18 years later the zoological collection of the Jardin des Plantes, Paris, was begun. The Zoological Society of London established its collection in Regent's Park in 1828, two years after the society itself was founded.

By the mid-19th century zoos were being opened all over the world; among those existing today, more than 40, most of which are in Europe, are more than 100 years old. Since the end of World War II there has been a rapid and worldwide proliferation of zoos, many of which have as their aim not the study of animals but public entertainment and commercial gain. The total number of animal collections open to the public in the world today is not accurately known but exceeds 1,000.

Function and purpose. The primary object of zoos that are in the charge of scientific societies is the study of animals. Thus, the purpose of the Zoological Society of London, as stated in its Royal Charter, is "the advancement of Zoology and Animal Physiology and the introduction of new and curious subjects of the Animal Kingdom." This society has been the model for many other zoological societies throughout the world. In the 19th century the emphasis of the investigations carried out in scientific zoos was mainly on taxonomy, comparative anatomy, and pathology. Today, the opportunities for scientific inquiry are much wider, and a few societies have established special research institutions. In the United States the Penrose Research Laboratory, of the Philadelphia Zoo is particularly concerned with comparative pathology. The New York Zoological Society maintains an Institute for Research in Animal Behavior and, in Trinidad, the William Beebe Tropical Research Station. In Great Britain the Zoological Society of London maintains, in addition to a modern hospital and pathology laboratories, two general research institutes—the Nuffield Institute of Comparative Medicine and the Wellcome Institute of Comparative Physiology.

Many zoos publish scientific journals and periodicals, which range in their contents from the popular to the highly technical. Again, the Zoological Society of London led the way. Its "Proceedings," now known as the *Journal of Zoology,* has appeared uninterruptedly since 1830.

In recent years a few zoos have intensified their efforts, frequently in cooperation with educational authorities, to provide an educational program for school children and students. Some zoos have full-time or voluntary guides on their staff, whose job it is to provide more information for visitors than can be given on labels attached to cages. Others meet this need by providing "talking labels," prerecorded tapes operated by the visitor himself.

Since World War II a number of zoos have been developed as breeding centres for animal species in danger of becoming extinct in the wild. Many threatened species have been saved by breeding in captivity. For example, in 1947 it was estimated that there were only 50 nenes, or Hawaiian geese, left on Hawaii and none anywhere else in the world. In 1950 two nenes were housed at the Wildfowl Trust at Slimbridge, Eng., and in 1951 a gander was hatched. The birds continued to breed successfully, and gradually the captive stock in Europe was spread over a dozen different menageries to minimize the risk of losses from disease or predators. Another species that has been saved by breeding in zoos is the European bison or wisent, the last wild specimen of which died in 1925. Other species that zoos have helped to survive include Père David's deer and many rare game birds. The increasing number of zoo births gives hope that zoos, rather than capturing wild animals for exhibition, will perhaps be able to restock the wild with zoo-born animals.

Design and architecture. Zoo design and architecture must meet two often conflicting needs: those of the animals (and the menagerie staff caring for them) and those of the visiting public. Zoos vary so widely in site, size, layout, age, and climatic conditions that there can hardly be a standard form of architecture.

Urban zoos (perhaps 80 percent of all zoos) are necessarily limited in size and have to make the best possible use of the available space. The animals are usually kept in houses, sometimes with associated outdoor enclosures. Cages, or some form of barrier, are usually necessary to prevent the animals from escaping and to discourage the public from getting too close to the animals. In addition to the simplest equipment in cages, such as scratching posts for the lions and tigers and branches and suspended chains or ropes for the monkeys, modern materials are increasingly used for the construction of backgrounds, artificial rocks, and trees to simulate a more natural habitat.

Elephants and rhinoceroses, which are among the largest mammals, are often accommodated within the same building, which is sometimes designed also to house hippopotamuses and tapirs. These animals are usually also provided with outdoor paddocks, always incorporating a pool for the hippopotamuses and often for the other species. Giraffes, whose height may exceed 4½ metres (15 feet), obviously need buildings that provide proper headroom, and also outdoor enclosures where they can exercise. Horses, zebras, okapis, camels, pigs, cattle, and antelopes require both houses and paddocks. Only the small mammals can be conveniently housed under one roof without outdoor paddocks.

Nocturnal animals are exhibited successfully in a number of zoos in buildings in which the normal cycle of daylight is reversed by means of artificial light. During daylight hours, when the animals would normally be asleep but when zoos are open to the public, the building is illuminated by dim white light or red light and the animals become active. At nightfall the houses are fully illuminated and the animals go to sleep.

Aviaries in urban zoos can take a number of forms. They may be a collection of small cages, each containing one or a pair of birds, within a building. They may be considerably larger cages, containing a number of species either representing closely related forms or providing a habitat display of, for example, seashore or woodland birds. There are various ways to keep birds within the aviary and still display them to the public. Wire mesh is the most common means, but a less visible barrier consists of vertically placed piano wire at one-half inch to one inch intervals. Glass is sometimes used, but unless it is very carefully positioned it may give unwanted reflections. Birds can also be confined in aviaries that are "enclosed" simply and effectively by brightly lighting certain portions of the enclosure and darkening the public area. The "walk-through" aviary is one in which the birds are given free run of a large space into which visitors are admitted through "air-lock" type doors. Such aviaries can simulate a natural environment with vegetation and streams.

Water birds and birds of prey are usually housed in outdoor aviaries with an attached shelter. Modern aviaries for these species are very large so that the birds can exercise sufficiently.

One of the most magnificent aviaries in the world is in the San Diego Zoo, in California, where it has proved possible to roof over natural canyons, of which one, used as a walk-through aviary, is about 25 m high, 46 m long, and 21 m wide. The walk-through Snowdon Aviary, at the London Zoo, is of a similar size but built over a man-made cliff. Opened in 1965, it is of unique design. Galvanized steel tension cables and aluminum tube shear legs support mesh on tetrahedral frames held in midair. The walk-through path cantilevers 12 m out from the cliff top.

Reptiles may be kept in individual cages in an enclosed reptile house. In subtropical and tropical zoos they are often kept outdoors in semi-natural enclosures or pits.

When animals are confined in houses, conditions such as ventilation, light, temperature, and humidity are adjusted to the particular needs of the species involved. Central heating plants and humidifiers may have to be installed in each building, with separate control systems for different cages. Many animals like to bask in a "hot spot" and feed in surroundings at a lower temperature. Infrared lamps are sometimes used to this end, and, in species

such as desert-living reptiles, ultraviolet light also is used. Direct sunlight is adequate if the windows allow passage of ultraviolet rays.

A number of open-range zoos have been established since the early 1930s in rural surroundings. The prototype is Whipsnade Park, established by the Zoological Society of London in 1932. Fewer species of animals are exhibited in such zoos than in urban zoos, but they are kept in more natural conditions in large paddocks. Animals are confined by a variety of methods including water-filled moats, dry moats, and wire-mesh fences.

While many open-space zoos exhibit their animals in paddocks containing only a single species—*e.g.*, a pride of lions or a herd of wildebeest or llamas—some try to create habitat displays consisting of mixed groups of animals. One of the best of these is at Borasparken, Sweden, where the African exhibit contains elephants, white rhinoceroses, Grant's zebras, reticulated giraffes, white-tailed gnus, crowned cranes, ground hornbills, ostriches, and guinea fowl.

In some modern zoo parks, sometimes called safari parks or lion farms, the animals are confined in very large paddocks through which visitors drive in their cars. While this practice is based on that observed in African nature reserves, it can prove dangerous when the density of traffic is high and when visitors fail to keep the windows of their cars closed or leave their cars. Provided that open-space zoos are run by experienced and properly trained staff, with veterinarians who have specialized in the care of exotic animals in attendance, those zoos could become very important as breeding centres for rare or endangered species.

Procurement and care of animals. It has been estimated that in a good modern zoo, for every 20 animals on display, only about 5 were bred in captivity, the remainder having been collected in the wild and usually purchased through dealers. Equally, for every animal that ends up in a dealer's hands, several others were probably killed in attempts at capture or died before they were sold to a zoo or other purchaser. In the interest of animal conservation, the breeding of captive animals is encouraged.

On arrival, zoo animals are quarantined and acclimatized to their new surroundings. Information on proper nutrition is exchanged between zoos directly or published in the *International Zoo Yearbook.* Temperature and other environmental requirements are also studied. Certain penguins, for example, have to be kept in refrigerated rooms if they are to thrive and breed. Adequate sleeping quarters, such as dens for foxes and wolves or burrows for rodents, also are provided.

Funding. Zoos are funded in various ways. In the United States most zoos are supported partially or wholly out of public funds by the town, city, or state in which they are located. The National Zoological Park, in Washington, D.C., was founded by Congress in 1889–90. Its site was purchased by the U.S. government, and running expenses are provided from public funds. The Zoological Park in the Bronx, New York City, and the Philadelphia Zoological Garden are managed by zoological societies, Both are supported partly by the subscriptions of members, partly by entrance fees, and partly by annual civic subsidies. In Britain most of the older zoos are maintained by zoological societies or trusts, all of which have an educational purpose. The running costs of the zoos are met by admission charges, membership subscriptions, and gifts and bequests.

Most European zoos, especially those in Germany, are run as civic institutions, but, in addition, entrance fees are charged. Some famous zoos, including those in Cologne and Frankfurt, are supported by the municipality but are run by zoological societies. The Paris zoo is one of the many institutions directly supported by the French Ministry of Education, in the same way as the Moscow zoo is a state organization.

In a number of countries zoo associations or federations have been set up. The largest of these is the American Association of Zoological Parks and Aquariums, founded in 1924. Other zoo federations include those of Great Britain and Ireland, Spain and Spanish America, Japan, Poland, and Germany. Related organizations include the International Union of Directors of Zoological Gardens and the Wild Animal Propagation Trust. Federations generally have among their objects the gathering and dissemination of facts and information relating to the management of zoological parks, the maintenance and raising of standards in zoos, the facilitation of the exchange and importation of zoological specimens, and the conservation of wildlife.

Where the same name may denote a person, place, or thing, the articles will be found in that order

zoochlorella, plural ZOOCHLORELLAE, any small green alga (often *Chlorella*) or, sometimes, flagellate protozoan (*e.g.*, the chlamydomonad *Carteria*) that lives within the bodies of various freshwater protozoans and invertebrates. Zoochlorellae often colour their hosts green (*e.g.*, green hydra and green *Paramecium bursaria*). As symbionts, zoochlorellae use carbon dioxide and nitrogenous and phosphorous wastes and provide oxygen and useful nutrients. Sometimes zoochlorellae are digested by the host, and they can survive independently of it. They may be passed from one generation to another in host germ cells.

zooflagellate, any flagellate protozoan that is traditionally of the protozoan class Zoomastigophorea (sometimes called Zooflagellata), although recent classifications of this group have questioned the taxonomic usefulness of the term because some zooflagellates have been found to have photosynthetic capabilities and some phytoflagellates heterotrophic capabilities.

Zooflagellates assimilate organic material by osmotrophy (absorption through the plasma membrane) or phagotrophy (engulfing prey in food vacuoles). The zooflagellate's flexible pellicle (envelope) is sufficiently thin in certain genera to permit pseudopodal projections. Zooflagellates exhibit a considerable variation in form, and they may be free-living, symbiotic, commensal, or parasitic in humans and other animals and in certain plants. For additional information about zooflagellates, *see* choanoflagellate; Holomastigotoides; hypermastigote; protomonad; trichomonad; trypanosome.

zoogeographic region: *see* faunal region.

zoogeography, the branch of the science of biogeography (*q.v.*) that is concerned with the geographic distribution of animal species. In addition to mapping the present distribution of species, zoogeographers formulate theories to explain the distribution, based on information about geography, physiography, climate, and geologic history, as well as knowledge of the evolutionary history and relationships of the animals involved.

zoology, branch of biology concerned with the members of the animal kingdom and with animal life in general. It embraces all conceivable forms of study, not only of the components of the animal body and the vital processes that sustain it but also of the relations of individual animals or animal groups with one another and the environment. Because of its vast scope, zoology is divided into a number of subdisciplines of which the chief ones include cytology, embryology, morphology, physiology, pathology, paleontology, genetics and evolution, taxonomy, ethology, ecology, and zoogeography.

A brief treatment of the science of zoology follows. For full treatment, *see* MACROPAEDIA: Biological Sciences.

For a description of the place of zoology in the circle of learning and for a list of both MACROPAEDIA and MICROPAEDIA articles in the subject field, *see* PROPAEDIA: Part Three, Division I.

The science of zoology has its origins in ancient Greece and the Roman Empire, in the works of Hippocrates, Aristotle, and Pliny. Later naturalists continued in the Aristotelian tradition. In the 15th century the invention of the printing press greatly aided the dissemination of information. The contributions of individuals such as William Harvey (the circulation of blood), Carolus Linnaeus (system of nomenclature), Georges-Louis Leclerc de Buffon (natural history), and Georges Cuvier (comparative anatomy) further advanced the field of zoology.

The identification of the cell as the common structural unit of living things and the advancement of the study of chemistry clarified for Claude Bernard the concept of homeostasis—the stability of the internal bodily environment. As technology progressed, a number of new biological disciplines, such as embryology, began to develop. A major turning point in zoological studies occurred in 1859, when Charles Darwin's *On the Origin of Species by Means of Natural Selection* was published. In it Darwin formulated his theory of evolution. Since that time the study of genetics has grown essential to a number of biological disciplines. While specialization has increased, the necessity for interdisciplinary studies also has become clear.

Zoomastigophorea, protozoan class also known as Zooflagellata. *See* zooflagellate.

zoonosis, plural ZOONOSES, any disease shared by humans and other vertebrate animals. The term was originally defined to describe a group of diseases that humans may acquire from domestic animals. This definition has been modified to include all human diseases that are acquired from or transmitted to any other vertebrate. Examples include rabies (*q.v.*; from small mammals such as the dog, fox, bat, and rodent), tularemia (*q.v.*; from rabbits and wild rodents), psittacosis (*q.v.*; from birds of the parrot family), glanders (*q.v.*; from horses), anthrax (*q.v.*; from ruminants, horses, and swine), brucellosis (*q.v.*; from domestic livestock), and a variety of respiratory infections from domestic animals and house pets.

zooplankton, small floating or weakly swimming organisms that drift with water currents and, with phytoplankton, make up the planktonic food supply upon which almost all oceanic organisms are ultimately dependent. Many animals, from single-celled Radiolaria to the eggs or larvae of herrings, crabs, and lobsters, are found among the zooplankton. Permanent plankton, or holoplankton, such as protozoa and copepods (an important food for larger animals), spend their lives as plankton. Temporary plankton, or meroplankton, such as young starfish, clams, worms, and other bottom-dwelling animals, live and feed as plankton until they leave to become adults in their proper habitats.

zooxanthella, any flagellate protozoan, sometimes classified as a yellow-green alga, with yellow or brown pigments contained in chromatophores. Zooxanthellae live in other protozoa (foraminiferans and radiolarians) and in some invertebrates. They use the carbon dioxide and waste materials of the host, supplying, in return, oxygen and food substances. Zooxanthellae spend their resting stage in

the host; at times they escape and become free-swimming, independent flagellates. Examples of zooxanthellae are *Cryptomonas* (*see* cryptomonad) and *Chrysidella*.

Zophar, also spelled SOPHAR, in the Book of Job (2:11, 11:1, 20:1, 42:9), one of the three comforters of Job, a biblical archetype of the good man whose misfortunes are undeserved. Like the other two comforters, Bildad and Eliphaz, Zophar emphasizes an old Hebrew concept—suffering is the inevitable lot of the evil man; therefore, Job's protests of innocence are deceptive, even sinful. Zophar is portrayed as more hotheaded than his two friends. In 2:11 he is identified as a Naamathite, or one who dwells in Naamah, perhaps a region in Arabia.

His first speech to Job (11:1) stresses three ideas: God's infinite transcendence; the need for Job to repent of the sins he denies having committed, so that God will restore his good fortune; and the ineluctable destruction of the wicked.

Zophar's second reply to Job (20:1) begins with an admission of agitation. Job's cries for his friends' mercy and the force of some of his arguments have upset Zophar. Controlling his disturbance, he then harangues Job about the evanescence of the evil man's pleasure. Such a man may prosper temporarily but then will inevitably "suck the poison of asps" (20:16) and find that "the earth will rise up against him" (20:27).

Unlike the other two comforters, Zophar does not have a third speech, and some commentators have concluded that parts of Job's speeches constitute this third reply.

Zoppot (Poland): *see* Sopot.

Zoquean (people): *see* Mixe-Zoquean.

Zorach, William (b. Feb. 28, 1887, Eurburg, Lithuania—d. Nov. 16, 1966, Bath, Maine, U.S.), U.S. traditionalist sculptor of simple, figurative subjects who was a leading figure in the early 20th-century revival of direct carving, whereby the sculptor seeks his image directly from the material to be carved, relying on neither the inspiration of models nor the aid of mechanical devices. Zorach's mature work is monumental in form and makes skillful use of the natural colour, veining, and textures of the materials used—usually stone and wood. Often, the marks of the sculptor's tools are left to enrich the surface.



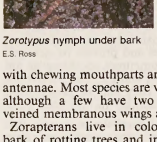
Zorach, photograph by Arnold Newman, 1943
© Arnold Newman

Zorach immigrated to the United States when he was four and was reared in Cleveland. He studied painting at the Cleveland Institute of Art and in Paris (1910–11), where he painted with vivid colours and freely rendered forms in the manner of Matisse and other painters of the Fauve movement. He took up sculpture in 1917 and gave up painting, except for watercolour, in 1922. From 1929 to 1960 Zorach taught sculpture at the Art Students League in New York City, where he inspired many students to take up wood carving.

Among his major public commissions are "Spirit of the Dance" (1932; Radio City Music Hall, New York City), the Mayo Clinic relief "Man and Work" (1953; Rochester, Minn.), and the "Spirit of the Sea" (1962; Bath, Maine).

He wrote two books: *Art is My Life* (1967), his autobiography, and *Zorach Explains Sculpture* (1947).

zorapteran, any member of the insect order Zoraptera, consisting of one family and at least 22 described species. They are found on every continent except Europe. They are minute insects, less than 3 millimetres (⅛ inch) long,

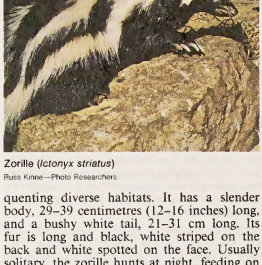


Zorotypus nymph under bark
E.S. Ross

with chewing mouthparts and nine-segmented antennae. Most species are wingless and blind, although a few have two pairs of sparsely veined membranous wings and eyes.

Zorapterans live in colonies beneath the bark of rotting trees and in humus but have no social organization. They feed on other arthropods and fungal spores and are of little economic importance.

zorille, also spelled ZORIL, or ZORILLA, also called STRIPED POLECAT, AFRICAN POLECAT, CAPE POLECAT, or STRIPED WEASEL (*Ictonyx* [sometimes *Zorilla*] *striatus*), African carnivore of the weasel family (Mustelidae), fre-



Zorille (*Ictonyx striatus*)
Russ Kinne—Photo Researchers

quenting diverse habitats. It has a slender body, 29–39 centimetres (12–16 inches) long, and a bushy white tail, 21–31 cm long. Its fur is long and black, white striped on the back and white spotted on the face. Usually solitary, the zorille hunts at night, feeding on rodents and insects. A typical litter contains two or three young.

Zorn, Anders (Leonard) (b. Feb. 18, 1860, Mora, Swed.—d. 1920, Mora), Swedish painter and etcher, internationally famed as one of the best genre and portrait painters in Europe at the end of the 19th century.

Zorn studied at the Stockholm academy and then travelled extensively throughout Europe. After working in England, France, and the United States, he returned to Mora in 1896.



Etching of Ernest Renan by Zorn, 1892; in the Nationalmuseum, Stockholm
By courtesy of the Nationalmuseum, Stockholm

Zorn painted Impressionist landscapes and portraits in both watercolour and oil; he is best known for the vigorous style of his paintings of peasant girls bathing. He did his best work in etching, employing a technique of drawing parallel lines across the plate. He was also a sculptor.

Zoroaster, Old Iranian ZARATHUSHTRA, or ZARATHUSTRA (b. *c.* 628 BC, probably Rhages, Iran—d. *c.* 551, site unknown), Iranian religious reformer and founder of Zoroastrianism, or Parsiism, as it is known in India. (*See* Zoroastrianism; Parsi.)

Life. A major personality in the history of the religions of the world, Zoroaster has been the object of much attention for two reasons. On the one hand, he became a legendary figure believed to be connected with occult knowledge and magical practices in the Near Eastern and Mediterranean world in the Hellenistic Age (*c.* 300 BC–*c.* AD 300). On the other hand, his monotheistic concept of God has attracted the attention of modern historians of religion, who have speculated on the connections between his teaching and Judaism and Christianity. Though extreme claims of pan-Iranianism (*i.e.,* that Zoroastrian or Iranian ideas influenced Greek, Roman, and Jewish thought) may be disregarded, the pervasive influence of Zoroaster's religious thought must nevertheless be recognized.

The student of Zoroastrianism is confronted by several problems concerning the religion's founder. One question is what part of Zoroastrianism derives from Zoroaster's tribal religion and what part was new as a result of his visions and creative religious genius. Another question is the extent to which the later Zoroastrian religion (Mazdaism) of the Sāsānian period (AD 224–651) genuinely reflected the teachings of Zoroaster. A third question is the extent to which the sources—the Avesta (the Zoroastrian scriptures) with the *Gāthās* (older hymns), the Middle Persian Pahlavi Books, and reports of various Greek authors—offer an authentic guide to Zoroaster's ideas.

A biographical account of Zoroaster is tenuous at best or speculative at the other extreme. The date of Zoroaster's life cannot be ascertained with any degree of certainty. According to Zoroastrian tradition, he flourished "258 years before Alexander." Alexander the Great conquered Persepolis, the capital of the Achaemenids, a dynasty that ruled Persia from 559 to 330 BC, in 330 BC. Following this dating, Zoroaster converted Vishtāspa, most likely a king of Chorasmia (an area south of the Aral Sea in Central Asia), in 588 BC. According to tradition, he was 40 years old when this event occurred, thus indicating that his birthdate was 628 BC. Zoroaster was born into a modestly situated family of knights, the Spitama, probably at Rhages (now Rayy, a suburb of Tehrān), a town in Media. The area in which he lived was not yet urban, its

economy being based on animal husbandry and pastoral occupations. Nomads, who frequently raided those engaged in such occupations, were viewed by Zoroaster as aggressive violators of order, and he called them followers of the Lie.

Zoroaster's teachings. According to the sources, Zoroaster probably was a priest. Having received a vision from Ahura Mazdā, the Wise Lord, who appointed him to preach the truth, Zoroaster apparently was opposed in his teachings by the civil and religious authorities in the area in which he preached. It is not clear whether these authorities were from his native region or from Chorasmia prior to the conversion of Vishtāspa. Confident in the truth revealed to him by Ahura Mazdā, Zoroaster apparently did not try to overthrow belief in the older Iranian religion, which was polytheistic; he did, however, place Ahura Mazdā at the centre of a kingdom of justice that promised immortality and bliss. Though he attempted to reform ancient Iranian religion on the basis of the existing social and economic values, Zoroaster's teachings at first aroused opposition from those whom he called the followers of the Lie (*drvegvant*).

Ahura Mazdā and the Beneficent Immortals. Zoroaster's teachings, as noted above, centred on Ahura Mazdā, who is the highest god and alone is worthy of worship. He is, according to the *Gāthās,* the creator of heaven and earth; *i.e.,* of the material and the spiritual world. He is the source of the alternation of light and darkness, the sovereign lawgiver, and the very centre of nature, as well as the originator of the moral order and judge of the entire world. The kind of polytheism found in the Indian Vedas (Hindu scriptures having the same religious background as the *Gāthās*) is totally absent; the *Gāthās,* for example, mention no female deity sharing Ahura Mazdā's throne. He is surrounded by six or seven beings, or entities, which the later Avesta calls *amesha spentas,* "beneficent immortals." The names of the *amesha spentas* frequently recur throughout the *Gāthās* and may be said to characterize Zoroaster's thought and his concept of god. In the words of the *Gāthās,* Ahura Mazdā is the father of Spenta Mainyu (Holy Spirit), of Asha Vahishta (Justice, Truth), of Vohu Manah (Righteous Thinking), and of Armaiti (Spenta Armaiti, Devotion). The other three beings (entities) of this group are said to personify qualities attributed to Ahura Mazdā: they are Khshathra Vairya (Desirable Dominion), Haurvatāt (Wholeness), and Ameretāt (Immortality). This does not exclude the possibility that they, too, are creatures of Ahura Mazdā. The good qualities represented by these beings are also to be earned and possessed by Ahura Mazdā's followers. This means that the gods and mankind are both bound to observe the same ethical principles. If the *amesha spentas* show the working of the deity, while at the same time constituting the order binding the adherents of the Wise Lord, then the world of Ahura Mazdā and the world of his followers (the *ashavan*) come close to each other. The very significant eschatological aspect of Zoroastrianism is well demonstrated by the concept of Khshathra (Dominion), which is repeatedly accompanied by the adjective Desirable; it is a kingdom yet to come.

Monotheism and dualism. The conspicuous monotheism of Zoroaster's teaching is apparently disturbed by a pronounced dualism: the Wise Lord has an opponent, Ahriman, who embodies the principle of evil, and whose followers, having freely chosen him, also are evil. This ethical dualism is rooted in the Zoroastrian cosmology. He taught that in the beginning there was a meeting of the two spirits, who were free to choose—in the words of the *Gāthās*—"life or not life." This original choice gave birth to a good and an evil principle. Corresponding to the former is a Kingdom of Justice and Truth; to the latter, the Kingdom of the Lie (Druj), populated by the daevas, the evil spirits (originally prominent old Indo-Iranian gods). Monotheism, however, prevails over the cosmogonic and ethical dualism because Ahura Mazdā is father of both spirits, who were divided into the two opposed principles only through their choice and decision.

The Wise Lord, together with the *amesha spentas,* will at last vanquish the spirit of evil: this message, implying the end of the cosmic and ethical dualism, seems to constitute Zoroaster's main religious reform. His monotheistic solution resolves the old strict dualism. The dualist principle, however, reappears in an acute form in a later period, after Zoroaster. It is achieved only at the expense of Ahura Mazdā, by then called Ohrmazd, who is brought down to the level of his opponent, Ahriman. At the beginning of time, the world was divided into the dominion of the good and of the evil. Between these, each man is bound to decide. He is free and must choose either the Wise Lord and his rule or Ahriman, the Lie. The same is true of the spiritual beings, who are good or bad according to their choices. From man's freedom of decision it follows that he is finally responsible for his fate. Through his good deeds, the righteous person (*ashavan*) earns an everlasting reward, namely integrity and immortality. He who opts for the lie is condemned by his own conscience as well as by the judgment of the Wise Lord and must expect to continue in the most miserable form of existence, one more or less corresponding to the Christian concept of hell. According to Avestan belief, there is no reversal and no deviation possible once a man has made his decision. Thus, the world is divided into two hostile blocks, whose members represent two warring dominions. On the side of the Wise Lord are settled herdsmen or farmers, caring for their cattle and living in a definite social order. The follower of the Lie (Druj) is a thieving nomad, an enemy of orderly agriculture and animal husbandry.

Eschatological teachings. The *Gāthās,* the early hymns, many of which may have been written by Zoroaster, are permeated by eschatological thinking. Almost every passage contains some reference to the fate awaiting men in the afterlife. Each act, speech, and thought is viewed as being related to an existence after death. The earthly state is connected with a state beyond, in which the Wise Lord will reward the good act, speech, and thought and punish the bad. This motive for doing good seems to be the strongest available to Zoroaster in his message. After death, the soul of man must pass over the Bridge of the Requiter (Cinvat), which everyone looks upon with fear and anxiety. After judgment is passed by Ahura Mazdā, the good enter the kingdom of everlasting joy and light, and the bad are consigned to the regions of horror and darkness. Zoroaster, however, goes beyond this, announcing an end phase for the visible world, "the last turn of creation." In this last phase, Ahriman will be destroyed, and the world will be wonderfully renewed and be inhabited by the good, who will live in paradisiacal joy. Later forms of Zoroastrianism teach a resurrection of the dead, a teaching for which some basis may be found in the *Gāthās.* Through the resurrection of the dead, the renewal of the world bestows a last fulfillment on the followers of the Wise Lord.

Cultic reforms. Zoroaster forbade all sacrifices in honour of Ahriman or of his adherents, the daevas, who from pre-Zoroastrian times had degenerated into hostile deities. In the prevailing religious tradition, Zoroaster probably found that the practice of sacrificing cattle, combined with the consumption of intoxicating drinks (*haoma*), led to orgiastic excess. In his reform, Zoroaster did not, as some scholars would have it, abolish all animal sacrifice but simply the orgiastic and intoxicating rites that accompanied it. The *haoma* sacrifice, too, was to be thought of as a symbolic offering; it may have consisted of unfermented drink or an intoxicating beverage or plant. Zoroaster retained the ancient cult of fire. This cult and its various rites were later extended and given a definite order by the priestly class of the Magi. Its centre, the eternal flame in the Temple of Fire, was constantly linked with the priestly service and with the *haoma* sacrifice.

Influence and assessments. After the conversion of Vishtāspa to such teachings, Zoroaster remained at the court of the king. Other officials were converted, and a daughter of Zoroaster apparently married Jāmāsp, a minister of the king. According to tradition, Zoroaster lived for 77 years, thus indicating that he died about 551 BC. After his death, many legends arose about him. According to these legends, nature rejoiced at his birth, and he preached to many nations, founded sacred fires, and fought in a sacred war. He was viewed as a model for priests, warriors, and agriculturalists, as well as a skilled craftsman and healer. The Greeks regarded him as a philosopher, mathematician, astrologer, or magician. Jews and Christians regarded him as an astrologer, magician, prophet, or arch heretic. Not until the 18th century did a more scholarly assessment of Zoroaster's career and influence emerge. (F.K.)

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Zoroastrianism, the ancient pre-Islāmic religion of Īran that survives there in isolated areas and more prosperously in India, where the descendents of Zoroastrian Iranian (Persian) immigrants are known as Parsis, or Parsees. Founded by the Iranian prophet and reformer Zoroaster in the 6th century BC, this religion, containing both monotheistic and dualistic features, influenced the other major Western religions—Judaism, Christianity, and Islām.

A brief treatment of Zoroastrianism follows. For full treatment, *see* MACROPAEDIA: Zoroastrianism and Parsiism.

Zoroaster's reforms cannot be appreciated without knowledge of the tradition into which he was born and educated. Society tended to be divided into three classes: chiefs and priests, warriors, and husbandmen and cattle breeders. This class structure is reflected in the religion, with particular gods or *daivas* ("heavenly ones") associated with each of the three classes. The *ahuras* ("lords"), for example, which included Mitra and Varuṇa, seem to have been connected only with the first class.

Zoroaster rejected the cults of all the gods except one *ahura*, Ahura Mazdā, the "Wise Lord." It is not certain that Zoroaster was the first to proclaim Ahura Mazdā. This deity appears as the great god of Darius I (522–486 BC), and it is not known whether Darius heard of him through Zoroaster's disciples or independently.

The origin of evil is traced in Zoroaster's system to an exercise of free will at the beginning of creation, when the twin sons of Ahura Mazdā entered into an eternal rivalry. One, Spenta Mainyu (Bounteous Spirit), chose good, thus acquiring the attributes of truth, justice, and life. The other, Angra Mainyu (Destructive Spirit), chose evil and its attendant forces of destruction, injustice, and death.

According to Zoroaster the world was soon to be consumed in a mighty conflagration from which only the followers of the good would rise to share in a new creation. Until this came to pass, the souls of those who died would cross the Bridge of the Requiter from whence the good would be led to wait in heaven, the wicked in hell.

Later Zoroastrian cosmology conceives the history of the world as a vast drama divided into four periods of 3,000 years each. In Infinite Time there existed Ormazd, who dwelt in the light, and Ahriman, who dwelt below him in the darkness. At the end of the first 3,000 years Ahriman crossed the Void that separated them and attacked Ormazd, who, perceiving that their struggle would last forever unless realized in finite terms, made a pact with Ahriman limiting the duration of their struggle. Ormazd then recited the Ahuna Vairya, the most sacred prayer of the Zoroastrians, which is believed to contain the germ of their whole religion. Ahriman, aghast, fell back into the abyss where he lay for another 3,000 years. During this time Ormazd called creation into being, first the spiritual creation including the Beneficent Immortals, then a corresponding material creation—sky, water, earth, plants, the Primeval Ox, and Primeval Man (Gayōmart). Next, to the *fravashis* (preexistent souls) of men Ormazd offered a choice between staying forever in their embryonic state and becoming incarnate in the physical world in order to secure his triumph over Ahriman; they chose birth and combat. Meanwhile Ahriman generated six demons and an opposing material creation.

At the end of the second period of 3,000 years Ahriman, instigated by Primeval Woman, the Whore, burst through the sky and corrupted the creation of Ormazd. He killed Gayōmart, from whose body mankind and the metals were generated, and the Ox, from which arose animals and plants. In the third period Ahriman triumphed in the material world but was unable to escape from it; trapped by Ormazd, he was doomed to generate his own destruction. The beginning of the last period witnesses the coming of religion on earth, namely the birth of Zoroaster. The end of each of its millennia is to be marked by the coming of a new saviour, successor and posthumous son of Zoroaster. The third and last saviour, Saoshyans, will bring about the final judgment, dispense the drink of immortality, and usher in the new world. Thus, Finite Time, which had come forth from Infinite Time, merges with it again after the interval of 12,000 years.

The literature of Zoroastrianism falls into two distinct parts: the Avesta, the original scriptural work, composed in a form of the ancient Iranian language called Avestan; and the much later texts written in Pahlavi, a dialect of Middle Persian, or in Persian.

After Zoroaster's death his religion slowly spread southward, through what is now Afghanistan, and westward into the territory of the Medes and Persians. As it did so, it did not remain immune from contamination with the ancient religion, whose gods and goddesses were again worshiped. This development, which seems to have taken place in Achaemenid times (559–330 BC), is reflected in the later part of the Avesta. For about four centuries after Alexander's conquest (330 BC), it seems, Iran was more or less hellenized and the indigenous religion neglected; a revival did not come about until toward the end of the Arsacid, or Parthian, Empire (247 BC–AD 224).

With the advent of a new and decidedly national Persian dynasty, the Sāsānian, in AD 224, Zoroastrianism became the official religion. Its hierarchy possessed considerable political power, and other religions (Christianity, Manichaeism, and Buddhism) were persecuted. The Avesta was compiled, edited, and provided with a translation and commentary in the vernacular, Pahlavi. The dualistic, or Mazdean, doctrine, which had gradually replaced the monotheistic system of the *Gāthās* during the Achaemenid period, became finally accepted as orthodox.

Under Muslim rule the bulk of the population was persuaded or forced to embrace Islām, but Zoroastrianism was tolerated to a certain extent and succeeded in holding its own fairly well for about three centuries. Between the 8th and 10th centuries religious persecution and forced conversion to Islām led some of the remaining Zoroastrians to leave Iran and settle in India, most of them eventually in the region of Bombay. By the 19th century these Zoroastrians, called Parsees, were distinguished for their wealth, education, and beneficence. In the 19th century the Parsees renewed contact with the only remaining Zoroastrians in Iran, the Gabars. These two groups and their emigrants to other countries are today the only surviving practitioners of the religion of Zoroaster. Zoroastrian worship is most distinctively characterized by tendance of the temple fire.

Zorrilla de San Martín, Juan (b. Dec. 28, 1855, Montevideo—d. Nov. 3, 1931, Montevideo), Uruguayan poet famous for a long historical verse epic, *Tabaré* (1886; final edition after several revisions, 1926), a poem in six cantos, based upon a legend of the love between a Spanish girl and an Indian boy.

Zorrilla de San Martín was educated in various Jesuit schools throughout South America (Santiago, Santa Fé, Montevideo). His first work, *Notas de un himno* (1876; "Notes for a Hymn"), dealing with themes of sadness and patriotism, clearly reflects the influence of the famous Spanish Romantic poet Gustavo Adolfo Becquer and sets the tone for all his poetic work that followed. In 1878 he founded the Catholic periodical *El bien público* and the next year achieved renown for his patriotic ode *La leyenda patria* ("The Fatherland Legend"). Throughout his life he held various government posts, including Uruguayan minister to France, Portugal, Spain, and the Vatican.

Zorrilla y Moral, José (b. Feb. 21, 1817, Valladolid, Spain—d. Jan. 23, 1893, Madrid), poet and dramatist, the major figure of the nationalist wing of the Spanish Romantic movement. His work was enormously popular and is now regarded as quintessentially Spanish in style and tone.

After studying law at Toledo and Valladolid, Zorilla y Moral left the university and went to Madrid to devote himself to literature. In 1837 he became an overnight success with his recitation of an elegy at the funeral of the poet Mariano José de Larra. He ran away from his wife and financial distress and was abroad from 1855 to 1866, where he wrote prolifically but remained insolvent. In 1889 he was crowned as the national poet and was granted a government pension.

Zorrilla wrote effortlessly: he was an improviser who made his name with his *leyendas* ("legends"), which told of remote times and places. His first collection of verse legends, *Cantos del trovador* (1841), however, suffered—like much of his other poetry—from its carelessness and verbosity.

Zorrilla's greatest success was achieved with his version of the Don Juan story, the play *Don Juan Tenorio* (1844). Written while he was in his 20s and later despised by him as a failure, it was the most popular play of 19th-century Spain and is still frequently performed. Like his other works, it exhibits those typically Spanish qualities that have made Zorrilla a uniquely national author: picturesque characters, intrigues and coincidences in its plot, lyrical flights, and great Romantic colouring.

zorrino: *see* skunk.

Zorzor, town, northwestern Liberia, West Africa. It is situated along the road from Monrovia to Sierra Leone. A local trade centre for agricultural products (rice, cassava, pineapples, and palm oil and kernels) grown by the Kpelle and Loma peoples of the surrounding area, it is the site of an American Lutheran church·hospital, a leper colony, and a handicrafts workshop. At Fisebu (3 miles [5 km] northwest) is the Zorzor Rural Teacher Training Institute.

Zoser (king of Egypt): *see* Djoser.

Zoshchenko, Mikhail Mikhaylovich (b. Aug. 10 [July 29, Old Style], 1895, Poltava, Ukraine, Russian Empire—d. July 22, 1958, Leningrad [now St. Petersburg]), Soviet satirist whose short stories and sketches are among the best comic literature of the Soviet period.

Zoshchenko studied law and then in 1915 joined the army. Between 1917 and 1920 he lived in many different cities and worked at a variety of odd jobs and trades. In 1921 in Petrograd (now St. Petersburg) he joined the Serapion Brothers literary group. Zoshchenko's tales are primarily satires on contemporary Soviet everyday life. One of his main targets was bureaucratic red tape and corruption, which he attacked with tongue-in-cheek wit, using artificial language and malapropisms that make his works virtually untranslatable. One critic (Gleb Struve) has remarked that it is as difficult to translate Zoshchenko into English or American as it would be to translate Edward Lear or Damon Runyon into Russian.

Beginning in the 1930s, Zoshchenko was subjected to increasingly severe criticism from officialdom. He tried to conform to the requirements of Socialist Realism—notably in *Istoriya odnoy zhizhni* (1935; "The Story of One Life"), dealing with the construction, by forced labour, of the White Sea–Baltic Waterway—but with little success. In 1943 the magazine *Oktyabr* began to serialize his psychological-introspective series of episodes, anecdotes, and reminiscences entitled *Pered voskhodom solntsa* ("Before Sunrise") but suspended publication after the second installment.

In 1946 Zoshchenko published in the literary magazine *Zvezda* a short story, "Prikluycheniya obezyany" ("The Adventures of a Monkey"), which was condemned by Communist critics as malicious and insulting to the Soviet people. He was expelled (with the poet Anna Akhmatova) from the Union of Soviet Writers, which meant the virtual end of his literary career.

After his death, the Soviet press tended to ignore him; but some of his works were reissued, and their prompt sale indicated his continuing popularity.

Zosimus, SAINT (b. Greece—d. Dec. 26, 418, Rome; feast day December 26), pope from March 417 to December 418. He was consecrated as Pope St. Innocent I's successor on March 18, 417. His brief but turbulent pontificate was embroiled in conflicts involv-

ing Gaul, Africa, and Pelagianism, a heretical doctrine that minimized the role of divine grace in man's salvation.

Zosimus' first act was to designate Bishop Patroclus of Arles papal vicar in Gaul, based on an alleged historical primacy of the see of Arles. This act provoked a crisis affecting all the churches of southern Gaul. The bishops of Narbonne, Marseille, and Vienne opposed Patroclus' elevation. Zosimus threatened excommunication.

Concurrently, the Pelagians—whose proponent Pelagius had been excommunicated on Jan. 27, 417, by Innocent and who in general were condemned by the African bishops—appealed to Rome, being successfully represented by Celestius (Caelestius). After receiving a profession of faith from Pelagius, Zosimus sent a strongly worded letter to the African bishops on Sept. 21, 417, accusing them of having acted precipitately in their condemnation. However, the next year Zosimus, again doubting Pelagius' orthodoxy, read his commentary on Romans; shocked by its doctrine, he commanded Celestius to appear before him for examination. Celestius fled Rome, thereby appearing self-condemned, and Zosimus issued the *Epistola tractoria* ("Epistolary Sermon") that excommunicated Pelagius and Celestius and condemned their doctrine. Pelagius, horrified by his excommunication, departed, probably for Egypt.

Even though he confirmed Innocent's judgment, Zosimus disturbed the African episcopate in a new controversy by espousing the cause of a disreputable priest called Apiarius, who had been excommunicated by Bishop Urbanus of Sicca Veneria. Defying African canon law, Zosimus dispatched legates to Africa with orders that included reorganizing the method of appeal between Africa and Rome and a threat to excommunicate Urbanus if he did not make amends with Apiarius. Against the Pope's domination, certain Roman clergy appealed to the imperial court at Ravenna, then the capital of the Western Empire, for which act Zosimus excommunicated them. The case regarding Apiarius remained unsettled when, to the relief of both Africa and Gaul, Zosimus died. He was buried in an unknown grave in the Basilica of St. Lawrence Outside the Walls, Rome.

Zou Yan (Chinese philosopher): *see* Tsou Yen.

Zouche, Richard (b. 1590, Ansty, Wiltshire, Eng.—d. March 1, 1661, Oxford), English jurist, one of the founders of international law, who became regius professor of civil law at Oxford and later practiced successfully in London.

Zouche was appointed a judge of the Court of Admiralty in 1641 and was twice returned to Parliament as a representative for Hythe, Kent. Zouche was a Royalist, and during the English Civil Wars, in 1646, he was one of those who negotiated the surrender of Oxford to the Commonwealth forces. He lost his seat on the bench in 1649 but retained his professorship and was reappointed to the Court of Admiralty after the Restoration (1660).

Zouche is remembered for his treatise on international law, *Juris et Judicii Fecialis* (1650), the first scientific manual covering the entire field. As custom and contemporary precedents loomed larger in his work than in the work of earlier writers, Zouche is thought by some scholars to have been the first positivist. Though he did not coin the phrase *jus inter gentes* ("law among nations") for international law, he first adopted it as a title more apt for the subject than *jus gentium* ("law of nations").

Zoug (Switzerland): *see* Zug.

Zouîrât, also spelled ZOUÉRATE, town, north-central Mauritania. It is the site of iron-mining operations, which account for a sizable portion of Mauritania's export earnings. It is connected by railway to the Atlantic port of Nouadhibou. Pop. (1988 prelim.) 25,892.

Zoysia, genus of creeping grasses of the family Poaceae, containing four or five perennial species native to southeastern Asia and New Zealand. They are excellent cover for flat, sandy, open areas.

Japanese, or Korean, lawn grass (*Z. japonica*), Manila grass (*Z. matrella*), and Mascarene grass (*Z. tenuifolia*) were introduced into North America as turf and lawn grasses because of their strong rhizomes (underground stems) and wiry leaves. The leaves are fineladed in both the Manila and Mascarene grasses.

Zrínyi, Miklós (b. Jan. 5, 1620, Csákvár, Hung.—d. Nov. 18, 1664, Csáktornya), statesman, military leader, and author of the first epic poem in Hungarian literature.

Born into an extremely wealthy aristocratic family, Zrínyi was educated by the Jesuits and became viceroy of Croatia in 1647. His chief concern was driving the Turks out of Hungary, and he spent his entire life fighting the conquerors, becoming the outstanding Hungarian military leader of his century. Zrínyi also opposed Habsburg rule and sought the unification of his dismembered country and the organization of a modern absolutist state. In 1664 he started an anti-Habsburg organization but was killed that same year by a wild boar.

Zrínyi's finest literary work, and one of the major works of Hungarian literature, is his epic *Szigeti Veszedelem* (1645–46; Eng. trans., "The Peril of Sziget," in *Hungarian Poetry,* 1955), which deals with the heroic defense of the fortress of Szigetvár (1566) against the armies of the sultan Süleyman II. The commander of the fortress, the central figure of the epic, was the poet's great-grandfather, who fell during the siege.

Zsigmond (Hungarian personal name): *see under* Sigismund.

Zsigmondy, Richard (b. April 1, 1865, Vienna, Austrian Empire—d. Sept. 23, 1929, Göttingen, Ger.), Austrian chemist who received the Nobel Prize for Chemistry in 1925 for research on colloids.

After receiving his doctorate from the University of Munich in 1889, Zsigmondy worked in research at Berlin and then joined the faculty of the University of Graz, Austria. From 1908 to 1929 he was director of the Institute for Inorganic Chemistry at the University of Göttingen.

While employed in a glassworks (1897) Zsigmondy directed his attention to colloidal gold, present in ruby glass, and discovered a water suspension of gold. He theorized that much could be learned about the colloidal state of matter from studying the manner in which the particles scatter light. To facilitate such study, he and Heinrich Siedentopf developed the ultramicroscope (1903), and Zsigmondy used it to investigate various aspects of colloids, including Brownian movement. His work proved particularly helpful in biochemistry and bacteriology.

Zsolna (Slovakia): *see* Žilina.

Zuara (Libya): *see* Zuwārah.

Zubatov, Sergey Vasilyevich (b. 1864, Moscow, Russia—d. March 15 [March 2, Old Style], 1917, Moscow), tsarist colonel of the Russian gendarmes known for his establishment of a system of surveillance to monitor the activities of revolutionary organizations.

Zubatov became an agent of the Moscow department of the Okhrana, the tsarist secret police that was a division of the Ministry of the Interior, sometime in the mid-1880s. From 1896 to 1902 he was the head of the Moscow Okhrana.

Between 1901 and 1903 Zubatov established the legal progovernment workers' organizations that were later given his name. His tactic is now referred to as Zubatovism, or Zubatovshchina. The aim of these organizations was to divert workers from social agitation by drawing them into organizations making purely economic demands for reform and operating under the secret surveillance of the police. The first of these societies was the Society of Mutual Aid of Workers in Mechanical Production, created in 1901 in Moscow and followed in the same year by the Jewish Independent Workers Party in Minsk and Vilna. The rhetoric of their organizers caused the radical press to brand the movement "police socialism." On Feb. 19, 1902, these organizations held a mass demonstration at the monument to Alexander II.

As Zubatov's organizations attracted more workers, they became more difficult to control. After a series of demonstrations degenerated into the general strike of 1903, the organizations were liquidated, and Zubatov, who had also been involved in unsuccessful intrigues against the interior minister, was relieved of his duties and banished to Vladimir.

His banishment was rescinded the following year. During the revolution of 1917, fearing that he would be the victim of the revolutionaries, Zubatov shot himself.

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Zubayr, Az-, town, southeastern Iraq. Located just southeast of Lake al-Ḥammār at the terminus of a railway line to Baghdad, it has long been important in trade with Saudi Arabia and Kuwait to the south. Before the founding of Baghdad in 762, Basra, Kufa, and Wasit were the largest and most important towns in Iraq. The town stands on the original 7th-century site of Basra, now located 8 miles (13 km) to the northeast. At Az-Zubayr can still be seen the remains of the mosque dedicated to the memory of Ẓubayr, one of the companions of Muḥammad, who was killed in the Battle of the Camels (658), fought outside the town walls. Over the centuries the city of Basra moved progressively eastward in its search for water, each time abandoning the western quarters, until the city reached its present site. An oil field has been developed at Az-Zubayr since 1949.

Zubiri, Xavier, in full JOSÉ XAVIER ZUBIRI APALATEGUI (b. Dec. 4, 1898, San Sebastián, Spain—d. Dec. 21, 1983, Madrid), Spanish Christian Existential philosopher who was known for his analysis of reality in terms of the interrelations of philosophy, science, and religion.

Zubiri studied theology in Rome, philosophy in Madrid (under José Ortega y Gasset) and in Freiburg, Ger., and physics and biology at the University of Louvain, Belg. Influenced by Roman Catholic philosophy and positive science, he created a "religation theory" of reality whereby an individual's relation to God and his sense of self were based on fulfillment of tasks obligatory upon entering the world. He was described as the shaper of Spanish philosophy from 1940 to 1980.

After teaching history of philosophy at the universities in Madrid (1926–36) and Barcelona (1940–42), with a hiatus during the Spanish Civil War, he gained recognition as a private tutor and author. His works include *Ensayo de una teoria fenomenológica del juicio* (1923; "Essay on a Phenomenological

Theory of Judgment"), *Naturaleza, historia, Dios* (1944; "Nature, History, God"), *Sobre la esencia* (1962; "On Essence"), and *Cinco lecciones de filosofía* (1963; "Five Lessons of Philosophy"). Later works included the trilogy *Inteligencia sentiente* (1980; "Sentient Intelligence"), *Inteligencia y logos* (1982; "Intelligence and Logos"), and *Inteligencia y razón* (1983; "Intelligence and Reason").

Zuccarelli, Francesco, Zuccarelli also spelled ZUCCHERELLI (b. Aug. 15, 1702, Pitigliano, Tuscany—d. Dec. 30, 1788, Florence), Italian Rococo painter who influenced 18th-century English landscape painting.

Zuccarelli apparently began his artistic training very early with Paolo Anesi and later worked in Rome with Giorgio Morandi and his pupil Pietro Nelli. After returning briefly to Florence, he moved to Venice in about 1732 and became associated with the Venetian school.

The facile technique, atmospheric light, and classical pastoral character that typify his picturesque Arcadian landscapes were especially appealing to the English. Zuccarelli visited England twice: at the end of 1752, remaining for 10 years with great success at painting landscapes, and again from 1765 to 1771. He was a founding member of the Royal Academy (1768), and he became one of George III's favourite painters. Zuccarelli had been elected to the Venetian Academy in 1763 and became its president in 1772. In addition to doing much work at Bergamo, he was for a time in Paris, and in the last two years of his life he returned to Rome and afterward to his native Tuscany. In addition to landscape paintings, Zuccarelli executed innumerable drawings, a few religious paintings, engravings, and tapestry designs.



Palazzo Zuccari (now the Biblioteca Hertziana), Rome, by Federico Zuccari, 1593
Photo SASKIA, North Amherst, Mass.



"Landscape with Figures," by Francesco Zuccarelli; in the Museo Poldi Pezzoli, Milan
By courtesy of the Museo Poldi Pezzoli, Milan; photograph, SCALA—Art Resource/EB Inc

Zuccari, Federico, Zuccari also spelled ZUCCARO, or ZUCCHERI (b. *c.* 1540, Sant'Angelo in Vado, Duchy of Urbino—d. July 20, 1609, Ancona), Italian painter and art theorist who became the central figure of the Roman Mannerist school and, after the death of Titian, possibly the best known painter in Europe.

Until 1561 Zuccari was the helper and pupil of his older brother, the painter Taddeo Zuccari. In 1565 Federico worked in Florence under the painter, architect, and biographer Giorgio Vasari and codified the theory of Mannerism in *L'idea de' scultori, pittori e architetti* (1607; "The Idea of Sculptors, Painters, and Architects") and in a series of frescoes in his own house in Rome (Palazzo Zuccari). In 1593 he became the first president of the Academy of St. Luke in Rome, which is to some extent the parent body of modern art academies. He completed some of Taddeo's work at Caprarola and travelled through France and the Netherlands in 1574.

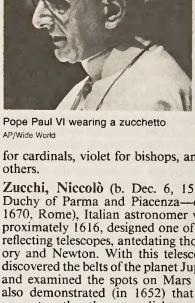
In England in 1575 Zuccari painted portraits of Queen Elizabeth I and the Earl of Leicester (and probably no one else—the hundreds of portraits in England that bear his name are ascribed without foundation). Later commissions were the painting of the dome of Florence cathedral (1575–79), a large work in the Palazzo Ducale at Venice in 1582, and much work for El Escorial in Spain (1585–88). His late paintings are much quieter and less mannered in style, and he lived to see Mannerism become extinct.

Zuccari, Taddeo, Zuccari also spelled ZUCCARO, or ZUCCHERI (b. Sept. 1, 1529, Sant'Angelo in Vado, Duchy of Urbino—d. Sept. 1/2, 1566, Rome), Italian painter, leader (with his brother Federico Zuccari) of the Roman Mannerist school of painting.

Largely self-trained at Rome, from the early 1550s he executed many decorative frescoes for facades and interiors of palaces and a few religious works.

From 1559 until his death he was in charge of his greatest commission, the frescoes and stucco decorations of the Villa dei Farnese at Caprarola, Italy, among the most splendidly ornamented rooms of their time.

zucchetto, small silk skullcap worn by Roman Catholic clergymen. Developed from the pileus (*q.v.*), a close-fitting, brimless hat commonly worn by the Romans, the zucchetto has probably been worn by ecclesiastics since the 13th century. It was worn under the mitre and biretta to preserve them and is still worn under these headcoverings at services. It is worn alone at other times. The colour depends on the wearer's rank: white for the pope, red for cardinals, violet for bishops, and black for others.



Pope Paul VI wearing a zucchetto
AP/Wide World

Zucchi, Niccolò (b. Dec. 6, 1586, Parma, Duchy of Parma and Piacenza—d. May 21, 1670, Rome), Italian astronomer who, in approximately 1616, designed one of the earliest reflecting telescopes, antedating those of Gregory and Newton. With this telescope Zucchi discovered the belts of the planet Jupiter (1630) and examined the spots on Mars (1640). He also demonstrated (in 1652) that phosphors generate rather than store light.

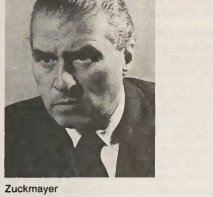
Zuckerman, Itzhak, also spelled YIZHAK CUKIERMAN, byname ANTEK (b. 1915, Warsaw—d. June 17, 1981, Tel Aviv, Israel), hero of Jewish resistance to the Nazis in World War II, and one of the few survivors of the Warsaw Ghetto Uprising (*q.v.*).

Zuckerman was active in a federation of young Zionist organizations, Hehalutz, and had early favoured the idea of armed resistance to Nazi depredations against the Jews. He was quick to interpret the first mass executions of Jews as the beginning of a systematic program of annihilation. Zuckerman represented Hehalutz at a meeting of Zionist groups convened in March 1942 and urged the creation and arming of a defense organization. Others feared resistance would provoke the Nazis to greater violence. But on July 28, soon after the first daily trainload of 5,000 Jews had left the Warsaw Ghetto to be gassed at Treblinka, his views were accepted, and the Jewish Defense Organization (Żydowska Organizacja Bojowa; ŻOB) was created under the leadership of Mordecai Anielewicz (*q.v.*). Zuckerman became one of his three co-commanders and was also involved in the leadership of a political arm founded at the same time, the Jewish National Committee (Żydowski Komitet Narodowy; ŻKN). Zuckerman had numerous contacts in the various underground groups on the "Aryan side," *i.e.*, outside the Ghetto, and it was he who negotiated the gift and black market purchase of the pistols and grenades and a few rifles that the ŻOB obtained. These, along with messages, he smuggled into the Ghetto through the Warsaw sewers. When the Warsaw Ghetto Uprising broke out he was on

the "Aryan side" and did what he could to get word of the plight of the Ghetto's remaining Jews to the Polish underground and to Poles and Jews abroad. He also smuggled in to the ŻOB such additional guns and grenades as could be found. After 20 days of battle, Anielewicz and his companions died when the Nazis overcame their command bunker, and Zuckerman returned to the Ghetto to take command. Before the end of the 28-day battle he led some 75 ŻOB fighters, including his future wife, Zivia Lubetkin, through the sewers and into underground havens on the "Aryan side."

Zuckerman continued to lead a Jewish band of guerrillas in the Polish underground and to alert Jewish leaders elsewhere to the situation of Jews inside Nazi Europe. At war's end he took part in organizing underground transportation for Jewish refugees from Europe to Palestine; he and Zivia settled there in 1947. They, with others, were founders of the kibbutz Lohamei Hageta'ot (Hebrew: The Ghetto Fighters) north of Haifa, where a memorial museum, Ghetto Fighters' House, was established. Zuckerman and his wife were prosecution witnesses in the 1961 trial of Adolf Eichmann.

Zuckmayer, Carl (b. Dec. 27, 1896, Nackenheim, Ger.—d. Jan. 18, 1977, Visp, Switz.), German playwright whose works deal critically with many of the contemporary problems engendered by two world wars.



Zuckmayer
Bavaria-Verlag

Zuckmayer served for four years in the German Army in World War I and thereafter devoted himself to writing. In spite of his association in 1924 with the avant-garde playwright Bertolt Brecht and the innovative director Max Reinhardt, he remained faithful to the techniques of Naturalism.

His first notable dramatic success was the earthy comedy *Der fröhliche Weinberg* (1925; "The Happy Vineyard"), for which he received the Kleist Prize. *Der Hauptmann von Köpenick* (1931; *The Captain of Köpenick*, 1932), one of his most highly regarded works, is a satire on Prussian militarism. In 1933 political pressure forced him to emigrate to Austria, where he wrote *Der Schelm von Bergen* (1934; "The Villain of Bergen").

He fled to the United States in 1939 and became a citizen. There he wrote one of his best known dramas, *Des Teufels General* (1946; *The Devil's General*, 1962). With this play, which dramatizes the plight of men torn between loyalty to country and the demands of conscience, Zuckmayer's dramatic career entered a new phase. The zestful, life-affirming spirit of his earlier works was thereafter tempered with critical moral evaluation. In this spirit he wrote *Barbara Blomberg* (1949). *Der Gesang im Feuerofen* (1950; "The Song in the Fiery Furnace"), and *Das kalte Licht* (1955; "The Cold Light"), based on the treason case of the atomic scientist Klaus Fuchs.

Zuckmayer took up residence in Switzerland in 1946. In 1952 his collected works received the Goethe Prize. Zuckmayer's faith in human nature was never totally shaken, and his plays, though often critical, do not have the apocalyptic tone of those by many of his German contemporaries.

Among his other works are essays, dramatic adaptations (as of Maxwell Anderson's *What Price Glory?*), motion-picture scenarios (as for *The Blue Angel*, 1930), novels (as *Salwäre; oder, die Magdalena von Bozen*, 1936; *The Moons Ride Over*, 1937), and two autobiographical works, *Second Wind* (1940; only the English version published) and *Als wär's ein Stück von mir* (1966; abridged English version, *A Part of Myself*, 1970). His collected works, in four volumes, were published in 1961.

Ẓufār (Oman): *see* Dhofar.

Zug (German), French ZOUG, smallest undivided canton of Switzerland, with an area of 92 sq mi (239 sq km), of which 12 sq mi are occupied by Lakes Zug and Ageri. Bounded by the cantons of Luzern and Aargau on the west, Zürich on the north, and Schwyz on the east and south, Zug lies on the hilly central Swiss Plateau, rising to the Hohe Rone mass (3,953 ft [1,205 m]) near the eastern boundary and to the Zugerberg ridge (3,409 ft) of the Rossberg mass in the south between the lakes. Its principal drainage is afforded by the Lorze River, which flows northward from its source in Schwyz through Lake Ageri to the lowland at the northern end of the Zugerberg, around the foot of which it curves to enter Lake Zug. It leaves the lake slightly west of its point of entrance and flows north-northwest over fertile lowlands to join the Reuss, which forms the northwestern boundary of the canton.

Historically, the canton consists of the lands acquired and ruled by its capital, the town of Zug (*q.v.*), until 1798. Near the southeastern corner of Lake Ageri is Morgarten, the scene of the great victory of the Swiss Confederation (Schwyz and some confederates from Uri) over the Habsburgs in 1315. In 1798 Zug's inhabitants opposed the French Revolutionary forces, and it formed one of the districts of the huge canton of Waldstätten in the Helvetic Republic until 1803, when it became a separate canton again. As one of the six Catholic cantons, it joined the Sonderbund (separatist Catholic league) in 1845 and took part in the Sonderbund War in 1847. In 1848 and 1874 it voted against the proposed federal constitutions, which were both adopted. Its present cantonal constitution dates from 1894.

The economy is largely agricultural, fruit growing being particularly important. Industry includes the manufacture of metal goods, textiles, and alcoholic beverages. The population is German speaking and mainly Roman Catholic. Pop. (1983 est.) 77,234.

Zug (German), French ZOUG, capital of Zug canton, north central Switzerland, on the northeastern shore of Lake Zug (Zugersee), at the foot of the Zugerberg (3,409 ft [1,039 m]), just south of Zürich. First mentioned in 1242 as a possession of the counts of Kyburg, it was purchased by Rudolf IV of Habsburg (later Rudolf I of Germany) in 1273. It entered the Swiss Confederation in 1352, and after several turbulent decades the Habsburgs renounced all claims to the town. Zug joined the league of Swabian cities against Leopold of Habsburg and shared in the victory at Sempach in 1386. At the time of the Reformation, it remained Roman Catholic and became a member of the Golden, or Borromean, League in 1586. In the 14th and 15th centuries it acquired various districts in its neighbourhood, which it ruled as subject lands until 1798. Historic landmarks include the Zytturm, or Clock Tower (1480), the town hall (1505), St. Oswald's Church (1478–1545), and the Capuchin monastery (1597). An important cattle market, Zug manufactures metal goods, electrical apparatus, and textiles. The population is German speaking and mainly Roman Catholic. Pop. (1983 est.) 21,369.

Zugspitze, mountain, southern Germany, the highest point (9,718 ft [2,962 m]) in the country. Zugspitze is part of the Wettersteingebirge in the Bavarian Alps, lying on the Austrian border. The mountain is approached on the



Eastern summit of the Zugspitze, Germany
Hans Huber

west by an aerial tramway (built 1924–26) from the village of Eibsee, and on the northeast by a railway from the town of Garmisch-Partenkirchen, both in Germany. The peak is noted for its scenic beauty and for its winter (skiing) and summer (climbing) activities. There is a meteorological observatory on the mountain.

Zuhayr (ibn Abī Sulmā Rabī'ah ibn Riyāḥ al-Muzanī) (b. *c.* 520—d. *c.* 609, Najd region, Arabia), one of the greatest of the Arab poets of pre-Islāmic times, best known for his long ode in the *Mu'allaqāt* collection.

Zuhayr was from the Muzaynah tribe but lived among the Ghaṭafān. Zuhayr's father was a poet, his first wife the sister of a poet, and two of his sons were poets. The elder son, Ka'b, is famous for the poem he recited for the Prophet Muḥammad, thereby signalling his acceptance of Islām. Zuhayr's poem in *al-Mu'allaqāt* (*see* Mu'allaqāt, al-) praises the men who brought peace between the clans of 'Abs and Dhubyān. In the poem, war is compared to a millstone that grinds those who set it moving, and the poet speaks as one who has learned from a long life mankind's need for morality. Zuhayr's extant poetry, available in several Arabic editions, includes other poems of praise and satires.

zuhd (Arabic: "detachment"), in Islām, asceticism. Even though a Muslim is permitted to enjoy fully whatever unforbidden pleasure God bestows on him, Islām nevertheless encourages and praises those who shun luxury in favour of a simple and pious life. The Qur'ān (Islāmic scripture) is full of verses that remind believers that life is fleeting and the hereafter everlasting. It also holds in great esteem those "servants of God who pass the night prostrating themselves in the worship of their Lord" (25:63–65). There are students of Islām, however, who maintain that *zuhd* was influenced directly by the Christian hermits, with whom early Muslims had some familiarity. Some scholars also point to the pre-Islāmic Arab *ḥanīf*s, who practiced the ascetic life and who may have had considerable influence on the Prophet Muḥammad. The Prophet himself spent long periods in solitary vigil, fasting and praying, even before his prophetic mission.

Zuhd developed in Islām as a result of the Muslim conquests, which brought with them material wealth and widespread indulgence in luxurious living. Religious Muslims reacted to this by calling for a return to the way of life of the Prophet and his pious Companions. The growth of the Islāmic state had also brought with it bitter political disputes that pitted Muslim against Muslim in fierce struggles for

power. The resulting bloodshed spurred men of religion to denounce such actions and to seek peace of mind in abstinence from all that distracts from the worship of God.

The terms *zuhd* and *zāhid* ("ascetic") were not used by pre-Islāmic Arabs or by early Muslims to describe the elaborate and systematic ascetic doctrines that became characteristic of later periods, from the 8th century on. Among the earliest *zāhid*s was al-Ḥasan al-Baṣrī (d. 728), whose sayings remained for a long time the chief guide of the ascetics. But it was not until after his death that *zuhd* became a significant and forceful movement in the religious and political life of the Muslim community. Many scholars have referred to Ibrāhīm ibn Adham and to his student and disciple Shaqīq al-Balkhī (d. 810) as the real founders of *zuhd,* as it became known in later periods. Ibn Adham stressed poverty and self-denial; indeed, he abandoned the wealth of his father and became a poor wanderer.

Because of the close ties among these pietists, the *zāhid*s are often regarded as being identical with the early Ṣūfīs, whose name, "wool-wearers," points to the ascetic practice of wearing hair shirts. Later Ṣūfīs, however, dismiss the *zāhid*s as men who worship God not out of love but for fear of hell or expectation of paradise.

Zuiderzee, English SOUTHERN SEA, former inlet of the North Sea. From the 13th to the 20th century, the Zuiderzee penetrated The Netherlands and occupied some 2,000 square miles (5,000 square km); it was separated from the North Sea by an arc of former sandflats that are now the West Frisian Islands. From about AD 400 these low-lying sandflats were inhabited by the Frisians, who in the face of rising sea levels built the first seaworks—dikes and *terpen* (or *werden*), mounds to which they retreated during periods of high water. The volume of these *terpen* ranks them among the great engineering works of humankind.

The territory that subsequently became the Zuiderzee was in the 1st century AD a mixture of lowland and freshwater lakes, including the central and largest of the lakes, called Flevo Lacus by the Romans. These lakes did not connect directly with the sea but emptied by way of a branch of the Rhine River. Later, however, during a period of rising sea level (AD 250–600), the river and the central lake were enlarged. A period of lower sea levels followed, but in the 13th century, notably during 1219 and 1282, further flooding submerged wide areas and created the Zuiderzee proper.

By about AD 1000, however, the *terpen* area had been completely enclosed by dikes. The controlling of water levels within the dikes developed into the practice of reclaiming tracts of lowland from a body of water (*see* polder). By 1667 the making of polders had developed to the point that the damming of the Zuiderzee was proposed. A feasible method, however, was not forthcoming until the flood of 1916 hastened the adoption of a plan developed by Cornelis Lely. In 1927–32 a dam 19 miles (30 km) long, known as the Afsluitdijk ("Enclosing Dam"), was built across the Zuiderzee, separating it into the outer Waddenzee (open to the North Sea) and the inner IJsselmeer (Lake IJssel). By the early 1980s four polders, largely agricultural land, had been created through an elaborately constructed system of pumping stations, dikes, sluices, and locks. Nearly half the IJsselmeer of the 1920s (626 square miles [1,620 square km] of a total 1,328 square miles [3,440 square km]) has been reclaimed and the much-reduced IJsselmeer has gradually become fresh water. *See also* IJsselmeer Polders.

Zuid-Holland, also spelled ZUIDHOLLAND, English SOUTH HOLLAND, *provincie,* western



Windmills along a canal in the province of Zuid-Holland, Neth.
Eric Carle—Shostal

Netherlands, bordering the North Sea and adjoining the *provincies* of Noord-Holland (north), Utrecht and Gelderland (east), and Noord-Brabant and Zeeland (south). Drained by the ramifications of the Lek, Waal, and Maas (Meuse) rivers, Zuid-Holland includes the islands of Dordrecht, IJsselmonde, Hoeksche Waard, Voorne-Putten, and Goeree-Overflakkee. It formed part of the historical county and province of Holland, which was divided officially in 1840 into the provinces of Noord-Holland and Zuid-Holland.

The coastal strip of beaches and dunes is used predominantly for recreational, resort, and residential purposes. On the lee side of the dunes are situated the old towns of Leiden, Delft, and The Hague, the last the capital of the province and the seat of government of the country. The sandy alluvial soil of the coast, called *geest,* is mostly devoted to horticulture, notably flowering bulbs in the Bulbland north of Leiden, vegetables and flowers in the Rijnsburg area to the northwest, and fruit and vegetables (especially tomatoes, cucumbers, and lettuce) in the Westland south of The Hague. Farther inland is a region of peat and fertile alluvial clay; agriculture is carried on in the reclaimed lakes (polders) and dairy farming on the older soils, with cheese making in the eastern districts. Gouda is the service centre for this region. The Delta Project (*q.v.*) provided for the channels between the delta islands to be dammed against the sea and for roads linking the islands to be built on the dams. Arable farming predominates on the marine clay soils of the delta islands.

By far the most important part of the province economically is the port and industrial area of Rotterdam, which extends along the New Meuse (Nieuwe Maas) River and connects to its outport, Europoort, via the New Waterway. Area 1,108 square miles (2,871 square km). Pop. (1994 est.) 3,313,193.

Zukerman, Pinchas (b. July 16, 1948, Tel Aviv, Israel), Israeli-American violinist, violist, and conductor.

Zukerman began playing at about the age of seven; when he was eight he entered the Tel Aviv Academy of Music. In 1962, sponsored by violinist Isaac Stern, he went to New York City to study at the Juilliard School, remaining there until 1967. Thereafter he appeared as a soloist throughout North America, and after his New York debut in 1969 he toured frequently in Europe. Among his recordings are the complete Beethoven violin sonatas (with Daniel Barenboim) and piano trios (with Barenboim and Jacqueline du Pré). A close friend of violinist Itzhak Perlman, Zukerman (playing the viola) frequently performed with him. He began conducting chamber music in 1974. He was musical director of the St. Paul Chamber Orchestra in Minnesota from 1980 to 1987.

Zukor, Adolph (b. Jan. 7, 1873, Ricse, Hung.—d. June 10, 1976, Los Angeles, Calif., U.S.), American entrepreneur who built the powerful Famous Players–Paramount motion-picture studio.

Immigrating to the United States at age 15, Zukor entered the penny-arcade business in 1903. Between 1904 and 1912 he and his partner Marcus Loew controlled a chain of theatres; in 1912 he left Loew, bought the American rights to the British-French motion picture *La Reine Elisabeth* (*Queen Elizabeth,* or *Queen Beth*) starring Sarah Bernhardt, and made a fortune as the film's exclusive distributor. Zukor then devised the idea of making films featuring Broadway stage actors in their current successes. He formed Famous Players with the slogan "Famous Players in Famous Plays" and made *The Count of Monte Cristo* and *The Prisoner of Zenda.* He later hired Mary Pickford to act in motion pictures in Hollywood.

In 1916 Zukor merged Famous Players with Jesse L. Lasky's Feature Play Company; Zukor became president and, in 1917, head of Paramount, which was Famous Players–Lasky's distribution company. In 1935 he became chairman of the board of Paramount Pictures, a figurehead position but one he retained (emeritus) until his death at the age of 103.

Zukor was one of the first to recognize the potential of the star system and to pay his screen actors large salaries. The other key to his success was the huge number of movie theatres he controlled, which showed the films produced by the studio. His autobiography is *The Public Is Never Wrong* (1953).

Zulia, *estado* ("state"), northwestern Venezuela. Zulia is bounded north by the Gulf of Venezuela and west by Colombia. Except for two narrow corridors on the southeastern shore, the largest one lying between the states of Mérida and Trujillo, it surrounds Lake Maracaibo. The state is composed mainly of lowlands, hot and humid in the south and hot and arid in the north. The land rises in the west into the Sierra de Perijá and in the southeast into the Mérida Range. Formerly one of Venezuela's poorer states, dependent upon limited agricultural resources, Zulia was radically changed economically after the discovery of oil in 1917 and especially after World War II. The petroleum industry at Lake Maracaibo is located in one of the richest oil-producing regions of the world; it produces as much as two-thirds of Venezuela's oil. Refineries, pipelines, and thousands of oil derricks dot the landscape, and the population has increased greatly. The largest of the lakeside cities is the state capital, Maracaibo (*q.v.*), the second largest city of Venezuela. Transportation to the oil centres is excellent. Area 24,400 square miles (63,100 square km). Pop. (1995 est.) 2,752,431.

Zulu, a nation of Nguni-speaking people in KwaZulu/Natal province, South Africa. They are a branch of the southern Bantu and have close ethnic, linguistic, and cultural ties with the Swazi and Xhosa. The Zulu are the single largest black ethnic group in South Africa and numbered about 9 million in the late 20th century.

Traditionally grain farmers, they also kept large herds of cattle on the lightly wooded grasslands, replenishing their herds mainly by raiding their neighbours. European settlers wrested grazing and water resources from the Zulu in prolonged warfare during the 19th century, and, with much of their wealth lost, modern Zulu depend largely on wage labour on farms owned by whites or work in the cities of South Africa.

Before they joined with the neighbouring Natal Nguni (*see* Nguni) under their leader Shaka in the early 19th century to form a Zulu empire, the Zulu were only one of many



Zulu chief of KwaZulu/Natal, South Africa
Authenticated News International

Nguni clans; Shaka gave the clan name to the new nation. Such clans continue to be a basic unit of Zulu social organization; they comprise several patrilineal households, each with rights in its own fields and herds and under the domestic authority of its senior man. Paternal authority is so strong that the Zulu may be called patriarchal. Polygyny is practiced; a man's wives are ranked by strict seniority under the "great wife," the mother of his heir. The levirate (compulsory marriage of a widow to her dead husband's brother) is also practiced.

The genealogically senior man of each clan is its chief, traditionally its leader in war and its judge in peace. Headmen (*induna*), usually close kin of the chief, continue to have charge of sections of the clan. This clan system was adopted nationwide under the Zulu king, to whom most clan chiefs are related in one way or another. When the Zulu nation was formed, many chiefs were married to women of royal clan or were royal kinsmen installed to replace dissident clan heads. The king relied on confidential advisers, and chiefs and subchiefs formed a council to advise him on administrative and judicial matters.

Boys in this highly organized military society were initiated at adolescence in groups called age sets. Each age set constituted a unit of the Zulu army and was stationed away from home at royal barracks under direct control of the king. Formed into regiments (*impi*), these men could marry only when the king gave permission to the age set as a whole.

Traditional Zulu religion was based on ancestor worship and on beliefs in a creator god, witches, and sorcerers. The king was responsible for all national magic and rainmaking; rites performed by the king on behalf of the entire nation (at planting season, in war, drought, or famine) centred on the ancestors of the royal line. Modern Zulu Christianity has been marked by the growth of independent or separatist churches under prophets, some of great wealth and influence.

The power and importance of the king, chiefs, and military system have declined substantially, and many of the young men leave KwaZulu/Natal to seek work elsewhere in South Africa. Knowledge of and strong pride in traditional culture and history are, however, almost universal among contemporary Zulu.

Zulu language, a Bantu language spoken in South Africa, especially in the Zululand area of KwaZulu/Natal province. Zulu is a member of the Southeastern, or Nguni, subgroup of the Bantu group of the Benue-Congo branch of the Niger-Congo languages. Other languages of the Southeastern Bantu group are Xhosa, Swazi, Sotho (Basuto), Tswana (Bechuana), Venda, and Ndebele. Zulu and Xhosa are similar enough to be considered dialects of one language, but speakers of Zulu and Xhosa consider them to be separate languages.

Zulu has borrowed many words from other languages, especially from Afrikaans and English. Its sound system contains three types of click sounds probably borrowed from speakers of Khoisan languages. Most words in Zulu end in a vowel.

Zulu War (1879), decisive six-month war in eastern South Africa, resulting in British victory over the Zulus. Before the war the Tugela River formed the boundary between Zululand and the British colony of Natal. Cetshwayo (*q.v.*) became king of the Zulus in the early 1870s. Unwilling to submit to British hegemony, he assembled a well-disciplined army of 40,000 to 60,000 men. Late in 1878 he received an ultimatum from Natal to disband his army and pay reparations for alleged insults. When he did not respond, British troops invaded under the leadership of Lord Chelmsford. Although the January 1879 rains impeded travel and the tall grasses of Zululand blocked their view, the invaders advanced into Zululand without taking normal precautions (such as scouts and sentries). The Zulu army attacked and annihilated the central British column at Isandhlwana, killing 800 British soldiers and taking nearly 1,000 rifles, with ammunition.

Later, British reinforcements arrived and Cetshwayo fled. The British advantage met a setback in April with the unsolicited arrival of a French prince, Napoleon III's son, in search of adventure. He joined a British expedition, underestimated the enemy, and was killed in a surprise attack in May. His death was an embarrassment for the British, who had been unable to protect him. Their victories continued, nevertheless. In July Cetshwayo was decisively defeated at Ulundi. Zululand then came under informal British control. It was annexed to Natal in 1887.

Zululand, historical region in the northeast section of present KwaZulu/Natal (formerly Natal) province, South Africa, and the home of the Zulu (*q.v.*) people.

The Zulu belonged to the Mtetwa empire, under its leader Dingiswayo (reigned 1809–17). On Dingiswayo's death the Zulu leader Shaka (reigned 1816–28) established his people's dominance over their neighbours and, using a well-disciplined and efficient fighting force, conquered most of what is now KwaZulu/Natal. During the reign of Shaka's successor, Dingane, the Zulu empire was penetrated by the Boers, who formed an alliance with Dingane's brother, Mpande, and deposed Dingane in 1840. The state survived, but under King Mpande (1840–72) portions of Zulu territory were taken over by the Boers and by the British, who moved into Natal in 1838 and annexed it in 1843. War broke out when Mpande's successor, Cetshwayo, refused to disband the Zulu army and to place himself under British control in 1878. Despite stiff resistance, the British defeated the poorly armed Zulu in July 1879, occupied the remainder of their country, and divided Zululand into 13 small kingdoms.

Zululand was made a British crown colony in 1887 under the Native Law of Natal, and rebellions were put down in 1888 and 1906. By the Natal Native Code of 1894, two-thirds of the Zulu's land was confiscated, and they were confined to native reserves. The incorporation of Zululand into Natal in 1897 ended its separate existence. Under the apartheid system, a Bantu Homeland (later called a black state) named KwaZulu was established for the Zulu in the 1970s and was composed of discrete areas of the historical Zululand. With the abolition of the apartheid system, KwaZulu in 1994 was reincorporated into Natal province, which was renamed KwaZulu/Natal.

Zumalacárregui y de Imaz, Tomás de (b. Dec. 29, 1788, Ormáiztegui, Spain—d. June 24, 1835, Cegama), Spanish military tactician and the most brilliant soldier to fight for Don Carlos, a Bourbon traditionalist contender for the Spanish throne, in the First Carlist War (1833–39).

Zumalacárregui abandoned his legal studies in 1808 to fight against the French in the Spanish War of Independence, in which he rose to the rank of captain. His royalist sympathies and deep religious convictions, however, made him unpopular and blocked his promotion until after 1823, when he was made a colonel and military governor of El Ferrol del Caudillo.

Zumalacárregui joined the Carlists in December 1833. An energetic organizer, he undertook the unification and disciplining of a Carlist army in Navarre and the Basque Provinces (in northern Spain). He then embarked upon a victorious military campaign marked by brutality on both sides. At the height of his success, Zumalacárregui was ordered, against his better judgment, to besiege the northern seaport of Bilbao, where incompetent medical attention for a minor wound led to his death.

Zumpe, Johann Christoph (b. 1735, Saxony?—d. 1800, Germany), German pianoforte maker and builder of the earliest known British piano (1766).

Zumpe was an apprentice of the renowned German instrument builder Gottfried Silbermann. Migrating to England in the 1730s, he worked for the Swiss-born harpsichord builder Burkat Shudi (Burkhardt Tschudi) before beginning independent work by 1761.

Zumpe made mostly square pianos with a "single action," a simple mechanism well suited to domestic instruments and later widely used by other builders. The quality and economy of Zumpe's pianos earned him a fortune; he had several partners, and, when he returned to Germany in 1784, he left a flourishing business to his successors, Schoene and Company. A Zumpe piano was played by Johann Christian Bach when he performed the first piano solo ever heard in an English concert in London in 1768. Zumpe also engaged in making citterns (guitarlike instruments) and built at least one claviorganum, a combination piano and pipe organ.

zun (Chinese vessel): *see* tsun.

Zuni, also spelled ZUÑI, North American Indian pueblo in west-central New Mexico, on the Arizona border (*see* Pueblo Indians). The Zuni speak a language related to Penutian. Their origin and early history are unknown; their mythology pictures their ancestors as emerging from underground and wandering to their present location. When they were first encountered by whites, the Spaniards in the 16th century, they were living in Hawikuh and five or six other towns. Collectively these came to be called the Seven Cities of Cibola, which became the focus of the golden empire sought vainly by Francisco Coronado and other explorers. After the Spanish defeat of the Pueblo rebellion in the late 17th century, the Zuni were crowded into one multistoried masonry pueblo.

Thirteen matrilineal clans compose Zuni society, and the major officers are male. The principal male occupation is corn (maize) farming, though some men have become excellent silversmiths and turquoise workers. Basketry and pottery are the main crafts for women. Like other Pueblo Indians, the Zuni are generally peaceful and deeply religious, with a complex ceremonial organization. Men often wear masks and costumes to impersonate gods or spirits called kachinas (katcinas).

Although the Zuni have undergone substantial acculturation to modern American life, some of their traditional culture survives. In the late 20th century the population of Zuni Pueblo was more than 5,000.



"A Corner of Zuñi," photograph by Edward S. Curtis, 1903; from *The North American Indian*

Courtesy of the Newberry Library, Chicago, Ayer Collection

Zunyi (China): *see* Tsun-i.

Zunz, Leopold, Hebrew YOM-TOB LIPPMANN (b. Aug. 10, 1794, Detmold, Lippe [now in Germany]—d. March 18, 1886, Berlin, Ger.), German historian of Jewish literature who is often considered the greatest Jewish scholar of the 19th century. He began (1819) the movement called Wissenschaft des Judentums ("Science of Judaism"), which stressed the analysis of Jewish literature and culture with the tools of modern scholarship.

Zunz studied classics and history at Berlin University, although he took his doctorate at the University of Halle (1821). Much of his life afterward was a precarious struggle with poverty. He served as a lay preacher for a congregation and worked as a newspaper editor and later as a teacher and principal at the Jewish teachers seminary in Berlin (1840–50).

The Science of Judaism was initiated with his seminal work, *Etwas über die rabbinische Literatur* (1818; "On Rabbinic Literature"), which revealed to the interested public, for the first time, the scope and beauty of postbiblical Jewish literature. In 1819, with the noted jurist Eduard Gans and a merchant and mathematician, Moses Moser, Zunz founded the Verein für Kultur und Wissenschaft der Juden ("Society for Jewish Culture and Science"). He and his colleagues hoped that an analysis and exposition of the breadth and depth of Jewish history, literature, and culture would lead to general acceptance of the Jews. From 1822 to 1823, Zunz edited the Society's *Zeitschrift* (periodical), to which he contributed a classic biography of Rashi, the great medieval commentator on biblical and rabbinical texts. When the society disbanded in 1824, he continued its work alone.

Zunz's *Gottesdienstlichen Vorträge der Juden, historisch entwickelt* (1832; "The Worship Sermons of the Jews, Historically Developed") is a historical analysis of Jewish homiletical literature and its evolutionary development up to the modern-day sermon. His revelations of the cultural depth of Jewish civilization in the European Middle Ages refuted the views of those who held that Jewish culture and learning ended with the biblical period.

Zur Geschichte und Literatur (1845; "On History and Literature") was a wide-ranging work that placed the gamut of Jewish literary activity in the context of European literature and politics. Zunz wrote three important works on the liturgies of Judaism and served as editor in chief of a translation of the Bible (1838), for which he translated the Books of Chronicles. In his last years he wrote a series of essays on the Bible, collected in *Gesammelte Schriften,* 3 vol. (1875–76; "Collected Writings").

Zunzunegui, Juan Antonio de (b. Dec. 21, 1901, Portugalete, Spain—d. May 31, 1982, Madrid), Spanish novelist and short-story writer, noted for his detailed, realistic technique and social criticism of Bilbao and Madrid. A member of the Spanish Academy since 1957, Zunzunegui received the National Prize for Literature for *El premio* (1961; "The Prize"), which, ironically, was itself a satire on literary prizes in Spain.

The novels Zunzunegui produced between 1926 and 1950 generally centre on contemporary life in Bilbao—for example, *Chiripi* (1925) and *El chiplichandle* (1940), criticizing Spain's immoral social climate; *¡Ay . . . estos hijos!* (1943; "Oh, These Children!"), on family life in Bilbao; and two novels on Bilbao bankers entitled *La quiebra* (1947; "The Bankruptcy"); and *La úlcera* (1949; "The Ulcer"), a naturalistic novel whose characters are grotesquely deformed.

All of Zunzunegui's works offer a detailed portrait of contemporary Spanish life and often present marginal social characters. His language is generally direct and unadorned and his characterization lacking in depth. His narrative technique is in the traditional realistic style of the 19th century.

Beginning with *El supremo bien* (1951; "The Highest Good"), the setting of Zunzunegui's narratives is Madrid. This work traces a family over three generations. *La vida como es* (1954; "Life As It Is"), considered his best work, depicts Madrid's underworld and captures its argot and local colour.

Zunzunegui's other works include *Las ratas del barco* (1950; "The Ship Rats") and *El mundo sigue* (1960; "The World Continues") and reflect a fatalistic, pessimistic view of society. His *Obras completas* were in eight volumes by 1976.

Zuo Zhuan (ancient Chinese commentary): *see* Tso chuan.

Zuo Zongtang (Chinese official and general): *see* Tso Tsung-t'ang.

Zuppke, Bob, byname of ROBERT CARL ZUPPKE (b. July 2, 1879, Berlin, Ger.—d. Dec. 22, 1957, Champaign, Ill., U.S.), American college football coach, credited with introducing (in the early 1920s) the offensive huddle, enabling the team with the ball to plan each play immediately before executing it.

Emigrating to the United States with his family in 1881, Zuppke was reared in Milwaukee, Wis. After graduation from the University of Wisconsin, he coached in high school until 1913, when he became head football coach at the University of Illinois, Urbana. In 29 seasons his Illinois teams won 131 games, lost 81, and tied 12. Perhaps their greatest victories were upsets of supposedly invincible teams from the universities of Minnesota (1916) and Michigan (1939). Zuppke's 1927 team was named national champion, and his 1923 team was awarded the same honour, retrospectively, by the Helms Athletic Foundation.

Zurbarán, Francisco de (baptized Nov. 7, 1598, Fuente de Cantos, Spain—d. Aug. 27, 1664, Madrid), major painter of the Spanish Baroque, especially noted for religious subjects. His work is characterized by Caravaggesque naturalism and tenebrism, the latter a style in which most forms are depicted in shadow but a few are dramatically lighted.

Zurbarán was apprenticed 1614–16 to Pedro Díaz de Villanueva in Seville, where he spent the greater part of his life. No works by his master have survived, but Zurbarán's earliest known painting, an "Immaculate Conception" dated 1616, suggests that he was schooled in the same naturalistic style as his contemporary Diego Velázquez. From 1617 to 1628 he was living in Llerena, near his birthplace; then he returned to Seville, where he settled at the invitation of the city corporation. In 1634 he visited Madrid and painted a series of "Labours of Hercules" and two scenes of



"A Franciscan Monk," oil on canvas by Francisco de Zurbarán, 1630–32; in the St. Louis Art Museum

The St. Louis Art Museum

the "Defense of Cádiz," which formed part of the decoration of the Salón de Reinos in the Buen Retiro palace. The "Adoration of the Kings," from a series painted for the Carthusian monastery at Jerez, is signed with the title "Painter to the King" and dated 1638,

the year in which Zurbarán decorated a ceremonial ship presented to the king by the city of Seville. The paintings for the Buen Retiro are the only royal commissions and the only mythological or historical subjects by him that are known. His contact with the court had little effect on his artistic evolution. He remained throughout his life a provincial artist and was *par excellence* a painter of religious life. In 1658 Zurbarán moved to Madrid.

Zurbarán's personal style was already formed in Seville by 1629, and its development was probably stimulated by the early works of Velázquez and by the works of José de Ribera. It was a style that lent itself well to portraiture and still life, but it found its most characteristic expression in his religious subjects. Indeed Zurbarán uses naturalism more convincingly than other exponents for the expression of intense religious devotion. His apostles, saints, and monks are painted with almost sculptural modelling and with an emphasis on the minutiae of their dress that gives verisimilitude to their miracles, visions, and ecstasies. This distinctive combination of realism and religious sensibility conforms to the Counter-Reformation guidelines for artists outlined by the Council of Trent (1545–63). Zurbarán's art was popular with monastic orders in Seville and the neighbouring provinces, and he received commissions for many large cycles. Of these, only the legends of St. Jerome and of the Hieronymite monks (1638–39) that decorate the chapel and sacristy of the Hieronymite monastery at Guadalupe have remained *in situ*. Little is known of his production in the 1640s apart from an altarpiece at Zafra (1643–44) and records of a large number of paintings destined for Lima, Peru (1647). By 1658 both the style and the content of Zurbarán's paintings had undergone a change that can be attributed to the influence of Bartolomé Esteban Murillo. In his late devotional pictures, such as "Holy Family" and "Immaculate Conception" (1659 and 1661, respectively; Museum of Fine Arts, Budapest), the figures have become more idealized and less solid in form, and their expression of religious emotion is marred by sentimentality. Zubarán had several followers whose works have been confused with his.

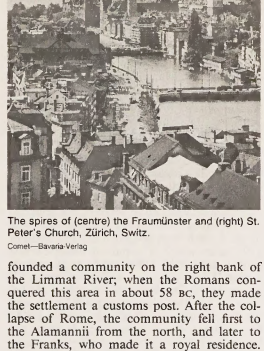
Zürich, canton, northeastern Switzerland, with an area of 668 sq mi (1,729 sq km), of which about 80 percent is reckoned as productive, including about 195 sq mi of forests. Of the rest, 28 sq mi are occupied by lakes, chiefly Greifen and Pfäffikon and part of Lake Zürich. The terrain consists of shallow river valleys draining northward toward the Rhine and separated by ridges trending northwest to southeast. The most important valley is that of the Linth, which expands into Lake Zürich and is continued as the Limmat. East of the lake, separated by successively higher ridges, are the valleys of the Glatt, which flows through the lake called Greifensee, and the more gorgelike Töss, separated from the Toggenburg (valley) by a ridge along the east boundary that reaches 3,717 ft (1,133 m) at the Hörnli. West of the lake is the valley of the Sihl, bounded farther west by the Albis Range, with Albishorn (3,002 ft) as its highest point.

Historically, the canton represents the territories acquired up to 1803 by its capital, Zürich, which officially ranks as the first to join the Swiss Confederation in 1351. The whole of the lower part of Lake Zürich was added in 1362, and the canton reached the Rhine after the purchase of Winterthur from the Habsburgs in 1467. It now extends from its enclave on the right bank of the Rhine in the German state of Baden-Württemberg to about 8 mi (13 km) south of the Pfäffikon See. The present cantonal constitution dates from 1869.

Although the land is highly cultivated, the canton is essentially a manufacturing area, noted especially for machinery and railway rolling stock; about one-third of the nation's total machine production is situated in the canton. Silk and cotton weaving are widespread. Zürich and Winterthur are the principal centres, while Uster, east of the Greifensee, and Thalwil, Horgen, and Wädenswil, on the western shore of Lake Zürich, are all industrial towns. Railways run through the valleys, and standard lines and mountain railways radiate in all directions from the city of Zürich. The Limmat Valley (Zürich to Baden) carried the first railway line opened (1847) in Switzerland. The population, the largest of any Swiss canton, is German speaking and predominantly Protestant. Pop. (1983 est.) 1,127,996.

Zürich, largest city of Switzerland and the capital of the canton of Zürich. It is a financial and industrial centre located in an Alpine setting at the northwestern end of Lake Zürich.

The first inhabitants of the site were the prehistoric peoples whose settlements of hut dwellings rose from pile foundations driven into the shores of the lake. The Celtic Helvetii



The spires of (centre) the Fraumünster and (right) St. Peter's Church, Zürich, Switz.
Comet—Bavaria-Verlag

founded a community on the right bank of the Limmat River; when the Romans conquered this area in about 58 BC, they made the settlement a customs post. After the collapse of Rome, the community fell first to the Alamannii from the north, and later to the Franks, who made it a royal residence. The community began to flourish as traders settled in the town and took advantage of its position straddling European trade routes. In 1218 Zürich became an imperial free city, and in 1351 an important alliance was made with the Swiss Confederation. In 1336 the citizens accepted a constitution that, based democratically on the guild system, balanced the power of the various crafts, the trades, and the nobility. As the guilds became more powerful—the city was able to purchase its freedom from the emperor in 1400—Zürich became embroiled in conflicts with neighbouring territories, but economic growth continued relatively unimpeded.

On New Year's Day, 1519, Huldrych Zwingli, a priest at the Grossmünster (Great Minster), began to preach a series of sermons that initiated the Swiss Protestant Reformation and transformed the character of Zürich itself. During the Counter-Reformation, the city offered asylum to many refugees from northern Italy and France, and the new residents further stimulated cultural and economic growth.

A liberal democratic order, with the citizenry electing and exercising strong control over the legislative as well as the executive branches of government, emerged during the 1830s. Zürich thus became well equipped to enter the modern industrial era: as early as 1787, a quarter of the population had been engaged in textile manufacturing, a successor to the medieval silk industry; and the 1830 constitution (further liberalized in 1869) aided an economic expansion centred on manufacturing and service industries. Zürich's historic international links also placed it in the forefront of modern world finance.

By the second half of the 20th century, the once dominant textile industry had lost its former importance, and heavy manufacturing industry—notably machine production—had become dominant. The city also has a vigorous tourist trade, which has made the downtown Bahnhofstrasse one of the world's great shopping streets. International congresses are also important. The city is a major railway centre, and the nearby Zürich–Kloten international airport is the busiest airport in Switzerland.

Zürich has nurtured a rich cultural life, and its theatres and opera have often been characterized by innovation and experiment. Educational institutions include the University of Zürich (1833), maintained by the canton, and the Federal Institute of Technology (1855). The Swiss National Museum (1898) is a treasure-house of historical, artistic, and scientific collections. The architectural legacy of the old city ranges from the Romanesque Grossmünster, built by Charlemagne in the 700s, and the 13th-century St. Peter's Church to the elegant guildhouses and patrician residences, some of which are used as restaurants or for civic functions. There are two great annual festivals: the April Sechseläuten, with a guild procession and the ceremonial burning of a snowman, and the September Knabenschiessen, a youthful sharpshooting contest. Mountain climbing in the nearby Alps is a popular sport. Pop. (1983 est.) city, 367,900; metropolitan area, 839,939.

Zürich, Lake, also called LAKE OF ZÜRICH, German ZÜRICHSEE, Swiss lake extending southeast from the city of Zürich. It lies at an altitude of 1,332 ft (406 m) and has an area of about 34 sq mi (88 sq km); its extreme length is 18 mi (29 km), maximum breadth 2½ mi, and maximum depth 469 ft. The Linth River flows into it and emerges as the Limmat. The greater portion of the lake is in the canton of Zürich, but 8 sq mi are in Schwyz and 4 sq mi in Sankt Gallen. The banks rise in gentle slopes, covered with vineyards and orchards, to hills with the Alps to the south.

The lake occupies a basin excavated by the Linth and Rhein glaciers flowing northwestward toward what is now Zürich, where a terminal moraine created the lake by damming. Another moraine between Pfäffikon (Schwyz canton) and Raperswil separates the navigable lower portion of the lake (Untersee) from the shallow upper part (Obersee). This moraine, although breached, was formerly a route for pilgrims to the monastery of Einsiedeln, on the island of Ufenau. The breach in the moraine was first bridged in 1358 and the present 3,039-ft causeway of masonry, carrying rail and road traffic, was built in 1878; a swing bridge in its centre permits small vessels to pass. Zürich is the only large city on the lake.

Zürich ware, faience (tin-glazed earthenware), faience fine (lead-glazed earthenware), and porcelain made at a factory near Zürich founded in 1763 by Salomon Gessner and others. The faience was at first painted in a style similar to that of the porcelain, but after

1775 both the faience and the faience fine were decorated by means of transfer printing. Two kinds of floral decoration of tableware prevailed: formal, or *indianische Blumen*, and naturalistic, or *deutsche Blumen*. Other decoration included delicately designed



Zürich porcelain centrepiece decorated with basketwork, shells, and dolphins, *c.* 1770; in the Victoria and Albert Museum, London

By courtesy of the Victoria and Albert Museum, London

painted Swiss landscapes. Porcelain figures were also made, in some cases modelled by Johann Valentin Sonnenschein, who worked at Zürich from about 1775 until 1779. Although the keynote of Zürich ware is finesse and restraint, at least one elaborate dinner service, with the full repertory of basketwork, shells, dolphins, and the like, was made there in about 1770. The factory closed toward the end of the 19th century.

Zürich Zoological Garden, German ZOOLOGISCHER GARTEN ZÜRICH, privately owned zoological park partially funded by the city and canton of Zürich. Opened in 1929, the 10-hectare (25-acre) zoo exhibits nearly 2,100 specimens of more than 330 species. It has a good ungulate collection and a breeding group of Humboldt's penguins. Its specialties include vicunas, pygmy hogs, snow leopards, Arabian oryx, and Rothschild's mynah birds. The zoo serves as the repository for the vicuna studbook.

Zurita y Castro, Jerónimo de (b. Dec. 4, 1512, Zaragoza, Spain—d. Oct. 31, 1580), Spanish government official who is regarded as the first modern Spanish historian.

A member of a noble Aragonese family, he was educated at the University of Alcalá. Under the Holy Roman emperor Charles V (King Charles I of Spain) and King Philip II of Spain, Zurita held a succession of offices, including the secretaryship of the Inquisition in Madrid. In 1548 he was given the newly created office of historiographer of the kingdom of Aragon, at that time a constituent kingdom of the Spanish monarchy. Subsequently, Philip II commissioned him to collect all state papers in Aragon and in the Italian dependencies of Spain and to deposit them in the castle of Simancas, where the Castilian state papers already were being concentrated. Zurita thus helped to establish the Spanish national archive of Simancas in 1567.

Zurita's research in Spain and Italy resulted in his major work, the *Anales de la corona de Aragón* (1562–80). Covering the period from the Moorish invasions (8th century) until the death of King Ferdinand II (1516), this was the first national history of Aragon, and it remains a useful source for Spanish history.

Zurvanism, also spelled ZERVANISM, modified form of Zoroastrianism that appeared in Persia during the Sāsānian period (3rd–7th century AD). It was opposed to orthodox Zoroastrianism, which by that time had become dualistic in doctrine. According to Zurvanism, time alone—limitless, eternal, and uncreated—is the source of all things.

Zurvān, god of time and fate, remotely influences human destinies, appearing under two aspects: Limitless Time (*i.e.*, eternal lord; Zurvān Akarana) and Time of Long Dominion (*i.e.*, lord of the existing world; Zurvān Dareghō-Chvadhāta). His worship is bound up with speculations about astrology and the world-year. He bears the epithets *ashōqar, frashōqar,* and *zarōqar* (meanings disputed), and the qualities these apparently indicate were construed as concrete, Zurvān being worshipped in four forms.

In later writings Zurvān is seen as the father of Ormazd and Ahriman (*see* Ahura Mazdā), perhaps a result of contact between Zoroastrianism and Greco-Babylonian astrological speculations. (Zurvanism appears to have had its stronghold in western Persia, bordering Babylonia.) Some scholars seek an origin for Zurvanism outside Zoroastrianism, in the worship of an ancient Median or pre-Iranian god. Although in its fatalism and pessimism Zurvanism is basically opposed to true Zoroastrianism, it seems probable that in cult and in a large body of doctrine it made few breaks with orthodoxy. It was in Zurvanite form that Zoroastrianism influenced Mithraism (in which Zurvān was an important deity) and Manichaeism.

Zutphen, *gemeente* (municipality), Gelderland *provincie* (province), east central Netherlands, at the confluence of the IJssel and Berkel rivers. Founded in the 11th century as Zuidveen (meaning "southern peat bog"), it became the seat of a line of independent counts until it passed to the counts of Gelderland in 1190. It was fortified in 1312 and became a member of the Hanseatic League. The town was sacked in 1572 by the Spanish, who occupied it until 1591. Zutphen was held by the French from 1672 to 1673 and again in 1795, after which it remained under French control until 1813. Occupied by the Germans during World War II, it suffered damage. Of the medieval fortifications, the ruined Berkel Gate (1312), the Nieuwestadpoort (gate), and the Drogenapstoren (Rampart Tower; 1444–46) remain. Other landmarks include the Grote Kerk (St. Walburgis; 13th–15th century), with its library folios chained to desks; the Wijnhuistoren (Winehouse Tower; 1627); the town hall (1729); and the 15th-century butter and meat halls (markets).

Zutphen is now a rail junction, market, and inland shipping centre; it has an important timber trade and manufactures paper, metals, and textiles. Pop. (1998 est.) 34,000.

Zutuhil (people): *see* Tzutujil.

Zuwārah, also spelled ZUARA, Mediterranean port, northwestern Libya. First mentioned in a Catalan sailing manual (1375) as Punta dar Zoyara, it later served as the western outpost of Italian-controlled Libya (1912–43), being the terminus of the now-defunct railway from Tripoli 65 mi (105 km) east. Its artificial harbour shelters a motorized fishing fleet. Cereals, dates, and esparto grass (used to make cordage, shoes, and paper) are local products. The population contains a small number of settled Berber farmers. Pop. (1988 est.) 31,200.

Zuylen, Belle van (Swiss novelist): *see* Charrière, Isabelle-Agnès-Élizabeth de.

Zūzanī, az- (fl. 11th century): *see* Ḥamzah ibn ʿAlī.

Zvenigorod, city, Moscow *oblast* (province), western Russia, located on the Moskva River, 33 mi (53 km) west of Moscow. Archaeological excavations (1943–45 and 1954–57) have revealed the existence of settlement there from the 12th and 13th centuries. The first written mention of Zvenigorod appeared in the 1339 will of Ivan Kalita, prince of Muscovy and Vladimir. From the 14th through the 16th centuries, Zvenigorod served as a defense post on the western approaches to Moscow, from Lithuania and Poland, along the Smolensk–Moscow road. The Gorodok (Citadel), an earth fortification rising about 150 ft (46 m) above the Moskva River, was built during this period. In 1398 the ruling prince, Yuri Zvenigorodsky, founded the Savvino Storozhevskiy Monastery at the confluence of the Storozhka and Moskva Rivers, 0.6 mi (1 km) from Zvenigorod. Peter I the Great, his brother Ivan V, and his sister Sophia found refuge in the monastery during the 1682 rebellion of the Streltsy, the Russian military corps established in the mid-16th century that formed the bulk of the Russian army. The natural environment of hills and forests has made the countryside around Zvenigorod a favorite retreat for such famous Russians as the political thinker Aleksandr Herzen (1812–70), the playwright Anton Chekhov (1860–1904), the short-story writer and novelist Maksim Gorky (1868–1936), and the composer Peter Ilich Tchaikovsky (1840–93).

Today the city's economic activities include the manufacture of furniture, school and office supplies, toys, sporting equipment, and clothing. Zvenigorod also has a technical training school specializing in finance. A fine example of early Moscow architecture in the Gorodok is the Uspenskiy Sobor (Assumption Cathedral) dating from the 14th century. It has a single dome, rectangular floor plan, and frescoes by the Russian painter Andrey Rublyov (1360/70–*c.* 1430), founder of the Moscow school of painting. Within the nearby Savvino Storozhevskiy Monastery stands the Rozhdestvensky Sobor (Nativity of the Virgin Cathedral; 1405) with an interior of 15th-, 16th-, and 17th-century paintings, and a small palace built for Tsar Alexis Mikhaylovich in 1652–54. The structures of the former monastery now house medical clinics, a sanatorium, and the Zvenigorod Historical Museum, as well as the Museum of Local Lore. Pop. (1991 est.) 18,900.

Zveno Group, small political organization that briefly formed a dictatorial regime in Bulgaria (1934–35); the name Zveno refers to a link in a chain. Founded in 1930, the Zveno Group was led by Col. Kimon Georgiev and was composed primarily of radical civilians, who had become disillusioned with a government hampered by military domination, irresponsible political parties, and uncontrolled terrorist activities. When an associate of the Zveno Group, Col. Damian Velchev, staged a coup d'etat (May 19, 1934), Georgiev became prime minister of Bulgaria.

The Zveno government, advised by Velchev, assumed a dictatorial character, dissolved Parliament, and abolished all political parties. It imposed strict censorship on newspapers, prohibited trade unions, and reorganized the educational system to stimulate the training of more technicians and scientists and to discourage the formation of a large intelligentsia. Shortly after taking office, Georgiev suppressed the terrorist Internal Macedonian Revolutionary Organization, established friendlier relations with Yugoslavia, and resumed diplomatic relations with the Soviet Union. In ad-

dition, his government reduced the peasants' debts, reformed the nation's credit system, and encouraged the extension of professional medical care into rural areas.

Despite the Zveno Group's efforts to stabilize Bulgarian politics and improve the country's economy and international position, King Boris III, whose influence had been reduced to a minimum, took advantage of unfounded rumours that the group intended to form a republic, gathered support among military officers, and deposed Georgiev and his government (Jan. 22, 1935).

Zvishavane, formerly SHABANI, town, south-central Zimbabwe. Its name is derived from *shavani,* a Sindebele word meaning "finger millet," or "trading together." Surrounded by low hills, it is on direct rail links to Harare (formerly Salisbury) and Bulawayo in Zimbabwe and to Maputo in Mozambique. The adjacent asbestos mine is its major economic asset. Zvishavane was created a village in 1920 and a town in 1930. Pop. (1992 prelim.) 16,-071.

Zwaardecroon, Hendrick (b. Jan. 26, 1667, Rotterdam, Neth.—d. Aug. 12, 1728, Batavia, Java, Dutch East Indies [now Jakarta, Indon.]), governor-general (1718–25) of the Dutch East Indies who introduced the cultivation of export crops there.

Zwaardecroon went to the Indies in 1684 as secretary to the commissioner-general of the Dutch East India Company and advanced steadily until he was appointed governor-general in 1718, when the company was in serious financial difficulties. He took harsh steps to halt smuggling and, more constructively, introduced new products into Java and expanded trade with China. He stimulated the production of indigo, improved cotton cultivation, and encouraged the production of sappanwood (from the tree *Caesalpina sappan*), used for dyes. Most important, he imported the coffee tree, a future staple of the economy.

Zwaardecroon also was responsible for the ruthless repression (1721) of the so-called conspiracy of Pieter Erberfelt, who, it was claimed (probably falsely), was plotting to expel the Dutch from the Indies.

Zwangendaba (d. 1848, Mapupo, near Ufipa, Tanganyika [now in Tanzania]), African king (reigned *c.* 1815–48) who led his Jere people on a monumental migration of more than 1,000 miles, lasting more than 20 years. A leader of incomparable stature, he brought his initially small tribe (later called the Ngoni) from its original home near modern Swaziland to the western part of present-day Tanzania, forming it into one of the most powerful kingdoms of eastern Africa.

Driven from the eastern part of southern Africa in 1818 by the Mfecane (the "Crushing," a period of Zulu wars and migrations), Zwangendaba led the Jere north in search of safety. Adopting the Zulu regimental organization that had defeated him and permitting the adoption of captives into Jere families, Zwangendaba collected an efficient and growing fighting force. In 1822 he crossed into what is now southern Mozambique. Defeated there in 1831 by other fleeing tribes, he followed the Zambezi River into what is now Zimbabwe and brought to an end the 300-year-old Changamire empire. The Zambezi was crossed in 1835, and he led his people victoriously through what is now Malawi and north of Lake Malawi to the southern end of Lake Tanganyika, where he founded a city, Mapupo. After his death the Ngoni split into five major divisions and continued their travels, occupying areas in present-day Tanzania, Malawi, and Zambia.

Zwedru (Liberia): *see* Tchien.

Zweibrücken, city, Rhineland-Palatinate *Land* (state), southwestern Germany, on the Schwarz River. The name, meaning "two bridges," appeared in Latin documents as Bipontium and in French as Deux-Ponts. The town is known to scholars for the *Editiones Bipontinae,* early printed volumes of Roman and Greek classics.

Originally an independent countship, Zweibrücken was chartered in 1352 and passed to the Palatinate lands of the Bavarian Wittelsbachs in 1385. From 1410 it was a duchy, and it became the residence of the house of Pfalz-Zweibrücken in 1477. The kings of Sweden between 1698 and 1718 were members of the house of Pfalz-Zweibrücken. The duchy fell to France in 1801, and most of it passed to Bavaria in 1816. Almost completely destroyed in World War II, the town has since been rebuilt. The castle (1720–25) and the late Gothic-style Church of St. Alexander (1493) survived. The town hall (1779–85) and other buildings are in Rococo and Baroque styles.

Zweibrücken is known as the "town of roses and horses" for its Rose Garden (east of the city) and its horse breeding (since 1744) and racing. Industries include metalworking and the manufacture of machinery, textiles, shoes, and wood products. Pop. (1992 est.) 34,645.

Zweig, Arnold (b. Nov. 10, 1887, Glogau, Silesia, Ger. [now Głogów, Poland]—d. Nov. 26, 1968, East Berlin, E.Ger.), German-Jewish writer best known for his novel *Der Streit um den Sergeanten Grischa* (1927; *The Case of Sergeant Grischa*). This novel depicts the social organism of the German army during World War I through the story of the Russian prisoner Grischa's tragic encounter with the vast machine of Prussian military bureaucracy.

Deprived of German nationality by the Nazis, Zweig lived as an émigré in Palestine from 1933 to 1948 and lived in East Germany from 1948. His other works include *Junge Frau von 1914* (1931; *Young Woman of 1914*), *De Vriendt kehrt Heim* (1932; *De Vriendt Goes Home*), *Erziehung vor Verdun* (1935; *Education Before Verdun*), and *Einsetzung eines Königs* (1937; *The Crowning of a King*), each of which pursues the fortunes of characters introduced in *The Case of Sergeant Grischa.*

Zweig, Stefan (b. Nov. 28, 1881, Vienna, Austro-Hungarian Empire [now in Austria]—d. Feb. 22, 1942, Petrópolis, near Rio de Janeiro, Braz.), German writer who achieved distinction in several genres—poetry, essays, short stories, and dramas—most notably in his interpretations of imaginary and historical characters.

Zweig studied in Austria, France, and Germany before settling in Salzburg in 1913. In 1934, driven into exile by the Nazis, he emigrated to England and in 1940 to Brazil. Finding only growing loneliness and disillusionment in their new surroundings, he and his second wife committed suicide.

Zweig's interest in psychology and the teachings of Sigmund Freud led to his most characteristic work, the subtle portrayal of character. Zweig's essays include studies of Honoré de Balzac, Charles Dickens, and Fyodor Dostoyevsky (*Drei Meister,* 1920; *Three Masters*) and of Friedrich Hölderlin, Heinrich von Kleist, and Friedrich Nietzsche (*Der Kampf mit dem Dämon,* 1925; *Master Builders*). He achieved popularity with *Sternstunden der Menschheit* (1928; *The Tide of Fortune*), five historical portraits in miniature. He wrote full-scale, intuitive rather than objective, biographies of the French statesman Joseph Fouché (1929), Mary Stuart (1935), and others. His stories include those in *Verwirrung der Gefühle* (1925; *Conflicts*). He also wrote a psychological novel, *Ungeduld des Herzens* (1938; *Beware of Pity*), and translated works of Charles Baudelaire, Paul Verlaine, and Émile Verhaeren. *The Royal Game and Other Stories* (1981) is a collection of his short stories translated by Jill Sutcliffe.

Zwelitsha, town, Eastern Cape province, South Africa. It was the provisional capital (1981–94) of the republic of Ciskei. The town is located directly south of King William's Town. It was established in 1946 as a residential area for employees of the nearby Da Gama textile factory owned by the Good Hope Textile Corporation. Most of the housing was built by the South African Bantu Trust. Corn (maize), sorghum, and livestock (cattle, sheep, and goats) are raised in the surrounding area. Industries in Zwelitsha produce furniture, leather goods, handwoven carpets, paints, agricultural equipment, plastic netting, ceramics, and toys. A small-scale industrial complex located in the town engages in wool washing, leather splitting, saw milling, and quarrying. A trade school giving instruction in welding, woodwork, and sheet-metal work is located at Zwelitsha, as is a teacher training centre. The indigenous population comprises two ethnic groups, the Xhosa and the Mfengu, who speak the Xhosa language. The town is connected by road with King William's Town and nearby East London. Pop. (1987 est.) 55,-000.

Zwickau, city, Saxony *Land* (state), Germany, on the Zwickauer Mulde River, at the entrance to the western Erzebirge (Ore Mountains), south of Leipzig. Slavic in origin, it was mentioned in 1118 as a trading centre. It developed as a German imperial city between 1135 and 1145 and became a royal market about 1150. About 1200 it passed to the Wettin margraves of Meissen. Thomas Müntzer, the German radical reformer, preached there in 1520–21. The composer Robert Schumann was born in Zwickau (1810), and a Schumann Museum was opened in 1955. The city was bombed in World War II, but most of the damage was repaired. The most noteworthy of its churches are St. Mary's Church (1465–1536; restored 1883–91) and the Romanesque-Gothic St. Catherine's Church (1212–19). Other notable buildings are the Gewandhaus (cloth merchants' hall; 1522–36), the 15th-century town hall, and Osterstein Castle (1565–85). Zwickau's industries include coal mining and the manufacture of automobiles, machinery, and cloth. Pop. (1993 est.) 110,-583.

Zwicky, Fritz (b. Feb. 14, 1898, Varna, Bulg.—d. Feb. 8, 1974, Pasadena, Calif., U.S.), Swiss astronomer and physicist, who made valuable contributions to the theory and understanding of supernovas (stars that for a short time are far brighter than normal).

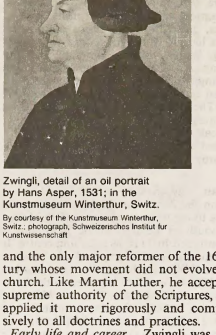
Zwicky received a doctorate in physics (1922) from the Swiss Federal Institute of Technology, Zürich, and served on the faculty of the California Institute of Technology, Pasadena, from 1925 to 1972.

During the early 1930s Zwicky contributed substantially to the physics of the solid state, gaseous ionization, and thermodynamics but soon turned to the study of supernovas, novas, and cosmic rays. In 1934, in collaboration with Walter Baade, he proposed that supernovas are a class of stellar explosion completely different from the ordinary novas and occur less often (two or three times every 1,000 years in the Milky Way Galaxy). Zwicky began conducting an extensive search of neighbouring galaxies for supernovas, and from 1937 to 1941 he discovered 18 of them. Only about 12 had been recorded previously in the history of astronomy.

As director of research (1943–46) of the Aerojet Engineering Corporation, Azusa, Calif., and technical adviser thereafter, he developed some of the earliest jet engines, including the JATO (jet assisted take-off) units used to launch heavy-laden aircraft from short runways.

Zwiebel: *see* Hoffmann, Heinrich.

Zwingli, Huldrych, Huldrych also spelled ULRICH (b. Jan. 1, 1484, Wildhaus in the Toggenburg, Sankt Gallen, Switz.—d. Oct. 11, 1531, near Kappel), the most important reformer in the Swiss Protestant Reformation



Zwingli, detail of an oil portrait by Hans Asper, 1531; in the Kunstmuseum Winterthur, Switz.

By courtesy of the Kunstmuseum Winterthur, Switz.; photograph, Schweizerisches Institut fur Kunstwissenschaft

and the only major reformer of the 16th century whose movement did not evolve into a church. Like Martin Luther, he accepted the supreme authority of the Scriptures, but he applied it more rigorously and comprehensively to all doctrines and practices.

Early life and career. Zwingli was the son of a free peasant who was a village magistrate. His mother, Margaret Meili, was the sister of the abbot of Fischingen in Thurgau, and his uncle Bartholomäus Zwingli was priest of Wildhaus and later dean of Wesen. Huldrych went to school at Wesen, then Basel (1494), and Bern (1496), where his master, Heinrich Wölflin, inspired in him an enthusiasm for the classics and a love of music. The Dominicans were interested in his musical gifts and almost enticed him to enter a convent. But his father and uncle dissuaded him, and, instead, he moved on to university studies at Vienna (1498) and then Basel (1502), where he was graduated in 1504.

Supported by teaching, he read theology and was deeply influenced by the lectures of the teacher and Reformer Thomas Wyttenbach. Ordained to the priesthood, he went, in 1506, to Glarus, where he proved a good pastor, encouraged education, commenced studying Greek and even Hebrew, and read widely in the Church Fathers. He was sympathetic toward the Renaissance movement and valued his correspondence with Erasmus. Service as chaplain with the Swiss Army led him to oppose the mercenary system. His stand provoked hostility at Glarus, and in 1516 he moved to a new charge at Einsiedeln, where he enjoyed both wide opportunities for preaching to the many pilgrims and fine facilities for study at the convent. Zwingli afterwards dated his evangelical understanding of the Scriptures from the period of transition to Einsiedeln. The difficulties at Glarus gave to this development a more than academic significance.

Beginnings of reformation. Zwingli at once began to preach his new convictions. Apart from topical criticism of abuses, he did not at first attack traditional positions, being content to expound the regular Gospel passages. A minor indulgence crisis arose in 1518, but Zwingli's witty castigation of the abuse found ecclesiastical favour and, finally, a titular honour by the papacy, from which he also drew a chaplaincy pension.

In 1518, despite much opposition, he was appointed people's priest at the Grossmünster (Great Minster) at Zürich. The post gave him little income or official influence but great scope for preaching. He commenced a series of expositions of the New Testament enlivened by topical application. Serious plague in 1519 found him faithful in his ministry, and his own illness and recovery, followed by his brother's death in 1520, deepened the spiritual and theological elements in his thinking and teaching that had hitherto been overshadowed to some degree by the humanistic. In 1520 he secured permission from the city's governing council to preach the "true divine scriptures," and the resulting sermons helped to stir revolts against fasting and clerical celibacy that initiated the Swiss Reformation (1522). In pursuance of his view of the supremacy of Scripture, Zwingli preached his now famous sermons at the Oetenbach convent and, despite local opposition to many of his ideas, he secured fresh authorization from his bishop to continue preaching. A tract *On Meats* and a printed version of the Oetenbach addresses, *The Clarity and Certainty of the Word of God,* appeared in 1522.

Victory of the Zürich Reformation. The year 1523 was crucial in the Zürich Reformation. In preparation for a disputation with the vicar general of Constance (Konstanz), arranged for January in the town hall of Zürich, Zwingli published his challenging 67 *Artikel.* His main contentions were adopted by most priests in the district and, in consequence, the celibacy of clergy came to be flouted, liturgical reform was begun, and a plan for the reform of the Grossmünster was drafted. A key part of this program was the reconstitution of the cathedral school as both a grammar school and a theological seminary to train Reformed pastors. The question of removing the images from the churches provoked a second disputation in October, in which Zwingli and his most intimate friend and fellow Reformer Leo Jud carried the day. Successive steps taken during 1524 and 1525 included the removal of images, the suppression of organs, the dissolution of religious houses, the replacement of the mass by a simple Communion service, the reform of the baptismal office, the introduction of prophesyings or Bible readings, the reorganization of the ministry, and the preparation of a native version of the Bible (the *Zürcher Bibel* appeared in 1529). Zwingli fostered the movement not only by his preaching and influence on the council but also by his various writings—*e.g., On Education, On Baptism, On the Lord's Supper,* and especially the comprehensive *Commentary on True and False Religion* (1525). He was publicly married to Anna Reinhard on April 2, 1524.

Zwingli's theses. From the city of Zürich the movement quickly spread not only to the canton of Zürich but to neighbouring cantons as well. Aided by the learned Roman Catholic theologian Johann Eck, the five forest cantons of Luzern, Zug, Schwyz, Uri, and Unterwalden resisted the new trend, but important centres like Basel and Bern declared for Zwingli. Zwingli himself, assisted by his fellow Swiss Reformer Heinrich Bullinger, took part in a disputation at Bern (1528) that formally introduced the principles of the Reformation to that city. The main theses he put forth were (1) that the church is born of the Word of God and has Christ alone as its head; (2) that its laws are binding only insofar as they agree with the Scripture; (3) that Christ alone is man's righteousness; (4) that the Holy Scripture does not teach Christ's corporeal presence in the bread and wine at the Lord's Supper; (5) that the mass is a gross affront to the sacrifice and death of Christ; (6) that there is no biblical foundation for the mediation or intercession of the dead, for purgatory, or for images and pictures; and (7) that marriage is lawful to all. With the friendly cantons of Basel and Bern, Zürich negotiated a Christian Civic Alliance (or League) based on the treaty by which Basel had been received into the Swiss confederacy but also including a common profession of faith.

Controversies. From 1525 Zwingli's work was hampered by disagreements, both within Switzerland and with the Lutherans outside. In Zürich itself an extremist group quickly became dissatisfied with the Zwinglian program, desiring the abolition of tithes, a severance of the state connection, the creation of a pure or gathered church of true believers (those who have experienced a conversion according to the moral beliefs and precepts of the New Testament), and the consequent ending of infant Baptism. Disputations were held with the leaders of the Anabaptist group in January and March 1525, but these were abortive. The first rebaptisms took place in February, and widespread propaganda was initiated. Seeing its authority flouted, the council imprisoned the leaders and finally, after a further useless disputation in November 1525, brought them under a capital sentence. In theological refutation of the movement, Zwingli wrote a special work, *On Baptism* (1525), in which his main emphasis was on the significance of water Baptism as a covenant sign. During the following years he devoted many other tracts to the subject, culminating in his *Tricks of the Catabaptists* (1527).

Relations with Luther. Meanwhile, his thinking and practice in relation to the mass had led to a sharp disagreement with Martin Luther. The two agreed in rejecting the eucharistic sacrifice. They also agreed in rejecting the medieval notion of a change of substance in the sacrament. Luther, however, felt himself bound by the words "This is my body" to teach the real presence of Christ's body and blood not in place of, but in, with, and under the bread and wine. Zwingli, on the other hand, convinced that the word "is" has the force of "signifies," did not maintain a "real" presence but simply the divine presence of Christ to his presence to the believer by the power of the Holy Spirit, as signified by the elements. He stated his views in two Latin tracts (1525) and the more popular work, *On the Lord's Supper* (1526). Luther and his supporters responded with much acrimony, refusing to see in the Swiss movement a true work of evangelical reformation. Through the good offices of Philip the Magnanimous, landgrave of Hesse, the Colloquy of Marburg (1529) was arranged with a view to reconciliation; Luther, Zwingli, and Martin Bucer all participated. Cordial agreement was reached on most issues, but the critical gulf remained in relation to the sacramental presence, and Luther refused the hand of fellowship extended by Zwingli and Bucer.

Zwingli would undoubtedly have welcomed agreement with Luther for political as well as theological reasons, for he saw a growing danger in the isolation of the Reforming cantons. The forest cantons had organized themselves against the alliance, and there was a real threat of imperial intervention. In offensive defense, the alliance attacked the forest cantons at Kappel, 10 miles south of Zürich in 1529, and enforced terms on the opposing districts. Attempts also were made to link up with Strassburg and allied reforming cities, but these were at first unsuccessful despite the help of Hesse. The results of division were seen at the Diet of Augsburg (1530), in which the evangelical groups presented three different confessions, including Zwingli's *Fidei Ratio.*

Lacking other friends, Zwingli turned to Venice and France, partly in view of their political hostility to the empire, partly in the hope of persuading the rulers to accept evangelical views. His *Exposition of the Faith* (1531) was addressed to Francis I of France to clear up misunderstandings and enlist his sympathy. The project faded, however, and in

1531 Zwingli urged on the alliance a further reduction of the forest cantons. Instead, Bern initiated a useless policy of economic sanctions that simply provoked the foresters to attack Zürich in October 1531. In the resultant Second War of Kappel, Zwingli accompanied the Zürich forces as chaplain and was killed in the battle, the spot where he fell being now marked by an inscribed boulder.

Contributions. The later preoccupation of Zwingli with ecclesiastical politics should not obscure his true contribution to faith and order. He accepted the supreme authority of the Scripture, although he applied it rigorously to all doctrines and practices. He laid influential stress on the divine sovereignty, though this was tempered by a milder view of original sin and a wide hope of salvation. His rejection of the sacraments as means of obtaining grace and as forms of intervention between the soul and God underlay the deepened conception of other Reformation leaders such as Bullinger, Pietro Martire Vermigli, and John Calvin. If he accepted lay authority in church government as exerted through the council, his personal influence averted both the subservient Erastianism (the supremacy of lay authority in ecclesiastical matters) of Lutheranism and exhausting conflict, as at Geneva. Obvious defects of disjointedness and intellectualism mark his writings. Behind them, however, lay an open, warm, and friendly disposition, and they embody a boldly striking attempt to rethink all Christian doctrine in consistently biblical terms. (G.W.B.)

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The standard works (all entitled *Huldreich Zwingli*) are by J.M. Schuler (1818); R. Christoffel (1854; Eng. trans., *Zwingli; or, The Rise of the Reformation in Switzerland,* 1858); and R. Stähelin, 2 vol. (1895–97). Among the best modern biographies is that of O. Farner, 4 vol. (1943–60), who also wrote a briefer account in 1918 (Eng. trans., *Zwingli the Reformer,* 1952, reprinted 1968). Perhaps the most comprehensive biography in English is G.R. Potter, *Zwingli* (1976); another ambitious English version was written by S.M. Jackson, *Huldreich Zwingli, the Reformer of German Switzerland* (1901, reprinted 1969); a fourth interesting life is J.H. Rilliet, *Zwingli, le troisième homme de la Réforme* (1959; *Zwingli, Third Man of the Reformation,* 1964). For Zwingli's theology, see W. Köhler, *Zwingli und Luther* (1924); and J.M. Usteri, *Zwinglis Tauflehre* (1882). A deeper appreciation of Zwingli the theologian rather than the humanist may be found especially in A. Rich, *Die Anfänge der Theologie Huldrych Zwinglis* (1949). For a brief but penetrating study of Zwingli's liturgical contribution, see F. Schmidt-Clausing, *Zwinglis liturgische Formulare* (1970). Among the various specialized studies of Zwingli, see especially C. Garside, Jr., *Zwingli and the Arts* (1966); R.C. Walton, *Zwingli's Theocracy* (1967); and F. Schmidt-Clausing, *Zwinglis Humor* (1968).

Zwischengoldgläser (German: "gold between glasses"), drinking glasses decorated with engraving in gold leaf laminated between two pieces of glass. The term is usually applied to beakers, goblets, and tumblers produced in Bohemia during the late 17th and early 18th centuries, but examples have been found in Roman catacombs of the 3rd century. These early glasses were made as follows: The inner side of the bottom of the glass was covered with gold leaf and a design scratched through the gold. A disk of glass was then fused to the inside bottom, leaving the gold sandwiched between two layers of glass. The 17th- and 18th-century technique was similar: Two glasses were made of identical shape, one slightly larger than the other. Gold leaf was applied to the outside of the smaller one and a design scratched on it; the smaller glass was then fitted into the larger and bonded to it. *See also* Mildner glass.

Zwolle, *gemeente* (municipality) and capital, Overijssel *provincie* (province), north central Netherlands, on the Zwarte Water (river). Chartered in 1230, it was a member of the Hanseatic League in the Middle Ages and a stronghold until its ramparts were destroyed in 1674 during the Anglo-Dutch Wars. It is now a commercial centre and rail junction at the intersection of the northern and eastern Dutch canal systems. Industries include shipbuilding and the manufacture of metal products, chemicals, and building materials.

Notable buildings include the Grote Kerk (St. Michael's Church), the Church of Our Lady, and the town hall, all dating from the 15th century. The Sassenpoort (gate; 1408) is almost all that remains of the medieval ramparts; the Bethlehem Church (1308, 1324) was part of an early convent. The nearby Sint Agnietenberg (Mount St. Agnes) is the historical site of the Augustinian monastery where Thomas à Kempis, the priest and devotional writer, spent most of his life. Pop. (1991 est.) 95,572.

Consult the INDEX *first*

Zworykin, Vladimir Kosma (b. July 30, 1889, Murom, Russia—d. July 29, 1982, Princeton, N.J., U.S.), Russian-born U.S. electronic engineer, inventor, and the father of modern television.

After education at the St. Petersburg Institute of Technology and the Collegê de France, in Paris, Zworykin served during World War I in the Russian Signal Corps. He emigrated to the United States in 1919 and became a naturalized citizen in 1924. In 1920 he



Zworykin, 1929
By courtesy of the Westinghouse Electric Corporation

joined the Westinghouse Electric Corporation in Pittsburgh, and in 1923 he filed a patent application for the iconoscope, or television transmission tube, and in 1924 an application for the kinescope, or television receiver. These two inventions formed the first all-electronic television system, as all older systems had been electromechanical, involving a rapidly rotating perforated disk or some similar device.

Although Westinghouse officials expressed little enthusiasm at the first demonstration of Zworykin's television, an improved system demonstrated in 1929 impressed an official of Radio Corporation of America (RCA). Zworykin was offered a position as director of electronic research of RCA at Camden, N.J., and subsequently at Princeton, N.J., to continue the development of his invention.

Zworykin's television system provided the impetus for the development of modern television as an entertainment and education medium. Although ultimately replaced by the orthicon and image orthicon tubes, the iconoscope was the basis for further important developments in television cameras. The modern television picture tube is basically Zworykin's kinescope. He also developed a colour-television system, for which he received a patent in 1928. His other developments in electronics include an early form of the electric eye and innovations in the electron microscope. His electron image tube, sensitive to infrared light, was the basis for the sniperscope and the snooperscope, devices first used in World War II for seeing in the dark. His secondary-emission multiplier was used in the scintillation counter, one of the most sensitive of radiation detectors.

In later life Zworykin lamented the way television had been abused to titillate and trivialize subjects rather than for the educational and cultural enrichment of audiences.

Named an honorary vice president of RCA in 1954, from then until 1962 Zworykin also served as director of the medical electronics centre of the Rockefeller Institute for Medical Research (now Rockefeller University) in New York City. In 1967 the National Academy of Sciences awarded him the National Medal of Science for his contributions to the instruments of science, engineering, and television and for his stimulation of the application of engineering to medicine. He was also founder-president of the International Federation for Medical Electronics and Biological Engineering, a recipient of the Faraday Medal from Great Britain (1965) and the U.S. Presidential Medal of Science (1966), and a member of the U.S. National Hall of Fame from 1977.

Zworykin wrote *Photocells and Their Applications* (1932), *Television* (1940; rev. ed., 1954), *Electron Optics and the Electron Microscope* (1946), *Photoelectricity and Its Application* (1949), and *Television in Science* and Industry (1958).

Zygadenus, Euthymius: *see* Zigabenus, Euthymius.

Zygmunt (Polish personal name): *see under* Sigismund.

zygomatic arch, bridge of bone extending from the temporal bone at the side of the head around to the maxilla (upper jawbone) in front and including the zygomatic (cheek) bone as a major portion. The masseter muscle, important in chewing, arises from the lower edge of the arch; another major chewing muscle, the temporalis, passes through the arch. The zygomatic arch is particularly large and robust in herbivorous animals, including baboons and apes. In human evolution the zygomatic arch has tended to become more gracile (slender). For example, *Australopithecus robustus,* an early hominid, had a large zygomatic arch, taken by some scholars to be evidence for a herbivorous diet, while *Australopithecus africanus,* a later hominid, had a small, fragile-looking arch and is generally believed to have been a hunter and omnivore. In modern humans the zygomatic arch is more prominent in some populations and is larger and more robust in males.

zygomatic bone, also called CHEEKBONE, or MALAR BONE, diamond-shaped bone below and lateral to the orbit, or eye socket, at the widest part of the cheek. It adjoins the frontal bone at the outer edge of the orbit and the sphenoid and maxilla within the orbit. It forms the central part of the zygomatic arch by its attachments to the maxilla in front and to the zygomatic process of the temporal bone at the side. The zygomatic bone forms in membrane (*i.e.*, without a cartilaginous precursor) and is ossified at birth.

Zygomycetes, class of fungi (division Mycota) characterized by sexually produced, resting spores (zygospores). Asexual reproduction occurs by the formation of nonmotile spores (aplanospores) in fruiting bodies (sporangia). Members of this class are saprobes (obtain their food from dead organic material) or are parasites of plants or animals. Included in the class is the common bread mold fungus, *Rhizopus. R. stolonifer* (*nigricans*), a common parasite of mature fruits and vegetables, causes food spoilage. It is used in the manufacture of alcohol and organic acids. *Pilobolus* is found living on dung; it forcibly discharges its reproductive spores upward to 1.8 m (6 feet), hence its common name hat thrower or shotgun fungus. The Entomophthorales are parasitic on insects, and the Zoopagales parasitize nematodes, rotifers, and other small animals.

Zygopetalum, genus of about 20 species of tropical American orchids, family Orchidaceae, that are cultivated as ornamentals. All species grow on other plants and have egg-shaped pseudobulbs (swollen stems) that bear two or more long, thin leaves. The flowering spike is often 60 cm (24 inches) tall.

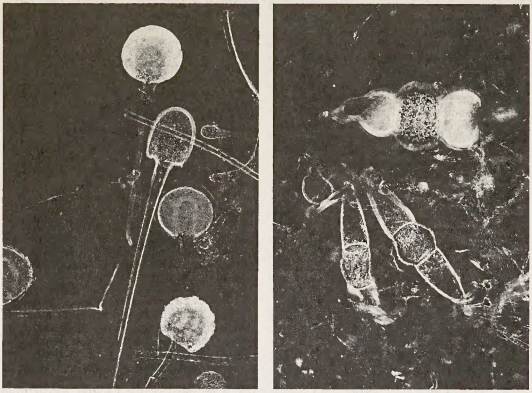
Zygopetalum flowers have green petals and sepals, spotted with purple or brown, and a white lip streaked with purple. Two similar species, *Z. mackayi* and *Z. intermedium,* are commonly cultivated for their long-lasting, fragrant flowers.

zymogen, also called PROENZYME, any of a group of proteins that display no catalytic activity but are transformed within an organism into enzymes, especially those that catalyze reactions involving the breakdown of proteins. Trypsinogen and chymotrypsinogen, zymogens secreted by the pancreas, are activated in the intestinal tract to trypsin and chymotrypsin. Activation is effected by the cleavage of one or more peptide bonds of the zymogen molecule and may be catalyzed by a separate enzyme—*e.g.*, enterokinase converts trypsinogen to trypsin—or by the active form itself—trypsin also converts trypsinogen to more trypsin. Zymogenic cells synthesize and store zymogens in inactive form.

Zyryanovsk, also spelled ZYRIANOVSK, or ZYR'ANOVSK, city, eastern Kazakhstan, on the Beryozovka River in the southern Altai Mountains. Zyryanovsk is an important centre of the lead- and zinc-mining industry, which first came into being when rich deposits of polymetallic ores were discovered there in 1794 by the exile Gerasim Zyryanov. The city is linked by rail to Ust-Kamenogorsk. Pop. (1991 est.) 53,800.

Żywiec, town, Bielsko-Biała *województwo* (province), south-central Poland, in the Carpathian Mountains on the Soła River near the border with Slovakia. It lies at the foot of Grójec Mountain, which has made it an important tourist centre. The town is also known for its large breweries.

Żywiec was first chronicled in the 14th century. Notable sites include the Renaissance Komorowski Castle (16th century), the Holy Cross Church (15th century), and the parish church (15th century), which contains the "Dormant Virgin," sculpted about 1500. Pop. (1991 est.) 32,000.



Reproduction in *Rhizopus nigricans* (left) asexually by means of the release of spores held in the round spore sacs (sporangia) which are attached to stalklike sporangiophores. (right) sexually by means of the fusion of gametangia to form zygospores
J.M. Langham

List of Abbreviations

A.B.	Bachelor of Arts (Latin *Artium Baccalaureus*); Army Base
Ac	actinium
AC	alternating current
A.C.T.	Australian Capital Territory
AD	in the year of the Lord (Latin *anno Domini*)
A.F.B.	Air Force Base
Afg.	Afghanistan
A.F.S.	Air Force Station
Ag	silver (Latin *argentum*)
AG	Limited-liability Company (German *Aktiengesellschaft*)
AH	in the year of the Hegira, or Muslim era (Latin *anno Hegirae*)
Al	aluminum, aluminium
Ala.	Alabama
Alb.	Albania
Alg.	Algeria
Alta.	Alberta
Am	Americium
AM	before noon (Latin *ante meridiem*)
AM	amplitude modulation
A.M.	Master of Arts (Latin *Artium Magister*)
Amer.	American
Ant.B.	Antigua and Barbuda
Ar	argon
Arg.	Argentina
Ariz.	Arizona
Ark.	Arkansas
Arm.	Armenia
Arpt.	Airport
As	arsenic
A.S.	Air Station
A.S.S.R.	Autonomous Soviet Socialist Republic
At	astatine
Au	gold (Latin *aurum*)
Aug.	August
Austl.	Australia
Av.	Avenida (Spanish: "Avenue")
Ave.	Avenue
Azer.	Azerbaijan
b.	born
B	boron
Ba	barium
B.A.	Bachelor of Arts
Bah.	The Bahamas
Bangl.	Bangladesh
Barb.	Barbados
BC	before Christ
B.C.	British Columbia
BCE	before the Common Era, or Christian era
Be	beryllium
B.Ed.	Bachelor of Education
Bela.	Belarus
Belg.	Belgium
Bfld.	Battlefield
Bge.	Bridge
Bi	bismuth
Bk	berkelium
Bldg.	Building
Bldgs.	Buildings
Blvd.	Boulevard
Bol.	Bolivia
Bos.-Her.	Bosnia and Hercegovina
Bots.	Botswana
BP	before the present
Br	bromine
Braz.	Brazil
Brit.	British
B.S.	Bachelor of Science
B.Sc.	Bachelor of Science
Bulg.	Bulgaria
Burk.	Burkina Faso
c.	about, approximately (Latin *circa*)
C	carbon; Celsius
C.	Cape
Ca	calcium
C.A.R.	Central African Republic
Calif.	California
Camb.	Cambodia
Camer.	Cameroon
Can.	Canada
Cay.Is.	Cayman Islands
Cb	columbium
Cd	cadmium
C.d'I.	Côte d'Ivoire
Ce	cerium
CE	Common era, Christian era
cf.	compare (Latin *confer*)
Cf	californium
cg	centigram(s)
Cia.	Company (Italian *Compagnia*; Portuguese *Companhia*; Spanish *Compañía*)
Cie.	Company (French *Compagnie*)
Cl	chlorine
cm	centimetre(s)
Cm	curium
CMSA	consolidated metropolitan statistical area
Co	cobalt
Co.	Company; County
Colo.	Colorado
Colom.	Colombia
Conn.	Connecticut
Cord.	Cordillera
Corp.	Corporation
cos	cosine
cot	cotangent
Cr	chromium
C.Rica	Costa Rica
Cro.	Croatia
Cs	cesium
csc	cosecant
Cu	copper (Latin *cuprum*)
Czech.	Czechoslovakia
Cz.Rep.	Czech Republic
d.	died
DC	direct current
D.C.	District of Columbia
Dec.	December
Del.	Delaware
Den.	Denmark
Dept.	Department
D.F.	Federal District (Spanish *Distrito Federal*)
Djib.	Djibouti
D.Litt.	Doctor of Letters (Latin *Doctor Litterarum*)
Dom.Rep.	Dominican Republic
Dr.	Doctor; Drive
Dy	dysprosium
E	east
Ecua.	Ecuador
ed.	edited; edition; editor
Ed.	*Britannica* editor, or editors
eds.	editors
e.g.	for example (Latin *exempli gratia*)
E.Ger.	East Germany
El Salv.	El Salvador
Eng.	England; English
Eq.Guin.	Equatorial Guinea
Er	erbium
Es	einsteinium
est.	estimate; estimated
Est.	Estonia
et al.	and others (Latin *et alii*, or *aliae*)
et seq.	and following page(s) (Latin *et sequens*, *sequentesve*, or *sequentia*)
etc.	and so forth (Latin *et cetera*)
Eth.	Ethiopia
Eu	europium
Expwy.	Expressway
F	Fahrenheit; fluorine
Fe	iron (Latin *ferrum*)
Feb.	February
ff.	and following pages
Fig.	Figure
Fin.	Finland
fl.	flourished (Latin *floruit*)
Fm	fermium
Fla.	Florida
FM	frequency modulation
Fr	francium
Fr.	France
Fr.Guia.	French Guiana
Fr.Poly.	French Polynesia
Ft.	Fort
g	gram(s)
Ga	gallium
Ga.	Georgia (U.S.)
Gd	gadolinium
Ge	germanium
Geo.	Georgia (country)
Ger.	Germany
Gib.	Gibraltar
GmbH	Company with Limited Liability (German *Gesellschaft mit beschränkter Haftung*)
Green.	Greenland
Gren.	Grenada
Guad.	Guadeloupe
Guat.	Guatemala
Guin.Bis.	Guinea-Bissau
h	hour(s)
H	hydrogen
Ha	hahnium
Hbr.	Harbour
He	helium
Hf	hafnium
Hg	mercury (Latin *hydrargyrum*)
H.K.	Hong Kong
HMS	His, or Her, Majesty's Ship, or Service
Ho	holmium
Hond.	Honduras
Hosp.	Hospital
Hung.	Hungary
Hwy.	Highway
I	iodine
I.	Island
ibid.	in the same place (Latin *ibidem*)
Ice.	Iceland
i.e.	that is (Latin *id est*)
Ill.	Illinois
In	indium
Inc.	Incorporated
Ind.	Indiana
Ind. Res.	Indian Reservation
Indon.	Indonesia
Inst.	Institute
Intl.	International
Ir	iridium
Ire.	Ireland
Is.	Islands
Jam.	Jamaica
Jan.	January
Jr.	Junior
K	potassium (Latin *kalium*); Kelvin; Köchel catalog number
Kazakh.	Kazakhstan
Kan.	Kansas
kg	kilogram
KG	Limited Partnership (German *Kommandit Gesellschaft*)
Kiri.	Kiribati
Kitts/N.	Saint Kitts and Nevis
KK	Limited-liability Company (Japanese *Kabushiki Kaisha*)
km	kilometre(s)
Kr	krypton
Ky.	Kentucky
Kyrgyz.	Kyrgyzstan
L.	Lake
La	lanthanum
La.	Louisiana
Leb.	Lebanon
Leso.	Lesotho
Liech.	Liechtenstein
Lith.	Lithuania
LL.B.	Bachelor of Laws (Latin *Legum Baccalaureus*)
LL.D.	Doctor of Laws (Latin *Legum Doctor*)
log	logarithm
Lr	lawrencium
Ltd.	Limited
Lu	lutetium
Lucia	Saint Lucia
Lux.	Luxembourg
m	metre(s)
MA	metropolitan area
M.A.	Master of Arts
Maced.	Macedonia
Madag.	Madagascar
Malay.	Malaysia
Mald.	Maldives
Man.	Manitoba
Marsh.Is.	Marshall Islands
Mart.	Martinique
Mass.	Massachusetts
Maurits.	Mauritius
mbH	Limited, with Limited Liability (German *mit beschränkter Haftung*)
Md.	Maryland
M.D.	Doctor of Medicine (Latin *Medicinae Doctor*)
Mem.	Memorial
Mex.	Mexico
mg	milligram(s)
Mg	magnesium
Mich.	Michigan
Micron.	Micronesia
Mil.	Military
min	minute(s)
Minn.	Minnesota
Miss.	Mississippi
Mlle	Mademoiselle
mm	millimetre(s)
Mme	Madame
Mn	manganese
Mo	molybdenum
Mo.	Missouri
Moldv.	Moldova
Mon.	Monument
Mong.	Mongolia
Mont.	Montana
Monts.	Montserrat
Mor.	Morocco
Mozam.	Mozambique
MP	member of Parliament
Mr.	Mister
Mrs.	"Missus"
M.S.	Master of Science
MSA	metropolitan statistical area
M.Sc.	Master of Science
Mt.	Mount
Mtania.	Mauritania
Mtn.	Mountain
Mts.	Mountains
mun.	municipality
Mus.	Museum
MV	Motor Vessel
Myan.	Myanmar
N	nitrogen; north
Na	sodium (Latin *natrium*)
NA	National Association
Namib.	Namibia
Natl.	National
Natl. Pk.	National Park
Nat. Res.	Nature Reserve
Nb	niobium
N.B.	New Brunswick; Naval Base
N.C.	North Carolina
Nd	neodymium
N.D.	North Dakota
Ne	neon
NE	northeast

Neb.	Nebraska
NECMA	New England county metropolitan area
Neth.	The Netherlands
Neth.Ant.	Netherlands Antilles
Nev.	Nevada
New Cal.	New Caledonia
Nfd.	Newfoundland
N.H.	New Hampshire
Ni	nickel
Nic.	Nicaragua
N.Ire.	Northern Ireland
N.J.	New Jersey
N.Kor.	North Korea
N.M.	New Mexico
no.	number
No	nobelium
Nor.	Norway
Nov.	November
Np	neptunium
NS	Nuclear Ship
N.S.	New Style (calendar)
N.S.W.	New South Wales
N.Terr.	Northern Territory
NV	Limited-liability Company (Dutch *Naamloze Vennootschap*)
NW	northwest
N.W.Terrs.	Northwest Territories
N.Y.	New York
N.Y.C.	New York City
N.Z.	New Zealand
O	oxygen
Oct.	October
Okla.	Oklahoma
Ont.	Ontario
op.	opus
Ore.	Oregon
Os	osmium
O.S.	Old Style (calendar)
p.	page
P	phosphorus
pA	Limited (Italian *per Azioni*)
Pa	protactinium
Pa.	Pennsylvania
Pak.	Pakistan
Pal.	Palace
Pan.	Panama
Para.	Paraguay
Pb	lead (Latin *plumbum*)
Pd	palladium
P.E.I.	Prince Edward Island
Pen.	Peninsula
perf.	performed; performance
pH	potential of hydrogen (acidity-alkalinity factor)
Ph.D.	Doctor of Philosophy (Latin *Philosophiae Doctor*)
Phil.	Philippines
Pk.	Park; Peak
Pkwy.	Parkway
Pl.	Place
Plat.	Plateau
PLC	Public Limited Company
Pm	promethium
PM	afternoon (Latin *post meridiem*)
PMSA	primary metropolitan statistical area
P.N.G.	Papua New Guinea
Po	polonium
Pol.	Poland
pop.	population
Port.	Portugal
pp.	pages
Pr	praseodymium
P.R.	Puerto Rico
prelim.	preliminary (census)
Prov.	Province
Prov. Pk.	Provincial Park
Pt	platinum
Pt.	Point
Pu	plutonium
qq.v.	which see (plural; Latin *quae vide*)
Que.	Quebec
Queen.	Queensland
q.v.	which see (singular; Latin *quod vide*)
R	Rankine
R.	River
Ra	radium
Rb	rubidium
Rd.	Road
Re	rhenium
Res.	Reservoir; Reservation
rev.	revised; revision
Rf	rutherfordium
Rh	rhodium
R.I.	Rhode Island
Rn	radon
Rom.	Romania
Ru	ruthenium
s	second(s)
S	South; sulfur
SA	Limited-liability Company (French *Société Anonyme*; Italian *Società Anônima*; Portuguese *Sociedade Anônima*; Spanish *Sociedad Anônima*)
S.Af.	South Africa
Sask.	Saskatchewan
Saud.Ar.	Saudi Arabia
S.Aus.	South Australia
Sb	antimony (Latin *stibium*)
Sc	scandium
S.C.	South Carolina
Scot.	Scotland
SCSA	standard consolidated statistical area
S.D.	South Dakota
Se	selenium
SE	southeast
sec	secant; second(s)
Seneg.	Senegal
Sept.	September
Seych.	Seychelles
S.F.S.R.	Soviet Federated Socialist Republic
Si	silicon
sin	sine
Sing.	Singapore
S.Kor.	South Korea
Slvk.	Slovakia
Slvn.	Slovenia
Sm	samarium
Sn	tin (Latin *stannum*)
Solo.Is.	Solomon Islands
Som.	Somalia
SpA	Limited-liability Company (Italian *Società per Azioni*)
Spr.	Spring
Sprs.	Springs
Sq.	Square
Sr	strontium
Sr.	Senior
Sri L.	Sri Lanka
SS	Steamship
SS.	Saints
S.S.R.	Soviet Socialist Republic
St.	Saint; State; Street
St. Pk.	State Park
Ste.	Saint (French *Sainte*)
S.Tomé/P.	São Tomé and Príncipe
Str.	Strait
Strs.	Straits
Suri.	Suriname
SW	southwest
Swaz.	Swaziland
Swed.	Sweden
Switz.	Switzerland
Ta	tantalum
Tajik.	Tajikistan
tan	tangent
Tanz.	Tanzania
Tas.	Tasmania
Tb	terbium
Tc	technetium
Te	tellurium
Tenn.	Tennessee
Terr.	Territory; Terrace
Terrs.	Territories
Th	thorium
Thai.	Thailand
Ti	titanium
Tl	thallium
Tm	thulium
Tpk.	Turnpike
trans.	translated; translation; translator(s)
Trin.	Trinidad
Trin./Tob.	Trinidad and Tobago
Tun.	Tunisia
Tur.	Turkey
Turkm.	Turkmenistan
U	uranium
U.A.E.	United Arab Emirates
Ugan.	Uganda
U.K.	United Kingdom
Ukr.	Ukraine
UN	United Nations
Univ.	University
Uru.	Uruguay
U.S.	United States
USGPO	United States Government Printing Office
USS	United States Ship
U.S.S.R.	Union of Soviet Socialist Republics
Uzbek.	Uzbekistan
v.	versus
V	vanadium
Va.	Virginia
var.	variant
Venez.	Venezuela
Vic.	Victoria
Viet.	Vietnam
Vinc./G.	Saint Vincent and the Grenadines
Vir.Is.	Virgin Islands
vol.	volume(s)
Vol.	Volcano
Vt.	Vermont
W	west; tungsten (wolfram)
Wash.	Washington
W.Aus.	Western Australia
W.Ger.	West Germany
Wis.	Wisconsin
W.Samoa	Western Samoa
W.Va.	West Virginia
Wyo.	Wyoming
Xe	xenon
Y	yttrium
Yb	ytterbium
Yugos.	Yugoslavia
Zamb.	Zambia
Zimb.	Zimbabwe
Zn	zinc
Zr	zirconium

Table of Measurement Conversions

To convert	Into	Multiply by
acres	hectares	0.40468564
Celsius (centigrade)	Fahrenheit	$(C^\circ \times 9/5) + 32$
centimetres	inches	0.3937008
cubic feet	cubic metres	0.028316847
cubic metres	cubic feet	35.31467
Fahrenheit	Celsius (centigrade)	$5/9(F^\circ - 32)$
feet	metres	0.3048
gallons (U.S. liquid)	litres	3.785412
grams	ounces (troy)	0.032150747
hectares	acres	2.471054
inches	centimetres	2.54
inches	millimetres	25.4
kilograms	pounds	2.2046226
kilometres	miles (nautical)	0.5399568
kilometres	miles (statute)	0.6213712

To convert	Into	Multiply by
litres	gallons (U.S. liquid)	0.26417205
metres	feet	3.2808399
metres	yards	1.093613298
miles (nautical)	kilometres	1.852
miles (statute)	kilometres	1.609344
millilitres	ounces (U.S. fluid)	0.03381402
millimetres	inches	0.03937008
newtons	pounds (of force)	0.224809
ounces (troy)	grams	31.1034768
ounces (U.S. fluid)	millilitres	29.5735
pounds	kilograms	0.45359237
pounds (of force)	newtons	4.44822
square kilometres	square miles	0.38610216
square miles	square kilometres	2.58998811
yards	metres	0.9144